BRIDGING THE LEGITIMACY GAP: A MULTI-LEVEL GOVERNANCE ANALYSIS OF GEOTHERMAL RESISTANCE IN PANDARINCANG, INDONESIA

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Abstract

Geothermal energy is one of Indonesia's most promising renewable energy sources, particularly in areas along the Ring of Fire. However, managing geothermal energy often involves complex dynamics, including policy, governance, and local community resistance. This study aims to map actors and analyse the dynamics of geothermal energy policy governance in Padarincang, Banten, from 2009 to 2025. This research uses a qualitative case study approach. Data was collected through in-depth interviews with stakeholders (central government, local government, and local communities), observation, and documentation from government reports, media, and academic publications. The research findings indicate that geothermal energy policy in Padarincang demonstrates a conflict of interests across government levels (national, regional, and village) and non-state actors (investors, mass organisations, and civil society). Community resistance arises from weak participation mechanisms and inadequate communication across governance levels. This study emphasises that Indonesia's energy transition success depends heavily on strengthening collaborative governance across all levels and actors.

Keywords: multi-level governance, energy governance, geothermal energy, Padarincang, transition energy

Abstrak

Energi panas bumi merupakan salah satu sumber energi terbarukan yang paling menjanjikan di Indonesia, khususnya di daerah-daerah di sepanjang Cincin Api. Namun, pengelolaan energi panas bumi seringkali melibatkan dinamika yang kompleks, termasuk kebijakan, tata kelola, dan resistensi masyarakat setempat. Studi ini bertujuan untuk memetakan aktor dan menganalisis dinamika tata kelola kebijakan energi panas bumi di Padarincang, Banten, dari tahun 2009 hingga 2025. Penelitian ini menggunakan pendekatan studi kasus kualitatif. Data dikumpulkan melalui wawancara mendalam dengan para pemangku kepentingan (pemerintah pusat, pemerintah daerah, dan masyarakat setempat), observasi, dan dokumentasi dari laporan pemerintah, media, dan publikasi akademis. Temuan penelitian menunjukkan bahwa kebijakan energi panas bumi di Padarincang menunjukkan konflik kepentingan di berbagai tingkatan pemerintahan (nasional, regional, dan desa) dan aktor non-negara (investor, organisasi massa, dan masyarakat sipil). Resistensi masyarakat muncul dari mekanisme partisipasi yang lemah dan komunikasi yang tidak memadai di berbagai tingkatan pemerintahan. Studi ini menekankan bahwa keberhasilan transisi energi Indonesia sangat bergantung pada penguatan tata kelola kolaboratif di semua tingkatan dan aktor.

Kata kunci: Tata Kelola Multi-tingkat, Tata Kelola Energi, Energi Panas Bumi, Padarincang, Transisi Energi

INTRODUCTION

Renewable energy has become a strategic issue in Indonesia's sustainable development. One renewable energy resource with great potential in Indonesia is geothermal energy. Geothermal potential, which accounts for 40 percent of the global energy potential, is considered feasible given Indonesia's location on the Pacific Ring of Fire, enabling its sustainable use. Geothermal reserves are estimated to reach 23.74 GW and have been identified at 357 locations throughout Indonesia (EBTKE-KESDM, 2025). The strategic role of geothermal energy in supporting Indonesia's decarbonization of its energy sector, particularly the electricity sector, has been widely recognized in academic studies (Halimatussadiah et al., 2023). This is supported by findings that geothermal energy is categorized as a low-emission energy source compared to fossil fuels (Rybach, 2003), can be provided constantly without dependence on weather or seasonal conditions (Nurwahyudin & Harmoko, 2020), and is considered competitive in terms of long-term costs when compared to other fossil fuels (Dutu, 2016). Some examples of successful geothermal applications worldwide include those in Switzerland, the United States, Indonesia, the Philippines, Turkey, Kenya, Iceland, and El Salvador (Gutiérrez-Negrín, 2024; Rybach, 2022).

To develop geothermal energy for electricity generation, the government has formulated strategic policies to promote its use as a core component of achieving national energy security. The government has updated regulations on the construction of Geothermal Power Plants (PLT-PB) that can be implemented in conservation forests, protected forests, and production Forests. (Fadhillah et al., 2023). To boost investment in the geothermal sector, the government provides incentives to investors, including streamlined permitting processes, tax incentives, and a more competitive electricity pricing scheme for geothermal power plants. (Azmi et al., 2021; Tambunan, 2018).

Currently, the government is targeting a 23% share of New and Renewable Energy (EBT) by 2025, with PLT-PB accounting for around 8% of total installed electricity capacity. (Dirjen EBTKE-KESDM, 2020; Halimatussadiah et al., 2023). This goal aligns with the country's commitment under the Paris Agreement to reduce carbon emissions and increase the share of renewables. (Halimatussadiah et al., 2023). However, this target has not been met and has been revised down to 17% - 19% (Muliawati, 2024). The government noted that by the end of 2024, the realisation of the EBT mix had reached 13.93%, a slight increase from 13.1% in 2023, but still far from the 23% target for 2025 set in the National Energy Policy

(KEN) and National Energy General Plan (RUEN) (Savitri, 2024). The slow progress in geothermal development is not only due to technical challenges, high investment costs, and regulatory uncertainty, but also closely related to policy governance issues that cause conflicts with local communities.

One of the geothermal energy projects that has faced conflict with local communities is the Geothermal Working Area (WKP) at Kaldera Danau in Banten Province. The Kaldera Danau WKP contains three potential geothermal sites: Rawa Danau, Karang Mount, and Pulosari Mount. However, the construction of the Rawa Danau geothermal power plant in Padarincang has faced opposition from the local community. As a result, the developer, PT. Sintesa Banten Geothermal (SBG) has been unable to complete its geothermal exploration in the area. The reasons for the community's resistance are related to the environmental, social, and economic impacts of the project (Halia Dinan, 2023; Jatnika & Amal, 2023; Muldi, 2021). Local community resistance to the Rawa Danau PLT-PB construction is not only occurring in Padarincang, but also in several other areas in Indonesia, including Wae Sano (Rosary, 2022; Udu, 2021), Mataloko (Haykal Ahmad et al., 2022; Taum, 2025), Talang Mount (Anggreta et al., 2022; Yolanda et al., 2021), and Lawu Mount (Ibrohim et al., 2019). Thus, local communities' resistance to PLTP-PB development is not just an old polemic, but remains relevant in recent years as a clear example that financial, regulatory, and social-community barriers are serious obstacles to geothermal energy exploration and expansion in Southeast Asia, particularly Indonesia (Milko, 2024)

Studies on geothermal energy in Indonesia indicate that academic attention has predominantly focused on technical aspects, resource potential, and feasibility studies, such as estimates of geothermal capacity in gigawatts. (Nasruddin et al., 2016; Setiawan, 2014) or exploration technology (Adityatama et al., 2019). In addition to technical aspects, several studies highlight social issues, such as community acceptance of geothermal power plants—for example, the Lawu case. (Ibrohim et al., 2019), Talang (Yolanda et al., 2021), and West Sumatra (Anggreta et al., 2022), which shows that public resistance arises due to ecological concerns, potential land damage, and the cultural and spiritual dynamics of local communities. Other studies also highlight economic and regulatory barriers, as well as high investment risks. (Azmi et al., 2021; Halimatussadiah et al., 2023). However, research on governance aspects—particularly interactions between levels of government in the implementation of geothermal policies—is still minimal. Several studies on renewable energy policies show that successful

implementation is greatly influenced by policy adaptation at the regional level and the mobilisation of actors across levels, including the community. (Pambudi & Ulfa, 2024; Sovacool & Martiskainen, 2020). However, these studies have not explored in depth how conflicts of interest, power imbalances, and a lack of deliberation between levels of government create deadlocks in geothermal projects such as Padarincang.

The Padarincang case discussed in this article shows that central regulatory support—such as the establishment of WKP by KESDM (2009), the PSN status granted through Presidential Decree 63/2004, and the RUEN and KEN mandates—does not automatically lead to social acceptance or smooth project implementation. Community resistance lasted for almost 15 years due to ecological concerns, vulnerability of the water source, and local spiritual and cultural values (SAPAR, istighosah actions, demonstrations). This condition indicates that the biggest obstacle is not technical aspects but the failure of multi-level governance, which is neither inclusive nor communicative among actors.

Thus, the knowledge gap identified is that the literature on geothermal energy in Indonesia has not provided an in-depth explanation of the dynamics of authority distribution, the ambivalent position of local governments, the power relations between the centre, regions, and investors, and how local resistance has become a form of correction to overly top-down governance. This article addresses this gap by analysing the Padarincang conflict as a case that combines political, social, and cross-level governance dimensions in the context of the national energy transition.

The objectives of this study are 1) to identify the actors who are involved in geothermal energy policy in Padarincang within the framework of MLG and 2) to analyse the dynamics of geothermal energy policy governance in Padarincang. Thus, this research not only contributes academically to the study of energy governance in Indonesia but also has practical implications for formulating energy policy that can bridge national interests with local needs and aspirations.

LITERATURE REVIEW

Gary Marks first popularised the concept of Multi-Level Governance (MLG) in the early 1990s in his study of European Union integration, which was later further developed by Hooghe et al., (2008) MLG refers to a governance pattern that does not rely solely on one level of government (state-centric), but involves complex interactions between actors and institutions at various levels, namely, supranational, national, regional, and local levels (Hooghe et al., 2008). From this perspective, political and administrative authority is not

singularly hierarchical, but distributed across levels of government and non-state actors. MLG emerged as a response to the limitations of the traditional centralised model of "government." (Hooghe et al., 2008). In this context, governance is understood as a network of interactions among actors rather than top-down command. This makes MLG relevant for analysing public policies that involve multi-level authorities and diverse interests, including renewable energy policies.

Hooghe et al., (2008) distiguish MLG into two main types, namely 1) Type I MLG, which focuses on the formal division of power among levels of government (e.g., central, provincial, district/city), and is stable and hierarchical. 2) Type II MLG, which emphasises more flexible functional networks, where various actors (government, private sector, NGOs/CSOs, and local communities) interact in governance based on specific issues. In energy policy practice, Type I is evident in the formal relationship between the central government (Ministry of Energy and Mineral Resources) and local governments. Meanwhile, Type II is manifested through deliberative forums, the roles of investors, civil society organisations, and affected local communities.

Research related to MLG has been widely used to explain the complexity of energy governance. Research on the implementation of renewable energy policies cannot be separated from the interactions among central policies, local government adaptation, and local community resistance and participation (Anggreta et al., 2022; Pambudi & Ulfa, 2024). Meanwhile, Sovacool & Martiskainen (2020) emphasise that energy transition requires adaptive and collaborative governance mechanisms across levels, as energy issues are cross-sectoral and have direct implications for society.

The MLG framework is highly relevant for understanding the challenges of geothermal energy in Indonesia. The case of the Padarincang geothermal project shows that its fate is not determined solely by national regulations (Presidential Regulation No. 22 of 2017 on RUEN; Government Regulation No. 79 of 2014 on KEN), but also by local government decisions, investor responses, and local community attitudes. The social conflicts that have arisen indicate a fundamental misalignment within this multi-level governance structure, where the central government is pushing for the accelerated development of renewable energy. At the same time, the local community feels their rights and interests are not being considered.

MLG helps explain why geothermal energy policies often face implementation challenges despite strong regulatory support and significant resource potential. Using this

framework, analysis goes beyond technical aspects (MW capacity or investment) to include actor dynamics, power relations, participation, and resistance at various levels. In the case of Padarincang, the application of MLG can map (i) the national level, in the form of regulations, energy mix targets, and central government investment commitments; (ii) the regional level, including the adaptation of energy policies to the context of the Banten region, including the role of the provincial/district government; (iii) the local level, including community resistance, local organizations, and cultural dynamics that influence policy acceptance; and (iv) non-state actors, including investors, environmental NGOs, and advocacy communities. Thus, the MLG approach enables this study to understand the complexity of geothermal energy governance not only as a technical or economic issue, but also as a multi-level political and social arena that interacts with other arenas.

METHODOLOGY

This study uses a qualitative research method with a case study approach (Alam, 2021), which is aligned with the research objective of conducting an in-depth analysis of the research object by collecting various types of information, which is then processed to obtain a solution so that the problems revealed can be resolved (Creswell & Creswell, 2018). The qualitative methods examined focus on the attitudes and opinions of informants from central, provincial, and local governments, as well as academics and NGOs. The research will be conducted in Padarincang, Serang Regency. This location was chosen because the Padarincang community has resisted the construction of the Kaldera Danau WKP geothermal energy project since 2011. The reason for choosing this location is the conflict over the community's resistance to the Rawa Danau geothermal power plant development, which has been ongoing for nearly 15 years.

The data collection technique used was interviews through purposive sampling (specific criteria) in the form of in-depth interviews with stakeholders, including: The Central Government, the Local Government, developer companies (PT. Sintesa Banten Geothermal could not be interviewed because the company had been acquired and was no longer operating), Padarincang community leaders, the Padarincang community, academics, and NGOs. Additionally, the researcher conducted field observations of the community's social conditions and dynamics around the project site. The documentary data in this study are policy documents (KEN, RUEN, Minister of Energy and Mineral Resources Regulation), official government

reports (Energy and Mineral Resources and the 2023–2025 energy mix report), journal articles, research reports, mass media, and relevant NGO publications.

Data analysis was conducted using thematic analysis based on the Multi-Level Governance (MLG) framework. The analysis process included (Braun & Clarke, 2006)1) data reduction: sorting primary and secondary data to identify patterns related to geothermal energy governance; 2) categorisation: grouping data into three levels of governance, the national level (central policy, energy mix targets, investment regulations), and the regional level (the role of provincial/district governments in licensing and implementation). Moreover, the local level (community response, socio-cultural dynamics, resistance), 3) Inter-Level Interaction Analysis: examining how policies and interests between levels interact or conflict during the implementation of the Padarincang geothermal project; and 4) interpretation: drawing key findings to answer the research questions and provide policy recommendations. To ensure data validity, this study uses source and method triangulation techniques. (Creswell & Creswell, 2018). Source triangulation is carried out by comparing interview data, official documents, and media reports. Method-based triangulation was conducted through a combination of interviews, observations, and document analysis. Reliability was maintained through systematic field notes and member checks with key informants.

RESULT

The Dynamics of Conflict in the Geothermal Energy Development Project in Padarincang

The development of geothermal energy in Padarincang began with a central government policy in 2009, when the Ministry of Energy and Mineral Resources designated Kaldera Danau as a Geothermal Working Area (WKP) in Banten Province. This designation placed Padarincang on the national exploration priority list through a series of technical regulations, preliminary mapping, and administrative arrangements that remained top-down and did not involve the local community. In 2010–2012, the government conducted feasibility and potential studies to prepare for a WKP auction that would open opportunities for private investment. Although exploration activities were not yet intensive, the community began to raise concerns about ecological risks, particularly regarding the sustainability of water sources and forests. However, opposition at this stage was still scattered and had not yet developed into an organized social movement.

The dynamics changed significantly in 2013–2024 after PT Sintesa Banten Geothermal was appointed as the developer and began conducting geological surveys, subsurface mapping, and

initial infrastructure development. The company's presence heightened tensions and fueled community resistance, driven by concerns about the vulnerability of the water catchment area and the potential for ecological landscape changes, which were considered a threat to the livelihoods and cultural practices of the residents. The conflict reached a high intensity since 2018, marked by collective mobilization through demonstrations, access blockades, and the involvement of various social actors, including religious leaders, youth, and women's groups. The designation of the project as a National Strategic Project strengthened its formal legitimacy but weakened social acceptance as the community felt sidelined in the deliberation process. As of 2025, the project has not shown significant progress, while the community has shifted its strategy of rejection towards advocacy, impact documentation, and the use of public space. The Padarincang case confirms that legal legitimacy alone is insufficient to ensure the success of renewable energy projects without accommodating local communities' ecological, social, and cultural claims.

The Mapping of Actors in the Multi-Level Governance Framework

The governance of geothermal energy policy in Padarincang involves various cross-level actors who interact, negotiate, and even come into conflict with one another. From an MLG perspective, the actors involved in the conflict over the construction of the PLTP-PB in Padarincang can be mapped into several layers, both vertically (between levels of government) and horizontally (between the state, the market, and civil society). Table 1 below shows the mapping of actors, levels, and interests in the Padarincang geothermal energy case:

Table 1. Mapping of Actors, Levels, and Interests in the Padarincang Geothermal Energy Case

Level Governance	Actor	Interests/Positions	Dynamic
National	Ministry of Energy and Mineral Resources, Central Government	Promoting the acceleration of renewable energy transition; achieving the national energy mix target of 23% by 2025	Dominant in determining geothermal working areas (WKP), it pays little attention to local communities' aspirations.
Region (Province and Regency)	Banten Provincial Government, Serang Regency Government	Supporting central government policy; deriving economic and	Ambivalent: on the one hand, following central government policy, on the

		political benefits from energy projects.	other, facing resistance from local communities.
Local (Affected communities)	Community leaders, mass organisations, and farmers	Rejecting the project due to concerns about damaging the environment, water sources, and local cultural practices.	Being an actor of resistance through demonstrations, advocacy, and collective resistance.
Non-State	Investors (private), NGOs, Media	- Investors: seeking profits from energy exploitation. - NGOs: advocating for environmental issues and community rights. - Media: articulating the pros and cons.	- Investors tend to coordinate with the central government; - NGOs and the media amplify the voices of local communities.

Based on the Table above, the governance of the Padarincang geothermal project operates within a multi-level governance framework, with interactions across levels and actors. The central government exercises regulatory control by establishing WKP and promoting geothermal investment as part of the national energy transition agenda. Local governments act as mediators, but their position is ambiguous, as they are caught between the demands of the central government and community pressure.

At the local level, the Padarincang community positions itself as an actor of resistance. Their concerns about environmental degradation, water sources, and cultural preservation led to the formation of a resistance movement. The presence of non-state actors, such as investors, NGOs, and the media, further complicates governance dynamics: investors coordinate with the central government to secure project certainty, while NGOs and the press expand the space for community articulation.

This dynamic reveals an asymmetry of power in energy governance. The central government and investors dominate the policy-making process, while local communities are excluded from the deliberative arena. Consequently, social conflicts emerge as a form of bottom-up pressure to correct overly top-down governance.

The Dynamics of Geothermal Energy Policy Governance in Padarincang

The Padarincang PLT-PB development project illustrates the complexity of relationships among actors across different government levels and non-governmental entities. The pattern of interaction shows vertical and horizontal flows in energy governance.

1. Vertical Flow (Top-Down Governance), in this pattern, the central government (Ministry of Energy and Mineral Resources) is the dominant actor that determines geothermal working areas (WKP) and promotes projects as part of the national energy transition policy. From the centre, policies are passed down to the provincial government (Banten) and regency government (Serang), and then to the sub-district government. However, this process is more instructive than deliberative. Local communities tend to be positioned as recipients of policy, rather than active subjects. Figure 1 shows the vertical flow of relations between levels of government (central - regional) in energy governance.
2. Horizontal Flow (Cross-Level and non-State): Simultaneously, non-state actors such as private investors establish direct relationships with central and local governments to ensure regulatory certainty and permits for geothermal power plant (PLT-PB) development projects. On the other hand, NGOs and the media are establishing horizontal networks with local communities to advocate, strengthen resistance, and expand public understanding of project impacts. Figure 2 shows the horizontal flow between cross-level and non-state actors in energy governance.

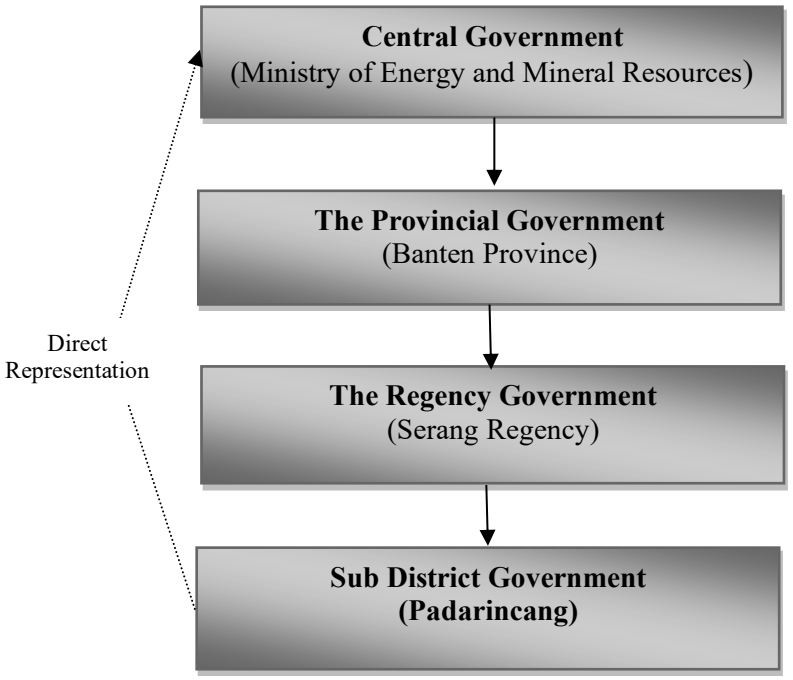

Figure 1. Vertical Flow (Top-Down Governance)

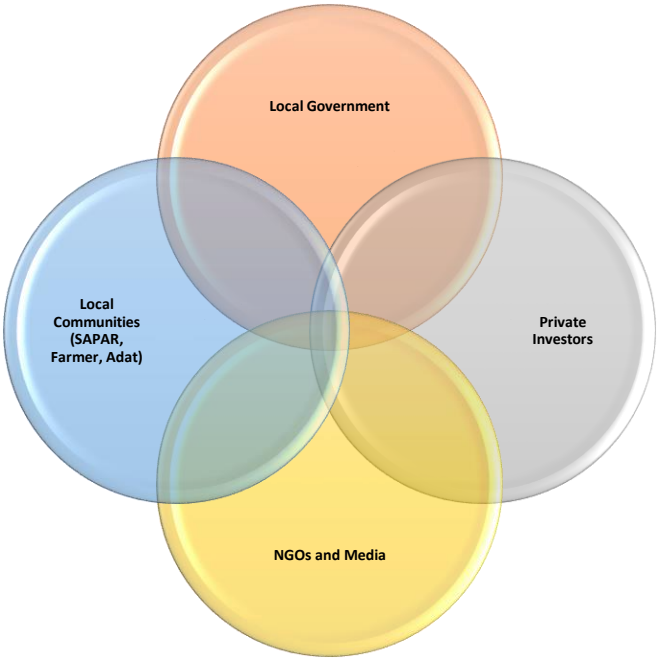

Figure 2. Horizontal Flow (Cross Level – Non-State)

Based on these interaction patterns, a dominant flow emerges in which the central government has the authority to determine geothermal working areas, particularly in terms of regulation and investment. Conversely, a resistance flow (bottom-up) emerges from local communities supported by NGOs and the media. However, this resistance flow is often unable to penetrate the formal decision-making arena at the central level, resulting in prolonged tensions and creating an imbalance of power. Meanwhile, local governments (provincial and district) find themselves in an ambivalent position. On the one hand, local governments must execute the mandate of the central government, while on the other hand, they face socio-political pressure from local communities. The absence of a deliberative forum that brings together all actors on an equal footing makes for fragmented, rather than collaborative, governance.

Thus, the case of the Padarincang PLT-PB development project demonstrates that achieving energy transition in Indonesia requires more than the strength of national regulations alone. An inclusive multi-level governance mechanism is needed, where local communities are not merely treated as policy recipients but also as deliberative actors whose voices are incorporated into the energy policy formulation process.

Discussion

The findings of this study reveal that the prolonged deadlock in the Padarincang geothermal project is not primarily the result of technical, geological, or investment challenges, but rather the outcome of a deeper structural misalignment within Indonesia's multi-level governance system. Although geothermal development in Padarincang has been supported by strong national regulations, including the assignment of the Working Area (WKP), the project's designation as a National Strategic Program, and its strategic role in achieving the national renewable energy mix target, the implementation process demonstrates a significant gap between national ambitions and local socio-political realities. This directly answers the research question by showing that governance fragmentation, power asymmetry, and weak participatory mechanisms are the main determinants of conflict escalation, thereby shaping the project's trajectory from 2009 to 2025.

Interpreted through the Multi-Level Governance (MLG) framework, these findings confirm that geothermal policy in Indonesia operates predominantly under a Type I MLG structure, in which authority is centralised and vertically organised among national, provincial, and district governments. (Hooghe et al., 2008). The central government's dominant role in determining WKP boundaries, regulatory procedures, and investment mechanisms reflects the hierarchical nature of decision-making. However, the absence of a corresponding Type II MLG structure—which would involve flexible, issue-based networks incorporating NGOs, civil society groups, and affected local communities results in the exclusion of key non-state actors from deliberative arenas. This absence of horizontal collaboration is evident in the weak communication channels, limited community participation, and lack of transparent consultation mechanisms during the exploration and planning phases.

These findings corroborate earlier scholarship on geothermal social acceptance in Indonesia, which highlights environmental concerns, distrust in government, and socio-cultural tensions as key drivers of resistance. (Anggreta et al., 2022; Ibrohim et al., 2019; Muldi, 2021). However, this study extends the literature by demonstrating that perceptions of ecological or economic risk do not merely drive resistance in Padarincang. Instead, it is fundamentally rooted in governance misalignment, specifically, the lack of deliberative processes, the invisibility of community voices in planning, and the ambivalent position of local governments caught between national mandates and grassroots contestation. In this sense, community resistance functions as a bottom-up corrective mechanism against an overly centralised policy process,

aligning with broader findings from energy transition governance studies that emphasise legitimacy as a prerequisite for successful implementation. (Sovacool & Martiskainen, 2020).

This study also contributes theoretically by refining the application of MLG in the context of renewable energy governance in developing countries. The results highlight a form of asymmetric multilevel governance, in which the central government retains disproportionate control over regulatory and investment authority. In contrast, regional and local governments bear the political and administrative burden of managing community tensions. Meanwhile, the communities most affected by the project remain structurally marginalised. This asymmetry is not explicitly captured in conventional MLG typologies, which often assume a degree of functional balance across levels. Thus, the findings suggest the need to incorporate power imbalances and social legitimacy considerations more explicitly into MLG analyses, especially in sectors such as energy, where infrastructure intersects with cultural values, environmental stewardship, and community identity.

Answering the essential "So what?" question, the findings of this study are critical because they demonstrate that Indonesia's slow progress in geothermal development, despite its vast resource potential and strong regulatory framework, cannot be resolved merely through technical capacity-building, fiscal incentives, or regulatory simplification. Unless governance structures are reconfigured to foster inclusive deliberation, recognise local agency, and align national objectives with local realities, Indonesia risks perpetuating similar conflicts across other geothermal sites. Indeed, the Padarincang case provides a cautionary example of how the absence of participatory governance can halt strategic energy transition projects for more than a decade, undermining national ambitions to achieve a low-carbon energy system.

In sum, the Padarincang conflict illustrates that successful geothermal governance requires more than hierarchical coordination; it requires a shift toward collaborative, participatory, and trust-building mechanisms across levels. By illuminating the governance dynamics underpinning resistance, this study lays a foundation for redesigning policy instruments and institutional arrangements that can better bridge national energy priorities with the lived experiences, rights, and aspirations of local communities.

Comparative Insight and Generalizability

The dynamics observed in the Padarincang geothermal conflict closely mirror governance patterns documented in other geothermal development sites across Indonesia. This suggests that the challenges identified in this case—power asymmetry between levels of

government, limited community participation, and the absence of inclusive deliberative mechanisms—are not isolated anomalies, but part of a broader structural issue within Indonesia's renewable energy governance. In Wae Sano, for instance, community resistance intensified due to perceptions of environmental risk, opaque communication, and residents' exclusion from early decision-making processes. (Rosary, 2022). Similar patterns of contestation occurred in Mataloko, where residents mobilised against exploration activities they perceived as threatening water sources and cultural landscapes. (Haykal Ahmad et al., 2022), as well as in Mount Talang (Yolanda et al., 2021) and Mount Lawu (Ibrohim et al., 2019). These cases collectively reinforce the idea that geothermal conflicts in Indonesia consistently emerge at the intersection of centralised energy ambitions and local socio-cultural concerns.

Against this backdrop, the Padarincang case offers valuable comparative insight. It highlights how the absence of coordinated multi-level engagement—particularly the failure to integrate Type II MLG elements such as community groups, NGOs, and local knowledge networks—creates a persistent legitimacy gap that fuels long-term resistance. Moreover, the ambivalent position of regional and district governments, which must both adhere to central directives and respond to local pressures, is evident in many other geothermal sites as well. This institutional tension demonstrates that local governments in Indonesia often lack the autonomy or capacity to mediate conflicts effectively, thereby reinforcing asymmetries in central–local governance.

From a broader international perspective, the findings resonate with geothermal governance challenges observed in other developing countries with centralised administrative systems. In the Philippines, deep-seated community resistance to geothermal exploration has been linked to insufficient consultation and disregard for local rights, despite national imperatives to expand renewable energy (Gutiérrez-Negrín, 2024). Likewise, geothermal projects in Kenya have faced contestation, with local communities perceiving limited material benefits and inadequate environmental safeguards. These parallels suggest that geothermal development in centralised governance contexts is particularly vulnerable to conflict when socio-cultural and ecological considerations are insufficiently addressed.

Given these patterns, the findings of this study possess strong analytical generalizability. While the Padarincang case is rooted in a specific geographical and socio-political context, the underlying governance mechanisms—central dominance, local

ambivalence, community resistance, and the absence of deliberative cross-level interaction—are transferable to other settings. The concept of asymmetric multi-level governance proposed in this study, therefore, provides a robust analytical lens for understanding similar conflicts in the renewable energy sector, both within Indonesia and in comparable international contexts. This analytical generalisation is significant because it provides a basis for anticipating governance risks in other geothermal sites, thereby informing the design of more participatory and adaptive policy instruments.

In this sense, the Padarincang case not only illuminates the governance constraints shaping geothermal development in Indonesia but also contributes to broader theoretical debates on how energy transitions unfold in settings characterised by hierarchical governance structures and diverse local identities. By articulating these comparative insights, the study reinforces the importance of designing energy policies that recognise the plurality of local experiences and promote meaningful participation across levels of governance. This imperative extends far beyond the boundaries of any single case.

CONCLUSION

The dynamics of geothermal energy policy governance in Indonesia, particularly in the case of Padarincang, illustrate deep tensions between national policy ambitions and local community interests. While the central government prioritises the rapid expansion of renewable energy through geothermal development to meet national energy mix targets, these efforts have been met with persistent resistance from local communities who fear the social, ecological, and cultural consequences of the project. Using the Multi-Level Governance (MLG) framework, the analysis reveals an apparent asymmetry of power in which decision-making is dominated by the central government and investors, leaving local communities as mere passive recipients of policy. Governance fragmentation further emerges through the ambiguous stance of local governments, which must implement central government directives while simultaneously facing pressures and opposition from their own constituencies. Compounding these issues is the absence of effective deliberative forums, which have hindered meaningful communication and coordination across central, regional, and local levels, ultimately allowing community resistance to arise as a corrective response to overly top-down governance. Taken together, the conflict surrounding geothermal development in Padarincang is not simply a technical or infrastructural challenge, but a manifestation of governance

shortcomings marked by limited inclusivity, insufficient participation, and weak cross-level collaboration.

This study provides important theoretical and practical contributions to the literature on renewable energy governance, particularly through its application of the Multi-Level Governance (MLG) framework in analysing the geothermal energy conflict in Padarincang. Theoretically, the study demonstrates that successful energy transition policies cannot rely solely on national regulatory strength or technical feasibility. Instead, transitions are shaped by complex interactions among central government authorities, provincial and local governments, local communities, investors, NGOs, and the media. By revealing the asymmetry of power between top-down policy agendas and bottom-up community resistance, this study advances scholarly understanding of how governance fragmentation and the absence of deliberative mechanisms hinder the implementation of geothermal projects in Indonesia. In practice, the findings highlight the need for a more inclusive and collaborative approach to energy governance, particularly by strengthening participatory communication, establishing equitable deliberation forums, and integrating local socio-cultural concerns into policy design and project planning. These insights are highly relevant for policymakers seeking to improve coordination across levels of government and for developers aiming to secure long-term social legitimacy for geothermal investments.

This study also offers benefits to multiple stakeholders. National policymakers can use these findings to evaluate and recalibrate their centrally driven renewable energy strategies, ensuring that national targets better align with local contexts. Regional governments may benefit from a clearer understanding of their mediating role and the need to balance political mandates with community expectations. For investors and geothermal developers, the study underscores the importance of social acceptance and the risks associated with neglecting community concerns, especially in areas with strong socio-cultural attachments to local ecosystems. Civil society organisations and community groups may also benefit from the study's affirmation of the need for more equitable governance structures that recognise local agency. Additionally, the study provides a valuable reference for scholars examining energy policy in developing countries or exploring MLG as a framework for complex governance arenas.

Despite its strengths, this research has several limitations. First, the absence of direct access to the developer company, which had ceased operations, restricts the completeness of the analysis regarding the corporate perspective and its interactions with the state. Second,

although the MLG framework offers a strong structural lens, the study does not capture in detail the informal political dynamics, such as brokerage, patronage networks, or micro-level negotiations that may influence resistance or policy outcomes. Third, the focus on a single case limits the generalizability of the findings to other geothermal sites with different political, cultural, and geographical characteristics. To address these limitations, future studies may conduct comparative research across multiple geothermal conflict sites in Indonesia to identify patterns and variations in governance dynamics. Further research could also integrate ethnographic or political ecology approaches to deepen understanding of community identity, spirituality, and cultural values shaping resistance movements. Additionally, future work may examine state–developer communication strategies and trust-building mechanisms, which appear to be critical yet underexplored factors in the sustainability of geothermal projects. Altogether, these directions will strengthen the broader understanding of Indonesia's energy transition challenges and contribute to more just, participatory, and durable energy governance arrangements.

AUTHOR CONTRIBUTIONS

Conceptualising and designing research, D.A.P., S.A., I.R.W.; collected the data, D.A.P., S.A., I.R.W., D.S.; conceived and designed the analysis, D.A.P., M.S.; writing-original draft preparation and editing D.A.P., S.A., I.R.W.; managing literature, D.A.P., M.S.; supervision, D.A.P.; project administration, D.A.P. All authors have read and agree to the published version of the manuscript.

ACKNOWLEDGMENTS

We want to express our gratitude to the Ministry of Higher Education, Science, and Technology of the Republic of Indonesia for funding this research through the Regular Fundamental Research Grant scheme for the 2025 Fiscal Year, with the main contract number: 125/C3/DT.05.00/PL/2025, subcontract number: 8002/LL4/PG/2025; 8002/LL4/PG/2025, 1036/1.1/LPPM/UNIBA/VI/2025.

REFERENCE

Adityatama, D., Umam, M., Purba, D., & Muhammad, F. (2019). Review of Geothermal Direct Use Application as an Alternative Approach in Community Engagement at Early

Exploration Phase in Indonesia. *PROCEEDINGS, 44th Workshop on Geothermal Reservoir Engineering Stanford University*.

Alam, Md. K. (2021). A Systematic Qualitative Case Study: Questions, Data Collection, NVivo Analysis and Saturation. *Qualitative Research in Organizations and Management*, *16*(1), 1–31. https://doi.org/10.1108/QROM-09-2019-1825

Anggreta, D. K., Somantri, G. R., & Purwanto, S. A. (2022). Social Acceptance: Mapping the Perspectives of Stakeholder in the Development of Geothermal Power Plants in West Sumatra, Indonesia. *International Journal of Sustainable Development and Planning*, *17*(4), 1053–1065. https://doi.org/10.18280/ijsdp.170402

Azmi, S., Ginting, B., & Sitepu, R. (2021). *Legal Protection for Investment in Geothermal Energy Development and Utilization in North Sumatra Province*. *16*(2).

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Creswell, J. W., & Creswell, J. D. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (Fifth Edition). SAGE Publications, Inc. https://spada.uns.ac.id/pluginfile.php/510378/mod_resource/content/1/creswell.pdf

Dirjen EBTKE-KESDM. (2020). *Rencana Strategis Direktorat Jendral Energi Baru Terbarukan dan Konservasi Energi 2020-2024*. EBTKE-KESDM. https://ebtke.esdm.go.id/post/2020/05/18/2540/rencaa.strategis.renstra.ditjen.ebtke.2020-2024

Dutu, R. (2016). Challenges and policies in Indonesia's energy sector. *Energy Policy*, *98*, 513–519. https://doi.org/10.1016/j.enpol.2016.09.009

EBTKE-KESDM. (n.d.). *Potensi Pengembangan Energi Panas Bumi di Indonesia*. KESDM. Retrieved March 7, 2025, from https://ebtke.esdm.go.id/lintas/id/investasi-ebtke/sektor-panas-bumi/potensi

Fadhillah, F. R., Asyari, M. R. A., Bagaskara, A., Purba, D., Katmoyo, R., Djandam, A., & Gurning, L. (2023). *Challenges in Getting Public Acceptance on Geothermal Project in Indonesia*.

Gutiérrez-Negrín, L. C. A. (2024). Evolution of worldwide geothermal power 2020–2023. *Geothermal Energy*, *12*(1), 14. https://doi.org/10.1186/s40517-024-00290-w

Halia Dinan, U. (2023). *Persepsi Masyarakat Terhadap Eksploitasi Panas Bumi Di Wilayah Kerja Pertambangan Kaldera Rawa Danau*. *Jurnal Kommunity Online*, *2*(2), 25–38. https://doi.org/10.15408/jko.v2i2.28278

Halimatussadiah, A., Pratama, M. Y., Maulia, R. F., & Adriansyah, M. (2023). *Analisis Bisnis dan Kebijakan untuk Mendorong Investasi Pembangkit Listrik Tenaga Panas Bumi (PLTP) di Indonesia*. LPEM FEB UI. https://lpem.org/analisis-bisnis-dan-kebijakan-untuk-mendorong-investasi-pembangkit-listrik-tenaga-panas-bumi-pltp-di-indonesia/

Haykal Ahmad, A., Adityatama, D. W., Akram Rusdianto, M., Mintorogo Pradana, G., Amanda Beryll, T., Vian Prasetyo, P., & Rachmadani, A. (2022). Geothermal Direct Use Alternatives in Mataloko to Increase Public Acceptance. *IOP Conference Series: Earth and Environmental Science*, *1014*(1), 012010. https://doi.org/10.1088/1755-1315/1014/1/012010

Hooghe, L., Marks, G., & Schakel, A. (2008). *Multi-Level Governance*. https://hooghe.web.unc.edu/wp-content/uploads/sites/11492/2020/11/2020_hooghe-marks-schakel_multilevel-governance_reduced-size-Caramani.pdf

Ibrohim, A., Prasetyo, R. M., & Rekinagara, I. H. (2019). Understanding Social Acceptance of Geothermal Energy: A Case Study from Mt. Lawu, Indonesia. *IOP Conference Series: Earth and Environmental Science*, *254*, 012009. https://doi.org/10.1088/1755-1315/254/1/012009

Jatnika, J., & Amal, M. I. (2023). Tantangan Implementasi Net Zero Emission di Banten: Studi Kasus Pembangunan Geothermal Padarincang. *ijd-demos*, *5*(4). https://doi.org/10.37950/ijd.v5i4.433

Milko, V. (2024). *Financial and community hurdles slow geothermal energy development in Southeast Asia*. AP News. https://apnews.com/article/geothermal-energy-indonesia-philippines-climate-finance-6de912a0a2911f3cb96a875aac3c6c95

Muldi, A. (2021). *Model Komunikasi Dalam Pengelolaan Konflik Geotermal Di Kabupaten Serang*. *Jurnal Riset Komunikasi*, *12*(1), 117–134. https://dx.doi.org/10.31506/jrk.v12i1.11739

Muliawati, F. D. (2024). *Target Bauran EBT RI 2025 Turun Jadi 17%, Ini Alasan ESDM.*. CNBC Indonesia. https://www.cnbcindonesia.com/news/20240118173844-4-507048/target-bauran-ebt-ri-2025-turun-jadi-17-ini-alasan-esdm

Nasruddin, Alhamid, M. I., Daud, Y., & Surachman, A. (2016). Potential of Geothermal Energy for Electricity Generation in Indonesia: A review. *Renewable and Sustainable Energy Reviews*, *53*, 733–740. https://doi.org/10.1016/j.rser.2015.09.032

Nurwahyudin, D. S., & Harmoko, U. (2020). Pemanfaatan dan Arah Kebijakan Perencanaan Energi Panas Bumi di Indonesia Sebagai Keberlanjutan Maksimalisasi Energi Baru Terbarukan. *Jurnal Energi Baru dan Terbarukan*, *1*(3), 111–123. https://doi.org/10.14710/jebt.2020.10032

Pambudi, N. A., & Ulfa, D. K. (2024). The geothermal energy landscape in Indonesia: A comprehensive 2023 update on power generation, policies, risks, phase and the role of education. *Renewable and Sustainable Energy Reviews*, *189, Part B*(114008). https://doi.org/10.1016/j.rser.2023.114008

Rosary, E. de. (2022, February 12). Proyek Geothermal Wae Sano: Antara Penolakan, Kepentingan Pariwisata dan Pengurangan Energi Fosil. *Mongabay*. https://www.mongabay.co.id/2022/02/12/proyek-geothermal-wae-sano-antara-penolakan-kepentingan-pariwisata-dan-pengurangan-energi-fosil/

Rybach, L. (2003). Geothermal energy: Sustainability and the environment. *Goethermics*, *32*(4–6), 463–470. https://doi.org/10.1016/S0375-6505(03)00057-9

Rybach, L. (2022). Geothermal Heat Pump Production Sustainability—The Basis of the Swiss GHP Success Story. *Energies*, *15*(21), 7870. https://doi.org/10.3390/en15217870

Savitri, P. I. (2024). *ESDM laporkan bauran energi baru terbarukan mencapai 13,93 persen*. ANTARA News.

Setiawan, H. (2014). Geothermal Energy Development in Indonesia: Progress, Challenges and Prospect. *International Journal on Advanced Science, Engineering and Information Technology*, *4*(4), 224. https://doi.org/10.18517/ijaseit.4.4.405

Sovacool, B. K., & Martiskainen, M. (2020). Hot transformations: Governing rapid and deep household heating transitions in China, Denmark, Finland and the United Kingdom. *Energy Policy*, *139*, 111330. https://doi.org/10.1016/j.enpol.2020.111330

Tambunan, M. R. U. D. (2018). Reconstructing Indonesian Fiscal Policy for Sustainable National Electricity: A Quintuple Helix Perspective. *Bisnis & Birokrasi Journal*, *24*(3). https://doi.org/10.20476/jbb.v24i3.9647

Taum, A. P. (2025, March 13). Tolak PLTP Mataloko, Massa Alter KGF Diterima Bupati Ngada. *Media Indonesia*. https://mediaindonesia.com/nusantara/751589/tolak-pltp-mataloko-massa-alter-kgf-diterima-bupati-ngada

Udu, J. D. (2021, Agustus). Menimbang Kembali Proyek Geothermal Wae Sano. *detikNews*. https://news.detik.com/kolom/d-5701797/menimbang-kembali-proyek-geothermal-wae-sano

Yolanda, S. M., Anggraini, D., & Putri, I. A. (2021). Gerakan Perempuan Salingka Gunung Talang dalam Menolak Pembangunan Geothermal di Kabupaten Solok. *Tanah Pilih*, *I*(1), 20–32. https://doi.org/10.30631/tpj.v1i1.674