

From Energy Transition to Legitimacy Crisis: A Narrative Policy Framework Analysis of Public Narratives on the Mataloko Geothermal Power Plant

Yohanes Soli^{1*}, Alfons Dwiyanto Fernandez², Jenny Pawolung³, Ester Theresia Clarita Tallo⁴, Frederikus Avelino Kefi⁵

^{1,2,5} Master of Public Administration, Universitas Gadjah Mada, Yogyakarta Special Region, Indonesia

³ Master of Public Policy and Management, Universitas Gadjah Mada, Yogyakarta Special Region, Indonesia

⁴ Master of Political Science and Government, Universitas Gadjah Mada, Yogyakarta Special Region, Indonesia

*Corresponding Author: yohanessoli@mail.ugm.ac.id

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ABSTRACT

This study aims to analyze the public narrative construction related to the Mataloko Geothermal Power Plant on social media by employing the Narrative Policy Framework (NPF) approach. The study stems from the contradiction between the idealization of geothermal energy as a form of green energy and the emergence of social resistance caused by its ecological and social impacts. Through a qualitative, case study based analysis, this research utilizes 287 posts from five social media platforms (X, TikTok, YouTube, Facebook, and Instagram) during the 2024–2025 period, categorized according to the four core elements of NPF: setting, character, plot, and moral of the story. The findings reveal that public narratives construct a symbolic structure, positioning the Catholic Church, WALHI NTT, and environmental activists as heroes, the government and PLN as villains, and local communities as victims. The narrative plot evolves from optimism toward energy transition to social resistance driven by information asymmetry, environmental degradation, and a crisis of policy legitimacy. Meanwhile, the moral message emphasizes the importance of energy justice and citizen participation in the development and implementation of renewable energy policies. These findings suggest that social legitimacy plays a key role in determining the success of energy projects and that digital narratives significantly influence public opinion, shaping the direction of Indonesia's energy transition policies.

Keywords: Mataloko Geothermal Power Plant, Narrative Policy Framework (NPF), Renewable Energy, Social Resistance, Social Media

INTRODUCTION

Geothermal power plants are developed with the primary aim of optimizing renewable energy potential while reducing dependence on fossil fuels, which significantly contribute to carbon emissions and environmental degradation (Hemeida et al., 2022; Kassem & Moscariello, 2025; Prasad & Raturi, 2022). In Indonesia, the development of geothermal power plants is legally grounded in Law No. 21 of 2014 on Geothermal Energy, which affirms the government's commitment to a clean energy transition and the reduction of greenhouse gas emissions in line with the Net Zero Emission 2060 target (Eze et al., 2025; Idroes et al., 2024; Yudha et al., 2022). However, the idealization of geothermal power plants as a source of green energy does not come without ecological consequences (Ibrohim et al., 2019; Pulungan et al., 2019; Semedi et al., 2018). Several studies have shown that some geothermal projects have, instead, generated negative impacts such as land cover degradation (Ibrohim et al.,

2019; Pulungan et al., 2019), groundwater contamination (Ahmad & Akhlaqul, 2025; Ouattara et al., 2024), and even social–ecological conflicts in areas surrounding the exploitation sites (Pardamean Siringoringo et al., 2025). These phenomena have triggered waves of public resistance in several regions, such as in Dieng (Rivelino Duta Muhammad et al., 2022), Mount Lawu (Ibrohim et al., 2019), and Mataloko in Ngada Regency, East Nusa Tenggara, where local communities argue that the promise of clean energy is not proportional to the environmental damage it has caused (Haykal Ahmad et al., 2022).

The development of the Mataloko Geothermal Power Plant has triggered a series of public protests since the project's early operational phase in 2010 (Haykal Ahmad et al., 2022). The Mataloko site was selected due to its geothermal potential, with an estimated capacity of around 2.5 MW, which is considered strategic for promoting clean energy development in eastern Indonesia (Sumotarto et al., 2021). However, after the project began operations, local communities started to report various adverse impacts, including agricultural land degradation (Guru et al., 2025), sulfur odor and hot mud emissions (Deva Aryanda et al., 2024), and a lack of transparency in social compensation processes (Jemadin, 2024). Initially, the Mataloko Geothermal Power Plant was projected to serve as a symbol of energy transition and green development (Harfani Soesanto & Suprihanto, 2025a); yet, in practice, it has revealed significant disparities between economic benefits and ecological risks (Guru et al., 2025; Jemadin, 2024). Several studies have found that the surrounding area exhibits signs of soil degradation and declining water quality (Jemadin, 2024). This situation has subsequently fueled public protests, particularly from community groups and religious leaders, who argue that the project was implemented without adequate environmental mitigation measures (Deva Aryanda et al., 2024).

The wave of public resistance against the Mataloko Geothermal Power Plant has not only occurred in physical social spaces but has also rapidly expanded into the digital sphere through various social media platforms. The transformation of communication technology has reshaped the dynamics of social movements, where digital spaces have become crucial arenas for citizens to voice aspirations, build solidarity, and influence public opinion and energy policy. Independent monitoring indicates that during the 2024–2025 period, a total of 287 social media posts related to the Mataloko Geothermal Power Plant were recorded, with X (formerly Twitter) emerging as the dominant platform, accounting for 132 posts. The highest level of activity was observed in October 2024, with 65 posts, marking the peak of issue escalation and a rise in public awareness. This trend of social media exposure regarding the Mataloko Geothermal Power Plant is illustrated in the following figure:

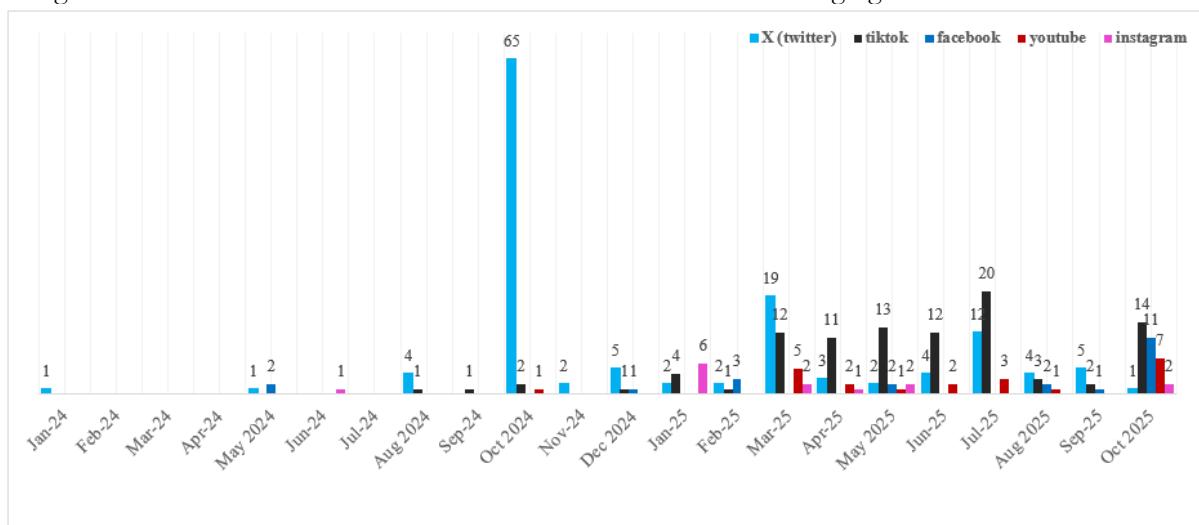


Figure 1. Trend of Media Exposure Related to the Mataloko Geothermal Power Plant on Social Media

Source: Processed Data from the Big Data Intelligence Socio Analytic System, 2025

Based on the exposure trend presented above, the initial analysis indicates that public narratives concerning the Mataloko Geothermal Power Plant form a distinctive symbolic character pattern: local communities are often portrayed as victims of the project's impacts; the government and PLTP management are depicted as antagonistic actors perceived to neglect environmental concerns; while environmental activists emerge as heroic figures. This narrative pattern reflects a policy issue framing imbued with socio-political meaning within the digital sphere. The Narrative Policy Framework (NPF) is particularly relevant for analyzing this phenomenon, as it provides a systematic approach to understanding how policy narratives are constructed, contested, and transformed within the public arena (Jones & McBeth, 2010; Shanahan et al., 2018). With its four core elements setting, characters, plot, and moral of the story NPF helps to disentangle the dynamics of policy meaning construction (Jones & McBeth, 2010). In the context of the Mataloko Geothermal Power Plant, the NPF enables researchers to trace the narrative shift from optimism to resistance and to understand how these dynamics shape public perception and the legitimacy of renewable energy policy in Indonesia.

Previous studies indicate that research on the Mataloko Geothermal Power Plant has rarely been examined through the lens of the Narrative Policy Framework (NPF), despite this approach being essential for understanding how public narratives influence support for or resistance to renewable energy policies (Jones & McBeth, 2010). Most existing studies have primarily focused on technical and geoscientific aspects, such as updating the numerical model of the Mataloko geothermal field using the TOUGH2 V.2 simulation software to refine geological data and field development planning (Astro, 2023; Harfani Soesanto & Suprihanto, 2025b; Jatmiko et al., 2021). Environmental studies have reported increased emissions of SO₂ and CH₄ gases, vegetation degradation, and groundwater contamination in surrounding exploitation areas (Abdullah et al., 2021; Haykal Ahmad et al., 2022; Jatmiko et al., 2021). From a public health perspective, research has found indications of respiratory problems and declining clean water quality due to geothermal waste disposal (Harfani Soesanto & Suprihanto, 2025a, 2025b; Sumotarto et al., 2021). Meanwhile, socio-political studies highlight the emergence of community protests driven by land conflicts, information asymmetry, and limited public participation (Abdullah et al., 2021; Harfani Soesanto & Suprihanto, 2025b; Haykal Ahmad et al., 2022).

Although numerous studies have explored the technical, environmental, and social aspects of the Mataloko Geothermal Power Plant, a significant research gap remains concerning the application of the NPF. Few studies have examined how public narratives, whether in conventional or digital media, shape societal perceptions and attitudes toward geothermal energy projects. Therefore, this research seeks to fill this gap by analyzing the Mataloko case through the NPF lens to understand the narrative construction of actors, the contestation of meanings, and the legitimacy of policy within media discourse (Crow et al., 2017; Jones & McBeth, 2010; Shanahan et al., 2018). Mataloko was selected as the study site because it represents one of the geothermal locations most frequently associated with social protests and tensions between residents and developers, providing a rich empirical context for narrative policy analysis (Guru et al., 2025; Harfani Soesanto & Suprihanto, 2025a; Jemadin, 2024). Media analysis is employed as the digital sphere has increasingly become the primary arena for shaping public opinion and discourse on environmental and renewable energy issues.

This study specifically aims to uncover the narrative constructions emerging within public discourse surrounding the Mataloko Geothermal Power Plant. It examines how narrative elements, such as setting, plot, characters (including heroes, villains, and victims), and moral messages, are shaped by both pro- and anti-development groups. The analysis focuses on the temporal dynamics of narrative transformation, particularly how early discourses emphasizing optimism toward energy transition gradually shifted into expressions of social resistance and a crisis of policy legitimacy. Accordingly, this research aims to explore how public narratives influence perceptions, trust, and support for renewable energy policies in Indonesia. The study addresses three key research questions: (1) How do narrative elements structure public discourse on social media? (2) How does the interaction between narrative characters influence the legitimacy of energy policy? Moreover, (3) How do moral messages and public hashtags reflect demands for social and ecological justice? The findings are expected to identify the dominant pro- and anti-narrative patterns, trace the transformation of public meaning, and interpret their implications for the direction of Indonesia's renewable energy policy.

RESEARCH METHOD

This study employs a qualitative research method with a case study approach, selected for its ability to explore in depth the social, political, and cultural contexts surrounding the controversy of the Mataloko Geothermal Power Plant. This approach is particularly relevant for understanding how public narratives are constructed, negotiated, and transformed within digital spaces, especially during debates between pro- and anti-development groups concerning renewable energy projects. The qualitative method enables the researcher to interpret the meanings embedded in texts, symbols, and discourses that emerge from online conversations, capturing not only what is said but also how and why such narratives are produced (J. Creswell, 2013; J. W. Creswell & Miller, 2000; Miles & Huberman, 2014). Meanwhile, the case study design enables an in-depth exploration of Mataloko Geothermal as a specific phenomenon that reflects the broader social dynamics of energy policy in Indonesia. The combination of these methods provides a comprehensive analytical framework for examining narrative constructions and the dynamics of public opinion in a contextual and interpretive manner.

The data for this research were obtained from social media platforms, encompassing the five most widely used networks among Indonesian netizens: Instagram, Facebook, X (Twitter), TikTok, and YouTube (Dwityas et al., 2023; Suhendra & Laraskana, 2024). The selection of these platforms was justified by their distinct discursive characteristics and patterns of public participation (Azkiya et al., 2023). Specifically, X functions as the primary space for opinion exchange and public discourse, while TikTok emphasizes emotionally charged visual storytelling. Facebook and YouTube serve as platforms for disseminating information and creating long-form documentation. The data were collected over the period from January 1, 2024, to November 8, 2025, a scientifically relevant

timeframe that represents an intense phase of public debate surrounding the Mataloko Geothermal Power Plant controversy, including heightened protest activity and increased digital media exposure. Based on data crawled through the Intelligence Socio Analytic (ISA) system, a total of 287 relevant posts were identified across social media platforms, comprising 132 on X, 97 on TikTok, 22 on YouTube, 22 on Facebook, and 14 on Instagram. The visualization of data distribution across platforms is presented in the figure below:

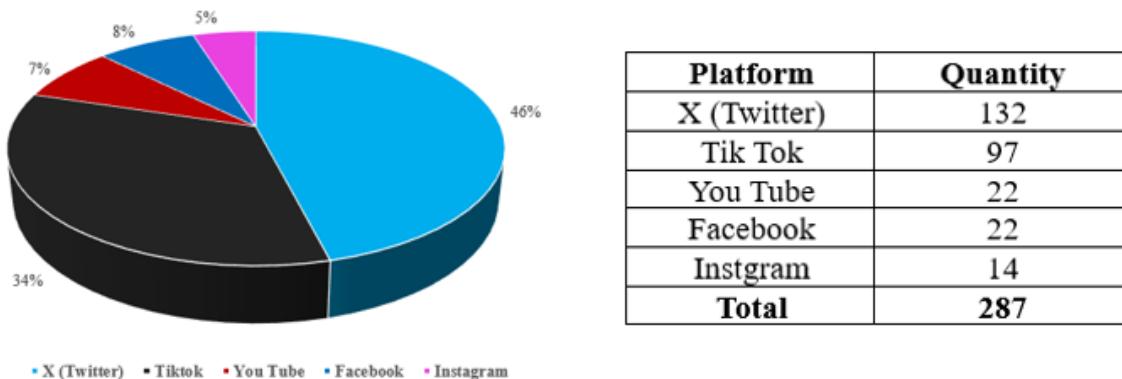


Figure 2. Total Number of Social Media Posts Related to the Mataloko Geothermal Power Plant During the 2024–2025 Period

Source: Processed Data from the Big Data Intelligence Socio Analytic System, 2025

All collected data were subsequently categorized based on the four main elements of the NPF, namely: setting (the policy issue context), character (actors portrayed as heroes, villains, or victims), plot (the cause effect flow and conflict dynamics), and moral of the story (the policy message or values conveyed). This categorization process was conducted to trace the narrative structures and framing patterns emerging within public discourse on social media. Methodologically, this approach is essential as it enables researchers to understand how pro and contra narratives surrounding the Mataloko Geothermal Power Plant are constructed, evolve, and influence public perceptions of renewable energy policy. The classification based on NPF elements not only illustrates the direction of public opinion but also reveals the dynamics of power relations and policy legitimacy manifested within digital discourse. The operational details of the analysis are presented in the following table:

Table 1. Operational Definitions of the Study

NPF Element	Data Required from Social Media	Analytical Approach	Expected Analytical Outcomes
Setting & Plot	<ul style="list-style-type: none"> Time of posting (discussion timeline) Narratives or statements explaining cause–effect relations Types of conflicts raised (environmental, social, economic) 	<ul style="list-style-type: none"> Identifying the social, political, and environmental contexts underlying the narratives, including mapping when the issue emerged, peaked, and declined. 	<ul style="list-style-type: none"> Understanding the temporal dynamics and policy context that frame the pros and cons surrounding the Mataloko Geothermal Power Plant.
Character	<ul style="list-style-type: none"> Mentions of actors (government, PLN, residents, activists, NGOs, academics, media) Sentiment or tone toward each actor Visual or symbolic representations 	<ul style="list-style-type: none"> Identifying who is positioned as the “savior,” “problem source,” or “victim” in online discussions. 	<ul style="list-style-type: none"> Revealing the symbolic structures and power relations within public narratives (who supports whom, who is blamed).
Moral of the Story	<ul style="list-style-type: none"> Statements expressing moral values or calls to action Hashtags carrying normative messages Posts containing policy demands or recommendations 	<ul style="list-style-type: none"> Exploring the normative messages conveyed by the public whether advocating policy change, rejecting the project, or supporting green energy initiatives. 	<ul style="list-style-type: none"> Interpreting the policy meanings constructed by the public and their implications for the legitimacy and direction of renewable energy policy.

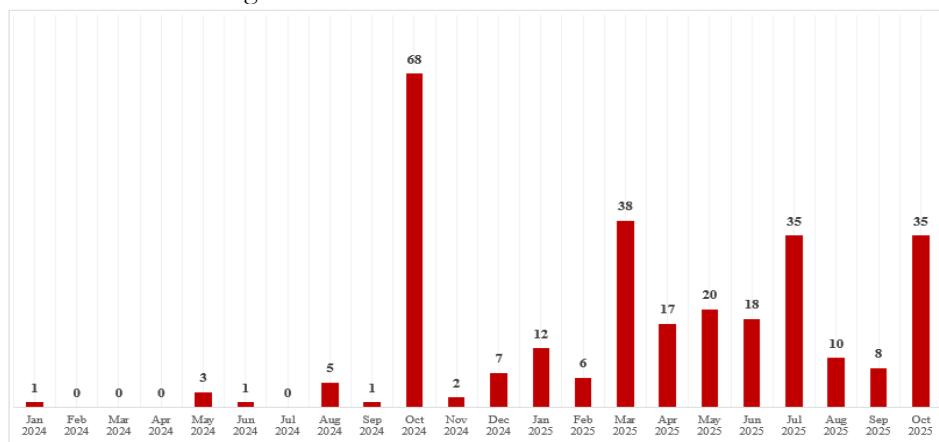
The data analysis technique employed in this study was conducted interactively, drawing on the interactive model proposed by Miles and Huberman (2014), which consists of three main stages: data reduction, data display, and conclusion drawing/verification. Social media data obtained through crawling were first reduced through a thematic coding process based on the four main elements of the NPF: *setting, character, plot, and moral of the story*. This process was carried out interactively and iteratively to ensure that each narrative was categorized according to its context. Subsequently, the coded data were displayed in the form of matrices or narrative maps to facilitate the identification of relationships among actors, conflicts, and emerging policy messages. The final stage involved concluding by interpreting narrative patterns and the temporal transformation of framing over time. This interactive analysis enables an in-depth understanding of the dynamics of public narrative construction regarding the Mataloko Geothermal Power Plant on social media.

RESULTS AND DISCUSSION

Settings & Plot

The analysis of the setting element in the Mataloko Geothermal Power Plant issue highlights the spatial, temporal, and socio-political contexts framing the emergence of public discourse surrounding the geothermal energy project in Flores. According to the NPF (Crow et al., 2017; Jones & McBeth, 2010; Shanahan et al., 2018), the setting serves as the foundation for understanding how policies are constructed within specific social and temporal contexts. In this case, the dynamics of the Mataloko Geothermal Power Plant issue issue from January 2024 to the end of 2025 reveal a shift from a technocratic phase toward a broader social conflict. Administrative planning and discussions on national energy policy characterized the initial phase of the project. At the same time, the end of 2024 was marked by an explosion of discourse triggered by the viral post of Dandhy Laksono. The temporal setting and policy context are crucial for understanding when and why public attention intensified, as well as how digital momentum shaped the trajectory of public debate between proponents of energy transition and opponents of the geothermal project in East Nusa Tenggara.

Meanwhile, the plot element in this analysis maps the chronological progression of the conflict narrative that developed among the government, local communities, and environmental advocacy groups. Based on the narrative policy analysis approach (Crow et al., 2017), the plot illustrates the trajectory of the issue from the policy stage to a crisis of social legitimacy. In the context of the Mataloko Geothermal Power Plant, the narrative began with the project planning phase in early 2024, escalated into a moral and ecological conflict by the end of 2024, and reached its peak of social resistance in 2025 through public demonstrations and official statements from the Catholic Church. This plot not only represents the tension between national energy interests and local community rights but also demonstrates how social media functioned as a primary driver of conflict escalation. The Metadata on Timing and Descriptions of Social Media Posts Related to the Mataloko Geothermal Power Plant during the 2024–2025 Period can be seen in Figure 3 below:



Time Period	Findings
Early 2024 (January–April)	The <i>Regional Government Work Plan (RKPD)</i> of Ngada Regency recorded that the development of the Mataloko Geothermal Power Plant (PLTP) had been included in the regional strategic plan, with an existing capacity of 1×1.8 MW in Golewa District and a proposed expansion to 2×10 MW (20 MW).
Mid-2024 (May–September)	The performance report of the <i>Directorate General of New, Renewable Energy, and Energy Conservation (EBTKE)</i> listed the Mataloko geothermal field among the national renewable energy monitoring and contribution targets.

Late 2024 (October–December)	By the end of 2024, discourse surrounding geothermal projects in Flores <i>Mataloko</i> , <i>Poco Leok</i> , and <i>Wae Sano</i> intensified after Dandhy Laksono (activist and Watchdoc journalist) posted a viral video on X (Twitter) and YouTube. He alleged that these geothermal projects were imposed without local consultation. The post was subsequently reshared by several public figures, including Zainal Abidin, sparking a surge in pro- and contra-discussions on social media, particularly on X and TikTok.
Early 2025 (January–March)	Large-scale peaceful demonstrations by residents and the Catholic Church in Ngada Regency opposing the Mataloko geothermal project marked a spike in public criticism. The Archdiocese of Ende officially declared its rejection of geothermal projects in Ngada and Ende.
Mid-2025 (May–September)	PLN's public outreach regarding drilling activities at Tiwu Bala River for the Mataloko Geothermal Power Plant became a major public communication moment and had the potential to trigger community reactions.
Late 2025 (October)	Public reports announced that the Mataloko Geothermal Power Plant project was targeted to achieve Commercial Operation Date (COD) in 2027, with construction progress reaching 89%, stimulating renewed public discourse on the project's progress and associated risks.

Figure 3. Temporal Metadata and Descriptions of Social Media Posts Related to the Mataloko Geothermal Power Plant During the 2024–2025 Period

Source: Processed Data from the Big Data Intelligence Socio Analytic System, 2025

Throughout 2024, the dynamics surrounding the Mataloko Geothermal Power Plant issue shifted significantly from a technocratic concern to a complex social and political matter. At the beginning of the year, the project appeared only in regional planning documents (*RKPD of Ngada Regency*) and the *EBTKE* report as part of the national energy transition strategy. However, public attention toward the policy increased following a socially impactful trigger event (Castelló & Lopez-Berzosa, 2023). This shift became evident in late 2024 when Dandhy Laksono's viral posts on X (Twitter) and YouTube highlighted alleged geothermal project implementations without community consultation. The incident transformed the direction of public discourse from a policy-centered discussion into a debate over social legitimacy and development ethics. Responses from public figures such as Zainal Abidin further amplified the issue's exposure in digital spaces, sparking debates between advocates of clean energy and opponents of geothermal projects in Flores.

Entering 2025, social conflict intensified with the emergence of moral movements and expressions of local community identity. The peaceful demonstrations organized by the Catholic Church and the people of Ngada indicated that the project faced not only technical challenges but also value-based cultural resistance. In narrative policy analysis, policy conflicts are often reinforced by opposing narratives that emphasize moral values and social justice (Jones & McBeth, 2010). The public outreach conducted by PLN at the Tiwu Bala River, however, provoked backlash as it was perceived to lack participatory engagement. When the project was announced to have reached 89% construction progress by the end of 2025, public discourse shifted toward debates over economic benefits versus ecological risks. The Mataloko Geothermal Power Plant thus reflects the complexity of Indonesia's energy policy positioned between the ambition for a clean energy transition and the demands for social justice from affected communities. This tension is reflected in the dominant public issues discussed, as illustrated in Figure 4 below:

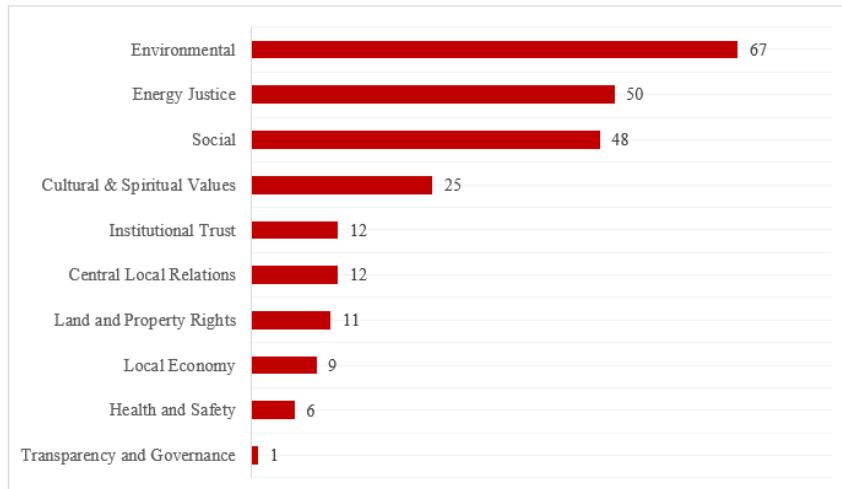


Figure 4. The Most Discussed Conflict Issues by Netizens Related to the Mataloko Geothermal Power Plant 2024–2025

Source: Processed Data from the Socio Analytic Big Data Intelligence System, 2025

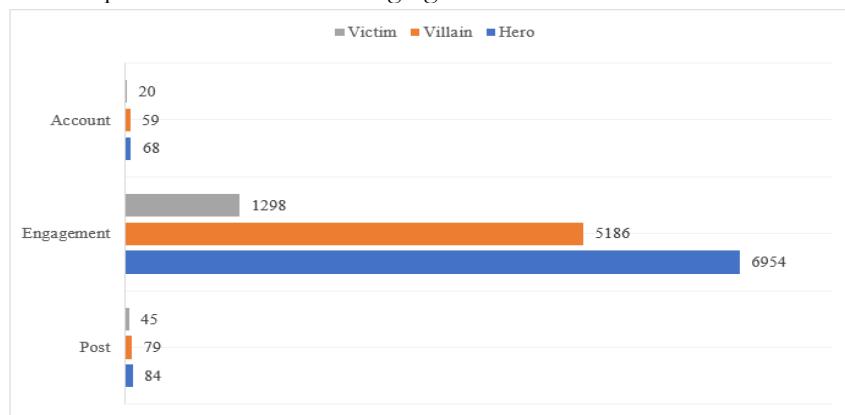
The data in Figure 4 indicate that environmental issues emerge as the most prominent topic in public discourse surrounding the Mataloko Geothermal Power Plant, with a total of 67 exposures. This issue centers on concerns about ecosystem degradation, groundwater contamination, and the potential risks of geothermal drilling to environmental stability. The dominance of ecological concerns highlights that environmental dimensions serve as the primary moral foundation in shaping public opinion, reaffirming the role of social media in fostering collective awareness of environmental issues (Singgalen et al., 2022). In addition, the issues of energy justice and social concerns occupy prominent positions, with 50 and 48 mentions, respectively, suggesting that public debates extend beyond the technical aspects of the project to include questions of benefit distribution and the social impacts on local communities.

Meanwhile, cultural and spiritual values, with 25 exposures, reflect strong moral resistance, particularly from the Catholic Diocese of Ende, which views the geothermal project as conflicting with the spiritual values of the Flores community. Issues related to institutional trust and central-local relations, each with 12 exposures, indicate low public confidence in both the government and developers. Moreover, themes of land rights, local economy, and occupational safety also appear, albeit with lower intensity, revealing that the Mataloko Geothermal Power Plant conflict is multidimensional encompassing interrelated environmental, social, economic, and trust aspects. Overall, this pattern emphasizes that the success of energy projects is determined not only by technical factors but also by social legitimacy and environmental ethics that underpin their acceptance by the community.

Character: Hero, Villain, Victim

The analysis of the character element in the Mataloko Geothermal Power Plant issue reveals the construction of three leading roles in public discourse hero, villain, and victim which reflect the dynamics of power and morality within environmental conflicts. Groups such as the Catholic Church, WALHI NTT, environmental activists, religious leaders, and alternative media occupy the hero position, as they are perceived to advocate for social and ecological justice. They act as moral defenders opposing energy policy inequality and promoting public participation. Their role demonstrates an effort to shift the state's technocratic narrative toward one centered on ecological justice (Carpenter & Harvey, 2019a). Meanwhile, the government, PLN, geothermal project developers, and EBTKE are portrayed as villains, representing structural powers perceived as disregarding community aspirations. This perspective aligns with the Network Theory of Power (Castells, 2011), which explains that environmental conflicts are often driven by unequal access to information and decision-making processes.

On the other hand, local communities in Poco Leok, Mataloko, Lembata, and Ngada are portrayed as victims, directly experiencing the social, economic, and environmental injustices caused by the geothermal project. They face threats to their living spaces, water sources, and cultural identity, as local communities are often the most vulnerable in elitist development processes (Castelló & Lopez-Berzosa, 2023; Macho & Castrillo, 2001). This victim narrative appears strongly in social media posts and religious leaders' statements that highlight suffering caused by the lack of transparency and public consultation. The character element in the Mataloko Geothermal Power Plant issue not only represents the social positions of actors but also illustrates the ideological conflict between economic development and ecological justice. The character analysis of the Mataloko Geothermal Power Plant Policy Narrative for 2024–2025 is presented in the following figure:



Character	Actor	Sentiment Description
Hero	Catholic Church, WALHI NTT, Environmental Activists, Religious Leaders, Alternative Media	Positioned as moral agents and environmental defenders, these actors frame the narrative around protecting people and nature from the geothermal project. With 84 posts and an engagement rate of 6,954, they receive strong public support for their advocacy and moral stance.

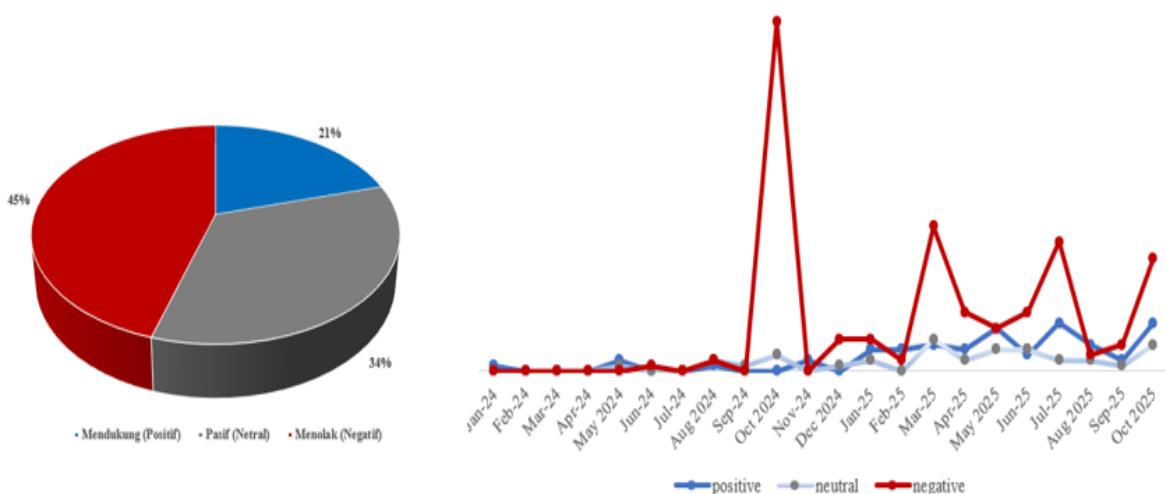
Villain	Government, PLN, Geothermal Project Developers, EBTKE	Depicted as parties imposing the project without adequate community participation and causing ecological harm. The narrative tends to reject and criticize energy policies. A total of 79 posts with 5,186 engagements reflect negative public perceptions toward these institutional actors.
Victim	Local Communities in Poco Leok, Mataloko, Lembata, and Ngada	Represented as those directly affected by geothermal exploitation losing land, facing environmental degradation, and experiencing social trauma. Although fewer in number (45 posts), these narratives effectively build public empathy and reinforce the legitimacy of the <i>Hero</i> group.

Figure 5. Character Analysis of the Mataloko Geothermal Power Plant Policy Narrative 2024–2025

Source: Processed Data from the Socio Analytic Big Data Intelligence System, 2025

The analysis of the character element reveals that the Catholic Church, WALHI NTT, environmental activists, religious leaders, and alternative media play prominent roles in framing the Mataloko Geothermal Power Plant issue. They are perceived as moral and advocative actors defending the interests of the people and the environment. With 84 posts and an engagement level reaching 6,954, these groups successfully mobilized public opinion through narratives of ecological justice, development ethics, and the protection of local living spaces. According to framing theory (de Gruchy et al., 2022), their strength lies in reframing the geothermal project as a moral issue rather than merely a technical energy matter. The presence of the Church and WALHI further reinforces the moral legitimacy of this movement, positioning public opposition not as a reactive stance but as an ethical resistance to policies perceived as neglecting marginalized communities.

Meanwhile, the government, PLN, geothermal project developers, and EBTKE are perceived as villains, blamed for causing ecological and social impacts due to a lack of community participation. With 79 posts and 5,186 engagements, this reflects a strong negative public perception toward state institutions. Conversely, local communities in Poco Leok, Mataloko, Lembata, and Ngada emerge as victims, symbolizing the suffering resulting from development. Although there were only 45 posts, narratives about land loss, environmental degradation, and social trauma effectively generated public empathy (Lazuardy et al., 2024). The combination of hero and victim roles reinforces moral opposition against institutional actors, creating a classic narrative structure of the people versus power that strengthens public opinion mobilization in digital spaces. Public sentiment toward the Mataloko Geothermal Power Plant issue during the 2024–2025 period reveals three main tendencies positive, neutral, and negative illustrating the shifting dynamics of public perception as the project evolves, as shown in the following figure:



Sentiment Category	Number of Posts	Dominant Actor	Sentiment Description
Positive (Supportive)	59 Exposures	Dominated by Government	Positive sentiment arises when the government highlights the 2060 net-zero emission target and promotes the economic benefits of the PLTP project. This narrative frames the Mataloko Geothermal Power Plant as a symbol of national energy progress.

Neutral (Passive)	98 Exposures	Dominated by Project Progress Updates	Neutral sentiment reflects an informative phase, indicating a public attitude of waiting for project outcomes. There are no explicit expressions of either support or opposition.
Negative (Oppositional)	130 Exposures	Dominated by Activists, Local Residents, and Environmental Advocacy Groups	A significant surge occurred between October and December 2024 following Dandhy Laksono's viral post about Poco Leok and Mataloko, which sparked subsequent protests by local communities and the Catholic Church in Ngada Regency. The emerging narrative highlights information inequality and a deepening crisis of public trust toward the government.

Figure 6. Netizens' Sentiment Toward the Mataloko Geothermal Power Plant 2024–2025

Source: Processed Data from the Socio Analytic Big Data Intelligence System, 2025

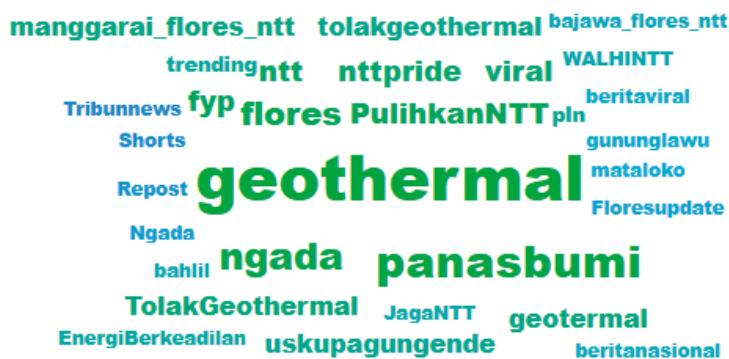
The analysis of public sentiment toward the Mataloko Geothermal Power Plant issue during the 2024–2025 period reveals three main tendencies positive, neutral, and negative illustrating the shifting dynamics of public perception as the project progresses. Positive sentiment (59 posts) is primarily dominated by government accounts emphasizing the 2060 net-zero emission agenda and the economic benefits of geothermal energy. In this context, such narratives reflect the government's effort to frame the Mataloko Geothermal Power Plant as part of national progress and the clean energy transition (Coyne et al., 2023). However, since these messages originate from official channels, public perception of them tends to remain within an informative scope, without generating significant emotional engagement.

Conversely, negative sentiment (130 posts) shows a sharp increase toward the end of 2024, triggered by the viral post from Dandhy Laksono regarding the Poco Leok and Mataloko issues. This oppositional narrative is dominated by environmental activists, the Catholic Church, and local residents, highlighting information inequality, lack of public consultation, and a growing crisis of trust toward the government and PLN. Such conditions indicate the erosion of governmental legitimacy due to non-transparent communication practices (Coyne et al., 2023). Meanwhile, neutral sentiment (98 posts) reflects a transitional phase between technocratic communication and social advocacy, in which the public awaits project outcomes without clear expressions of support or rejection. This pattern demonstrates how social media public opinion functions as a barometer of social trust toward national energy policy.

Moral of the Story

The moral of the story element in the Mataloko Geothermal Power Plant issue highlights how the public prioritizes moral and ethical values in their response to renewable energy policies. Through social media posts, communities, activists, and religious figures advocate for social justice, environmental protection, and meaningful public participation. Calls to action such as "Restore NTT, save Flores' nature" and "Clean energy must be fair for the people" symbolize moral demands that energy policies should not only focus on economic development but also on social welfare and ecological sustainability. Hashtags like #TolakGeothermal, #PulihkanNTT, and #SelamatkanFlores carry strong normative messages, expressing resistance against the government's technocratic dominance. The moral values voiced by the public underscore the principle of energy justice, ensuring fairness in the distribution of energy benefits and burdens, and recognizing the rights of local communities to determine the future of their living environment.

The analysis of the moral element also reveals how public narratives contribute to shaping the legitimacy of renewable energy policies at the local level. Posts containing demands and policy recommendations such as calls for project transparency, citizen consultation, and land protection imply that energy policies should prioritize people and the environment over mere electricity output figures. Public discussion spaces, such as social media, enable moral oversight of state policies (Carpenter & Harvey, 2019b). In the context of PLTP Mataloko, the widespread moral messages represent a form of ethical governance, or social pressure on the government to uphold ecological justice. The calls to review the project and strengthen community participation reflect the public's aspiration for Indonesia's energy transition to uphold human values and environmental sustainability. This moral framing is further illustrated in the hashtag analysis shown in Figure 7 below:



Hashtag	Hashtag Narrative	Hashtag Analysis
#geothermal	Opposition	The hashtag analysis indicates that posts are predominantly negative in sentiment, characterized by rejection narratives from BEM IFTK Ledalero, Pastor Marsel, and Parabel Collective, who highlight the environmental and social impacts of the geothermal project. A small portion of posts, such as those from <i>Tribun Kupang</i> and <i>Satarmese.net</i> , are positive or neutral, focusing on informative content and local benefits.
#PulihkanNTT	Opposition	The analysis shows that all posts from <i>WALHI Nasional</i> and <i>WALHI NTT</i> exhibit a dominantly negative sentiment, marked by narratives opposing geothermal projects in Flores and Lembata. The posts emphasize ecological threats, ethical flaws, and inequities between public and corporate interests. The communication tone is assertive and emotional—such as “GEOTHERMAL IS NOT FOR NTT” and “reject geothermal”—reinforcing a strong opposition to government and geothermal development policies.
#panasbumi	Opposition	Posts using the hashtag #panasbumi show a predominantly negative sentiment toward geothermal projects in NTT. Most posts (<i>Satarmese.net</i> , <i>Ignas Picture</i> , <i>Mosato TV</i>) are critical, highlighting environmental damage, community resistance, and the Church’s stance against the project. However, a few posts adopt a neutral or supportive tone, such as those from <i>Tribun Kupang</i> and some <i>Satarmese.net</i> content that provide educational explanations about geothermal energy. Overall, public narratives remain dominated by negative sentiment and social resistance toward the geothermal project.
#TolakGeothermal	Opposition	Posts with the hashtag #TolakGeothermal display a strongly negative and oppositional sentiment. The majority originate from <i>WALHI Nasional</i> and <i>WALHI NTT</i> , consistently emphasizing the project’s negative environmental impacts, threats to public safety, and ethical issues in NTT’s energy policy. The narratives express anger and fear, including accusations of violations and intimidation against residents, as voiced by <i>Rakyat Bicara</i> . No supportive or neutral posts were found, underscoring a consolidated public opinion strongly opposing the geothermal project.
#uskupagungende	Opposition	Posts with the hashtag #uskupagungende tend to express opposition to the geothermal project, although some exhibit positive or moderate tones. Posts from <i>Mosato TV</i> and <i>Tribun Kupang</i> reinforce the narrative of rejection by the Catholic Archdiocese of Ende toward the project in Flores. However, accounts such as <i>Kakak Romo Louis</i> and <i>Satarmese.net</i> present more balanced views, emphasizing the Church’s prudence and understanding of geothermal benefits. Overall, public discourse remains dominated by opposition sentiment, framed within religious and moral caution.

Figure 7. Dominant Hashtags of Netizens Related to the Mataloko Geothermal Power Plant (2024–2025)

Source: Processed Data from the Big Data Intelligence Socio Analytic System, 2025

At the beginning of 2024, the digital discourse surrounding the Mataloko Geothermal Power Plant remained vastly informative and neutral. As a newly emerging issue, discussions were initially framed within a technocratic context before evolving into broader public debate. However, by the end of 2024, hashtags such as #geothermal, #PulihkanNTT, and #panasbumi had become dominated by negative sentiments, emphasizing ethical concerns and environmental impacts. Key actors, such as WALHI, BEM IFTK Ledalero, and Pastor Marsel, played

significant roles in shaping the framing, which suggests that the project primarily serves corporate interests. The virality of posts by Dandhy Laksono further accelerated the formation of an emotionally charged collective opinion, marking a narrative shift from policy discussion to moral and ecological struggle (Arora et al., 2022; Carpenter & Harvey, 2019c; Sundjaja et al., 2017).

In the subsequent phase, hashtags such as #TolakGeothermal and #UskupAgungEnde reinforced the moral and spiritual dimensions of public resistance toward the geothermal project. Narratives articulated by the Church and civil society groups reflected a deep distrust toward the government and developers, particularly due to the absence of public consultation and concerns about potential environmental degradation. Here, collective narratives were mobilized to foster social solidarity and assert moral legitimacy (Ardi & Pradiri, 2021; Rachimoellah et al., 2024). Although neutral and informative posts such as those from Tribun Kupang and Satarmese.net were present, the dominance of rejection narratives indicates that social media has become a key arena for generating social and political pressure. Overall, the digital discourse surrounding PLTP Mataloko not only illustrates a conflict in energy policy but also reveals a crisis of trust between local communities and the state within the broader framework of sustainable development.

CONCLUSION

Based on the analysis above, the issue surrounding the Mataloko Geothermal Power Plant (PLTP Mataloko) highlights the tension between the national ambition for an energy transition and local demands for social and ecological justice. What began as a technocratic conflict evolved into a moral and political issue due to limited public participation and a growing crisis of trust toward the government and project developers. Social media has played a pivotal role in amplifying this discourse, revealing three main narrative characters: the hero (the Catholic Church, WALHI, and environmental activists) as moral and ecological defenders; the villain (the government and PLN) as symbols of power perceived to neglect public aspirations; and the victim (local communities) as those directly affected by the project's consequences. Through moral narratives, the public calls for environmental protection, policy transparency, and energy justice, voiced through hashtags such as #TolakGeothermal and #PulihkanNTT. The success of renewable energy projects in Indonesia, therefore, depends not only on technical and economic feasibility but also on social legitimacy, public participation, and respect for human and environmental values.

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REFERENCES

Abdullah, S., Sumarno, Leksono, A. S., Sudarto, & Syam, S. (2021). Modeling of SO₂ and CH₄ emission distribution in the area mataloko geothermal power plant, East Nusa Tenggara, Indonesia. *International Journal of Design and Nature and Ecodynamics*, 16(4), 401–410. <https://doi.org/10.18280/ijdne.160407>

Ahmad, D. M., & Akhlaqul, D. (2025). Enhancing Environmental Sustainability and Socio-Economic Prosperity: The Feasibility of the AMIS Methodology in Mitigating H₂S Impacts in Ulumbu Geothermal Working Area. *IOP Conference Series: Earth and Environmental Science*, 1456(1). <https://doi.org/10.1088/1755-1315/1456/1/012003>

Ardi, R., & Pradiri, A. P. (2021). Determinant factors of partisans' confirmation bias in social media. *Humanitas Indonesian Psychological Journal*, 18(1), 1–13. <https://doi.org/10.26555/humanitas.v18i1.1966>

Arora, S. D., Singh, G. P., Chakraborty, A., & Maity, M. (2022). Polarization and social media: A systematic review and research agenda. *Technological Forecasting and Social Change*, 183. <https://doi.org/10.1016/j.techfore.2022.121942>

Astro, R. B. (2023). Overview of the Potential and Utilization of Geothermal Energy on Flores Island. *Jurnal Penelitian Pendidikan IPA*, 9(12), 1377–1384. <https://doi.org/10.29303/jppipa.v9i12.5616>

Azkiya, N. R., Mahroza, J., Rishdianto, A., & Almubaroq, Z. (2023). ANALYSIS OF THE IMPACT OF SOCIAL MEDIA ON THE POLITICAL PARTICIPATION OF INDONESIAN YOUTH IN THE PERSPECTIVE OF DEFENSE MANAGEMENT 1. *NUSANTARA: Jurnal Ilmu Pengetahuan Sosial*, 10(7), 1–13. <https://doi.org/10.31604/jips.v10i7.2023>

Carpenter, J. P., & Harvey, S. (2019a). “There’s no referee on social media”: Challenges in educator professional social media use. *Teaching and Teacher Education*, 86. <https://doi.org/10.1016/j.tate.2019.102904>

Carpenter, J. P., & Harvey, S. (2019b). “There’s no referee on social media”: Challenges in educator professional social media use. *Teaching and Teacher Education*, 86. <https://doi.org/10.1016/j.tate.2019.102904>

Carpenter, J. P., & Harvey, S. (2019c). “There’s no referee on social media”: Challenges in educator professional social media use. *Teaching and Teacher Education*, 86. <https://doi.org/10.1016/j.tate.2019.102904>

Castelló, I., & Lopez-Berzosa, D. (2023). Affects in Online Stakeholder Engagement: A Dissensus Perspective. *Business Ethics Quarterly*, 33(1), 180–215. <https://doi.org/10.1017/beq.2021.35>

Castells, M. (2011). A Network Theory of Power. In *International Journal of Communication* (Vol. 5). <http://ijoc.org>.

Coyne, S. M., Rogers, A., Holmgren, H. G., Booth, M. A., Van Alfen, M., Harris, H., Barr, R., Padilla-Walker, L. M., Sheppard, J. A., Shawcroft, J., & Ober, M. A. (2023). Masters of media: A longitudinal study of parental media efficacy, media monitoring, and child problematic media use across early childhood in the United States. *Journal of Children and Media*, 17(3), 318–335. <https://doi.org/10.1080/17482798.2023.2200958>

Creswell, J. (2013). *Qualitative, Quantitative, and Mixed Method Approaches in Research Design*.

Creswell, J. W., & Miller, D. L. (2000). *Getting Good Qualitative Data to Improve Educational Practice* (Vol. 39, Issue 3).

Crow, D. A., Lawhon, L. A., Berggren, J., Huda, J., Koebele, E., & Kroepsch, A. (2017). A Narrative Policy Framework Analysis of Wildfire Policy Discussions in Two Colorado Communities. *Politics and Policy*, 45(4), 626–656. <https://doi.org/10.1111/polp.12207>

de Gruchy, T., Zikhali, T., Vearey, J., & Hanefeld, J. (2022). Framing Migration During the Covid-19 Pandemic in South Africa: A 12-Month Media Monitoring Project. *Media and Communication*, 10(2), 253–264. <https://doi.org/10.17645/mac.v10i2.4990>

Deva Aryanda, A., Reza Wahyu Artura Putra, M., Dyah Nugraheni, P., & Sulistianingsih, D. (2024). Sanksi Korporasi Pencemar Lingkungan dan Perlindungan Pejuang Lingkungan Hidup di Indonesia. In *Proceeding Unnes* (pp. 01–51).

Dwityas, N. A., Marta, R. F., & Briandana, R. (2023). Media Sosial dan Aktivisme Digital Perempuan: Analisis Wacana #Ibutunggalmelawan di Instagram. *Jurnal Komunikasi*, 18(2), 109–132. <https://doi.org/10.20885/komunikasi.vol18.iss2.art1>

Eze, V. H. U., Eze, E. C., Alaneme, G. U., & Bubu, P. E. (2025). Recent progress and emerging technologies in geothermal energy utilization for sustainable building heating and cooling: a focus on smart system integration and enhanced efficiency solutions. In *Frontiers in Built Environment* (Vol. 11). Frontiers Media SA. <https://doi.org/10.3389/fbuil.2025.1594355>

Guru, W., Jimi Jeruma, Y., Ronal Purnama, P., Artikel, R., Kunci, K., Timur, F., Etis, K., & Leok Corresponding Author, M.-P. (2025). Dharma dan Geothermal: Menimbang Kewajiban Etis Terhadap Alam di Manggarai. *Jurnal Sains Ekonomi Dan Edukasi*, 2(5), 1049–1064. <https://doi.org/10.62335>

Harfani Soesanto, I., & Suprihanto, A. (2025a). Analisis Perhitungan Struktur Cellar Pemboran pada Wellpad Proyek Penyiapan Infrastruktur PLTP Mataloko. *JPII*, 3(1), 25–33. <https://doi.org/10.14710/jpii.2025.25706>

Harfani Soesanto, I., & Suprihanto, A. (2025b). Analisis Perhitungan Struktur Cellar Pemboran pada Wellpad Proyek Penyiapan Infrastruktur PLTP Mataloko. *JPII*, 3(1), 25–33. <https://doi.org/10.14710/jpii.2025.25706>

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). <https://doi.org/10.1088/1755-1315/1014/1/012010>

Hemeida, M. G., Hemeida, A. M., Senjyu, T., & Osheba, D. (2022). Renewable Energy Resources Technologies and Life Cycle Assessment: Review. In *Energies* (Vol. 15, Issue 24). MDPI. <https://doi.org/10.3390/en15249417>

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(1). <https://doi.org/10.1088/1755-1315/254/1/012009>

Idroes, G. M., Afjal, M., Khan, M., Haseeb, M., Hardi, I., Noviandy, T. R., & Idroes, R. (2024). Exploring the role of geothermal energy consumption in achieving carbon neutrality and environmental sustainability. *Helijon*, 10(23). <https://doi.org/10.1016/j.helijon.2024.e40709>

Jatmiko, B. W., Pratama, H. B., & Sutopo. (2021). Updated Numerical Model of Mataloko Geothermal Field. *IOP Conference Series: Earth and Environmental Science*, 732(1). <https://doi.org/10.1088/1755-1315/732/1/012024>

Jemadin, S. (2024). Dilemma of Geothermal Development in Flores Manggarai: Blessing or Curse? *Jurnal Ilmu Sosial Politik & Humaniora*, 7(2), 01–12. <https://doi.org/10.36624/jisora.v7i2.170>

Jones, M., & McBeth, M. (2010). A Narrative Policy Framework: Clear Enough to Be Wrong? *The Policy Studies Journal*, 38(2), 01–25. <https://www.proquest.com/scholarly-journals/narrative-policy-framework-clear-enough-be-wrong/docview/210543073/se-2?accountid=13771>

Kassem, M. A., & Moscariello, A. (2025). Geothermal energy: A sustainable and cost-effective alternative for clean energy production and climate change mitigation. In *Sustainable Futures* (Vol. 10). Elsevier Ltd. <https://doi.org/10.1016/j.sfr.2025.101247>

Lazuardy, A., Nurcahyo, R., Kristiningrum, E., Ma'aram, A., Farizal, Aqmarina, S. N., & Rajabi, M. F. (2024). Technological, Environmental, Economic, and Regulation Barriers to Electric Vehicle Adoption: Evidence from Indonesia. *World Electric Vehicle Journal*, 15(9). <https://doi.org/10.3390/wevj15090422>

Macho, S., & Castrillo, P. (2001). *An Introduction to the Economics of Information: Incentives and Contract*. Oxford University Press.

Miles, M., & Huberman, M. (2014). *Qualitative Data Analysis: A Methods Sourcebook*. Arizona State University.

Ouattara, A., Azhaari, R. N. N., Hu, A. H., Kuo, C. H., & Huang, H. (2024). Comparative Life Cycle Assessment Study on Carbon Footprint of Water Treatment Plants: Case Study of Indonesia and Taiwan. *Sustainability (Switzerland)*, 16(19). <https://doi.org/10.3390/su16198409>

Pardamean Siringoringo, L., Situmeang, Z., & Meka, N. (2025). Central Sumatra Basin: The First Sedimentary Basin for Geothermal Energy Development in Indonesia? *Rudarsko Geolosko Nafni Zbornik*, 40(1), 1–12. <https://doi.org/10.17794/rgn.2025.1.1>

Prasad, R. D., & Raturi, A. (2022). Techno-economic analysis of a proposed 10 MW geothermal power plant in Fiji. *Sustainable Energy Technologies and Assessments*, 53. <https://doi.org/10.1016/j.seta.2022.102374>

Pulungan, L., Ashari, Y., & Wicaksana, I. K. (2019). Preliminary study potential of heavy metals in geothermal sludge. *Journal of Physics: Conference Series*, 1375(1). <https://doi.org/10.1088/1742-6596/1375/1/012063>

Rachimoellah, M., Lubis, P. H., & Utimadini, N. J. (2024). Digital Activism and Political Change: Challenges of Social Media's Impact on Political Development. *Jurnal of Middle East and Islamic Studies*, 11(2), 1–22. <https://doi.org/10.7454/meis.v11i2.177>

Rivelino Duta Muhammad, R., Pratami Putri Yogandari, A., Aunurrofiq, M., Riyan Suryansyah, A., Hendri, H., & Marza, S. (2022). Social Impact Management of Land Clearing Process in Dieng 2 Sub-Project, PT Geo Dipa Energi (Persero). *IOP Conference Series: Earth and Environmental Science*, 1014(1). <https://doi.org/10.1088/1755-1315/1014/1/012018>

Semedi, J. M., Willemen, L., Nurlambang, T., Van Der Meer, F., & Koestoer, R. H. (2018). Developing a framework for assessing the impact of geothermal development phases on ecosystem services. *IOP Conference Series: Earth and Environmental Science*, 103(1). <https://doi.org/10.1088/1755-1315/103/1/012003>

Shanahan, E. A., Jones, M. D., & McBeth, M. K. (2018). How to conduct a Narrative Policy Framework study. *Social Science Journal*, 55(3), 332–345. <https://doi.org/10.1016/j.soscij.2017.12.002>

Singgalen, Y. A., Sijabat, R., Widayastuti, P., & Harnadi, A. (2022). Community Empowerment and Social Welfare Development through Social Entrepreneurship. In *Jurnal Studi Sosial dan Politik* (Vol. 6, Issue 2).

Suhendra, S., & Laraskana, T. N. (2024). Analisis Penggunaan Media Sosial Instagram Dalam Meningkatkan Kesadaran Dan Partisipasi Pengguna Terhadap Layanan LRT (Light Rail Transit) Sumatera Selatan. *Jurnal Publisitas*, 10(2), 226–233. <https://doi.org/10.37858/publisitas.v10i2.383>

Sulaiman, A., & Studi Pascasarjana Manajemen Komunikasi, P. (2024). Media Digital dan Gerakan Sosial: Analisis Logika Aksi Konektif. In *Jurnal Indonesia : Manajemen Informatika dan Komunikasi (JIMIK)* (Vol. 5, Issue 2). <https://journal.stmiki.ac.id>

Sumotarto, U., Yunis, Y., Hendrasto, F., Pudyastuti, K., Sammuel, E. R., Rizky, D., & Nayoan, A. G. P. (2021). Geothermal Well Targeting in Consideration to Geological Structures of Mataloko Field, Flores. *IOP Conference Series: Earth and Environmental Science*, 819(1). <https://doi.org/10.1088/1755-1315/819/1/012019>

Sundjaja, A. M., Lumangaol, F., Budiarti, T., Abbas, B. S., Abdinagoro, S. B., & Ongowarsito, H. (2017). The Role of Social Media User Experience as a Mediator for Understanding Social Media User Behavior in Indonesia's Museum Industry: Literature Review. *Journal of Physics: Conference Series*, 801(1). <https://doi.org/10.1088/1742-6596/801/1/012052>

Yudha, S. W., Tjahjono, B., & Longhurst, P. (2022). Sustainable Transition from Fossil Fuel to Geothermal Energy: A Multi-Level Perspective Approach. *Energies*, 15(19). <https://doi.org/10.3390/en15197435>