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COMPASS

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Communications guide for geothermal projects

Author 1 Amel Barich, GEORG

Author 2 Dario Bonciani, COSVIG

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Executive Summary

Geothermal energy has immense potential but remains largely underutilized due to social acceptance challenges and technical complexities. This document outlines communication guidelines aimed at improving stakeholder engagement and public understanding of geothermal projects, with a focus on the COMPASS project. By emphasizing transparency, trust-building, and tailored communication strategies, these guidelines aim to enhance the success of geothermal projects, reduce NIMBY-related concerns, and foster sustainable energy transitions.

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1 Introduction

1.1 Importance of Effective Communication in Geothermal Projects

Geothermal energy has the potential to make a significant contribution to the global renewable energy mix. However, despite its sustainability and reliability, geothermal projects often face public resistance, delays, or even cancellations. This is often due to misconceptions about the environmental risks, lack of familiarity with the technology, or a failure to effectively engage local communities. In this report, we address the communication strategies essential for fostering social acceptance and support for geothermal projects, with a focus on the lessons learned from the COMPASS project and relevant literature.

The main target actors of this report are developers and operators of geothermal projects, as well as public authorities involved in the management of geothermal resources, to enable them in adopting effective communication strategies aimed at increasing public awareness of this resource and local initiatives for its use.

2 Understanding the Social Resistance to Geothermal Projects

Social resistance to geothermal energy projects is a common issue and one of the critical barriers to their implementation. Despite geothermal energy being recognized as a renewable and stable energy source, certain social, cultural, and environmental concerns can trigger opposition. Understanding the root causes of this resistance is essential for devising strategies to overcome it.

One of the primary reasons for social resistance is the lack of public awareness about geothermal energy and its benefits. Many people are unfamiliar with the technology and its potential to contribute to sustainable energy systems. This lack of familiarity often leads to uncertainty, misinformation, and scepticism about the safety, environmental impact, and overall feasibility of geothermal projects. In addition, data on geothermal projects are often fragmented, not easily available, or not advertised, despite publicly accessible. This may be interpreted as a lack of transparency, while a gap in knowledge can create a breeding ground for myths and misconceptions that escalate into widespread opposition.

Additionally, community concerns regarding environmental and health impacts are another source of resistance. For example, fears of induced seismicity, water contamination, noise, and disruption to landscape and local ecosystems can create significant pushback from residents living near proposed geothermal sites. Such concerns can be heightened if past experiences, whether from geothermal or other energy projects, have led to negative environmental outcomes, resulting in mistrust between the community and developers, or public authorities.

Cultural and local identity factors also play a role. For example, in regions like New Zealand, geothermal fields hold cultural significance, especially for indigenous groups like the Māori, who may view these areas as sacred. This cultural connection can amplify resistance if the development is perceived to disrespect or disregard cultural values.

Resistance can also arise from socio-economic dynamics, particularly in regions where the community feels they do not benefit from the project, either directly through job creation or indirectly through infrastructural or social benefits. If local communities perceive that the economic gains from the project primarily benefit external actors—such as private companies or government bodies—and do not provide tangible improvements to their quality of life, opposition is likely to grow.

Moreover, the NIMBY (Not In My Backyard) syndrome—a phenomenon where residents support renewable energy development in theory but resist its implementation in their immediate environment—is prevalent in geothermal projects. This resistance often stems from concerns over localized impacts, such as noise, visual blight, air emissions, groundwater depletion and proximity to residential areas. Without adequate communication and engagement efforts, beyond what provided by national transpositions of Directive 2003/35/EC[1], local communities may feel that they are shouldering all the risks without receiving proportional benefits.

The COMPASS project has identified these dynamics and stresses the importance of early and transparent communication, local stakeholder involvement, and the dissemination of reliable information to mitigate resistance. Recognizing and addressing community concerns and misconceptions, while ensuring clear communication of the benefits of geothermal energy, is crucial to gaining social acceptance.

3 Key Elements of an Effective Communication Strategy

3.1 Transparency and Trust Building

The foundation of any successful communication strategy lies in building trust with the local community. This is achieved through transparency and openness, ensuring that stakeholders are informed about project plans, timelines, and potential risks. Clear, consistent messaging throughout the project lifecycle helps to counter misinformation and build credibility. Journalists and information workers are key actors for citizens' trust building. These actors should be trained to have adequate awareness on geothermal technologies. An additional solution to raise awareness and gain trust is to promote educational initiatives with schools.

3.2 Early Engagement

Early engagement with stakeholders—particularly local residents and policymakers—ensures that concerns are addressed before they escalate. Involving the community from the outset allows developers to incorporate local insights and adapt their projects to better fit community needs, fostering a sense of ownership and acceptance.

[1] Directive 2003/35/EC of the European Parliament and of the Council of 26 May 2003 providing for public participation in respect of the drawing up of certain plans and programmes relating to the environment and amending with regard to public participation and access to justice Council Directives 85/337/EEC and 96/61/EC - Statement by the Commission. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32003L0035.

3.3 Localized Messaging

Tailoring communication to the local context is essential. Different regions and communities have unique social, cultural, and environmental concerns that should be reflected in the messaging. For instance, in regions where geothermal energy is less known, communication should focus on education and awareness-building, while in areas with a history of geothermal development, it may focus on mitigating specific concerns such as seismic activity or air emission monitoring.

4 Tools for Engaging Stakeholders

4.1 Public Consultations and Meetings

Preliminary public surveys help to understand the awareness, socio-economic aspects and concerns of local communities. Face-to-face meetings remain one of the most effective tools for engaging stakeholders, allowing for two-way communication and fostering dialogue. Town hall meetings, workshops, and focus groups offer opportunities for the public to voice concerns, ask questions, and provide feedback.

4.2 Visual and Digital Tools

Complex technical information can be made accessible through infographics, videos, and interactive maps. These tools help simplify concepts like geothermal drilling and energy production, making them easier for non-experts to understand. Online webinars and social media platforms also offer effective channels for reaching wider audiences. Periodic guided visits to infrastructures and building or drilling sites allow the public to experience first-hand and better understand what geothermal energy is.

4.3 Feedback Mechanisms

Establishing clear feedback mechanisms—such as surveys, public comment portals, and community advisory boards—ensures that stakeholders feel heard and valued. This can lead to more constructive interactions and a greater likelihood of project success.

5 Guidelines for Addressing NIMBY Syndrome

NIMBY syndrome presents a unique challenge to the successful deployment of geothermal projects, as it reflects a broader societal concern where individuals acknowledge the importance of renewable energy but reject its implementation within their own locality. Effectively addressing NIMBY syndrome

requires a strategic, multi-faceted approach that prioritizes stakeholder engagement, transparency, and benefits-sharing.

5.1 Understanding the local background

The local political, social and cultural background should be assessed through public surveys and analysis of the public debate. Investigating the awareness level, interests and concerns of local communities, including authorities, allows to map different groups of stakeholders and plan tailored communication and engagement strategies. COMPASS investigates the background of communities living close geothermal facilities and has set up public surveys to improve its communication and engagement plans.

5.2 Early and Transparent Communication

It is essential to engage with local communities from the earliest stages of project planning. Transparent communication about project goals, processes, and potential impacts, helps establish a foundation of trust. However, relevant information should be selected to do not overload the public and geothermal utilization should be compared with other energy media. Detailed information on the benefits of geothermal energy, such as reducing carbon emissions and providing stable electricity, heat and cool, should be disseminated through multiple channels—town hall meetings, newsletters, and online platforms. In COMPASS, communication has been structured to include risk-benefit analysis, explaining both potential downsides (e.g., minor seismic risks) and the mitigation strategies in place to address them.

5.3 Incorporating Public Input

A top-down approach can aggravate NIMBY attitudes, making residents feel ignored or sidelined. To combat this, developers must involve the public in decision-making processes. Regular consultation meetings and participatory forums where local stakeholders can voice concerns, suggest modifications, and understand the rationale behind project decisions can create a sense of ownership and participation. The dialogue should go beyond the legal minimum and addressing concerns only, presenting all aspects of the project and other possible scenarios. COMPASS has integrated this approach by facilitating public consultations and involving community representatives in project assessments, offering transparency and direct lines of communication.

5.4 Demonstrating Tangible Local Benefits

One of the key factors exacerbating NIMBY resistance is the perception that the local community bears all the risks while the benefits go to external stakeholders. Therefore, it is crucial to emphasize and ensure that local residents benefit directly from the geothermal project. This could be in the form of job creation, improved infrastructure, and energy cost reductions for the local population and companies. A proper communication on how public financial resources coming from royalties are used demonstrates how geothermal energy promotes the local development. Initiatives like community investment schemes, where locals have a stake in the project, or agreements to reinvest part of the

project's profits back into local services, can be effective in addressing NIMBY concerns. In COMPASS, localized benefits have been a central part of the communication strategy, focusing on community engagement to highlight how the projects contribute to the local economy.

5.5 Localized Risk Mitigation Strategies

Often, NIMBY opposition arises from concerns over environmental and health risks. Addressing these concerns through localized risk assessments and offering tailored mitigation strategies—such as noise reduction measures or visual impact assessments—can help ease opposition. Moreover, developers must be prepared to offer reassurances backed by scientific evidence and, where possible, allow for third-party reviews to validate their claims. Environmental data and risks should be easily available and comparable with other scenarios and energy media. In the COMPASS project, extensive environmental impact assessments (EIAs) and Life Cycle Assessments (LCAs) have been conducted, and the results have been communicated to the public to alleviate concerns.

5.6 Building Long-Term Relationships

NIMBY syndrome is often driven by mistrust of developers or authorities. Establishing long-term, genuine relationships with the community, through consistent engagement, addressing grievances, and fulfilling promises, can turn opposition into support over time. Keeping an open-door policy and continuing dialogue even after the project is completed ensures ongoing community satisfaction and helps to maintain trust.

By implementing these strategies, geothermal developers can not only address the NIMBY syndrome but also foster a culture of collaboration, where the community sees itself as an integral part of the project's success.

6 Best Practices and Lessons Learned

6.1 Successful Communication Case Studies

- Iceland Deep Drilling Project (IDDP): The IDDP emphasized transparency and community engagement, using real-time data to inform local residents about project developments and mitigate concerns about seismicity and environmental damage.
- CarbFix **(Iceland):** Successfully integrated community engagement and media outreach to promote the environmental benefits of geothermal carbon storage. This initiative gained significant public support due to its clear environmental message and proactive stakeholder engagement.
- Horizon 2020 GEOENVI project**:** GEOENVI (2018-2021) was aimed at tackling the environmental concerns for deploying geothermal energy in Europe. The project set up a methodology for LCA adapted to deep geothermal energy, allowing a comparison with other energy sources. The project engaged with policy makers to discuss about effects of geothermal on the environment and launched a campaign on social media, to weekly communicate *geothermal good news* from different European countries.

- **Groß-Gerau and Trebur geothermal projects (Germany):** the project developers held public meetings to share information and open discussions in each project, after analysing attitudes of local stakeholders on geothermal energy: environmental protection groups, farmers, public institutions and individuals. The strategy implemented allowed the geothermal projects development in a friendly and supportive environment.
- **Deutsche ErdWärme geothermal projects (Germany):** the ErdWärme website can be considered a good practice example for operators and project developers, since it reports clear information on its shareholders to demonstrate financial reliability, description of actions and tools to prevent and mitigate environmental risks, the company commitment to promote local development, clear description of geothermal energy and project development phases, videorecording of public engagement initiatives. The company has also an information center and promotes site visits and educational initiatives for schools.
- **United Downs Geothermal Project (UK)**: This project has been proactive in community engagement, organizing regular public information sessions and maintaining open communication to address concerns about seismicity and environmental impact. United Downs has built a solid base of community support by emphasizing the sustainable and economic benefits of geothermal energy for local residents and working to address any issues transparently. The project demonstrates how consistent outreach and addressing community feedback can enhance public acceptance and support for geothermal initiatives.
- **Crowdthermal Project – Spanish and Hungarian Case Studies**: In Spain and Hungary, the Crowdthermal project focused on involving local communities early in the planning stages to address social acceptance. In Spain, community participation was encouraged through informational events and discussions to alleviate environmental concerns. In Hungary, the project emphasized financial and environmental benefits, engaging stakeholders through workshops and participatory planning to integrate local views, thus fostering acceptance for geothermal initiatives in both countries.

6.2 Lessons Learned

- **Proactive Engagement:** Delays often occur when communication is reactive rather than proactive. By engaging communities early, developers can address concerns before they escalate into opposition.
- **Incorporating Feedback:** Projects that adjust their plans based on stakeholder feedback tend to encounter less resistance and achieve greater community buy-in.

7 Using Social Media and Digital Platforms

Social media and digital platforms play a pivotal role in modern communication strategies. They allow developers to reach broader audiences quickly, share real-time updates, and engage with communities in more interactive ways. COMPASS, for instance, has successfully used LinkedIn, Facebook, and Instagram to share project milestones, explain technical advancements, and address community concerns. Best practices include:

- **Regular Updates:** Posting frequent updates about project progress, achievements, and next steps helps maintain transparency.
- **Multimedia Content:** Utilizing videos, infographics, and interactive Q&A sessions helps demystify complex technologies and foster engagement.
- **Hashtags and Trends:** Using project-specific hashtags and engaging with trending topics can increase visibility and reach.

8 Communicating the Environmental Benefits of Geothermal Projects

Effectively communicating the environmental benefits of geothermal projects is critical in addressing public concerns and fostering acceptance. Geothermal energy, unlike fossil fuels, is a renewable resource that offers a stable, continuous energy supply with a low carbon footprint. However, the technical and environmental aspects of geothermal energy are often misunderstood by the public, leading to opposition or scepticism. This section outlines strategies for communicating the environmental advantages of geothermal energy and addresses concerns related to its implementation.

8.1 Highlighting the Low Carbon Footprint

One of the most significant advantages of geothermal energy is its potential to reduce greenhouse gas emissions and to provide sustainable heat, electricity and raw materials (e.g. lithium, silica and CO_2). Geothermal power plants produce significantly less CO_2 compared to fossil fuel-based plants, making it an essential player in the fight against climate change. However, this fact alone is not always enough to convince stakeholders and local communities. Providing clear, quantifiable data on how geothermal energy reduces emissions is crucial. For example, sharing statistics on the amount of CO_2 avoided by using geothermal energy versus traditional coal or gas can be compelling, especially when presented in relatable terms (e.g., equivalent to removing X number of cars from the road).

Additionally, geothermal power plants have the potential to become carbon-negative over time, especially when integrated with technologies like Carbon Capture and Storage (CCS). This message should be central to communication strategies, particularly in regions where the reduction of carbon emissions is a key political and public concern.

In the context of COMPASS, the project's goal of reducing the Levelized Cost of Electricity (LCOE) while lowering the carbon footprint of geothermal projects directly ties into this environmental benefit. Communicating these goals with specific metrics can help to build confidence in the sustainability of geothermal energy.

In communicating this benefit, it's important to use clear, relatable metrics. For example, explaining that geothermal energy can reduce a country's carbon footprint by "X million tons of CO_2 annually," or that a single geothermal plant can remove the equivalent of thousands of cars from the road each year, makes the environmental benefits more tangible to the public.

8.2 Reduced Land Use and Visual Impact

Compared to solar farms or wind turbines, geothermal plants require less surface area and have a relatively low visual impact. Geothermal power stations are often compact, and the majority of the infrastructure remains underground, minimizing their footprint and visibility in natural or residential landscapes. This is a critical benefit to communicate, particularly in areas where visual pollution and land usage are major concerns. Highlighting the relatively small land use can help mitigate opposition that arises from concerns about visual blight or land displacement, a frequent issue in renewable energy projects, particularly wind energy.

8.3 Sustainability and Resource Longevity

Geothermal energy is not only a renewable resource but also a highly sustainable one. Unlike other renewable sources such as solar or wind, geothermal energy is not dependent on weather conditions, offering a reliable and constant energy supply. This stability is one of the most underappreciated benefits, and it's critical that this aspect is highlighted during stakeholder engagements. In addition, it may provide flexible heat and electricity, supporting the deployment of other non-programmable renewable energies. Many geothermal wells can continue to provide energy for decades without significant decline in output, making it a long-term solution for energy security.

8.4 Addressing Environmental Concerns and Misconceptions

Despite the environmental benefits, there are often concerns about the potential negative impacts of geothermal energy projects, such as induced seismicity, land use, water contamination and air emissions (e.g., ammonia, hydrogen sulphide, boron, trace metals, etc.). Addressing these concerns directly is essential to maintaining public trust and ensuring community support.

For instance, induced seismicity, while rare, can be a concern in certain areas. Developers need to explain the measures in place to monitor and mitigate seismic risks. Communicating the data from environmental impact assessments (EIAs) transparently can help alleviate fears; while carrying out life cycle assessment (LCA) studies can help to easily understand the impacts of the energy unit produced with geothermal, considering the whole plant lifecycle and make comparisons with other energy sources. Additionally, explaining the technological advancements in well design and drilling methods that reduce environmental risks, such as those being developed in the COMPASS project, can reassure the public.

Moreover, water use and contamination fears must be addressed with clear information on closed-loop systems, which prevent contamination by keeping geothermal fluids isolated from groundwater. Highlighting case studies from geothermal plants with exemplary environmental records can further reinforce the message that geothermal energy is a safe and sustainable option.

Air emissions, which are mainly linked to plants adopting the flash technology, can be reduced developing adequate systems for reducing pollutant emissions. However, data on air emissions and air quality should be easily accessible and efforts put in place to reduce emissions, including their

benefits, should be published. In addition, proper communications for the general public should report about results of environmental monitoring and health of communities living close geothermal plants, to address public concerns.

8.5 Visual Tools for Environmental Communication

To make complex environmental data more accessible, developers should use visual tools such as infographics, videos, and interactive simulations. These tools can demonstrate the environmental benefits of geothermal energy in a simple and engaging way, making it easier for the general public to understand how geothermal energy works and how it positively impacts the environment.

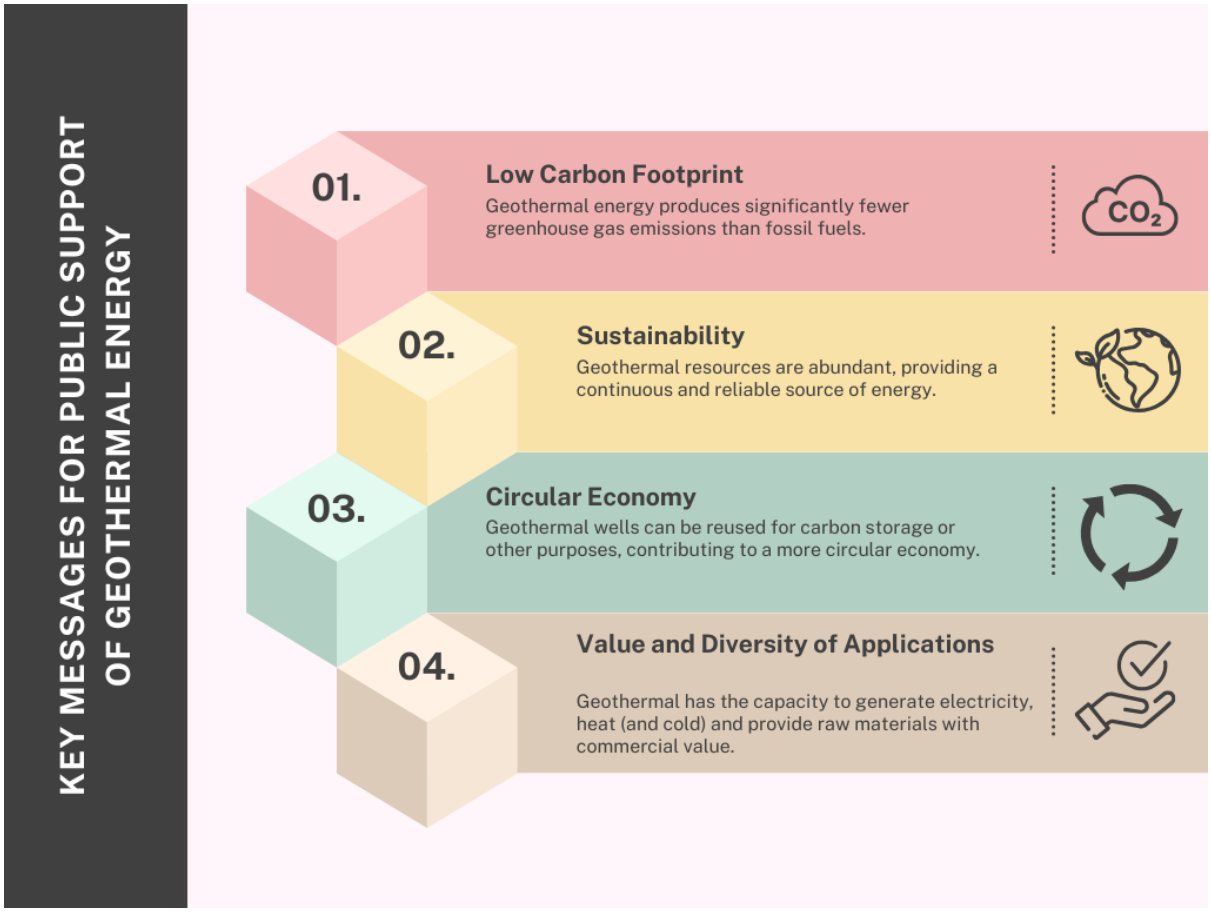

Figure 1. Key Messages for Public Support of Geothermal Energy

For example, an interactive map showing how geothermal plants reduce CO_2 emissions compared to fossil fuel plants or how repurposed geothermal wells contribute to carbon storage can visually represent the long-term environmental benefits, or an elaborated interactive animation of the Lindal Diagram. These tools can be disseminated through social media platforms, public presentations, and the project's website to reach a wider audience.

9 Monitoring and Adapting Communication Strategies

Communication strategies must be adaptable to changing circumstances. This includes:

- **Monitoring Public Sentiment:** Using surveys, social media analytics, and public consultations to gauge community sentiment and adjust strategies accordingly.
- **Updating Stakeholders:** Regular updates about changes in the project, new findings, or adjustments in strategy help maintain trust and credibility.
- **Flexibility in Messaging**: As the project progresses, the focus of communication may need to shift—from education and awareness to managing expectations and addressing new concerns.

10 Conclusion

Effective communication is integral to the success of geothermal projects. By prioritizing transparency, early engagement, localized messaging, and continuous feedback, developers can foster social acceptance and reduce resistance. The COMPASS project serves as a model for how communication strategies can be adapted to meet the unique challenges of geothermal energy projects, ensuring that they can contribute to a sustainable energy future.