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Social Acceptance: Mapping the Perspectives of Stakeholder in the Development of Geothermal Power Plants in West Sumatra, Indonesia

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ABSTRACT

The Indonesian government is pushing for an increase in the development of geothermal power plants. West Sumatra is one of twenty provinces in Indonesia that have geothermal potential. The government has given the company permission to develop geothermal potential in two districts in West Sumatra. Phase I development has been successfully carried out in South Solok Regency, while Solok Regency has experienced problems. Social acceptance is one of the determining factors for the success of the project development. This article aims to look at the perspectives of stakeholders around the geothermal field, and analyze the social acceptance of a geothermal power plant project in West Sumatra. This research uses case study research method. Data collection is done by interview, observation, and document studies (such as Environmental Impact Assessment documents, government regulations on geothermal, and local media news). The results show that there are variations in stakeholder perspectives regarding geothermal power plants. Public acceptance of the geothermal power plant in South Solok Regency is relatively good because the company positions the surrounding community as partners. Social acceptance at the project site in Solok Regency was relatively weak and there was a resistance movement. Socio-political acceptance (by various stakeholders such as the Provincial Government, Regency Government, Nagari Government, and Regional House of Representatives) tends to be substantial due to the multiplier effect of development. This study has limitations in looking at the dynamics of local politics, which are the determinants of support, and the readiness of the Regional Government to face the rejection phenomenon at the local level. This is an input for further research, because in this study it was found that social acceptance requires the support and readiness of the Regional Government. So that the rejection by the local community can be resolved, so that the extraction of electrical energy goes according to the government's target, and the rights of the local community in the project site area are fulfilled.

1. INTRODUCTION

The Indonesian government encourages the development of geothermal power plants to meet energy needs and is committed to the Paris Agreement [1, 2]. The Indonesian government targets the contribution of geothermal power plants to the national energy mix to reach 7.241MW in 2025 and 17.600MW in 2050 [3]. Considerations for developing geothermal power plants are: the amount of energy potential (Indonesia has 40% of the world's total geothermal energy) [4, 5]; low emission compared to fossil energy [6, 7]; is renewable, and resilient (not affected by seasons) compared to other renewable energies [3, 8].

The Government of Indonesia has prepared various policies to increase geothermal energy utilization for power generation. These policies include: making regulations permitting geothermal utilization activities in protected forest areas and conservation areas; providing attractive feed-in electricity tariffs for development companies; establishing a Geothermal Fund Facility (GFF) to provide information on the costs of initial geothermal development; uniform licensing, as well as withdrawing the authority for geothermal management from the regional government to the central government [8].

The Government of Indonesia's efforts has been quite successful. Based on data on the installed capacity of geothermal power plants, it shows an increasing trend from 1.403,5MW (in 2014) to 2.130,7MW (in 2020), and Indonesia is the second-largest geothermal producer in the world (beating the Philippines in 2018) [3, 9]. However, the Government of Indonesia's targets tends to be ambitious, given that the rate of addition of geothermal power generation capacity is not significant [10-12], and constrained in project development. Of the two Geothermal Working Areas (in Indonesian, it is called WKP) in West Sumatra Province tendered by the government to be developed, South Solok Regency has completed the unit I project (in production). Meanwhile, for WKP in Solok Regency, the company has not yet completed its exploration (± five years since the geothermal permit was granted, exploration activities have not been completed). The issue of social acceptance appears to be a constraint to the construction of power plants at the local level.

Social acceptance of geothermal is weaker than other renewable energies. The good news is that geothermal energy tends to be more easily accepted by the public than energy sourced from fossils [13]. However, acceptance by the public tends to differ from the approval of the local community. The first wave of social acceptance researchers stated that local people tend to be very objectionable because geothermal extraction activities are nearby. This phenomenon is known as NIMBY (Not in My Backyard) syndrome. The community will support government programs in the use of renewable energy but refuse development in their area, and this causes development delays [14-16].

Many studies have discussed the rejection of constructing a geothermal power plant (in Indonesia, called PLTP) at the project site. Researchers generally explain local community resistance using the viewpoint of resistance, social movements, and conflicts (conflicts of interest between actors). Some of these studies include: 1) Santoso & Kusumasari (2019) examining the resistance movement carried out by the Save Slamet Alliance against the construction of a Geothermal Power Plant by PT. Sejahtera Alam Energi, on Mount Slamet, Central Java [17]; 2) Research conducted by Yolanda et al. (2021) about the women's movement against the PLTP development plan developed by PT. Hitay Daya Energi in Solok Regency, West Sumatra [18]; 3) Muldi (2021) conducted a study of the rejection of the surrounding community towards the development of PLTP carried out by PT. SBG in Wangun Village, Serang Regency, Banten Province [19]; 4) Simatupang et al. (2018) studied the conflict between local communities and the geothermal development company PT. Sarulla Operational Limited for alleged environmental pollution [20]; 5) Public rejection of the PLTP development plan on Mount Ciremai, Kuningan Regency, West Java, and on the slopes of Mount Lawu, Tawangmangu, Karanganyar Regency, Central Java [21]; 6) Study of changes in community support from Idamdehe Village, West Halmahera Regency for PLTP development. The local community initially supported PLTP, then changed its decision to reject it. They are worried about the environmental impact caused by the company PT Star Energy Geothermal Halmahera [22]; 7 Research on the strategy of civil society in developing a discourse against the construction of the Gunung Talang-Bukit Kili PLTP, Solok Regency, West Sumatra [23].

The seven studies are very good at explaining the basis of community resistance to PLTP development and analyzing social movements. However, the study did not pursue findings of the project's potential to work with local community rights in mind. Studies like this are needed to find ways to make the project's presence acceptable to local communities. The social acceptance framework offers an alternative perspective, seeking to balance energy extraction activities with recognizing the rights of local communities.

Studies of social acceptance in the geothermal field tend to vary. Based on the study subjects, some studies examine the public perspective (people who do not live in the project site area) regarding geothermal development [13], and some are looking at it from the perspective of the local community living around the project site [24-26]. Spatially, the resistance tends to be strong in the community around the project site area. From the framework used, some studies look at the issue of social acceptance from a macro perspective [24]. In contrast to previous studies, this study looks at the perspectives of various stakeholders around the geothermal field and examines social acceptance using the perspective of second-wave social acceptance or criticism approaches (read more about Batel [14]). This approach is used with the following considerations: 1) The local community around the project site has a perspective that geothermal development impacts them, thus rejecting the project, so the rejection is not because they don't care about the environment (different from the perspective of the first wave of social acceptance); 2) This paper states that geothermal development is needed to meet the increasing energy demand and resistance constraints at the local level can be overcome if the rights of local communities are fulfilled.

The aims of this research are 1) to map the stakeholders and their perspectives on the development of geothermal power plants in West Sumatra; 2) to analyze social acceptance in geothermal fields in West Sumatra. This article is expected to contribute to overcoming resistance at the local level. So that the government's target of increasing the contribution of renewable energy (especially geothermal development for indirect use) in the national energy mix, which is stated in the General National Energy Plan (Presidential Regulation No. 22 of 2017), can be achieved.

2. LITERATURE REVIEW

Social acceptance in this study is defined as the willingness of various stakeholders to approve the construction of a geothermal power plant. The study of social acceptance starts from the initial assumption that ideally, renewable energy is easy to get public support. Most developers and authorities think their activities are not a problem because people tend to accept renewable energy easily. This is not the case at the project site; there is opposition (rejection) due to NIMBY syndrome [16]. The point of view of this social acceptance study is how to make the existence of a project acceptable, especially in local communities, as affected parties.

This study uses the second wave of social acceptance framework. Batel (2020) classifies social acceptance studies into three categories: 1) The first wave of social acceptance research in the 1990s was called the normative approach. They see local community resistance as the NIMBY syndrome, selfishness that does not consider the benefits of building a project and is labelled irrational. The expected implications of social acceptance research using this normative approach are to overcome resistance to the development of renewable energy (in this paper, geothermal power plants); 2) The second wave, starting in the 2000s, is said to have used a criticism approach. Social acceptance researchers criticize NIMBY and argue that it is necessary to understand local community opposition (using the community's point of view). So, in this criticism approach, procedural justice and distributive justice are studied to increase social acceptance; 3) The third wave, social acceptance research in the 2010s, used critical approaches. Researchers from this group are ideologically critical of developing renewable energy, which is seen as the workings of the neoliberal capitalization system. So, they tend to be reflective in questioning whether the opposition should be reduced/overcome [14]. These three classifications of social acceptance research are not mandatory based on the most recent emerging perspectives. This classification is only to map the perspective used by researchers. This article uses a criticism approach (second wave) to examine the practice of procedural justice and distributive justice in the geothermal field of West Sumatra.

Examining the dimensions of social acceptance, using the ideas offered by Wustenhagen et al. [16]. Social acceptance has three dimensions: Socio-Political Acceptance, Community Acceptance, and Market Acceptance. Socio-political acceptance highlights at the macro level, such as energy policies set by the government, technology that is acceptable to society, acceptance from key stakeholders. The acceptance of the community at the project site (local level) to find distributive justice (such as applying the principle of justice delivered by the development company, using a cost and benefit perspective for the community around the project area), as well as procedural justice (highlighting the involvement of all stakeholders at the local level in decision-making) [16, 27]. The definition of distributive justice refers to the perceived fairness of the distribution of outcomes. In this distributive justice, there is an attempt to identify extraction activities that do not pose risks and dangers to local communities. Procedural fairness is defined as the perceived fairness of the procedures used in making decisions about the distribution of outcomes [28, 29]. Market acceptance is the acceptance of renewable energy products seen from consumers, investors and fellow companies [16]. Analyzing the social acceptance of geothermal power plant development in West Sumatra, the framework in Figure 1 below is used:

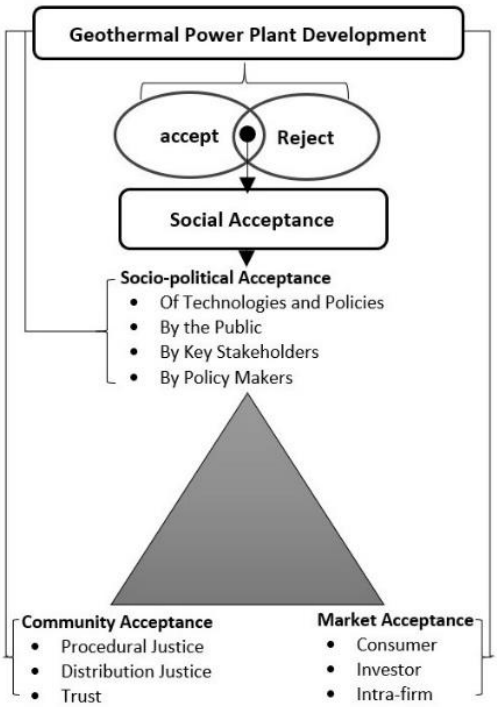

Figure 1. Social acceptance framework

Based on the framework above, whether a geothermal development project is accepted or not can be seen from three dimensions: socio-political acceptance, community acceptance, and market acceptance. If one of the dimensions does not work, for example, there are constraints on community acceptance, even though the other two dimensions work, the geothermal development project will be hampered.

3. RESEARCH METHOD

This research uses a case study method to see stakeholders' perspectives regarding geothermal development and analyse social acceptance. This study focuses on two districts in West Sumatra Province, designated as Geothermal Working Areas by the Government. This research uses a multi-case study (see Yin [30]) by selecting one location that has successfully developed a geothermal power plant while other locations have experienced problems. Solok South Regency is an area that has successfully developed a geothermal power plant phase I (has been generating electricity), and Solok Regency is an area that has obstacles in the exploration stage. These two areas have the same characteristics: rural communities with the majority working as farmers. However, the social acceptance of geothermal power plant development is different in these two areas.

Data was collected by interviewing various stakeholders, such as Provincial Government, Regency Government, Local Government (in West Sumatra known as Nagari Government), local communities, NGOs. The interviews were conducted semi-structured to examine the perspectives of each stakeholder regarding the development of geothermal power plants. Observations are made to observe activities and interactions between stakeholders. Documents are collected by browsing official government documents, such as Environmental Impact Analysis documents, government regulations regarding geothermal, regional spatial plans, and others. Besides that, local media news about geothermal development was also collected. The selected local media news is an online news port. The consideration of choosing online news media is because it is easily accessible by readers who have smartphones and internet connections. This effort is relevant because, based on 2019 data, 63.53% of Indonesia's population owns a cellular phone [31]. The selection of online media in West Sumatra is carried out using Alexa Rank (a website that provides valid information about online media rankings) [32]. Based on an Alexa Rank search, there are five major online media in West Sumatra: Harianhaluan.com; Klikpositif.com; Covesia.com; Hariansinggalang.co.id; and Minangkabaunews.com. Rankings tend to change, so media selection and news gathering are guided by the June 2020 Alexa Rank (the beginning of local media newsgathering). The process of searching for news in each online media is carried out using keywords (such as "*panas bumi*", "Geotermal", "Geothermal", "PLTP", "PLTPB", "Geothermal Work Area"). The use of keywords tends to be the same because there are variations in the way of writing ("*panas bumi*" and "Geotermal" is written in Indonesian; "Geothermal" is written in English; "PLTP" and "PLTPB" is a variation of writing for geothermal power plants.

Data analysis using NVivo software. The analysis process has started since the beginning of data collection. The results of interviews and observations were transferred in the form of transcripts. Then all transcripts of interviews, observations, official Government documents, and online media news are imported into the NVivo software. The process of codifying data and mapping each stakeholder's perspective is carried out on the NVivo device. Next, the data in words and visualizations are presented [33, 34].

4. FINDING

4.1 Geothermal potential in West Sumatra

West Sumatra is one of twenty provinces in Indonesia, designated as an area with a Geothermal Working Area

(WKP). The government has established three WKP in this province to produce geothermal energy. The Geothermal Working Areas are: *First*, the Bonjol WKP in Pasaman Regency, which was found on April 21, 2011, in WKP Decree No. 1150K/30/MEM/2011. This WKP has an area of 10,100 ha. Research on geothermal potential in this area has been carried out since 1949 by Van Bemmelen in his geological studies throughout Indonesia. The following analysis was carried out by Nikmatul Akbar from the Directorate of Volcanology in 1972 and 1980, aiming to inventory and initial investigate geothermal phenomena in West Sumatra [35]. Geothermal sources in Bonjol can be identified by surface manifestations (the emergence of hot springs with a temperature of 49.7-87.9°) and an estimate of a medium-temperature geothermal reservoir of ±180°C [36, 37]. The Ministry of Energy and Mineral Resources (in Indonesia, called Kementerian ESDM) has offered the Preliminary and Exploration Survey Assignment Area (in Indonesia, called WPSPE) for this potential. However, no development company has yet explored the area at the end of this research.

Second, WKP Gunung Talang – Bukit Kili in Solok Regency. The government established this WKP on June 3, 2014, in the WKP Decree No. 2777K/30/MEM/2014, with an area of 27,000 ha. The reservoir temperature is estimated to be ±200ºC. On February 23, 2017, a consortium of development companies obtained a geothermal permit Number 2/1/IPB/PMA/2017 [35, 38, 39]. When the development company started exploration activities, it was rejected by the community at the project site [18, 23, 40, 41]. This refusal caused exploration activities to be delayed. The research findings show that a wave of rejection emerged during 2017-2018. In 2019 there tends to be no resistance by the local community. The development company had conducted a preliminary study at the location. However, the company has not resumed exploration activities (until now-ed).

Third, Liki Pinangawan WKP – Muara Laboh, South Solok Regency. This WKP was established on November 24 2014, as stated in the WKP Decree No. 4112K/30/MEM/2014. This WKP has an area of 62,300 ha. This area is identified as having geothermal resources with the manifestation of Sapan Malulong hot springs. The estimated temperature of the geothermal reservoir is 210-320°C [42]. On July 23, 2015, this WKP was granted a Concession Permit to the developer company through Decree No. 3415/K/30/MEM/2015 [35]. Long before the concession permit was issued in South Solok, this company had conducted a preliminary geothermal survey at the site based on the Decree of the Minister of Energy and Mineral Resources Number 0128K/30/MEM/2008 [43]. Currently (in 2022), the company has completed the development of phase I by producing 85MW and will continue phase II with an estimated installed capacity of 65MW [9].

Other geothermal potentials are found in six regencies in West Sumatra Province. The six regencies show the characteristics of storing geothermal potential from the emergence of heat potential on the surface (hot water appears). There are 12 potential points spread across six regencies in West Sumatra, namely: a) Cubadak, West Pasaman Regency, estimated reserves of 70 MW; b) Talu, West Pasaman Regency, with a hypothetical 8MW resource; c) Lubuk Sikaping, Pasaman Regency, 100MW of speculative resources; d) Panti, Pasaman Regency, is estimated to have reserves of 25MW; e) Simisuh, Pasaman Regency, is estimated to have reserves of 57MW; f) Koto Baru Merapi, Agam Regency, 25MW speculative resources; g) Maninjau, Agam Regency, with 25MW of speculative resources; h) Pariangan, Tanah Datar Regency, with a potential reserve of 31MW; i) Talago Biru, Tanah Datar Regency with a hypothetical 27MW resource; j) Si Tujuh, Lima Puluh Kota Regency with a speculative resource of 25 MW; k) Sumani, Solok Regency with estimated reserves of 52MW; l) Surian, Solok Regency has 75MW of speculative resources [35].

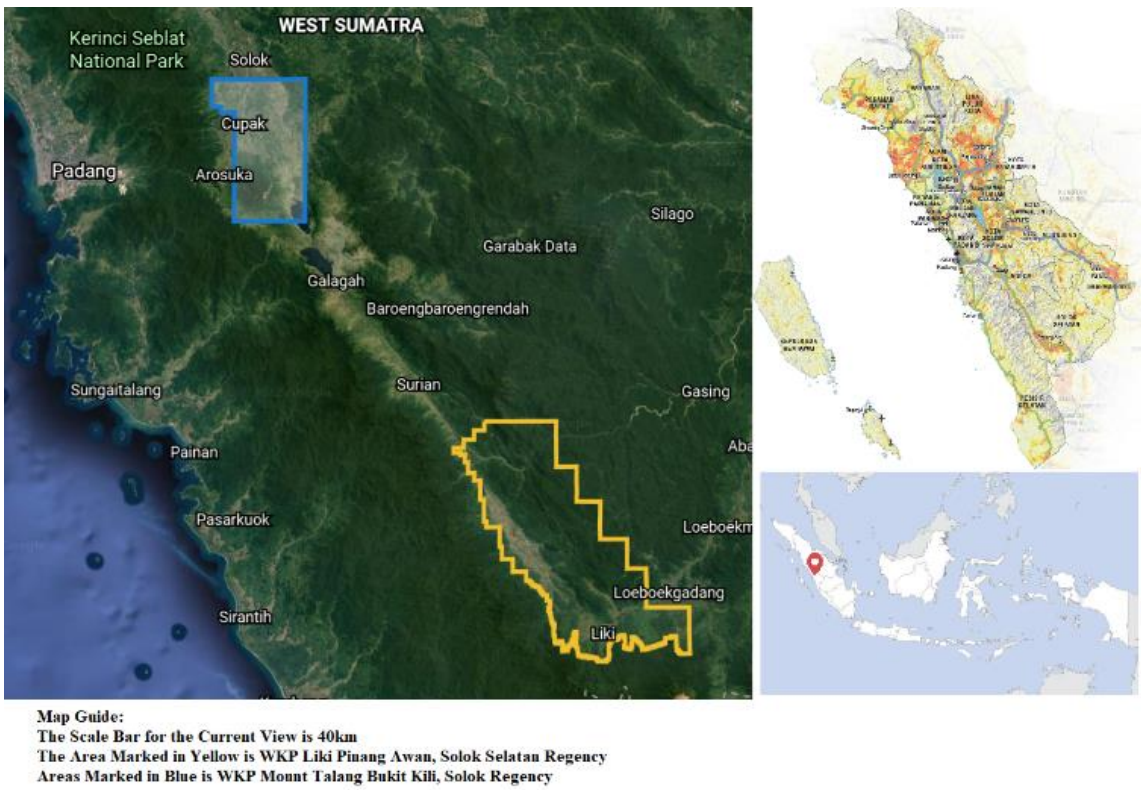

Figure 2. Map of Geothermal Working Areas in South Solok Regency and Solok Regency

The two regencies designated as WKP, and the developer company has been granted permits to extract geothermal energy, are located in South Solok Regency and Solok Regency. The locations of the two WKPs can be seen on the map of Figure 2.

The yellow area is the Liki Pinangawan Muara Laboh WKP, South Solok Regency, which has successfully developed phase I geothermal power plants. The blue area is the Gunung Talang WKP - Bukit Kili, Solok Regency, which experienced problems at the initial survey stage of activities exploration.

4.2 Stakeholders and perspectives regarding the development of geothermal power plants

The research findings show various stakeholders in the two geothermal development project locations. These stakeholders consist of Central Government, Provincial Government, Regency Government, Local Government (referred to as Nagari Government in West Sumatra Province), companies, and local communities. In the case of developing a geothermal power plant in Solok Regency, there is the involvement of Non-Governmental Organizations (NGOs) and experts.

Before explaining the stakeholders' perspective, it is necessary first to explain the role of each stakeholder regarding the development of geothermal power plants. In Indonesia, the authority to organize geothermal activities for indirect use (geothermal power plants) is the authority of the Central Government. Previously, from 2003 to 2014 (before 17 September 2014), the head was held by the Regional Government, including making regulations, organizing tenders, licensing, and supervising (See Hermanto and Narindo [44]). However, the limitations of the Regional Government make the authority withdrawn by the Central Government). Then, after the enactment of Law No. 21 of 2014 concerning Geothermal, the central government has the power, such as: make national policies around energy; make arrangements in the geothermal field; geothermal grant permits; guidance and supervision; carry out exploration, exploitation, and utilization of geothermal activities (See article 6, Law No. 21 of 2014 concerning Geothermal). Provincial governments provide support for Central Government policies such as: making a Regional Energy General Plan based on the National Energy General Plan, granting environmental permits for exploration and exploitation activities in the administrative areas under their authority, and supervising the activities of geothermal power plants projects. The company is the holder of a geothermal permit, selected through a tender mechanism by the central government, to carry out a series of exploration, exploitation and utilization activities in the Geothermal Working Area. Before 2000 the companies that were given the authority to develop geothermal were state-owned companies (such as *Pertamina* and the State Electricity Company) [11]. But now, there are opportunities for domestic and foreign investors to build. The local government assists the coordination process between the Provincial/ Regency government and the local community in the project site area. Local communities live in the project site area (around and within the geothermal working area).

The involvement of NGOs only occurred in Solok Regency, not during development in South Solok Regency. The involvement of NGOs began to emerge when the local community discussed plans to develop a geothermal power plant in the Solok Regency area. The research findings show that the involvement of NGOs as advocates helps local communities to obtain rights related to the existence of the project. Relations between local communities and NGOs had existed long before the geothermal development plan was socialized to local communities. Then, the presence of NGOs as advocates can strengthen local communities to fight for their rights. The research findings also show that the choice of local communities to reject geothermal development is a choice based on awareness of the potential impacts of geothermal development.

The involvement of experts was also evident during the development of a geothermal power plant in Solok Regency. The involvement of these experts in their capacity as scientists who know about geothermal development is used as a reference by the Regional Government, Companies, Local Communities, and NGOs. Experts who have a perspective on the benefits of geothermal development become a reference for local governments and companies. So that the local government and companies state that the geothermal effect is beneficial starting at the national, regional and local levels. Expert opinions criticizing fracking practices, and methods of overexploitation, were referred to by local communities and NGOs. This expert information is used to strengthen the argument against geothermal development in Solok Regency.

The research findings show that there are two perspectives regarding geothermal development that the stakeholders own in outline. The Central Government, Regional Governments, Nagari Governments, and development companies believe that geothermal development benefits the economic sector and the environment. The local community in South Solok Regency at the beginning of the project had concerns that the project would impact the economic, social, and environmental lives of people living in and around the project site area. The South Solok Regency Government appeased the local community's concerns so that there was no escalation of the conflict. Trust in Local Government by the local community and the partnership approach chosen by the development company make the initial worries of the project subside. Unlike the case in Solok Regency, the local community's concerns have been transformed into a resistance movement. So, in the case of Solok Regency, local communities and NGOs have the perspective that geothermal development can have a negative impact on local communities in the economic, social, and environmental sectors.

The Central Government, Regional Government, and Nagari Government have the same perspective that the development of geothermal power plants is beneficial, so it needs to be developed. The Government's point of view is 1) The development of geothermal power plants is profitable in the economic sector, such as a) Increasing Regional Original Income; b) Increasing the realization of investment; c) Utilization of local energy, encouraging increased investment; d) Open job opportunities that prioritize local workers; e) The existence of development companies in the regions creates a multiplier effect; f) The local community will benefit from the Corporate Social Responsibility program run by the company; 2) The advantages of developing geothermal power plants in the environmental sector are: a) Potential areas, contribute to increasing the installed capacity of geothermal power plants so that the target for the contribution of renewable energy in the national energy mix is achieved; b) Achieving the goal of energy security, by prioritizing the use of local energy resources, as well as renewable and sustainable. c) Reducing greenhouse gas emissions.

The Regional Government shows its seriousness in encouraging the development of geothermal power plants in West Sumatra. As the Regional Head, the Governor of West Sumatra for the 2010-2015 and 2016-2021 periods has made various efforts to promote geothermal potential to attract investors. On several occasions, the West Sumatra Provincial Government has encouraged geothermal investment opportunities, such as 1) On the side-lines of attending the 2017 General Food and Drink Trade Fair in Germany, the Governor conveyed investment opportunities in the geothermal energy sector (i); 2) In the Regional Investment Activities in West Sumatra which are participated by investors, the Regional Government promotes the potential of geothermal energy owned (ii); 3) When visiting Chicago, United States of America (iii); 4) West Sumatra Diplomatic Tour which was attended by 25 Ambassadors of various countries to explore investment opportunities in West Sumatra (iv); 5) Governor's Presentation on Investment Potential in West Sumatra, Los Angeles, United States of America (v); 6) Investment potential in West Sumatra (including geothermal) was also conveyed by the Governor at the Indonesia Australia Business Summit (IABS) (vi). The efforts of the Governor of West Sumatra are also in line with the Deputy Governor, as well as at the Regency level. The government of South Solok Regency, and Solok Regency, has a perspective that the development of geothermal power plants has benefits in the economic and environmental sectors. So that this project is beneficial for all parties (State, geothermal producing regions, companies, and local communities).

The Government's perspective on the benefits of geothermal development is disseminated in local media news. The narratives conveyed by the Central Government, Regional Governments, and Local Governments in local media news focus on economic and environmental benefits. Based on local media news searches, the top five ideas surrounding the development of geothermal power plants were most frequently voiced, namely: environmentally friendly projects; encourage the availability of electrical energy; increase local revenue; improve the economy at the local level, and; local community benefit from the provision of Corporate Social Responsibility (CSR). Figure 3 shows the benefits of geothermal development being voiced in the local media.

The narrative about the economic and environmental benefits of developing geothermal power plants in local media shows the Government's position as the initiator and a means of campaigning for the benefits of energy development. Then, this narrative of economic and environmental benefits tends to be widely voiced because the local media quoted the Government's statement. The research findings also show that most of the local media editorial boards at the research site are neutral (not having political interests and reporting according to the journalistic code of ethics).

The development company expects support from various stakeholders for the smooth running of the project, given the considerable costs and risks of exploration [4]. When a company decides to get involved in a geothermal development project, they are prepared financially and take risks to benefit from the extraction activities. The tendency for companies to take a long time to carry out a series of exploration, exploitation and production activities, and the principle of renewable energy, make companies need support from various stakeholders. With business practices carried out by companies, they expect profits, the State benefits from taxes and profit-sharing mechanisms, and local communities also benefit from company activities (one of which is a social responsibility as regulated in Law No. 21 of 2014).

The company's perspective on geothermal relates to development challenges. A geothermal power plant development company in South Solok Regency stated that the challenges in development were: 1) Determining the purchase price agreement for electricity with PLN; 2) The initial investment cost is quite significant due to the cost of building infrastructure to the site; 3) Drilling challenge (Of the six drillings carried out by the company, three wells were successful, three more failed). The development company was able to face these obstacles, so it succeeded in carrying out the first phase of development, which produces 85MW of electrical energy, and will proceed to phase II. The success of the production carried out by the company cannot be separated from the support of the Government, Regional Government, Local Government, Regional People's Representative Assembly, and Local Communities. In contrast to what happened in South Solok Regency, development companies in Solok Regency tend to highlight the weak support from the local community. Community Acceptance is a challenge to continue exploration activities in the area.

The perspective of local communities and NGOs on developing geothermal power plants in Solok Regency focuses on potential impacts. Local communities in Solok District and NGOs highlighted the project's economic, social, and environmental impacts. The land acquisition process is the potential economic impact that is feared. Although there is a sale and purchase transaction in the land acquisition process, this condition is considered detrimental to the local community. If the acquired land is agricultural, it is possible to change livelihoods. Then, if the acquired land is where the local community lives, it takes time to find a new place to live, and a transition occurs until the life of the local community returns to normal. The project's social impacts felt by local communities are: There was a horizontal conflict between the local community who agreed and the local community rejecting the project. This condition interferes with the integration of local communities in the project site area. Besides that, vertical conflict is also inevitable in the area. Then, the environmental impacts highlighted by local communities and NGOs are project activities that cause gas emissions released into the atmosphere, land subsidence, earthquakes, and others.

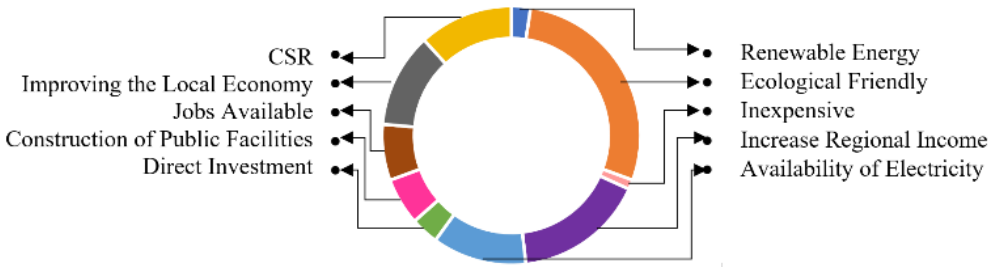

Figure 3. Percentage of benefit narratives of geothermal development presented by stakeholders

The local community living around the project hopes that the extraction activities will not harm them. Although challenging to fulfil, within the framework of social acceptance, it is necessary to apply distributive justice and procedural justice (to achieve harmony between extractive activities and safeguard the rights of local communities). Then NGOs in Indonesia are in a position to support community rights to natural resource management [45]. Therefore, NGO advocacy is often found in local communities living in extractive industry project locations, including Solok Regency.

Differences in perspective between the government and the Company, with local communities and NGOs, empirically occur in developing geothermal power plants in Solok Regency. The advantages of geothermal power generation over fossil energy and its resilience compared to other renewable energies have been recognized and proven in the findings of experts [46, 47]. However, wisdom is needed to acknowledge that these projects also have an impact objectively. Various studies have discussed the effects of energy extraction [7, 13, 48-50]. If there is a neglect of the perspective of the local community and NGOs, it can cause problems in the future, and this happened in the case in Solok Regency. The provincial government is not ready to face this difference of opinion. So, when there is resistance at the project site, NGOs are suspected of provoking local communities to object. The view of the Provincial Government is stated in the following quote: “The Deputy Governor of West Sumatra reminded NGOs not to provoke the public with environmental issues, rejecting investment in West Sumatra. He hopes that in the future, there will be no more organizations or NGOs that influence the community to hinder investment in the name of caring for the environment, such as the plan to build a geothermal power plant in Solok Regency” (vii).

The Governor of West Sumatra also conveyed the same thing, highlighting the local community's rejection because they have not received correct information or tend to be wrong (viii). Based on the statement from the Provincial Government, it is deemed necessary to confirm and ensure the truth of information about the potential impacts of developing geothermal power plants owned by local communities. A wise move is recognizing that the project is having an effect objectively. The government and companies are undoubtedly ready with a series of mitigation efforts to minimize these impacts. Theoretically, it tends to be easy to convey the need for transparency in providing information to local communities. Empirically the dynamics in the field are challenging to practice information transparency encourage social acceptance of the project. Efforts that need to be made by the government and companies are a) Uniform knowledge of policymakers (government) about projects, and can explain the primary considerations of the urgency of developing geothermal power plants; b) The company's ability to "negotiate" with the community and explain technical issues in a language that the community can understand; c) The control mechanism by the State runs, by applying the principles of transparency and fairness, overseeing the practice of energy extraction activities carried out by the company (even though the two are in a symbiotic relationship [51]).

The success of constructing a geothermal power plant in the South Solok Regency seems to be a breath of fresh air to achieve the energy mix target. The multiplier effect of energy projects is often used as an example by the government and companies that geothermal development has benefits. There has been no rejection of its impact on growth in the South Solok Regency. This condition is expected to be an example that power plant development projects can coexist with local communities. Figure 4 below is a stakeholder perspective on developing geothermal power plants in West Sumatra.

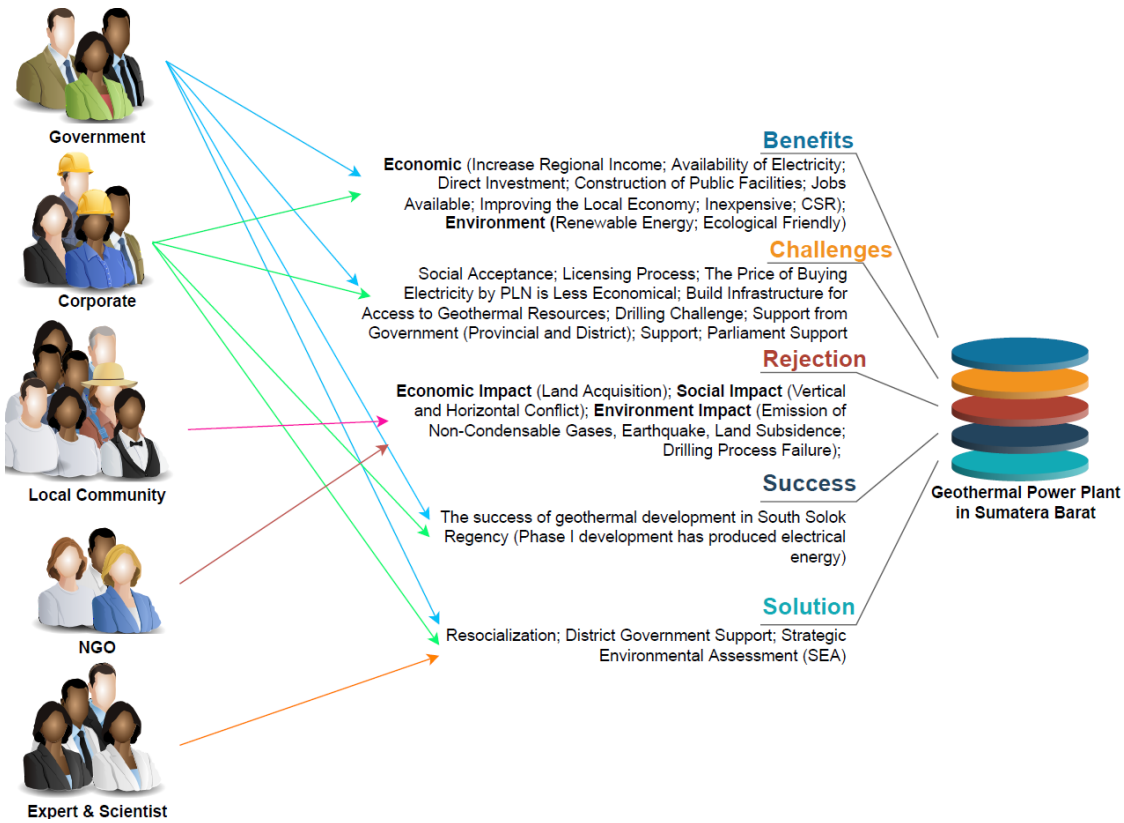

Figure 4. Stakeholder perspectives regarding geothermal power plant development

Based on Figure 4, there are five classifications of geothermal development perspectives. The perspective of benefits, and challenges, is the focus of the Government and development companies. The local community and NGOs refused because they were worried about the impact on the Solok Regency geothermal field. The success story of geothermal development is also the focus of the Government and development companies, related to production bonuses that South Solok Regency will receive; a series of CSR activities that the company has carried out, even these activities were carried out before the company entered the Commercial Operation Date (COD) stage. On various occasions, development companies in South Solok Regency have stated that the Company's success cannot be separated from the support of the Government and local communities.

Experts and scientists highlight the issue of geothermal development in Solok Regency, which is rejected by the local community. Efforts offered by experts to overcome this problem are by conducting a Strategic Environmental Study (in Indonesian, it is called KLHS). This assessment is carried out to ensure that geothermal extraction does not have the potential to damage the environment and harm the community. An environmental and economic evaluation is required (ix). From the government side, the resolution of the refusal is made by re-socialization.

4.3 Social acceptance in geothermal development in West Sumatra

Geothermal power projects work if the three dimensions of social acceptance offered by Wustenhagen et al. [16] work accordingly. If the wrong dimensions don't work well, it will affect the smooth running of the project. As in the case in Solok Regency, the dimensions of socio-political acceptance and market acceptance are not sufficient without the support of the local community (community acceptance). Unlike what happened in South Solok Regency, the three dimensions worked, so the phase I power plant development project successfully entered the production stage.

The socio-political acceptance surrounding renewable energy development in West Sumatra is the same as in Indonesia in general. The forms of socio-political acceptance of geothermal development are: 1) Some policies have been implemented to encourage the development of geothermal power plants. These policies include a) The Indonesian government has made a policy to increase the target installed capacity of geothermal power plants to 7,241MW in 2025 and 17,600MW in 2050 [1]. The Provincial Government of West Sumatra supports the Central Government's target, by increasing the target installed capacity of geothermal power plants by 250MW in 2025 (± 3.5% of the national target), and 950MW in 2050 or ± 5.4% of the national target (See Regional Regulation of West Sumatra Province No. 11 of 2019, concerning the General Plan of Regional Energy for 2019-2050); b) Make a policy to grant geothermal development permits in forest areas, so that there is no debate among government agencies (Regulated in Law No. 21 of 2014 on geothermal; and Regulation of the Minister of Environment and Forestry Number P.46/Menlhk/Setjen/Kum.1/5/2016, concerning Utilization of Geothermal Environmental Services in National Parks, Grand Forest Parks and Nature Tourism Parks); c) The policy is to set the highest benchmark price for the purchase of electricity from the developer company by the State Electricity Company (PLN) (See Regulation of the Minister of Energy and Mineral Resources Number 17 of 2014, concerning the Purchase of Electricity). This regulation generally regulates tariff ceilings and price variations between provinces related to local transmission access [52]. However, empirically, negotiations are necessary to reach an agreement, and sometimes the negotiation process takes a long time. The experience of developing companies in South Solok Regency states that they need four years in the negotiation process with PLN for buying and selling electricity (x); d) Other policies that encourage increased development of geothermal power plants (such as: establishing a Geothermal Fund Facility (GFF) to provide information on initial geothermal development costs; uniform licensing); e) Geothermal development policy in South Solok Regency and Solok Regency, following the Regional Spatial Planning in each region; 2) Development of geothermal power plants in West Sumatra, obtaining support from Politicians who serve in The House of Representatives of the Republic of Indonesia and the Regional Representatives Council.

The rejection in the geothermal field in Solok Regency tends to be highlighted by the Provincial Government as the lack of solid support from the Regency Government for this project. The statement by the Deputy Governor of West Sumatra for the 2016-2021 period, quoted by online media, stated that: "If there is a deviation (rejection by the local community), of course, the Regent/Mayor (Regency Government) will supervise, not just sitting in the office" (vii). This indicates that the Solok Regency Government is clumsy in facing the rejection of the local community (because it has no experience dealing with similar problems). The critical perspective tends to consider this situation where geothermal development does not have a political incentive for the Regency Government [52]. So, there is no visible effort to "calm" the rejection by the local community. Research findings indicate that the Solok District Government supports this project but has limitations in overcoming resistance. There was an attempt at dialogue between the District Government and the local community. Still, before an agreement was reached, the conflict escalated, triggered by the company's activities secured by the military. So, the socio-political acceptance remains in the geothermal power plant project in Solok Regency and South Solok Regency.

Market acceptance of energy is related to its renewable nature and relatively low price. The availability of pure energy sourced from renewable energy cannot be implemented in West Sumatra and Indonesia. Upstream energy sources are varied (some are sourced from renewable energy and sourced from fossils), mixed in the electricity transmission network. So that consumers who obtain electrical energy from PLN receive hybrid electricity from renewable energy and fossil energy (power plants sourced from fossil energy in Indonesia are still active). Then, the expectation of cheap energy prices is undoubtedly still a challenge because renewable energy must compete with conventional power [53, 54]. If the price of electricity sourced from cheap geothermal energy will reduce the developer company's interest in working on the project, considering the costs and risks that the company must face at the beginning of the project. If prices tend to be high, the State Electricity Company as the sole buyer, will find it difficult to provide electricity at low prices (to be affordable by the public). The middle path chosen by the government is the tariff ceiling as the highest benchmark for purchasing electricity by PLN. So, the market acceptance tends to be the availability of renewable energy (having a sustainable nature) and low prices.

The Community Acceptance Dimension is a challenge in any extractive industry project. Mary et al. [53] stated that in addition to socio-political acceptance, the community's will around the project site is needed to jointly build the nation by giving up land for geothermal power plants (of course with a fair buying and selling mechanism). This article emphasises that it is not easy for local communities to give up their land willingly (sometimes it becomes the only asset to fulfil their daily needs). Most local people at the project site in Solok Regency work in the agricultural sector (Based on 2019 data, 88.18% of the population work as farmers).

The results showed that the local community rejected geothermal development in Solok Regency because the three dimensions of community acceptance experienced obstacles. The three dimensions are: First, different procedural justice perspectives are shared by local communities and NGOs with the government. According to local communities and NGOs, before carrying out development, applying the principle of Free, Prior, and Informed Consent (FPIC) as a local community right recognized at the international level is necessary. In Indonesia, the state has authority over natural resources. This authority also protects community rights (including the project site area). Although not as broad as the requests regulated in FPIC, the rights of local communities are guaranteed by the state, such as: obtaining information about plans for developing geothermal power plants; the right to receive benefits in the form of social responsibility; the right to obtain appropriate compensation if there is an error in the project; and, the right to file a lawsuit there is a loss due to the project. Suppose the government understands procedural justice in providing information. The government understands distributive justice by providing information about the geothermal power plant development project in Solok Regency. After the socialization of community involvement related to land acquisition and a series of public consultations. Differences in procedural justice perspectives can be resolved by dialogue to equalize perceptions between the Government, Companies, Local Communities, and NGOs. Second, the local community has not thoroughly discussed the distribution justice dimension. This condition causes local communities to have the view that the company's existence has the potential to reduce the land they own and the potential environmental impacts caused by the project (such as possible exposure to SO2 and CH4 emissions; earthquakes; land subsidence; and failure in the drilling process). This community perspective shows that the distribution of justice is not precise, so it seems that the project incurs high costs that must be borne by the local community, not commensurate with the benefits they will get. The third is the dimension of trust that has not been established between local communities, development companies, and the government. However, the unfinished business was exacerbated by the choice of the development company to ask the police and military to secure the initial survey. So, in the case in Solok Regency, the discussion of procedural justice has not yet been completed. The company's choice to ask for assistance from the police and military led to an escalation of conflict. So far, no agreement has been reached, and exploration activities have not continued.

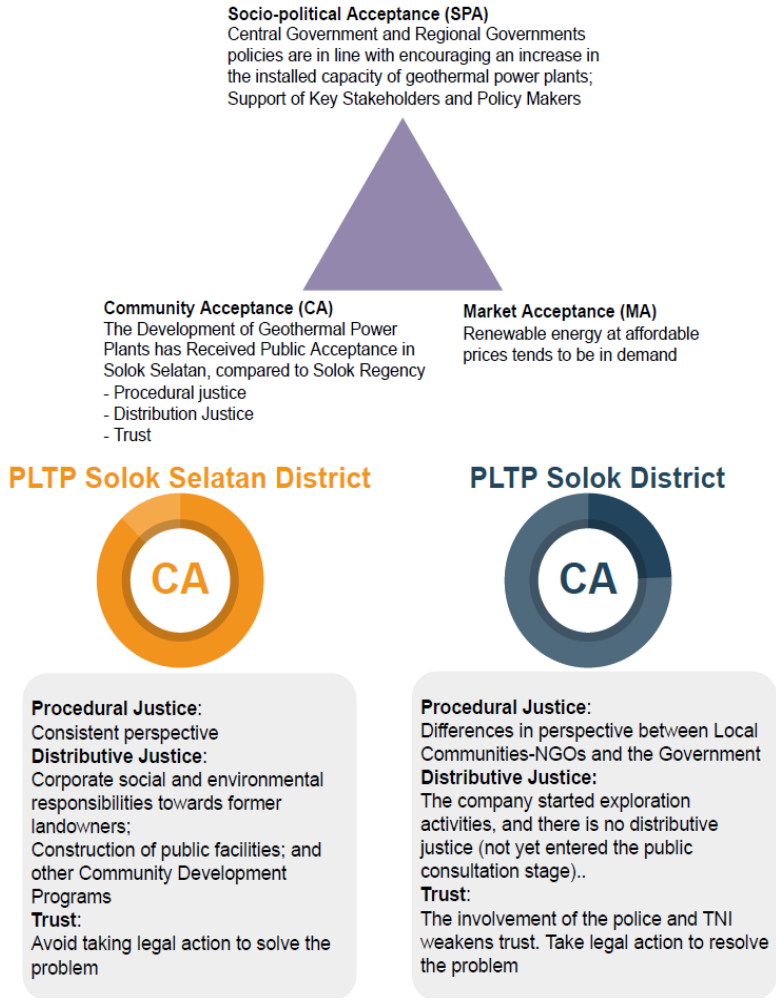

Figure 5. Social acceptance in the field of geothermal power plant development in West Sumatra

In contrast to Solok Regency, distributive justice in South Solok Regency can be seen from the company's social and environmental responsibilities towards former landowners. The land acquisition process does not appear to be just a sale and purchase transaction with the agreement of both parties. The company ensures a better economic life for former landowners. Companies have a moral responsibility to conduct studies and provide assistance to ensure that former landowners experience economic improvement (xii). Trust in the project can be seen in the company's efforts to avoid using legal channels to solve problems. For example, when a case of steam and water bursts occurred during the company's well testing process, a video of the blast was circulated on social media. The development company in South Solok Regency chose not to report the distribution of the video of the explosion. Through the company's Site Support Manager, the company's founder stated that video creators do not need to be reported because the local community is our family (the company). Companies must be able to coexist with the community (xiii).

Based on two cases of developing geothermal power plants in West Sumatra, Community Acceptance in South Solok Regency is going well, in contrast to Solok Regency. Figure 5 summarizes social acceptance at the project site.

The research findings show that Procedural Justice, Distributive Justice, and trust in the geothermal field in South Solok Regency can work because of the readiness of the Regional Government to deal with concerns at the beginning. The statement from the South Solok Regency Government guaranteeing that the project is safe and will not cause harm to the local community seems to be able to calm the local community's concerns at the beginning of the project being socialized. Then the partnership perspective adopted by the company (as seen in the practice of Distributive Justice) further strengthens the community's trust in the project.

5. CONCLUSIONS

The construction of the geothermal power plant was successful because of Socio-Political Acceptance, Market Acceptance, and Community Acceptance. Based on cases in two geothermal fields in West Sumatra, Community Acceptance has an essential role in the smooth running of the project. In line with Wustenhagen's opinion [16], the findings of this study also indicate that Procedural Justice, and Distributive Justice, need to be thoroughly discussed with the local community before the company carries out exploration activities. The synergy of the Regency Government (for WKP locations are in one Regency) with the development company is needed to build trust with the local community. Although the local community believes in the Regency Government, it is necessary to build trust between the development company and the local community. Positioning the local community as a partner is the keyword for the company to build trust.

Learning from the case of the construction of a geothermal power plant in Solok Regency, it is necessary to avoid using police services to secure company activities at the project site. It is understood that the development company wants exploration activities to be carried out immediately, considering there is a time limit in exploration and efficiency considerations. However, the choice of securing initial survey activities by the police and military was understood by local communities and NGOs as a form of intimidation, which led to resistance from local communities. The emergence of resistance from the local community is better addressed through dialogue until Procedural Justice and Distributive Justice are achieved, and the company has a perspective that the local community is their partner. Then the district government is required to be able to overcome the rejection. The most effective way is to open a dialogue room with the local community. So that the local community understands the primary considerations of the importance of developing this energy, it is necessary to clarify the local community's rights. People living in the site area will undoubtedly feel the impact, but this project must guarantee economic, social, and environmental security (discussed in the context of Distributive Justice).

This study ignores the cultural dimensions of the local community in the project site area. Further research has the opportunity to explore the relationship between social acceptance and the cultural dimension. Besides, this research also ignores the dynamics of local politics. In a democratic country like Indonesia, there is a leadership change every five years. The perspective of the Regional Government in this study represents the perspective of the Regional Government for the 2016-2021 period. There may be a change in the measures chosen by the new government to resolve objections in the project site area. This is a gap for further research to look at the dynamics of local politics and the efforts made to realize social acceptance of geothermal power projects.

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NOMENCLATURE

MW	Megawatts
WKP	Geothermal working area
PLTP	Geothermal power plant

APPENDIX

Media news sources listed in this article are those quoted directly. The list of media news sources is as follows:

i. Covesia.com. Dari Pameran UMKM Hingga Potensi Investasi di Sumbar, Gubernur Gaes Investor ke Jerman. October, 14 2017
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