CLEAN AIR TASK FORCE

"There's No Substitute for Trust": Communication and Community Engagement Best Practices for Next-Generation Geothermal Development

1. Overview

The U.S. is on the cusp of a geothermal energy revolution. The Next-Generation Geothermal Commercial Liftoff Report estimates that next-generation geothermal could provide 90 GW or more of power to the grid by 2050, potentially as much as 300 GW (Gertler et al., 2024). Research from Clean Air Task Force (CATF) suggests that just 1% of the U.S.'s potential for superhot rock geothermal (a form of next-generation geothermal that makes use of temperatures in excess of 400°C) could ultimately produce as much as 4.3 terawatts of clean firm power – 8 times the United States's 2021 electricity consumption (Clean Air Task Force, n.d.).

Fulfilling this enormous potential would mean large numbers of geothermal projects sited in communities around the country – which makes community engagement a crucial lever for project success. Yet, around the country, community opposition is growing to many energy projects, including renewable energy projects (Eisenson et al., 2024) and emerging energy projects (Jones, 2024). If geothermal is to reach its full potential, it must build strong support among local communities in order to avoid these challenges. Successful community engagement, especially in the first few projects built in each new region, will set the tone for future development and have ripple effects on the overall speed and success of geothermal development in the U.S.

The goal of this report is to understand the challenges related to geothermal community engagement and communication and to landscape the approaches and best practices that have proven successful.

To better understand how to communicate with the public about geothermal energy, CATF conducted a number of research initiatives, including focus groups with people living across the western U.S., two nationally representative surveys to understand public perceptions of geothermal, and interviews with a number of leading geothermal developers to discuss how they had engaged local communities for projects they were developing.

We also reviewed other materials related to geothermal community engagement and public communications (Levine and Smith, 2023; Geothermal Unleashed 2024), as well as other (non-geothermal-specific) research on community engagement (Clean Air Task Force and Graham Sustainability Institute, University of Michigan, 2024; Greenlight America n.d.; Clean Air Task Force, 2023; Butterworth et al., 2024).

These data covered a wide swath of the U.S. public, and the local communities referenced in our interviews with developers varied by partisanship, economic status and wealth, population density, and status as urban vs. rural. Yet the findings across all of our research were remarkably consistent. **To successfully engage with local communities, developers should communicate consistently and proactively, communicate with the public in a way that works for them, understand and address local needs, practice transparency, and consider the most appropriate messenger.**

2. The geothermal communication challenge and opportunity

CATF's research confirms what the geothermal community has long presumed: the general public remains largely unaware of geothermal power generation. Some don't know what "geothermal" means at all, and many others know it primarily in the context of surface hydrothermal features, heat pumps, or district heating systems. That means developers entering a community likely need to explain not just their specific proposed project, but the concept of geothermal power generation and the broader industry behind it. This makes early-stage community engagement efforts very important: a good (or bad) first impression in one area can ripple out to affect future projects and general perceptions of geothermal energy.

Geothermal energy's numerous benefits can make it attractive to communities. It creates jobs both directly and indirectly; for example, one developer we interviewed estimated that each direct job created by their geothermal projects could be matched by 6 to 7 indirect jobs in hotels, grocery stores, and other support industries. Geothermal projects on public lands generate royalty payments to local governments, and all geothermal projects create tax revenue, often at meaningful levels for communities. For example, one geothermal project developer we spoke with noted that they are the largest and second-largest taxpayer in the two counties they operate in. Additionally, geothermal creates no emissions and requires a smaller land footprint than energy sources like wind, solar, coal, or natural gas. For all these reasons, geothermal can be a compelling opportunity for communities where the resource potential exists.

However, other features of geothermal projects can create confusion or concern. CATF's research has identified seismicity, water use (especially in drought-prone areas), and cost as topics which are likely to be very salient concerns in many cases. However, each community is different, and their priorities will vary. Past experiences suggest residents may also have environmental concerns related to pollution, air quality, biodiversity and endangered species, and more. In rural areas, communities may worry about the disruption of scenic areas and changes to the character of a region. Concerns about the effects of geothermal development on property, such as the use of eminent domain, are also likely. And some community concerns are not based in fact, such as the possibility of drilling into a magma chamber and causing a volcano to erupt.

The similarities between geothermal and oil and gas (in terms of both technologies used and companies which may be involved in the development, either now or in the future) can create further concerns in communities where oil and gas companies caused harm or eroded trust. Additionally, the fact that geothermal developers are generally private companies with a profit motive can make trust even harder to earn.

When these factors converge, they can severely undermine community trust and produce extraordinary consequences. In one case, an interviewee recounted needing an armed guard at their first presentation in a community. When community trust is strong, however, the results are promising – projects moving efficiently and smoothly through local permitting processes, leading to local economic benefits and ultimately a quicker rollout of renewable energy.

When it comes to geothermal development, the stakes are high for community engagement and communication. The remainder of this report lays out best practices in these areas.

3. Community engagement and communication best practices

While each community is unique, the findings from our research were remarkably consistent. To successfully engage and communicate with local communities, developers should communicate consistently and proactively, communicate with the public in a way that works for them, understand and address local needs, practice transparency, and consider the most appropriate messenger.

The blue boxes highlight quotes from the geothermal developers and experts we interviewed, and from other key stakeholders.

3.1. Communicate consistently and proactively

Successful community engagement requires frequent, consistent, proactive communication with as many people as possible in as many ways as possible.

> **"If you don't tell your story, someone else will tell their version for you."**

Developers should communicate with their local community early and often. Research on public perceptions of geothermal energy, focused on induced seismicity risks, finds that "the population is open to the use of geothermal energy, but early communication will be key to avoiding a decline in acceptance" (Cousse et al., 2021). This suggests that developers should engage communities well before a project formally begins. Early communication is critical to build understanding about geothermal energy and the potential project, and to identify any existing opposition. As one developer put it, "If you don't want us here, tell me now." In some cases, the developer we interviewed began their engagement before even leasing land and long before siting a project. For example, a California community choice aggregator named Sonoma Clean Power set up a GeoZone for geothermal development in their region. As part of the project, and prior to serious engagement with developers, the Sonoma Clean Power team worked with the boards of supervisors of two local counties to help them pass resolutions in support of exploring geothermal energy. This proactive show of government support helped attract interest from developers and also established a feeling of "up-front ownership" of the process from elected officials. State and local governments, as well as community and advocacy organizations, should follow Sonoma Clean Power's example and find ways to support proactive planning processes.

> **"We really made a singular effort to communicate with the public in any way we could think of."**

In our interviews, geothermal developers laid out an extensive list of stakeholders they engage with as part of the project development process. These include:

Government stakeholders

- Tribes
- City councils
- Mayors
- County commissioners
- State legislatures
- Federal Congressional delegations
- Governor's offices
- State and local regulatory agencies
- School boards

Other stakeholders (e.g., assisted living and senior living communities)

Private stakeholders

- Chambers of commerce and other economic development groups
- Local business owners
- Nonprofit stakeholders
- Community groups
- Labor unions
- Local NGOs
- Local chapters of larger NGOs
- Local universities
- Local associations like a rancher's association
- Farm bureaus
- Rotary clubs

Not all of these groups will be interested in learning more about or engaging deeply with a project from the start, but developers should continue to provide them with information and opportunities to participate throughout the project development process. Early and frequent communication is especially important for tribes, as discussed further in a subsequent section.

The developers we interviewed engaged local stakeholders in myriad ways. The most important were public town halls held before and throughout the project development processes. These should be publicized widely so the community knows they are happening; for example, one developer informed the community about their meetings through local papers, community newsletters, and even by posting on notice boards in local grocery stores. Other mechanisms for community engagement include regularly attending/presenting at meetings of the local government (e.g., city council, county board, etc.); attending preexisting community meetings; meeting with government officials and/or their staffs to update them on the progress of the geothermal project; hosting site visits for local government officials, reporters, and the general public; meeting with specific stakeholder organizations; setting up booths at local festivals; and offering interviews with local media. Some developers also engage with the education system, such as by providing educational materials for local schools (Geothermal Technologies Office 2024).

> **"When you're part of the community for a long time, people know you. It's really about having a network. You have to spend time on the ground."**

Developers reported that it might feel awkward to continue "putting yourself out there," but that consistently showing up in the community is a crucial mechanism to meet key local contacts and understand community needs.

> **"Regularity of communication has been really key for us."**

As a project progresses, developers should maintain a regular cadence of updates to local stakeholders and should follow through on questions or concerns raised earlier in the process. For example, one developer hired a local contractor as the site supervisor for their project and had him come to public meetings to help demonstrate to the community that the developer was following through on their promise to hire locally. For this developer, following through on promises was essential to changing the mind of a local reporter who was initially opposed to the project.

> **"[T]hey are just so consistent in their visibility and engagement." – local county commissioner speaking about the FORGE team (Cariaga 2024)**

3.2. Communicate with the public in a way that works for them

Successful engagement with the public requires communicating with the public in a way that works for them – meeting people where they are both literally and figuratively.

> **"Don't dumb it down, but put it into regular English that people use and can relate to."**

It is important to ensure that the public can access the information developers are sharing. This means hosting public events at times that work for most people and in locations that are easily accessible, as well as meeting communities at events and locations where they already are. If significant portions of the community are more comfortable speaking a language other than English, developers should provide content in that language. Technical content should be simplified and explained in language that will make sense to the average person. And whenever possible, communication with the public should incorporate visuals (charts, graphics, etc.) to help reach visual learners. For example, one developer we interviewed was working in a local community with concerns about the aesthetic impact of the proposed geothermal project. To address these concerns, the developer used photos and mockups to illustrate that the project would be small and would not impact key views. Being able to envision the project, rather than just hearing about it, helped some community members better understand what its impact would be.

It's also crucial to meet people where they are physically. Developers should show up in person rather than through a screen, even for projects located in rural areas far away from a company's headquarters. In our interviews, geothermal project developers responded to questions about public engagement with answers that focused on in-person interaction; virtual tools like social media and email were rarely mentioned. Frequent travel to a remote location can create a strain on staff, but face-to-face, "boots on the ground" communication is crucial for successful community engagement.

> **"A Zoom call does not replace being present, meeting someone on the site."**

When staff are on the ground in a project site, they should be sure to engage with the community at events that matter to that community. Rodeos, state fairs, and the like may be new experiences for some project staff. But having employees attend local community events shows respect for the community and signals that the developer wants to understand the community's unique way of life.

> **"Find a team that can engage, not just sitting in an office."**

> **"I'm getting texts from the mayor … you can't really outsource that."**

Respectfully matching people's level of knowledge is equally as important as physically meeting them where they are. CATF's research indicates when infrastructure projects have been successfully sited, the community has "experience and familiarity with the form of development" (Clean Air Task Force and Graham Sustainability Institute, University of Michigan, 2024). When the details of a project or energy source are unfamiliar, many people will find it hard to endorse the project. This natural risk-aversion among many members of the public means that lack of knowledge about geothermal energy can lead to a lack of support for geothermal projects. However, CATF's focus groups and surveys indicate that many members of the public are interested in learning more about geothermal. Developers entering a new community need to provide education and resources to introduce not just themselves, but also geothermal energy as a concept.

Different communities will have different questions and concerns about geothermal, and developers should address the topics that matter most to community members. That said, there are a few common patterns that appear across many communities which developers should be prepared to address in their communications.

"You can't go in assuming that you know what they need to know."

People generally start from what they know when considering new technologies, continually looking for parallels and other examples to help them develop opinions. For example, members of the general public participating in geothermal focus groups compared geothermal to EVs (as an example of a technology with higher upfront costs, but lower costs over time), solar (in terms of land use), almond farming (in terms of water use), train construction (as examples of large infrastructure projects that often go significantly over time and over budget; will the same be true of geothermal?), and more. Some of these comparisons are more accurate than others, illustrating the difficulties of accurately communicating about new technologies with which listeners are unfamiliar. The geothermal community must proactively use accurate metaphors and parallels to help the public understand geothermal in the context of what they already know.

Especially important in education efforts is education about the subsurface. Unlike other renewable energy technologies, geothermal development happens underground and out of sight. Research from CATF and others finds that many members of the public perceive the subsurface as unknown and risky, and they often have concerns about unanticipated impacts from geothermal development (Dickie et al, 2020). To address these concerns, developers should make sure to clearly lay out for the public what happens in the subsurface during geothermal development – including subsurface modeling, pre-site-selection subsurface characterization work, and subsurface monitoring tools and protocols used throughout the lifetime of a project. The geothermal community should help members of the public understand the detailed information that developers have about the subsurface and the amount of tracking and monitoring that is conducted throughout a project's lifespan.

Survey responses discussing concerns about geothermal energy:

- **"messing with the earth is never good"**
- **"who knows the long term effect on the earth"**

In many cases, community members' questions or concerns about geothermal projects may be unrealistic. For example, in one of CATF's public perception surveys, survey respondents expressed concerns about geothermal energy causing volcanic eruptions or cooling down the earth's core, neither of which are actual risks. Some of the developers we interviewed reported similar experiences in their community engagement. In these cases, it is crucial to respond to all concerns, no matter how factually inaccurate they are. These concerns may be unfounded, but they will nevertheless drive opposition to geothermal development if not answered.

When responding to inaccurate ideas about geothermal energy, research suggests that focusing solely on factual corrections may not be the best approach. Instead, effective communication uses a "truth sandwich": start with a true statement, briefly refute the false claim, and end with a reminder of the actual (positive) impacts of the project in a community (Greenlight America n.d.). When encountering questions or concerns, rather than inaccurate information, developers should take a similar approach by leading with the truth rather than with the false information they are trying to rebut.

Example

Question: "Will geothermal wells pollute groundwater?"

Answer (leading with the false information; not recommended):

- "Geothermal wells will not pollute groundwater. Geothermal wells are lined with cement and steel casing that prevents water from escaping while it travels down the well, and the bottom of the well is far away from drinking water sources. There are also specific legal requirements for geothermal developers to make sure their wells don't endanger drinking water. Across decades of geothermal development in the US and around the world, there are no known instances of groundwater contamination caused by geothermal energy."

Answer (leading with the truth; recommended):

- "Geothermal energy is an extremely safe energy source. Geothermal wells are lined with cement and steel casing that prevents water from escaping while it travels down the well, and the bottom of the well is far away from drinking water sources. There are also specific legal requirements for geothermal developers to make sure their wells don't endanger drinking water. Across decades of geothermal development in the US and around the world, there are no

In all cases, but especially when responding to factual inaccuracies, the tone of communication matters. Developers should take a respectful attitude that indicates that they take community concerns seriously, even when explaining across a significant knowledge gap. Developers should also be willing to invest the time needed to help people understand, explaining key topics multiple times and in multiple ways to ensure they are understood and help the public feel comfortable with the project.

3.3. Understand and address local needs

Every community is different, and successful community engagement takes into account the unique needs and perspectives of community members.

The first step towards meeting community needs is understanding what those needs are. Before entering a community, developers should take the time to research the area. This preliminary research is no substitute for actual interaction with community, but it can build a base of understanding which will make subsequent community engagement more effective. During the preliminary research phase, developers should try to understand the community's top priorities and concerns, learn relevant historical context, identify any existing mechanisms for community engagement and participation, and landscape the community leaders (organizations or people) who can help disseminate information in the community.

"Find out what people care about"

"You have to address what their fears are."

"We respect them as people."

Once the developer begins to engage the community, they should bear in mind that communication is a two-way process. Our interviews with developers identified a wide range of mechanisms for community engagement, from attending the county fair to meeting a lawmaker in their office (and many more, as discussed above).

What these community engagement mechanisms have in common is that they enable two-way communication between developers and key stakeholders. One-way communication (such as flyers, mass mailings, newspaper advertisements, creating informative videos, publishing content on a website, etc.) was generally referenced by interviewees only as a way to facilitate or follow up on two-way conversations.

> **"Community engagement is often a one-way street: we're going to communicate to you all the benefits we'll bring to your community, and you're going to like it! It doesn't happen so easily … it has to be two-way."**

Two-way conversations matter because only through "deep listening" can developers understand and respond to the values and concerns of a local community. Multiple developers mentioned staying in "listening mode" at the start of community engagement processes to develop an understanding of the context in that community. This means that when hosting public meetings about a project or proposed project, developers should not only present information but should also give an opportunity for community members to share concerns, ask questions, and communicate what matters to them. One developer we interviewed stated that the best thing they did was ask the community to share their concerns at the very first public meeting held for a project.

> **"Ask the right questions … 'What's going on?' and then 'Tell me more.'"**

Asking questions and listening are especially important in cases where community trust is low due to past experiences. For example, one developer we interviewed shared that in the community where their project is sited, there is a history of developers showing up and promising to create jobs. Many of these promises went unfulfilled, creating skepticism in the community. Learning this context can help the developer understand the importance of laying out clear expectations about job creation and updating the community on progress towards those goals.

As a community's needs come into focus, developers must work to meet those needs. CATF's research indicates that successful infrastructure projects bring tangible benefits to the community in which they are sited, improving the economic landscape and contributing to a community's long-term goals (Clean Air Task Force and Graham Sustainability Institute, University of Michigan, 2024). In some cases, this may involve formally-negotiated community benefits agreements (CBAs) (Clean Air Task Force, 2023), though none of the developers we interviewed mentioned an official CBA. What developers did mention was hiring locally when possible, donating to local initiatives and causes (even those unrelated to geothermal energy), and supporting community businesses, from the local hardware store to electricians to hotels to restaurants. Many geothermal developers are startups with limited budgets and can't meet every need expressed by the community. But showing up over time, even in small ways, is crucial.

> **"Make sure you're providing a local solution. You don't know what you're solving until you get there, but you need one."**

One of the most important needs in many communities is the need to feel that their input has been meaningfully incorporated into project outcomes. CATF's research indicates that successful infrastructure projects are those in which there is community consent and strong local engagement, with the community heavily involved throughout project development (Clean Air Task Force and Graham Sustainability Institute, University of Michigan, 2024). Inadequate procedural equity (defined in part as "the community's ability to influence project outcomes") is a key contributor to opposition to renewable energy projects in the United States (Butterworth et al., 2024). This means that when developing solutions to issues identified by the community, developers should seek input and guidance from community members themselves. Not all ideas will work, but developers should be willing to adjust project designs when possible.

For example, if community members have concerns about aesthetics and visibility, the project could be sited behind a hill or screened with vegetation or fencing; to address worries about nighttime light pollution, a motion-sensor light pointed downwards could be used instead of a searchlight.

"[It's] about being a good neighbor."

If there is strong, consistent community opposition to a project, developers may need to site their project in a different location. As one of our interviewees put it, "some histories we can't overcome." Making community members feel that they do not have control over what's happening in their own local community – that a project will be pushed forward against their wishes and over their opposition – is a surefire way to destroy trust, cement opposition, and poison the well for geothermal development across a region.

'There's two things we all hate: loss of control and change. Those are so emotional… When we lose control of what we think we should have control over, we become frustrated – as individuals or families or communities.".

Collaborative, meaningful engagement is especially important with tribes. Tribal leaders in a geothermal focus group indicated that tribal consultation processes often feel like exercises in "checking the box" rather than meaningful collaborative work – "meeting with a tribe is different than listening to them." These tribal leaders often feel that their tribes' concerns about projects are ignored, even though they would like to partner and collaborate on geothermal projects and help find ways to mitigate negative impacts (Levine and Smith, 2023). A full discussion of specific tribal considerations related to geothermal development is outside the scope of this report, but a few areas of particular sensitivity are that potential geothermal project sites may be located on land which tribes have a deep connection to (even if the land is not officially designated as tribal land) and that local waters (including waters connected to or located near geothermal projects) have a special role in the cultural and religious practices of some tribes. Developers should be sensitive to the unique needs and perspectives of tribes and to their status as sovereign nations.

"It has to be key folks within the community who can communicate that there is [community] control over the project."

3.4. Practice transparency

Transparency is one of the most important aspects of successful communication, and it is especially important in a geothermal context. The public does not have a general base of knowledge about geothermal energy the way they might with other energy sources, and many community members are skeptical of oil and gas companies and perceive them as less transparent. Therefore, it is especially important for geothermal developers to emphasize transparency in their community engagement.

"[Communities see a] culture that comes from fossil development about sneaking in under the radar."

This means following up on questions and requests for information from the community, updating communities throughout a project, and reporting the results of their work. Rather than ignoring or trying to minimize community questions or concerns, developers should share information about precisely the topics which are of greatest interest for community members and should be honest and up-front about the risks and benefits of their proposed project.

"If you're not honest and open, ideas will run wild. … Your story also has to be accurate and transparent and consistent."

One of the key takeaways from NREL's tribal focus groups was that developers should "Foster open and honest communication to illustrate the pros and cons of a project" and shouldn't "try to 'sell' only the benefits" (Levine and Smith, 2023). This advice applies to all communities, not just tribal ones.

Transparent communication is important at all stages of a project, from initial scoping to construction, operation, and maintenance. Some of the developers we interviewed record questions and comments at community events and then post them online or create publicly-accessible FAQs based on questions from the public – transparent, responsive communication which "helped establish a layer of trust with our stakeholders," in the words of one interviewee. In another case, government agencies with oversight over a project were not fulfilling their obligations to share information. The developer took it upon themselves to share the documents directly, meeting the community need for information and building trust. And geothermal developer Calpine has a hotline at their project site where community members can report issues or ask about concerns they may have. Developers should be clear from the start about their plans for a project site – such as the number of wells planned and the ultimate size of the project – and should make sure that the community understands what the impact of a project will be. Just as importantly, developers should demonstrate that they are listening by following up on concerns, reporting back on how input was used, and making visible changes where appropriate. When stakeholders feel heard and see that their feedback leads to meaningful action, it builds the kind of long-term trust that supports successful project development.

> **"[The community] liked that I said … 'If this is your big issue, let's get down to brass tacks and talk about it.'"**

> **"That's what it takes – transparency. If you tell people you're going to do something, you have to do it. And do it publicly."**

Transparency also includes being honest about uncertainty – saying "I don't know" or "I'll get back to you." This is especially important when it comes to discussions about project viability, timeline, and scope. Developers should not make specific commitments about a project's details (e.g., that it will be a certain size or in a specific location) unless they are certain they will be able to fulfill those commitments. Similarly, in cases where a developer is scoping an area but hasn't decided whether to develop there, they should be clear with the community about the possibility that a project will not move forward. Upfront transparency reduces community fears and manages expectations about the potential benefits that a geothermal project might bring.

Finally, transparency means being unafraid to share details about projects, even technical details. Of the developers we interviewed, multiple had backgrounds in relevant scientific fields (e.g., geology, groundwater hydrology), and many companies hire experts with those backgrounds. For example, one organization hired an outside consultant to do an official hydrologic evaluation and shared the results publicly both online and through hard-copy factsheets that were handed out at public meetings and other public events. (That said, it's also crucial to translate scientific research into a language that regular people can understand.)

> **[We're] not afraid to answer questions. We have to be transparent – can't appear to be hiding things."**

A great example of transparent communication is the approach taken by both AltaRock Energy and FORGE related to seismicity. For both projects, seismicity was a key concern among the local community. The developers addressed this concern by sharing information about how seismicity happens and about seismicity at the project site. AltaRock created dedicated webpages showing seismic events, including the size of each, at their site.

In Utah, FORGE placed computers at three local libraries that let community members access the University of Utah's seismic monitoring for all of Utah – including near the FORGE site – with live seismograms. This type of information-sharing built trust and confidence with local communities near AltaRock and FORGE's projects by enabling better understanding of the effects of those projects. For example, one community member was initially skeptical of AltaRock's project but subsequently told an AltaRock employee "you said that you were going to do this [provide seismic data] and you really did it," and later told another community member to trust the AltaRock employee because "she tells the truth."

"We are very transparent about seismicity and talk about it."

"We had numbers to back it up … [that our activities] won't cause the concerns you're worried about." You soothe community fears "by presenting people with facts."

When initiating this type of information-sharing, developers should take the time to explain how to interpret the data (for example, that negative numbers on the Richter scale indicate extremely small seismic events) and to put the data in context of other information (for example, the amount of seismicity associated with other activity). For both AltaRock and FORGE, this was crucial to helping community members understand that seismicity associated with the projects was small and insignificant, increasing confidence in the safety of the projects.

3.5. Consider the most appropriate messenger

Many members of the general public express skepticism toward private companies, particularly when profit motives are involved. Some worry that developers may not always be fully transparent, and negative perceptions of the oil and gas industry can sometimes carry over to geothermal. Similarly, trust in government is mixed, with a large portion of Americans viewing public institutions as politically influenced and/or insufficiently responsive to local concerns.

Oil and gas companies looking to do geothermal work "will go into the room with not a whole lot of trust."

Therefore, in addition to their own consistent and transparent community engagement, developers may benefit from partnering with or engaging other organizations on geothermal education efforts (Clean Air Task Force and Graham Sustainability Institute, University of Michigan, 2024).[1] Universities, research institutions, and NGOs don't have "skin in the game" the way developers do, and they are more trusted than private companies and governments. This makes them well-positioned to provide education on geothermal (including its risks and benefits) to communities.

When doing community engagement themselves, developers should utilize community engagement experts rather than relying on technical staff. Community engagement and communication requires a distinct skillset, and having a dedicated team or staff person with expertise in this area is helpful.

Developers may also want to note in their public communications any regulations that they follow, and (if accurate) explain that regulations are developed by independent government agencies, rather than political appointees. Essentially, this asks community members to trust the government's regulatory abilities rather than relying on the goodwill of private companies they may not know.

1 In successful infrastructure projects, information is often provided by a trusted third party (i.e., not the developer).

Finally, developers we interviewed noted the importance of elevating the voices of locally trusted actors who are supportive of the project. Engaging a wide range of stakeholder groups can ensure that community members with different perspectives have someone they trust who will help them understand what geothermal energy is and how a geothermal project might affect them.

3.6. Case study

One interviewee walked through the type of conversation he might have with a family who lived near a site with potential for a conventional geothermal project… a conversation which might go something like this:

- "The brine we're looking for is 2,000 feet or so below the water that you use for your irrigation."
- "2,000 feet!"
- "Yeah, it's maybe even 5,000 feet below the water you use. How deep are your wells right now?"
- "200 feet."
- "Has your water table been stable?"
- "Yeah, we have a good water table here."
- "Other wells are drilled in the valley and every well has to be designed to prevent any migration of water between upper and lower aquifers. That has to be done to a state engineering standard and finance engineer's evaluation."
- "What?"
- "Not only does the state regulate us, but when we go out for financing, the financing entity hires their own lawyers and engineers. They won't fund unless they can guarantee that we've done everything in accordance with best design practices so that this will continue to pay them back."
- "Oh. I hadn't thought about it like that – sort of like your mortgage company requiring a home inspection."
- "That's exactly right."
- "So how can that water be 350 degrees down there?"
- "Great question. Have you done any canning, Mary?"
- "Yeah, just got the canned peaches."
- "Great, so you probably know that water can't be hotter than 212 degrees without being pressurized."
- "That's right."
- "The water we have is over 300 degrees under extreme pressure. That means it's confined. It doesn't communicate with your aquifers."

A few key aspects are notable in the interviewee's approach to the conversation. First, he doesn't rely on immediately creating trust in his company in particular. Rather, he develops trust in the process of generating geothermal energy by mentioning the outside organizations who monitor his company's work (such as regulatory agencies and financing entities). He also makes it clear that there are shared incentives between the community and the people with control over a project; for example, community members want the developer to follow best practices (to protect their homes), and financing entities want the same thing (so that projects succeed in the long term and generate revenue). He provides detailed information to the community members – even getting into the weeds on how water reacts to different temperatures and pressures – but uses analogies and language that are familiar to the people he's speaking with, such as mortgages and canning fruit. And his in-depth and transparent answers to their questions show respect and a commitment to information-sharing.

4. Conclusion

Geothermal energy is at a tipping point. With an enormous resource potential and many benefits for the energy system and local communities, it is poised to grow dramatically. Community support is a crucial limiting factor that can make or break projects and the geothermal industry as a whole.

Our research makes it clear that effective community engagement and communication requires a significant investment – there are no shortcuts. Developers must spend time traveling in person through a community, meeting and talking to people, not just once but many times throughout the project development process. They must invest the time to convert technical information into a form that can be understood by the community and then share that information widely. They must be willing to adjust their project to meet community needs, potentially even finding a different site altogether. They must invest in relationships with key stakeholders throughout the community.

But while the costs of community engagement may be high, the rewards make it well worth the investment. Developers we interviewed shared numerous stories of how trusting relationships with communities streamlined and smoothed the process of developing their projects. Successful community engagement can ensure that communities want a project to succeed and are actively partnering with developers to make that happen.

One interviewee put it plainly: the costs of community engagement, while high, are small compared to the overall cost of a geothermal project. Lack of community engagement can put the entire project at risk. For developers, the foolish investment would be to go forward without engaging communities.

"A lot of people don't understand how much work it takes. It's not a magic bullet."

"There's no substitute for trust, and building trust takes time."

"For so long [some companies] were pushy about 'we can just go do this, they can't stop us,' and we have to take a different approach. My approach is to make everybody wants done what I want done, so it gets done."

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