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INDONESIA'S GEOTHERMAL CHALLENGES

2024

Amidst Potential and Exploitation
in the Name of Energy Transition



Parallel to mineral mining,
geothermal energy is also
a breeding ground for conflict
and a looming threat to
the livelihoods of the people.

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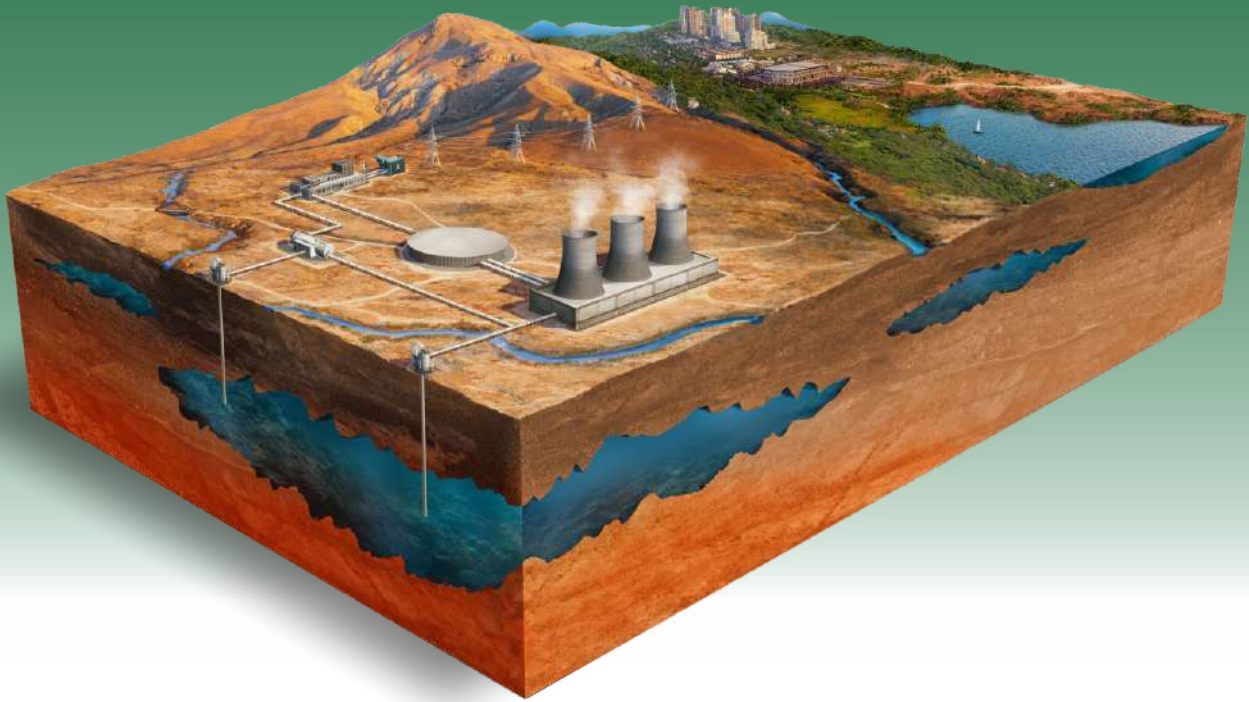
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EXECUTIVE SUMMARY



In the midst of the current climate crisis, the world is increasingly focused on establishing power plants that draw from renewable energy sources. The demand for sustainable, low-carbon energy sources has become compulsory. Among the array of energy sources, geothermal power, harnessed from the Earth's heat, is considered to meet these criteria. Indonesia, like many other nations, enthusiastically celebrates the vibrant development of geothermal energy as a renewable resource.

Nevertheless, it is essential to acknowledge that the journey of transforming geothermal energy into electricity is derived from an extractive process that demands considerable resources. Even in its implementation, it often gives rise to conflicts within communities. Stories of earthquakes, groundwater pollution, crop failures, the loss of endemic biodiversity,

and tragic incidents resulting from toxic gas explosions due to pipeline ruptures have unveiled the darker side of Geothermal Power Plants (GPP). Their presence seems intertwined with the irony revealed through the narratives of local inhabitants and various academic reports.

However, instead of conducting a thorough evaluation, the Government of Indonesia (GoI) remains resolute in its belief that geothermal power plants (GPP) are low in greenhouse gas emissions, persisting with the development of both existing and new GPP projects. Yet, throughout the construction and surface installation phases to operational processes, the greenhouse gas emissions can reach quantities equivalent to those of coal-fired power plants (PLTU). This implies that the claims of GPP being free from Greenhouse Gas (GHG) emissions remain unproven.

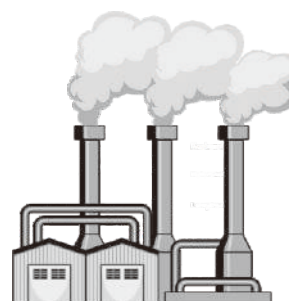
Not only does GPP pose environmental and social challenges, but it also inflicts financial losses. Based on economic modeling, GPP in three locations in East Nusa Tenggara (Wae Sano, Sakoria, and Ulumbu) risk causing a loss of farmers' income amounting to IDR 470 billion during the construction phase. Meanwhile, economic output losses will reach IDR 1.09 trillion in the second year of geothermal extraction. The workforce is estimated to decrease by 20,456 workers in the first year and 50,608 workers in the second year of the project. The presence of GPP in the first year will decrease productivity in agriculture, fisheries, and plantations, which have long been the lifeblood of the local economy. In the following years, an even wider array of economic sectors among the community will continue to decline.

To critically assess the impacts of geothermal exploration and exploitation, this report will present several analyses of Geothermal Power Plant (GPP) projects in various regions of Indonesia and other countries. The debate on their merits and drawbacks is inevitable, but one thing is

certain: both existing and planned GPP projects must undergo a comprehensive evaluation. Emphasizing justice and participation, GPP development plans should engage various stakeholders, especially local communities who are the custodians of their living spaces. There is an urgency for the redefinition of energy needs, reframed by grassroots communities rather than being solely determined by the government or deskbound academics.

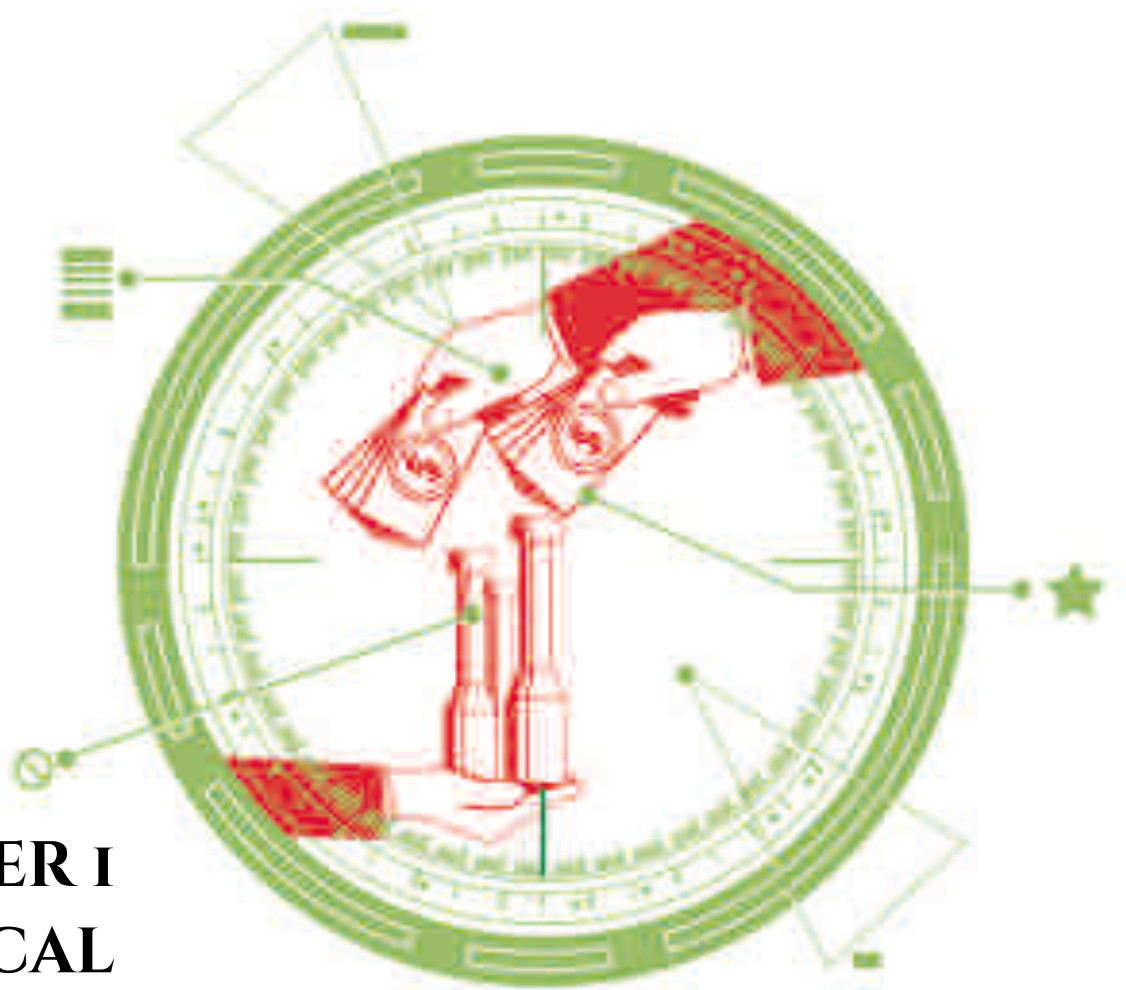
We extend our deepest gratitude to those who played a role in completing this report, providing valid sources, contributing their time for discussions, and offering alternative perspectives as foundations for viewing the complexity of the national energy transition landscape. To our readers, we recognize that this report is merely a beginning—a living document that can be continuously updated in line with the resilience of communities defending their living spaces from energy procurement projects that do not align with their needs. Therefore, we hope that this report will inspire the creation of other reports written with enthusiasm and supported by more up-to-date and comprehensive data to complement our presentation, which may have gaps.

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CHAPTER I POLITICAL AND ECONOMIC ANALYSIS ON GEOTHERMAL POLICY

Any form of regulatory constraints must be simplified, trimmed, and reduced. The government will invite the parliament to issue two major laws. First, the Job Creation Law. Second, the Empowerment of Micro, Small, and Medium Enterprises (SME) Law. Each of these laws will be an omnibus law, meaning a single law that simultaneously revises several laws, even dozens of laws. Dozens of laws that hinder job creation will be revised simultaneously. Dozens of laws that hinder the development of SME will also be revised directly

Joko Widodo

President of the Republic of Indonesia¹

¹ "Speech of the President of the Republic of Indonesia at the Plenary Session of the People's Consultative Assembly (MPR RI) on the Occasion of the Inauguration of the President and Vice President for the 2019-2024 Term, page 7, Jakarta, October 20, 2019, available at:" <https://kemlu.go.id/download/L3NpdGVzL3B1c2F0L0RvY3VtZW50cy9QaWRhdG8vTGpmbm55S9QaWRhdG8IMjBQcmVzaWRlbiUyMFJJTlwmMjAlMjBPa3QIMjAyMDE5LnBkZg==>

Indonesia's strategic geographical position which lies within the convergence of tectonic plates and along the equator, grants it a seemingly endless reservoir of energy resources. Over the years, this has made Indonesia heavily reliant on extractive industries, consequently placing it among the top ten countries in the world with the highest carbon emissions.

Based on the current situation, it can be asserted that the endeavour to promote low emission power generation has become a non-negotiable action for Indonesia. This is responded to through various international commitments by the government to reduce carbon emissions by 31.8% (through domestic efforts) and 41% (with international assistance) by 2030, as outlined in the (Enhanced) Nationally Determined Contribution (NDC) document. These commitments stem from the ratification of the Paris Agreement (COP21), which led to the enactment of Law No. 16 of 2016 regarding the Ratification of the Paris Agreement to the United Nations Framework Convention on Climate Change.

Although it can be considered somewhat belated, Indonesia has embarked on a journey to explore various non-fossil energy sources. One that is currently being vigorously explored and drawing our collective attention is geothermal energy. It is essential to understand that, in its entirety, Indonesia possesses a considerable geothermal resource potential, estimated at around 11,073 Megawatts electrical (MWe), with reserves of approximately 17,506 Mwe

Meanwhile, the national electricity generation capacity at the end of 2016 amounted to 59.6 Gigawatts electrical (GWe), equivalent to 59,600 MWe of electricity. If this potential were fully utilized for power generation, it could add 18% to the current total electricity production capacity. The distribution of geothermal energy sources can be considered almost uniform, with sites numbering more than 300, spanning from Sabang to Merauke².

However, in light of all the potential records, it is crucial that we delve deeper into how far geothermal energy meets the qualifications of sustainable renewable energy and, more importantly, equity. In this report, we attempt to unveil the 'environmentally friendly' claims it carries, as well as how Geothermal Power Plant (GPP) projects often disregard the presence and involvement of the local communities in the geothermal working areas. These communities rely on the sustainability of the ecosystems they preserve as sources of their livelihoods, including the local wisdom they have nurtured through generations³.

²Yunus Daud, "Energi geothermal di Indonesia: potensi, pemanfaatan, dan rencana ke depan.", available at: <https://theconversation.com/energi-geothermal-di-indonesia-potensi-pemanfaatan-dan-rencana-ke-depan-112921>

³Ode Rakhman, Sumber Energi bersih Panas Bumi di Indonesia; Menjadi kotor Akibat Utang Luar Negeri dan Arogansi Pemerintah Pusat, Briefing Paper, WALHI.

a. Geothermal Development in Indonesia on The World (Bank) Agenda

The growth of geothermal power plant development in Indonesia can be described as relatively slow compared to other countries. This is due, in part, to the high costs associated with development and exploration. On average, geothermal project development takes around five and a half years. This is a significantly longer timeframe compared to that required for other renewable and conventional energy options, such as solar photovoltaic systems.

The high cost of development isn't limited to exploration drilling but also extends to the preparation of adequate infrastructure, including the land acquisition process, given that geothermal exploration often requires extensive land areas. Furthermore, the majority of geothermal sites in Indonesia are located along volcanic belts and conservation forests, spanning from Sumatra to Java, Bali, Maluku, and even Sangihe Island. This, undoubtedly, escalates the financing costs as infrastructures, such as roads to access project sites, must be established⁴.

In 2011, the World Bank stated that Indonesia represented a potential growth market for geothermal energy. Indonesia possessed a geothermal potential of 23.7 GW⁵, yet only 1.3 GW were

installed to serve the country's 250 million population at the time. With the dynamic economic activities and a continuously increasing population, the demand for energy, particularly renewable energy, was destined to rise.

However, the lack of funding and national level human resource capacity for geothermal management, including the absence of technology for maintaining existing networks, posed particular challenges for Indonesia. This created an opportunity for international financial institutions. With assistance from the World Bank, various companies from donor countries worldwide rushed to tap into Indonesia's geothermal resources.

During President Susilo Bambang Yudhoyono's (SBY) tenure, Indonesia's foreign policies that emphasized soft power over hard power garnered global attention. For instance, his commitment to reducing Indonesia's emissions to 26% by the year 2020 as part of climate change mitigation efforts was highly appreciated by the international community, despite the challenges in its implementation that are far from achieving success.

⁴ Erlin Puspitasari (2017), The World Bank's Influences On The Political Economy Of Geothermal Liberalization Under President Susilo Bambang Yudhoyono Administration, Universitas Airlangga, Page. 49

⁵ <https://ebtke.esdm.go.id/lintas/id/investasi-ebtke/sektor-panas-bumi/potensi>

This image was intentionally cultivated as part of efforts to establish bilateral, regional, or multilateral partnerships. Building an international and global image was of great importance to President SBY, particularly in reflecting Indonesia as a nation capable of recovery after facing economic crises⁶. President SBY's ambition was well-received by the World Bank, as demonstrated through their financial support for geothermal development projects.

The World Bank's efforts to promote economic integration through various stages during President SBY's administration bore fruit. One notable project was the World Bank and Pertamina Geothermal Energy (PGE) initiative known as the Geothermal Clean Energy Investment Project, aimed at developing geothermal resources in Ulubelu (Lampung) and Lahendong (North Sulawesi), with a loan value of \$508 million.

Through this project, several major countries have managed to secure significant contracts. Japanese companies have benefited from contracts, such as Sumitomo Corporation's contract with PGE for the construction of units 1, 2, 3, and 4 at the Ulubelu geothermal power plant. Moreover, critical equipment like geothermal steam turbines and power generation systems for all these projects have been manufactured by the Japanese company Fuji Electric Co., Ltd. Additionally, Toshiba had previously won a contract awarded by PLN subsidiary PT. Geo Dipa Energy to supply essential equipment for the GPP Patuha Unit 1 geothermal power plant, including steam turbines,

generators, and primary auxiliary and management equipment⁷.

To leverage the support and projects of the World Bank and accelerate geothermal exploration, President SBY revoked the 2003 Geothermal Law (27/2003) and replaced it with the 2014 Geothermal Law (21/2014). With Law 21/2014, the government officially removed geothermal activities from the mining sector and reclassified them as a renewable energy category requiring further exploration.

This change seemed to legitimize geothermal exploration for more extensive resource exploitation, as it no longer fell under mining restrictions. The replacement of Law 27/2003 with Law 21/2014 on Geothermal was considered a breakthrough by the government, as geothermal activities were now categorized more as fluid extraction rather than mining. Based on this, the government redefined geothermal business, moving from the previous Geothermal Mining Business License (IUP) to the Geothermal Business License (IPB).

⁶ibid. Page. 79

⁷ibid. Page. 83

A similar development occurred in the National Spatial Plan (Rencana Tata Ruang Wilayah - RTRW) as regulated in Government Regulation No. 13 of 2017, amending Government Regulation No. 26 of 2008 concerning the National RTRW. Geothermal energy was no longer categorized as part of the mining sector, and its mandate was directly aligned with national energy policy.

In Law 21/2014, it was also mentioned that geothermal exploration activities could be carried out in conservation areas under the framework of 'environmental services utilization.' The government changed the concept of geothermal working area (WKP) auctions, shifting from a focus on the lowest price parameter to competition based on work programs and exploration commitments. Additionally, state-owned enterprises (BUMN) were granted the authority by the government to conduct exploration and exploitation without going through the auction mechanism.

With geothermal energy no longer categorized as mining, guarantees for drilling, exploration, and funding for geothermal projects, including foreign loans, poured into Indonesia. Multi-national private banks and multilateral development banks, such as the World Bank and the Asian Development Bank (ADB), boldly extended loans to geothermal power plant developers, whether they were private or government entities. The commitments to reduce emissions

by 29% by 2030, a renewable energy mix target of 23% by 2025, and the development target of 35,000 MW in 2019 seemed to act as incentives for disbursing loans, especially to private entities. All of this was aimed at expediting geothermal power plant development. While these loans were granted and managed by private entities, they were strategically linked to the national government. In other words, the government had to ensure that the geothermal power plant development targets were successfully met and that the electricity trading business ran smoothly to repay the debts extended by various international financial institutions.

In reality, several existing Geothermal Power Plants (GPPs) in Indonesia were constructed with borrowed funds. A recent example is the construction of the Rantau Dedap GPP, located in Muara Enim and Lahat, South Sumatra. This GPP project required approximately Rp 8.2 trillion in funding, with a total target capacity of 98.4 MW, and the first phase of the power plant having a capacity of 86 MW. The project was expected to draw resources from approximately 12 to 16 drilling wells and was estimated to have a construction duration of around one year⁸.

⁸Denis R. Meilanova, GPP RANTAU DEDAP: Pengeboran Eksplorasi Dimulai Medio 2018, available at: <http://kalimantan.bisnis.com/read/20180104/451/723058/GPP-rantau-dedap-pengeboran-eksplorasi-dimulai-medio-2018>

This GPP is managed by PT. Supreme Energy Rantau Dedap (SERD). In 2018, SERD signed a financing agreement for the Rantau Dedap geothermal project worth 540 million USD with the goal of becoming operational in 2020. This financing agreement was signed by SERD with the Japan Bank for International Cooperation (JBIC), the Asian Development Bank (ADB), and an international commercial bank group consisting of Mizuho Bank Ltd, the Bank of Tokyo-Mitsubishi UFJ, and Sumitomo Mitsui Banking Corporation, with Nippon Export and Investment Insurance serving as the guarantor. SERD is a joint venture consisting of PT Supreme Energy, ENGIE from France, as well as Marubeni Corp and Tohoku Electric Power Co., Inc from Japan. To develop this project, SERD also appointed the EPC Contractor, a consortium of PT Rekayasa Industri and Fuji Electric Co., Ltd⁹.

Through its official website, the Asian Development Bank (ADB) formally announced on March 26, 2018, that it had signed a loan agreement worth \$175.3 million with PT Supreme Energy Rantau Dedap (SERD) to support the second phase of the geothermal power plant project in South Sumatra Province, Indonesia.

This agreement further strengthens ADB's efforts to enhance infrastructure development led by the private sector and promote clean energy investments in the Asia-Pacific region. As part of the

financing, ADB will also provide additional loans from the Clean Technology Fund (CTF), which represent a roll-over of the existing CTF facility for the first phase of this project.

The CTF loan for the first phase played a crucial role in confirming the commercial resource size and enabling the project to proceed with construction and operation financing. In addition to ADB, the project received financing from the Japan Bank for International Cooperation and three commercial banks with guarantees from Nippon Export and Investment Insurance, each amounting to \$188.8 million and \$125.9 million, respectively¹⁰. Lastly, in September 2019, the World Bank approved a \$150 million loan for Indonesia to enhance its geothermal energy investments by reducing the risks associated with early-stage exploration. This loan was accompanied by a \$127.5 million grant from the Green Climate Fund and Clean Technology Fund, two institutions supporting climate-friendly development¹¹.

⁹ Annisa ayu artanti, Proyek Panas Bumi, Supreme Energy Teken Pinjaman USD540 Juta, available at:

<https://www.medcom.id/ekonomi/energi/nN9Dqy3K-proyek-panas-bumi-supreme-energy-teken-pinjaman-usd540-juta>

¹⁰ Asian Development Bank, ADB Beri Komitmen \$175,3 Juta untuk Investasi Energi Panas Bumi di Indonesia, <https://www.adb.org/id/news/adb-commits-1753-million-geothermal-energy-investment-western-indonesia>

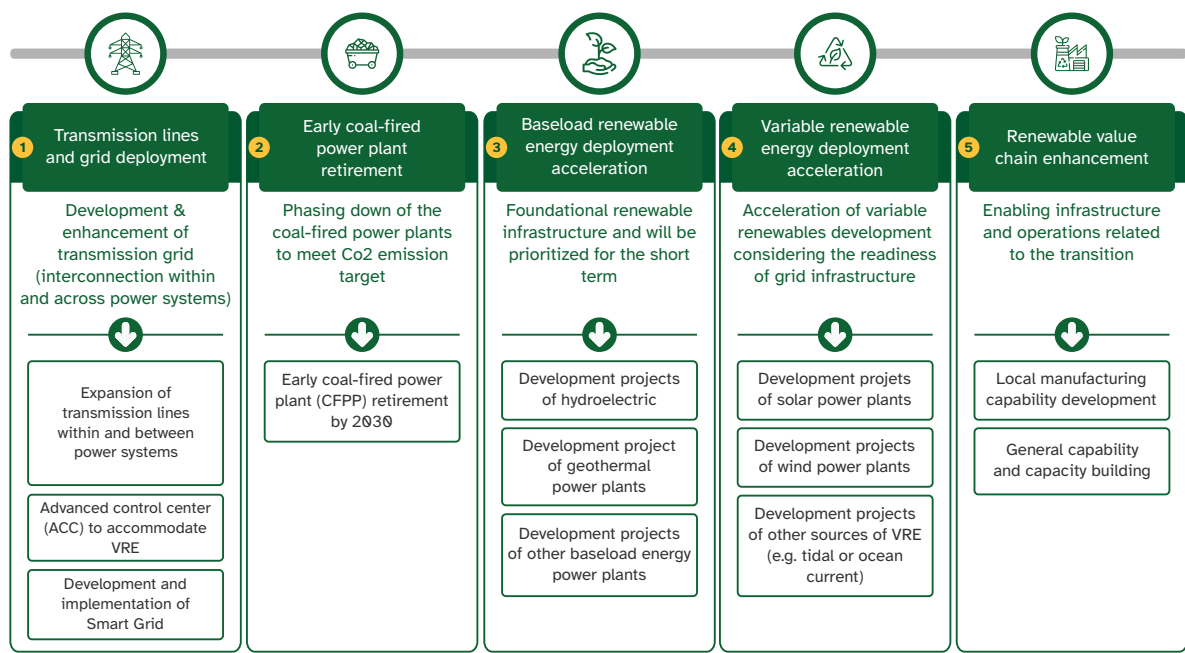
¹¹ The World Bank, "Indonesia: Scaling Up Geothermal Energy by Reducing Exploration Risks", available at:

<https://www.worldbank.org/en/news/press-release/2019/09/26/indonesia-scaling-up-geothermal-energy-by-reducing-exploration-risks>, accessed on June 28, 2023.

Meanwhile, the negotiation of the Just Energy Transition Partnership (JETP) with its five investment areas includes geothermal as one of the baseload or large-scale renewable energy projects. JETP is a funding agreement worth \$21.5 billion, equivalent to approximately Rp335 trillion, aimed at accelerating a

just energy transition. The renewed focus on geothermal in the JETP funding model is closely linked to the involvement of donor institutions such as ADB and the World Bank, which have been engaged in geothermal financing in Indonesia.

Five Focus Area on JETP Financing



Source : CIPP JETP, 2023

JETP Scenario Capacity by Technology

No	Name	Capacity (GW)						
		2022	2025	2030	2035	2040	2045	2050
1.	Coal	32.8	39.4	40.6	39.4	36.8	24.8	0.0
2.	Natural Gas	19.0	26.0	31.8	31.9	31.8	30.0	9.5
3.	Oil	3.4	3.3	0.0	0.0	0.0	0.0	0.0
4.	Nuclear	0.0	0.0	0.0	1.3	7.3	10.0	10.0
5.	Bioenergy	0.1	0.7	3.5	6.3	19.9	29.2	34.1
6.	Geothermal	2.3	3.5	6.4	14.1	21.2	21.5	21.7
7.	Hydropower	5.2	6.5	14.6	21.3	40.6	50.1	65.4
8.	Hydrogen-based fuels	0.0	0.0	0.0	0.0	0.0	2.6	31.4
9.	Solar PV	0.1	4.1	29.3	77.1	100.1	177.6	264.6
10.	Wind	0.1	0.7	8.6	24.7	29.2	36.3	44.0
11.	Storage	0.0	0.1	4.3	5.5	7.6	15.3	38.0
Total		63.1	84.3	139.3	221.6	294.5	397.4	518.8

Source: CIPP JETP, 2023

On October 25 2023, through an official letter delivered by the regional government of West Manggarai Regency, East Nusa Tenggara, the World Bank stated that it was withdrawing from funding the PLTP project in West Manggarai. The cancellation of funding by the World Bank was carried out after its representatives met directly with residents twice in 2022. This was their response to residents' requests in letters accusing the project of violating their rights as human beings.

b. Post-Reform Geothermal Utilization Policy

According to Abadi Poernomo, during the reform era, President Abdurrahman Wahid issued Presidential Decree No. 76/2000, in which it was stated that the government would conduct geothermal resource exploration activities until proven reserves were found. The fundamental change after the issuance of this Presidential Decree was that the management of geothermal resources became the sole responsibility of the government, while Pertamina's role in the geothermal sector was reduced to that of a corporate entity, except for contracts that were already in effect and ongoing.

This was further reinforced by the issuance of the Oil and Natural Gas Law No. 22/2001, which stated that after the establishment of the Implementing Body, Pertamina, which was formed under Law No. 8/1971, had to be restructured into a state-owned company¹². He further explained that after a lengthy debate in 2003, the government issued Law No. 27/2003¹³ which regulated the utilization of geothermal resources in

Indonesia, both as a mining commodity and as an energy source for direct and indirect utilization (of electricity). Replacing Presidential Decrees No. 45/1991 and 49/1991, Law No. 27/2003 also regulates the granting of permits according to the type of activity (indirect utilization or electricity generation, direct utilization, and associated mineral production). Permits can be issued by Regional Governments in accordance with their authority and by the Central Government for areas located in two provinces¹⁴.

In its course, Law No. 27/2003 was repealed and declared invalid, to be replaced by Law No. 21/2014¹⁵. However, there are several controversial policies related to the authority over the exploration and exploitation of geothermal energy, as outlined in Law No. 21/2014. We will now discuss each of these policies in detail:

¹² Expert Statement: Ir. Abadi Poernomo, Dipl. Geoth. Eng. Tech in the Trial of Case Number: 11/PUU-XIV/2016 in Testing Law Number 21 Year 2014 on Geothermal and Testing Law Number 23 Year 2014 on Regional Government against the 1945 Constitution of the Republic of Indonesia, Page. 106, available at: https://www.mkri.id/public/content/persidangan/putusan/11_PUU-XIV_2016.pdf

¹³ ratified on October 22, 2023 by Indonesian President Megawati Soekarno Putri

¹⁴ *ibid*, page. 107.

¹⁵ ratified on September 17, 2014 by the President of Indonesia Dr. H. Susilo Bambang Yudhoyono



1. Law No. 21/2014 allows for the use of geothermal energy in conservation areas by removing the term "Mining Activities" that was present in Law No. 27/2003¹⁶. Because of the modification in the law, geothermal energy can now be used directly or indirectly in all areas of Indonesia, including production forests, protected forests, conservation forests and waterways, marine areas, and customary lands¹⁷. As a result, rather than adhering to the ideals of sustainability and environmental preservation¹⁸, UU 21/2014 appears to overlook environmental interests in favor of economic ones.
2. The centralization of Geothermal Utilization for Indirect Utilization, as stipulated in UU 21/2014, has withdrawn the authority of Regional Governments in the implementation of Geothermal Utilization for Indirect Utilization, which was previously established in UU 27/2003, and has placed this authority under the Central Government. Thus, the authority of Regional Governments is now limited to Geothermal Utilization only for Direct Utilization.

The centralization of indirect utilization is further emphasized in Law No. 23 of 2014 concerning Regional Governments (UU 23/2014)¹⁹, and it is ultimately reinforced by the Constitutional Court Decision Number 11/PUU-XVII/2016²⁰. In this regard, the Indonesian Constitutional Court argued that centralizing the management of geothermal resources for indirect utilization under the authority of the central government is related to the far-reaching implications and potential conflicts that may arise across provinces and even international borders²¹.

The assessment of such implications should serve as a warning to the government to prevent the negative effects of indirect geothermal energy consumption on the environment and society.

¹⁶ General Elucidation of Law 21/2014 Paragraphs 3 and 6:

Geothermal is currently not optimally utilized because most of it is located in remote areas and Forest Areas that do not have adequate supporting infrastructure and infrastructure. The existence of Geothermal in conservation Forest Areas cannot be utilized at all, so the utilization of Geothermal needs to be improved in a planned and integrated manner to reduce dependence on fossil energy. In addition, Geothermal utilization is expected to grow economic growth centers that will improve the community's economy. The existing legal foundation, namely Law No. 27/2003 on Geothermal and its implementing regulations have not been able to answer the challenges in Geothermal development optimally. This is, among others, related to the term mining/mining activities which brings the consequence that Geothermal activities categorized as mining/mining activities cannot be cultivated in conservation Forest Areas because it is not in accordance with Law Number 5 of 1990 concerning Conservation and Natural Resources and Ecosystems and Law Number 41 of 1999 concerning Forestry. In addition, there is no comprehensive regulation of Geothermal exploitation for Direct Utilization."

¹⁷ Article 5 and Article 16 paragraph (2) of Law 21/2014;

¹⁸ Articles f and i of Law 21/2014

¹⁹ Article 14 point 4 of Law 23/2014;

²⁰ The petition to review Law No. 21/2014 on Geothermal and Law No. 23/2014 on Regional Government against the 1945 Constitution of the Republic of Indonesia (UUD 1945) submitted by Dr. H. Soekarwo, et al was rejected by the Constitutional Court because it had no legal basis and the Constitutional Court stated that geothermal meets the criteria (Article 13 of Law 23/2014) so that it is appropriate to be the authority of the Central Government. This is especially so when considering the potential conflicts that arise if the authority is handed over to the regions, while the government is working hard to ensure national energy security, which in the future depends heavily on the ability to utilize the existence of new renewable energy, including geothermal (Consideration [3.12.3] pp. 137-138).

²¹ Consideration [3.12.3] in Constitutional Court Decision Number 11/PUU-XVII/2016 pp. 137-138, see also Article 13 of Law 23/2014;

c.

The Omnibus Law on Job Creation and Amendments to the Geothermal Law

Under the pretext of boosting investment and job creation, the regulation of geothermal utilization has also been addressed through the Job Creation Law. Through this law, the Indonesian government initiated a major regulatory overhaul. This was primarily aimed at facilitating investors and entrepreneurs by providing them with more flexibility to invest in Indonesia. On the other hand, the Job Creation Law²² not only streamlines the investment process but also simplifies bureaucracy while weakening environmental and social safeguards. In its drafting process, it didn't adequately involve meaningful public participation²³, and, even in its academic draft, community participation was considered a hindrance to investments.

The numerous controversial changes, coupled with the potential for significant environmental and social losses in Indonesia, illustrate how the Government and the Indonesian House of Representatives are willing to disregard the principles of public participation in a democratic rule of law state. These actions have prompted strong reactions and widespread resistance from various segments of society, which have been expressed through large-scale protests. The opposition has come from a diverse range of groups, including labor unions, farmers, students, academics, human rights activists, and has been wide-

spread across Indonesia. Furthermore, 36 global investors have expressed their concerns about the deregulation of environmental protection in the Job Creation Law²⁴.

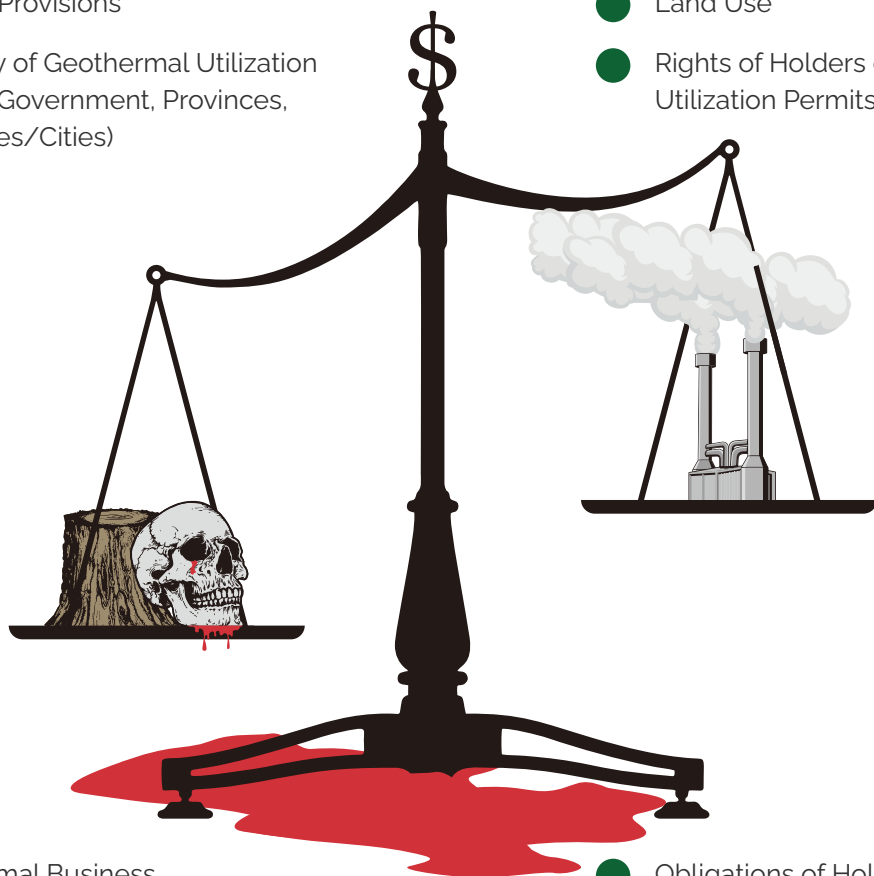
The opposition seemed to be disregarded, and the Government and the Indonesian House of Representatives continued to move forward with the completion of the Job Creation Law. It was eventually passed in a plenary session on October 5, 2020, and enacted by the President on November 2, 2020 (Law Number 11 of 2020 concerning Job Creation). Later, the Constitutional Court of Indonesia declared it Conditionally Constitutional through Constitutional Court Decision Number: 91/PUU-XVIII/2020 on November 25, 2022. This decision was once again made by curbing public participation, similar to what happened when the government issued Government Regulation in Lieu of Law Number 2 of 2022 concerning Job Creation (Perppu Cipta Kerja), which was later approved in a plenary session of the House of Representatives during the 19th Session of the IV Legislative Session of 2022-2023 on March 21, 2023, and subsequently enacted by the President (Law No. 6 of 2023).

²²Now becomes Law No. 6 of 2023 Concerning the Stipulation of Government Regulation in Lieu of Law of the Republic of Indonesia Number 2 of 2022 Concerning Job Creation into Law ("Job Creation Act").

²³Constitutional Court Decision Number: 91/PUU-XVIII/2020 (p. 393): Meaningful participation as: (1) the right of the public to have their opinions heard, (2) the right of the public to have their opinions considered, and (3) the right of the public to have their opinions explained or answered.

²⁴Syahrizal Sidik, CNBC Indonesia: "Beredar Surat Sumitomo ke Wamenlu Soal Omnibus, Apa Isinya?", available at: <https://www.cnbcindonesia.com/market/20201018182824-17-195223/beredar-surat-sumitomo-ke-wamenlu-soal-omnibus-apa-isinya>

One of the laws revised by the Omnibus Law on Job Creation is the Republic of Indonesia Law No. 21 of 2014 on Geothermal Law²⁵, At least 35 articles in the Geothermal Law were amended by the Omnibus Law, and the parts of the Geothermal Law that were amended include:

- 
- General Provisions
 - Authority of Geothermal Utilization (Central Government, Provinces, Regencies/Cities)
 - Land Use
 - Rights of Holders of Direct Utilization Permits
 - Geothermal Business for Direct Use
 - Geothermal Licensing
 - Administrative Sanctions
 - Obligations of Holders of Direct Utilization Permits
 - Obligations of Geothermal License Holders
 - Development and Supervision
 - Criminal Provisions

(For details of the revised articles, see the appendix section)

Here are some of the concerns raised by the Omnibus Law on Job Creation (Cipta Kerja Law) in relation to geothermal resource usage. Let's look at them one by one:

²⁵ Paragraph 5 Energy and Mineral Resources Article 38 letter c of the Job Creation Act: "To provide convenience for the public, especially Business Actors, in obtaining Business Licenses from the Energy and Mineral Resources sector, this Law amends, deletes, or establishes new arrangements for several provisions stipulated in: Law Number 21 of 2014 concerning Geothermal (State Gazette of the Republic of Indonesia of 2014 Number 217, Supplement to State Gazette of the Republic of Indonesia Number 5585);



The regulation of geothermal resources in the Omnibus Law on Job Creation remains exploitative and lacks an orientation towards environmental sustainability

By designating protected forest areas and conservation areas (forest and conservation areas) as working areas for both direct and indirect utilization, the potential for threats to the existence of flora and fauna, changes in land-scape, and pollution automatically increases. This is concerning and may impact the degradation of protected and conservation area status. Furthermore, this is also contradictory to the

Sustainable Development Goals (SDGs), particularly Goal 14, regarding conserving and sustainably using marine resources for sustainable development²⁶ and Goal 15, in relation to protecting, restoring, and promoting sustainable use of terrestrial ecosystems, managing forests sustainably, combating desertification, halting land degradation, and halting biodiversity loss²⁷.



This has the potential to perpetuate and expand agrarian conflicts

It is primarily because the Job Creation Act still includes customary land as part of the Geothermal Utilization Management Area. Learning from several cases related to geothermal development, the fundamental issue is the designation of geothermal infrastructure locations and the associated threats to the Customary Land Management Area (*Wilayah Kelola Rakyat* or WKR). Protests and opposition by local communities are often rooted in the lack of accessibility to information and transparency in the socialization process conducted by the government and project operators regarding geothermal development plans. This is a significant contributing factor to conflicts between

local communities and project operators, as seen in the case of PT. Geo Dipa Energi versus the Wae Sano community in West Manggarai Regency, East Nusa Tenggara (2016)²⁸, PT Hitay Daya Energy Vs Gunung Talang community, Solok Regency, West Sumatera (2018)²⁹, PT Ormat Geothermal Vs Wapsalit community, Buru Namlea Regency, Maluku (2022)³⁰, PT. State Electricity Company (PLN) vs Poco Leok community, Manggarai Regency, NTT (2023)³¹.

²⁶ Ministry of National Development Planning/Bappenas, "14. Ocean Ecosystems." available at: <https://sdgs.bappenas.go.id/tujuan-14/>

²⁷ Ministry of National Development Planning/Bappenas, "15. Terrestrial Ecosystems." available at <https://sdgs.bappenas.go.id/tujuan-15/>

²⁸ Ebed de Rosary, Proyek Geothermal Wae Sano: Antara Penolakan, Kepentingan Pariwisata dan Pengurangan Energi Fosil, available at: <https://www.mongabay.co.id/2022/02/12/proyek-geothermal-wae-sano-antara-penolakan-kepentingan-pariwisata-dan-pengurangan-energi-fosil/>

²⁹ Fajar Pebrianto, Kontroversi Proyek geothermal yang Picu Tagar Save Gunung Talang, available at:

<https://bisnis.tempo.co/read/1149681/kontroversi-proyek-geothermal-yang-picu-tagar-save-gunung-talang>

³⁰ Chandra Iswinarno, Tempat Sakralnya Dijadikan Lokasi Eksplorasi Panas Bumi, Warga Adat Soar Pito Soar Pa Meradang, tersedia pada: <https://sulsel.suara.com/read/2022/09/06/144319/tempat-sakralnya-dijadikan-lokasi-eksplorasi-panas-bumi-warga-adat-soar-pito-soar-pa-meradang>

³¹ Ebed de Rosary, Warga Tolak Proyek Geothermal Poco Leok, Ini Alasannya, available at: <https://www.mongabay.co.id/2023/03/23/warga-tolak-proyek-geothermal-poco-leok-ini-alasannya/>



Through the centralization of permit issuance, the Job Creation Act also threatens democracy

The authority to grant permits for geothermal projects, whether for direct or indirect use, is now concentrated in the hands of the Central Government, both politically and administratively. According to Agnes Setyowati, a lecturer at the Faculty of Social and Cultural Sciences, Universitas Pakuan, Bogor, centralization has several weaknesses. One of these is the questionable quality of decision-making, often disregarding important factors. Responses to changes also tend to be slow because decisions heavily depend on the response of a small elite holding power. These two factors lead to doubts about the effectiveness of decision-making. Instead of considering various elements of society's needs in depth, decisions are often made with reference only to organizational perspectives. The dominant position of the Central Government can potentially weaken democracy³².

In the case of geothermal utilization, these weaknesses often manifest on the ground, leading to conflicts with local communities and negative environmental impacts, such as ecological disasters. This can be observed in the case of PT Sejahtera Alam Energy (PT SAE). Their geothermal project had a significant impact on Curug Cipendok, a famous waterfall tourist spot in Banyumas. The previously clear waters of Curug Cipendok turned brown, and local fish ponds were affected due to

the turbidity of the water. This was caused by PT SAE's activities involving hillside deforestation, which led to landslides and soil entering the river. Research conducted by the Lingkar Kajian Banyumas (LKB) corroborated these findings. In response to these issues, the government has consistently stated that the project will continue, regardless of opposition from various stake-holders³³.

Similar issues have also arisen in the neighborhoods of Lahendong, Tondangow, and Pangolombian in the South Tomohon district. The residents there have lodged complaints with the Tomohon City Regional People's Representative Council (DPRD) in North Sulawesi, due to environmental pollution caused by the operation of the Lahendong Geothermal Power Plant (GPP). Since its operation in 2005, around 10,000 residents have suffered from this pollution. Rice and vegetable crops have withered and become unproductive. Residents suspect that the pollution originates from the hot vapor emissions generated by the activities at the Lahendong GPP, which have a radius of influence extending from 50 to 100 meters around the GPP. Subsequently, these concerns were conveyed to environmental consultants from Sam Ratulangi University in Manado.

³² Agnes Setyowati, "Haruskah Sentralisasi menjadi Pilihan dalam Tata Kelola Organisasi?," available at: <https://www.kompas.com/edu/read/2021/08/19/060956071/haruskah-sentralisasi-menjadi-pilihan-dalam-tata-kelola-organisasi?page=2>.

³³ L Darmawan, "Masih Terjadi Pro dan Kontra Pembangunan GPP Baturraden, Adakah Solusi?," available at: <http://www.mongabay.co.id/2017/07/31/masih-terjadi-pro-dan-kontra-pembangunan-GPP-baturraden-adakah-solusi/>

The residents requested that samples of plants, soil, and water be analyzed to determine if there are any impacts from the GPP. They also complained about the quick deterioration of zinc roofs and the changing color of drainage water to brown. The zinc roofs used by residents now only last for two years, while in the past, they could last for over a decade. Another indication of pollution noticed by residents is the disappearance of

several fish species, such as the Sayok and Komo fish, which were previously common in Lake Linow. As additional information, the Lahendong GPP consists of nine production wells and two injection wells to supply steam. GPP Unit 1 with a capacity of 20 MW has been in operation since August 2001, while Units 2 and 3 have been operating since 2009.



The issuance of Business Licenses can be granted before the completion of land rights usage on state land

This is in contradiction to the principles of Free Prior Informed Consent (FPIC). Such a policy is akin to denying the rights of the community to participate meaningfully. This aligns with the opinion of one social scientist, Diana Conyers. According to her, participation is a tool or means to obtain information about conditions, attitudes, and needs.

The development process will have greater legitimacy if the community feels involved, starting from the preparation process, implementation, and other processes. This is because the principles of democracy can be said to work well when they directly involve the community in the development process³⁴.



The revocation of regulations related to imprisonment penalties for business license violators and their replacement with fines increases the risk of land and environmental exploitation by companies

Additionally, this regulation also enhances the potential for the criminalization of citizens who reject geothermal utilization activities. This is due to the addition of criminal imprisonment penalties, which have increased from one year to seven years. In one of the articles in the Job Creation Act related to criminal provisions, it states that obstructing or impeding geothermal company activities is a criminal act (delict). As stated in Article 162 of Law Number 3 of 2020, which amends Law

Number 4 of 2009 on Mineral and Coal Mining (Law 3/2020). According to data from WALHI in 2023, there are 53 individuals in Indonesia who have been criminalized due to their opposition to mining activities, and all of them have been charged under Article 162 of Law 3/2020. Below are the contents of these two articles, which are often used as the basis for the state to criminalize citizens who oppose projects that threaten their living environment.

³⁴ Diana Conyers, *Perencanaan Sosial Di Dunia Ketiga, Suatu Pengantar*. Yogyakarta: Gadjah Mada University Press.

Article 73 of the Job Creation Act

Any person who intentionally obstructs or hinders geothermal utilization by business license holders in the field of geothermal energy as referred to in Article 46 shall be punished with imprisonment for a maximum of 7 (seven) years or a fine of up to IDR 70,000,000,000.00 (seventy billion Indonesian Rupiahs).



Article 162 Law Number 3/2020

Any person who obstructs or interferes with mining activities conducted by the holder of an IUP, IUPK, IPR, or SIPB that meets the requirements as referred to in Article 136 paragraph (2) shall be punished with imprisonment for a maximum of 1 (one) year or a fine of up to IDR 100,000,000.00 (one hundred million Indonesian Rupiahs).



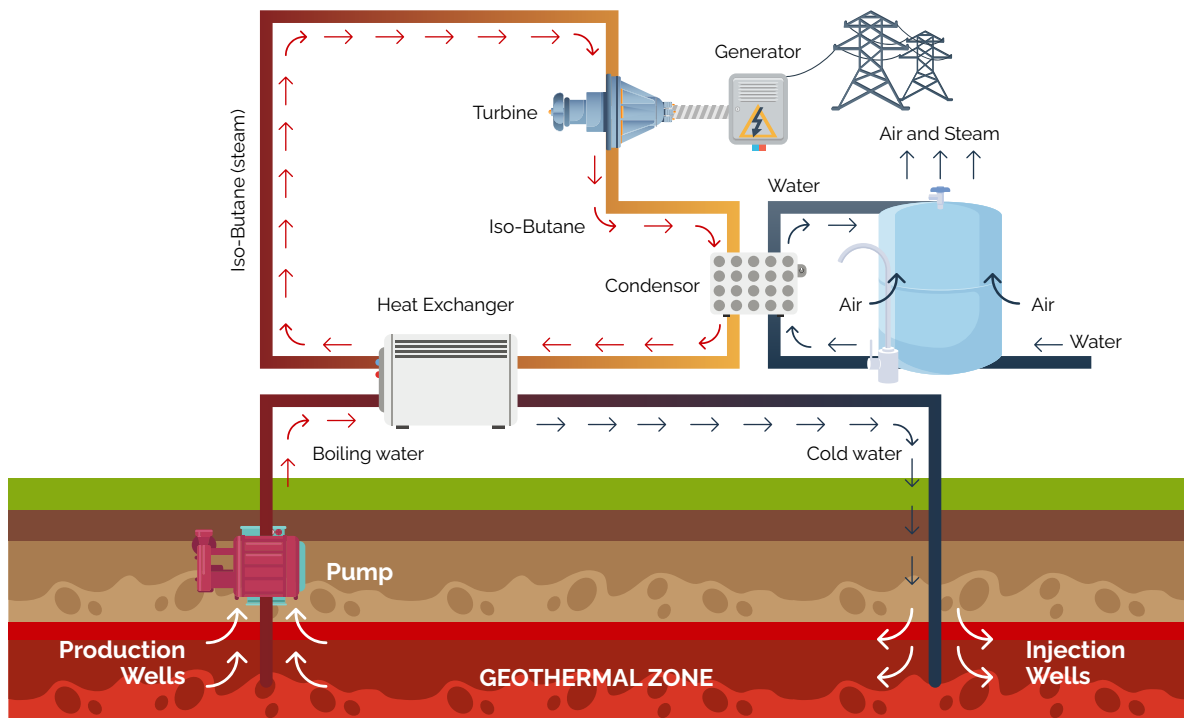
CHAPTER 2 GEOHERMAL CHALLENGES FROM AN ECOLOGICAL PERSPECTIVE: REFLECTIONS FROM PAST INCIDENTS



The perception of geothermal energy as a renewable energy source often leads to the oversight of the potential risks associated with it. Environmental damage emerges as a notable concern, warranting careful consideration in both upcoming geothermal projects and those already in operation. These concerns are inherently tied to the operational methodologies employed in the pursuit of harnessing geothermal energy.

The method employed in utilizing geothermal energy for electricity generation inevitably involves a mining process. Similar to mining operations, drilling is an integral part of this process. Drilling serves the purpose of creating production and injection wells. Production wells are designed to convey hot gases or fluids from beneath the Earth's surface to the top. These hot fluids are subsequently processed to harness energy. However, the availability of these natural hot fluids is limited and will eventually deplete,

necessitating the creation of injection wells. Injection wells are responsible for returning the fluid into the Earth's subsurface. Within the Earth's subsurface, the fluid interacts with hot rocks, undergoes a temperature increase, and is then directed back to the Earth's surface through production wells. This process often yields significant environmental consequences, ultimately impacting not only the ecosystems of flora and fauna but also the living spaces of human communities dependent on them.



a. Geothermal Projects and Its Correlation with Increased Seismic Risk

In the process of geothermal mining, there is always a need to enhance the capacity of its natural geothermal system (Enhanced Geothermal System-EGS) to sustain the production process. One popular method for this purpose is Hydraulic Fracturing, commonly known as Fracking. This technique involves creating fractures in the reservoir to improve the soil's permeability, enabling better water flow through the pore spaces. However, this method is not without its risks, as increased permeability also means a decrease in the cohesion properties of the rocks. This, in turn, can trigger minor earthquakes. When combined with Indonesia's highly active tectonic nature in some areas, minor earthquakes provide a powerful formula for generating significant seismic events.

Unfortunately, in Indonesia, many complaints about supposed seismic impacts induced by geothermal power plant (GPP) activities are frequently not followed up on with thorough study. As a result, there are few research records on the effects of GPP. Some of the ailments are strongly suspected to be the result of geothermal mining activity on Mount Salak's slopes. They have recorded multiple earthquakes in their vicinity since the Mount Salak GPP's initial operation. Residents in Dieng, notably in the Kepakisan area (Batur District), have reported similar incidents. One house was reported to have collapsed due to major wall fissures, which are thought to have been caused by drilling and fracking operations.

Concerns about seismic risks related to geothermal drilling have triggered local protests, and in some cases, led to project cancellations in Europe. The distance between the project site and urban areas often affects the level of community acceptance³⁵. Geothermal projects located near urban areas tend to have lower public acceptance due to concerns about repeated seismic risks during their operation.

A series of earthquakes that occurred in Basel, Switzerland, between December 2006 and March 2007 served as an initial event that reminded the European community of the potential threats arising from geothermal operations. More than 10,000 seismic events related to geothermal projects were detected by six seismometers placed around the injection well in Basel³⁶. Claims for damages were subsequently filed, which had to be paid by the project's insurance company, amounting to 9 million Swiss francs³⁷. After a comprehensive investigation that lasted three years, the geothermal project in Basel was finally halted in 2009. However, if this geothermal operation had continued for its full 30-year lifespan, the region was projected to experience up to 170 more earthquakes, with a 15 percent chance of an earthquake causing losses of over 600 million Swiss francs³⁸.

Almost simultaneously with the closure of the geothermal project in Basel, Switzerland, in 2009, in Duttweiler, Germany, the first resistance to geothermal operations emerged after a series of earthquakes with magnitudes of up to 2.7, which were triggered by the geothermal project. The anti-geothermal movement in Germany then grew through the formation of the "German Citizens' Initiative Against Geothermal Energy," which became a nationwide effort³⁹. The rise of new initiatives and wide networks within Germany's developing anti-geothermal movement suggests that protests against geothermal projects are based on perceived risks, threats, and injustices linked with these projects. It goes beyond the "not in my backyard" mindset that drives local sentiments.

Recently, earthquake events triggered by geothermal activities also occurred in France in December 2020, where the area around Strasbourg was shaken by a series of earthquakes with magnitudes up to 3.5. The epicenter was located approximately 10 kilometers north of Strasbourg, near the site of a geothermal power plant project under construction. The prefecture office, the government representative responsible for the Lower Rhine region of France, immediately called for the cessation of geothermal operations.

³⁵Theresa A.K. Knoblauch, Evelina Trutnevyte, Michael Stauffacher, Siting deep geothermal energy: Acceptance of various risk and benefit scenarios in a Swiss-German cross-national study, *Energy Policy*, Volume 128.

³⁶Swiss Seismological Service (SED), 2007. DHM-Basel: Feststellungen 1. http://www.seismo.ethz.ch/static/Basel/www.seismo2009.ethz.ch/basel/articles/Pressekonf_Basel_20070125.pdf

³⁷Reuters, 2010. Geothermal energy gets cash but hits roadblocks. <https://www.reuters.com/article/us-energy-geothermal-analysis-idUSTR61M5CY20100223>

³⁸S. Baisch et al. Deep Heat Mining Basel: Seismic Risk Analysis, SERIANEX Group (2009)

³⁹C. Kunze et al. Contested deep geothermal energy in Germany—The emergence of an environmental protest movement. *Energy Res. Soc. Sci.* (2017)

A company spokesperson confirmed that the earthquakes were indeed related to their company's activities⁴⁰.

A similar situation has not only occurred in Europe but also in Pohang, South Korea, in 2017, where earthquakes triggered by geothermal operations were more significant. With earthquake magnitudes up to 5.5, this earthquake event became the second largest earthquake in modern Korean history. Considering that Pohang is a densely populated area, it's not surprising that this earthquake caused 90 injuries and resulted in damages amounting to US\$52 million.

The magnitude of the earthquake and the resulting damage left severe trauma among the residents of Pohang regarding geothermal projects⁴¹.

Geothermal power facilities have also had a severe impact on local infrastructure in a number of countries, including New Zealand, Iceland, and Japan⁴². Over-exploitation, neglect, and a lack of commitment to environmental and human protection have fueled the destructive force, resulting in disasters and community losses.

b. Land Subsidence and the Risks It Poses Due to Changes in Earth's Relief

In one resident's testimony from Dieng, aside from frequent earthquakes that caused a house to collapse, they also experienced sudden sinking or subsidence of soil layers on their land. Similar issues were reported by residents of Mataloko, East Nusa Tenggara⁴³. They stated that on their land, used for farming and residence, many holes from the operation of GPP Mataloko could be found. It started with small holes that gradually enlarged and were filled with mud and hot gas, leading to a complete loss of five hectares of farmland for residents. The surrounding land also became drier, and its quality undoubtedly deteriorated.

A decrease in soil density causes the event of subsiding land surfaces, which results in changes in the earth's relief. Continuous geothermal mining requires the extraction and injection of water, which disturbs soil density. The effective pressure is affected by lowered pore pressure, which is directly proportional to compressibility and the thickness of the compacted layer⁴⁴. In other words, while the external load remains constant, the pressure within the soil and rocks decreases. This results in the soil structure becoming unstable and the land experiencing drying, making land subsidence inevitable. The potential for subsidence increases during the rainy season, which may lead to landslides.

⁴⁰ DW, 2020. France: Geothermal project shelved after mini quakes. <https://www.dw.com/en/france-firm-shelves-geothermal-project-after-mini-earthquakes/a-55829869>

⁴¹ D.H. Im et al. Public perception of geothermal power plants in Korea following the Pohang earthquake: a social representation theory study. *Publ. Understand. Sci.* (2021)

⁴² Greiner et al. The political ecology of geothermal development: Green sacrifice zones or energy landscapes of value? *Energy Research and Social Science.* (2023)

⁴³ Ahmad Syifa dalam "Belajar dari Pengalaman, Energi Panas Bumi Menelan Banyak Korban". available at: https://mengeja.id/2021/09/03/belajar-dari-pengalaman-energi-panas-bumi-menelan-banyak-korban/#_ftn5

Residents in Wairakei in northern New Zealand have been dealing with a similar scenario for a long time. Since conducting research in the 1940s and the subsequent operation of the Wairakei geothermal power plant (GPP) in 1958, New Zealand has been regarded as a global pioneer in geothermal power generation. The long voyage of New Zealand's geothermal projects has also left a variety of consequences and tensions. As the world's second geothermal power plant, the Wairakei GPP has had measurable environmental effects.

As a result of the extraction of geothermal fluids for over 50 years (at the time of the study), land subsidence occurred in the Wairakei and Tauhara geothermal fields, forming depressions resembling lunar craters in this area. The total land subsidence in Wairakei and Tauhara has reached 15 meters, making it the most significant recorded subsidence due to fluid extraction from the ground, even exceeding that caused by groundwater exploitation in urban areas or in the oil and gas industries⁴⁵.

In Iceland, issues concerning the interests of local populations from geothermal activity have also been documented. Iceland is one of the fastest-developing countries in geothermal energy, the country generates 31.2% of its electricity supply from geothermal power plants (GPP).

However, the development of geothermal energy in Iceland has not always been viewed favorably by the country's residents, particularly when it operates in conservation areas such as national parks, wildlife reserves, and national conservation sites, which have long been the country's top natural tourist destinations⁴⁶.

Iceland's tourism stakeholders are concerned that the utilization of these protected areas may reduce their value as natural habitats for outdoor adventure enthusiasts. Changes in the terrain induced by energy projects such as geothermal and its supporting infrastructure, such as road construction for geothermal projects, are also anticipated to affect perceptions of the places' naturalness, lowering their market value as outdoor adventure destinations. These worries are genuine because both domestic and foreign tourists visit Iceland with a specific interest in places devoid of disturbances and artificial infrastructure⁴⁷.

⁴⁴ Batubara, Bosman "Dampak Negatif Energi Geothermal terhadap Lingkungan, Front Nahdliyin untuk Kedaulatan Sumber Daya Alam, Yogyakarta. (2014)

⁴⁵ Allis et al. Update on subsidence at the Wairakei-Tauhara geothermal system, New Zealand. *Geothermics* (2009)

⁴⁶ Tverijonaite et al, How close is too close? Mapping the impact area of renewable energy infrastructure on tourism, *Energy Research & Social Science* Volume 90, (2022)

C.

Aquatic System Damage; Water Pollution, Soil Damage, and Decline in Agricultural Productivity

The operational system of geothermal power plants heavily relies on the supply of clean water. According to research conducted by WALHI Central Java, geothermal mining activities require at least 40 liters per second, or around 6,500-15,000 liters of water to produce 1 MWe of electricity⁴⁸. Water is primarily needed in the injection process, where large volumes of clean water are sprayed into the hot rocks within the Earth's crust to generate steam. Furthermore, water is required in the fracking process, which involves injecting a large amount of high-pressure water into rocks to generate fractures and enhance permeability.

In its implementation, this method not only affects soil stability but also increases the potential for groundwater contamination. First, in the fracking process, the water used is mixed with chemicals to facilitate the rock fracturing process. This is the cause of groundwater pollution. Contamination occurs due to hydrothermal solutions containing various contaminants, such as arsenic, antimony, and boron.

Furthermore, the decrease in the quality of borehole casings, both in injection wells and production wells, can also lead to water pollution. Inadequate casing can cause leaks and result in groundwater contamination. The third cause is improper reinjection practices, leading to the spread of water from hydrothermal processes within the aquifer layers,

which then rises to the surface through pumping wells. Lastly, water pollution in geothermal operations is caused by the disposal of used geothermal water into surface watercourses. This contaminated water then spreads and enters surface water bodies, including the water channels used by residents and their water supply sources.

Cases of water pollution directly related to the disruption of clean water supplies are among the most severe repercussions faced by inhabitants around geothermal power plant (GPP) projects in Indonesia, particularly those that have been in operation. This is one of the most severe impacts since it affects not only daily requirements but also the livelihoods of the population, the majority of whom are farmers, as witnessed in the Dieng area.

One of the springs near the Dieng geothermal power plant (GPP), which has been used by local communities for domestic and agricultural uses, has turned turbid in recent years. This was followed by a salty taste and the production of crusts in bathtubs, accompanied by a pungent stink. Furthermore, water-hungry geothermal extraction activities have reduced water discharge in some settlements in the Dieng area.

⁴⁷Tverijonaite et al. The perceived impact area of renewable energy infrastructure on tourism: The tourism industry's perspective. Institute of Life and Environmental Sciences, University of Iceland. (2021)

⁴⁸From the reports of Central Java WALHI, <https://www.walhijateng.org/2022/01/27/aksi-warga-dieng-tolak-pembangunan-pltp-2-geo-dipa-dieng/>

Aside from Dieng, the aftermath of the Lahendong GPP operations in North Sulawesi left a grim story of the destruction of Lake Linow, a popular tourist destination. The decline of sayok and komo populations in Lake Linow after the GPP's operation is one evidence of water body contamination⁴⁹. Sayok and komo are lake specific insects that reside on the water's surface. This insect is utilized as a bioindicator of lake water pollution because it is extremely fragile and sensitive to even little changes in the body of water.

In addition to the subsidence due to fluid extraction for power generation, the long-term geothermal operations in New Zealand have also caused damage to geysers and heavy metal pollution in bodies of water. More than 100 geyser systems in New Zealand have been damaged or completely lost due to geothermal energy development. Geysers are a rare type of hot spring that, due to pressure, erupt and send jets of water and steam into the air. For the people of New Zealand, geysers have significant importance for recreation, the economy, and scientific research. The loss of many geysers due to geothermal operations in New Zealand is even considered one of the "greatest environmental losses in New Zealand's history."⁵⁰

New Zealand's environmental harm is not limited to the disappearance of geysers. The operation of the Wairakei geothermal power plant also contributed to the release of arsenic into the Waikato River, New Zealand's largest river, with

quantities exceeding 0.06 mg/L, six times the allowable limit of 0.01 mg/L.

Besides New Zealand, Japan too had an incident regarding the harm in its Rankoshi Project in Hokkaido. The operation of geothermal activities in this region led to arsenic pollution in their river systems, with the amount of arsenic poisoning rivers in Japan being substantially greater than in New Zealand. On June 29, 2023, a blowout at the geothermal plant spewed hydrogen sulfide gas into the air, resulting in the release of arsenic ranging from 11 mg/L to 15.9 mg/L into the Niseko Anbetsu River⁵¹. Such widespread arsenic pollution is, of course, a major worry for those who come into touch with the water.

On June 30, 2023, the relevant authorities ordered the restriction of the use of three river systems: Niseko Anbetsu River, Niseko Anbetsu River No. 2, and Shiribetsu River, to prevent river water contamination to the local residents. Media reports indicate that at least 19 people, including local residents and field workers, have complained of deteriorating physical conditions such as headaches and eye problems, as well as environmental damage to 7.5 hectares of forest that has turned brown due to the spewing of gas and arsenic-mixed water⁵². However, with the ongoing emissions from the geothermal project site, the number of victims and damages may continue to increase.

⁴⁹ Accessed from online article: Warga Terusik Pencemaran dari PLTP Lahendong via <https://nasional.kompas.com/read/2011/11/09/03364826/warga.terusik.pencemaran.dari.pltp.lahendong>

⁵⁰ G. Kelly. History and potential of renewable energy development in New Zealand. *Renew. Sust. Energ. Rev.*, 15 (5) (2011)

⁵¹ Mitsui Oil Exploration Co., Ltd. 地熱発電調査事業するご関に蒸気噴出における説明資料. July 10th, 2023

Local residents near the site have also suffered losses as they can no longer sell their agricultural products. The residents' harvest, including rice, bell

peppers, and cherry tomatoes, is not allowed to be traded to avoid potential contaminants in their agricultural products⁵³.

d. Greenhouse Gases and Toxic Releases

A low-risk narrative is routinely presented in any place where geothermal exploration and exploitation initiatives are planned. GPPs are always compared to traditional coal-fired power plants in terms of lower greenhouse gas emissions, making them a greener and more reliable option that should not be rejected by the local community. However, geothermal energy is not as "green" as it has long been described.

In GPPs, greenhouse gas emissions (GHG) encompass emissions released during both the construction/plant cycle and the operational/fuel cycle. Data calculations from Italy and several locations in Turkey reveal that GHG emissions from the operational cycle of GPPs can be equivalent to or even higher than conventional coal-fired power plants. In nine GPP units across seven geothermal sites in Büyük Menderes Graben and Gediz Graben, Turkey, the CO₂ emission factors range from 400 to 1,300 g/kWh, with an average (based on installed capacity) of 1,050 g/kWh. In Italy, the CO₂ emissions from GPPs Bagnore and GPP

Piancastagnaio between 2002 and 2009 ranged from 245-779 g/kWh, with a weighted average of 497 g/kWh. For equivalent CO₂⁵⁴ emissions, the range is 380 to 1,045 g/kWh, with an average of 693 g/kWh⁵⁵.

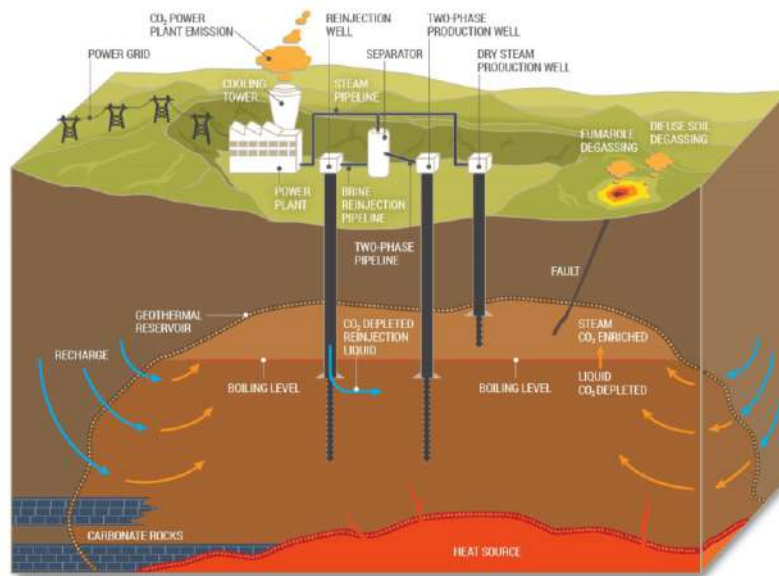
On the other hand, the plant cycle includes emissions related to the construction of the power plant and surface installations, drilling and well completion, production of materials required for the installations, and the decommissioning of the facilities. GHG emissions from the plant cycle of geothermal power projects are equivalent to 10 gCO₂e/kWh for a standard project duration of 30 years. Meanwhile, the fuel cycle refers to the release of GHGs during the energy conversion process for electricity production. So far, emission calculations for GPPs have primarily focused on the fuel cycle alone, neglecting emissions from the plant cycle.

⁵² NHK. 2023. 蘭越町蒸気噴出1か月 事態長期化で風評被害や住民ケアが課題. <https://www3.nhk.or.jp/sapporo-news/20230728/7000059541.html>

⁵³ Yahoo News Japan. 2023. 環境汚染から1カ月蘭越蒸気噴出も 懸念への月. <https://news.yahoo.co.jp/articles/7ed926908210bb57e7bfd2e67b28b625ea9299a9>

⁵⁴ "Carbon dioxide equivalent" or "CO₂e" is a term to describe various GHGs (methane/CH₄, nitrous oxide/N₂O, tropospheric ozone/O₃, etc.) in the same unit. For each amount of greenhouse gas, CO₂e signifies the amount of CO₂ that has an equivalent global warming impact.

⁵⁵ Ibid.



(Source: Thráinn Fridriksson et al., 2017)⁵⁶

In addition to carbon emissions, geothermal projects generate concerns because of the possibility of hazardous gas emissions. Hydrogen sulfide (H₂S) is emitted into the environment during the geothermal heat extraction process. H₂S is a poisonous gas with a horrible odor (similar to rotten eggs), and excessive amounts can be hazardous to people. GPP operations that ignore safety precautions may result in fatalities. The repeated incidents at the Sorik Marapi GPP in North Sumatra, Indonesia, is an example.

On September 16, 2022, approximately eight indigenous Mandailing residents living around the PT. Sorik Marapi Geothermal Power (SMGP) projects were exposed to H₂S gas. As the residents of Sibanggor Julu Village in Puncak Sorik Marapi Subdistrict, Mandailing Natal Regency, were relaxing, some suddenly collapsed on the

road, and others followed. Leaks of hydrogen sulfide gas poisoning the residents around this power plant unit occur frequently. In fact, on January 25, 2021, five people died, and dozens of residents were hospitalized due to hydrogen sulfide exposure. On March 6, 2022, another gas leak occurred, affecting at least 52 people who were hospitalized. This continued on April 24, 2022, with 21 victims, including a 6 month-old child, exposed to hot mud mixed with toxic gas⁵⁷.

Also a tragic incident happened, where a landowner was found dead in the middle of his rice field more than 200 kilometers away from GPP Sorik Marapi, in Banuaji Village, North Tapanuli. At the time, locals noticed clear foam developing in the rice fields, emitting a sulfur/rotten egg odor that progressively permeated throughout the hamlet.

⁵⁶ Aksoy (2014) dan Bravi & Basosi (2014) dalam Fridriksson, T., Merino, A. M., Orucu, A. Y., & Audinet, P. (2017, February). Greenhouse gas emissions from geothermal power production. In Proc 42nd Workshop on Geothermal Reservoir Eng Stanford University February (pp. 13-15)

⁵⁷ Ayat S. Karokaro dalam "Panas Bumi Sorik Marapi Terus Telan Korban". Available at: <https://www.mongabay.co.id/2022/09/22/panas-bumi-sorik-marapi-terus-telan-korban/>

This had been happening from the beginning of GPP Sarulla's operation, which is around 5 kilometers from the community, and had gotten worse over time⁵⁸.

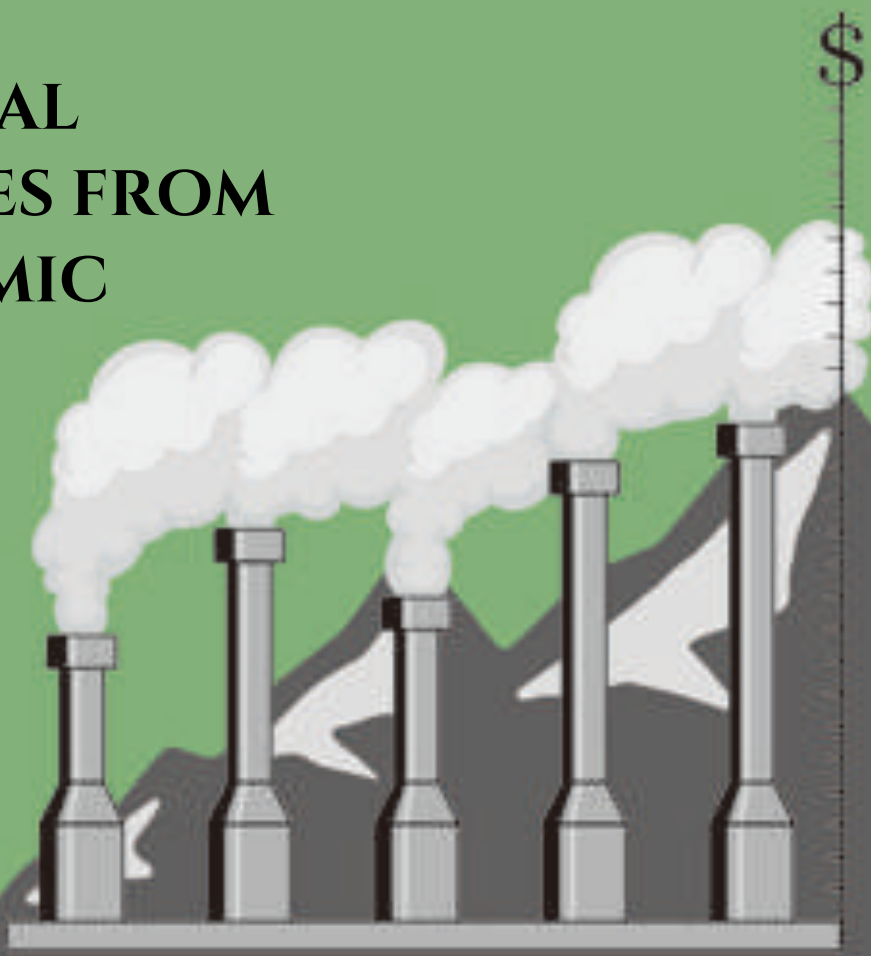
The affected communities around the Mataloko GPP project suffer from Acute Respiratory Tract Infections (ARIs) and itching, which are caused by the emissions of sulfur vapors and mud. These health issues occur not only during the dry season when rainfall is minimal but also during the rainy season. The fact that these health impacts are not limited to a

specific season is a cause for alarm. It demonstrates that these problems are serious and require immediate attention. Public health should be the top priority, and negative effects like ARIs and skin irritation should not merely be minimized but completely avoided.

⁵⁸ Della Syahni dalam Keluhan Seputar Pembangkit Panas Bumi, Ada Omnibus Law Khawatir Perburuk Kondisi. Available at: <https://www.mongabay.co.id/2020/09/12/keluhan-seputar-pembangkit-panas-bumi-ada-omnibus-law-khawatir-perburuk-kondisi/>

CHAPTER 3

GEOHERMAL CHALLENGES FROM AN ECONOMIC ANALYSIS



The ongoing debate regarding the positive and negative impact on utilizing geothermal energy as an electricity source, can be examined from various perspectives. However, one thing for sure, geothermal projects incur significant cost. Before geothermal potential can be fully utilized, there are exploration processes required. This involves the deep drilling process on geothermal wells, reservoir testing and development of appropriate infrastructure.

The exploration for assessing the geothermal potential in a particular region is often hindered by geological and hydrogeological uncertainties, which pose a high risk regarding the successful discovery of economically and sustainably viable geothermal reservoirs. Geological risks and technical hurdles can cause some geothermal projects to fall short of their production targets, even after significant investments.

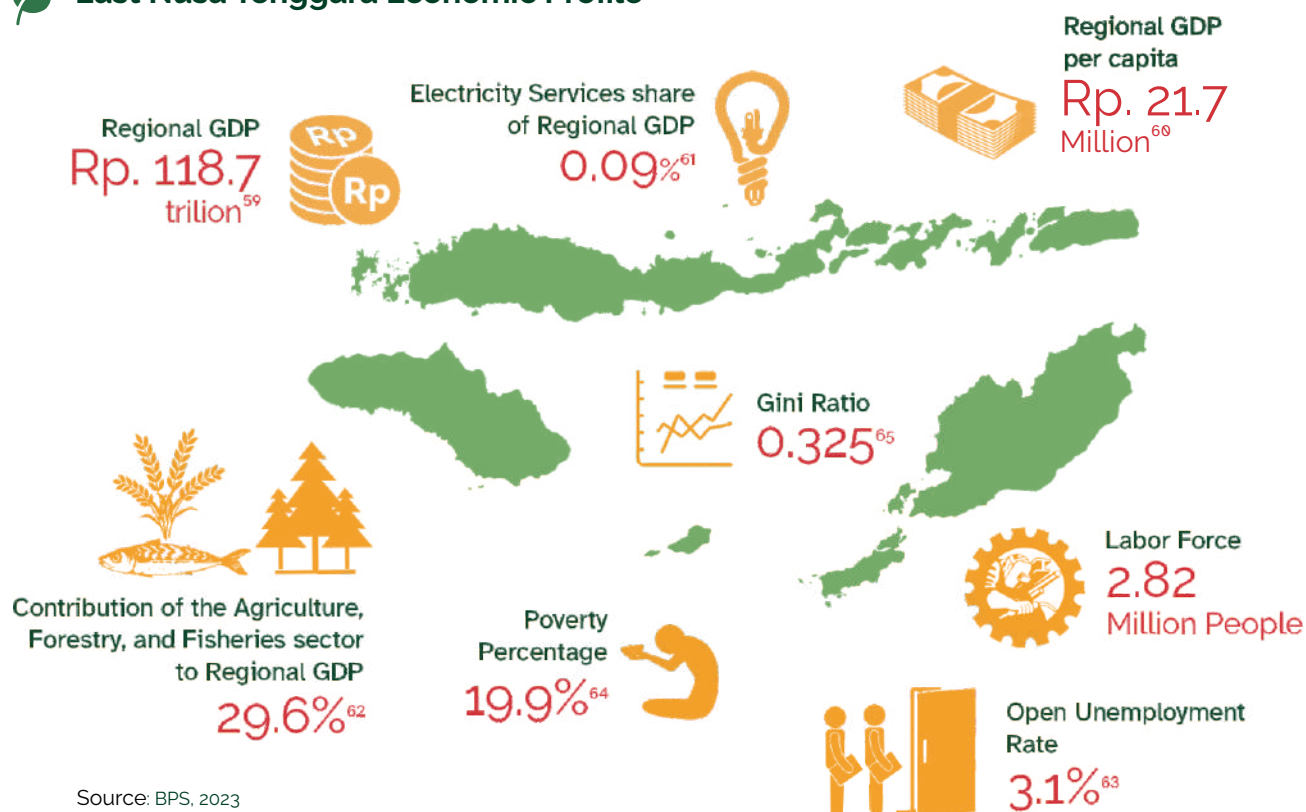
Furthermore, market energy price volatility is a significant issue. Geothermal electricity prices tend to be fluctuating, making

it challenging to compete competitively with other energy sources. Additionally, the transmission network structure from geothermal generators to distant consumption centers requires significant investments, making it difficult to be an economical choice. This has been observed in locations such as Tolhuaca, Chile, and Cooper Basin, Australia, where the high geothermal potential doesn't always correlate with the success of exploitation.

When considering additional metrics such as economic production, aggregate employment, and regional inequality, the effects of geothermal projects on the local economy are not necessarily good.

Although geothermal energy is viewed as a source of energy, its effects on the local economy, particularly in East Nusa Tenggara, must be carefully evaluated.

East Nusa Tenggara Economic Profile



Models and Modeling Assumptions

In the study evaluating economic consequences, the authors' team used the Inter-Regional Input-Output (IRIO) approach based on the 2016 BPS Input-Output table data as one of the methods to estimate the long-term economic

impacts of geothermal projects. Given Flores' status as a geothermal island, this modeling uses examples from three geothermal power plant (GPP) projects in Flores, namely Wae Sano, Sokoria, and Ulumbu.

⁵⁹ Per 2022

⁶⁰ Per 2022

⁶¹ Per 2022

⁶² Share of Agriculture, Forestry and Fisheries sector to GRDP 2022

⁶³ Per February 2023

⁶⁴ Per March 2023

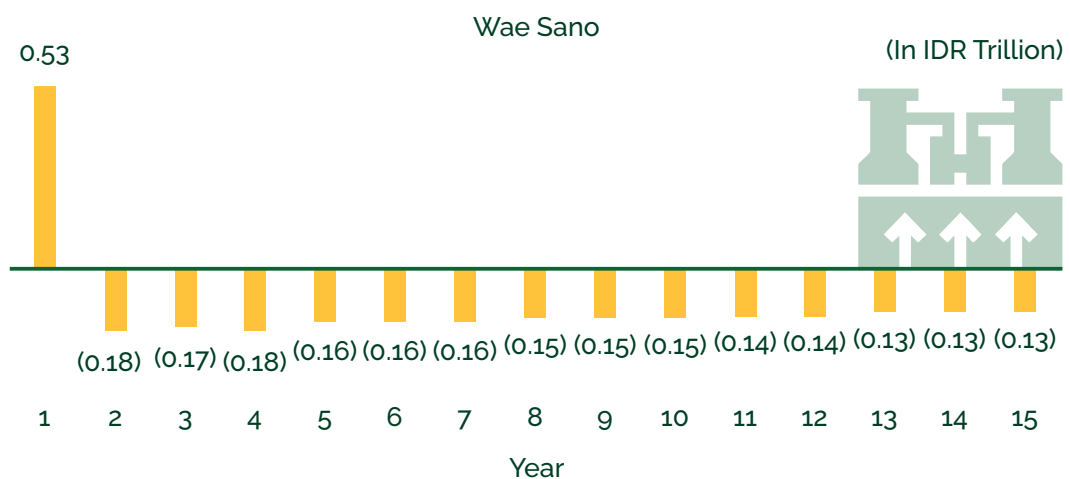
⁶⁵ Per March 2023

1. There is an investment of Rp3 trillion for the construction of geothermal power plants carried out in the first year of development in three locations in East Nusa Tenggara⁶⁶.
2. There are operational costs equal to the additional electricity consumption caused by GPP.
3. There is an increase in electricity consumption with the presence of geothermal power plants that will reduce agricultural production by 0.13%⁶⁷.
4. There is an increase in electricity consumption with the presence of geothermal plants which will reduce the clean water products enjoyed by the community by 0.1%⁶⁸.

The impact modeling results will be reported in aggregate on a national economic scale, as well as the effects on regional economies.

a. The impact on the National Economy

 Wae Sano GPP Project



The development of the geothermal project in Wae Sano has a national economic impact of Rp530 billion. Only in the first year does the project have a positive impact on the national economic aggregate, while consistently, it has a negative impact, especially due to the reduction in agricultural productivity and water

production. The impact generated in the first year is more related to the construction process. However, the overall impact on geothermal mining activities results in a negative impact, accumulating a decrease in the total Gross Regional Domestic Product (GRDP) of East Nusa Tenggara until the end of the estimated year in 2037.

⁶⁶Based on investment value data of three GPP projects in Wae Sano, Sokoria, and Ulumbu (East Nusa Tenggara)

⁶⁷The decrease in agricultural production is derived from the elasticity of geothermal electricity production with agricultural food production calculated by the research team using an econometric model.

⁶⁸The decrease in Clean Water production is obtained from the elasticity of electricity production from geothermal with Clean Water production calculated by the Research team using an econometric model.

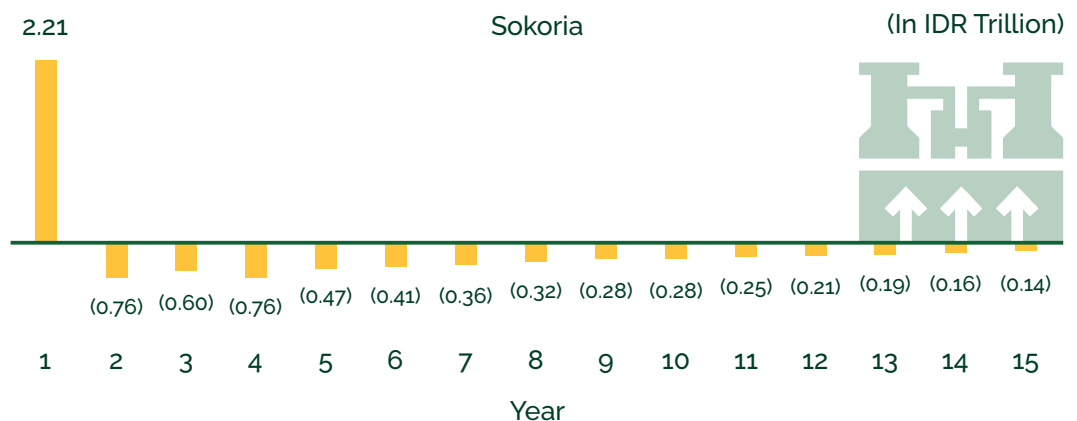
The presence of the geothermal project will disrupt the community of Wae Sano, which is deeply anchored in farming activities, relies on the benefits of the forest, and has a need for clean water. Claims of geothermal benefits in generating new economic sources, particularly tourism, will be called into question. For starters, the Wae Sano village, which relies on coffee and clove plantations as well as numerous other garden produce, will find it difficult to participate in the geothermal project due to skill differences. As a result, geothermal marginalizes existing livelihoods, such as the effects of land use changes and road access.

Secondly, the community in Wae Sano has long been practicing sustainable tourism (eco-tourism) due to the presence of various endemic fauna

(especially birds) that can only be found around the Wae Sano forest. The presence of geothermal mining activities, including the pre-construction process, will create the risk of reduced tourism income for the community.

Thirdly, the Wae Sano community has long received a grant for Solar Power Plants from the Government, and the challenge in energy sustainability is the maintenance cost and solar power plant spare parts after the grant is completed. Compared to promoting large baseloads like Geothermal, the Government could better encourage environmentally friendly energy sources such as Solar Power Plants, along with the availability of spare parts and skill transfer for local technicians.

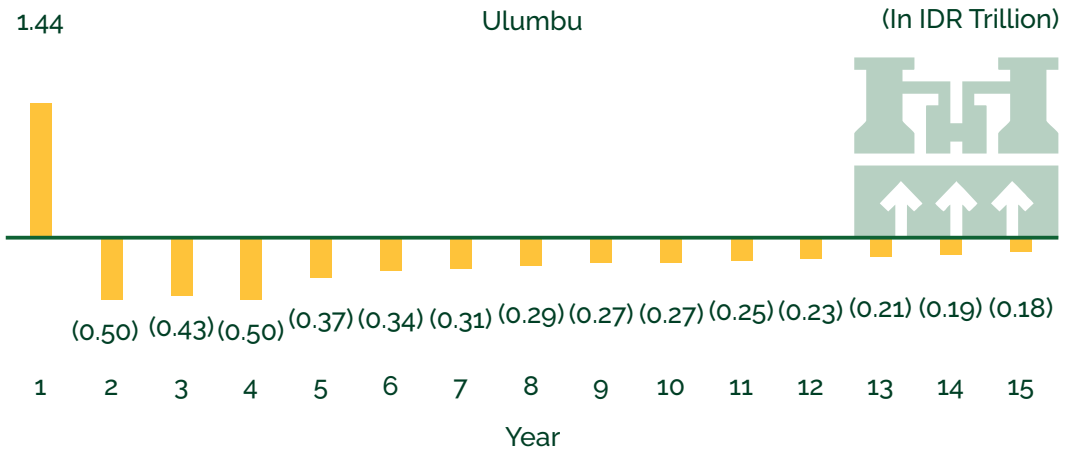
Sokoria GPP Projects



The development of the geothermal project in Sokoria has a higher impact on the national economy compared to

projects in Wae Sano and Ulumbu. However, the negative impact that follows is also greater.

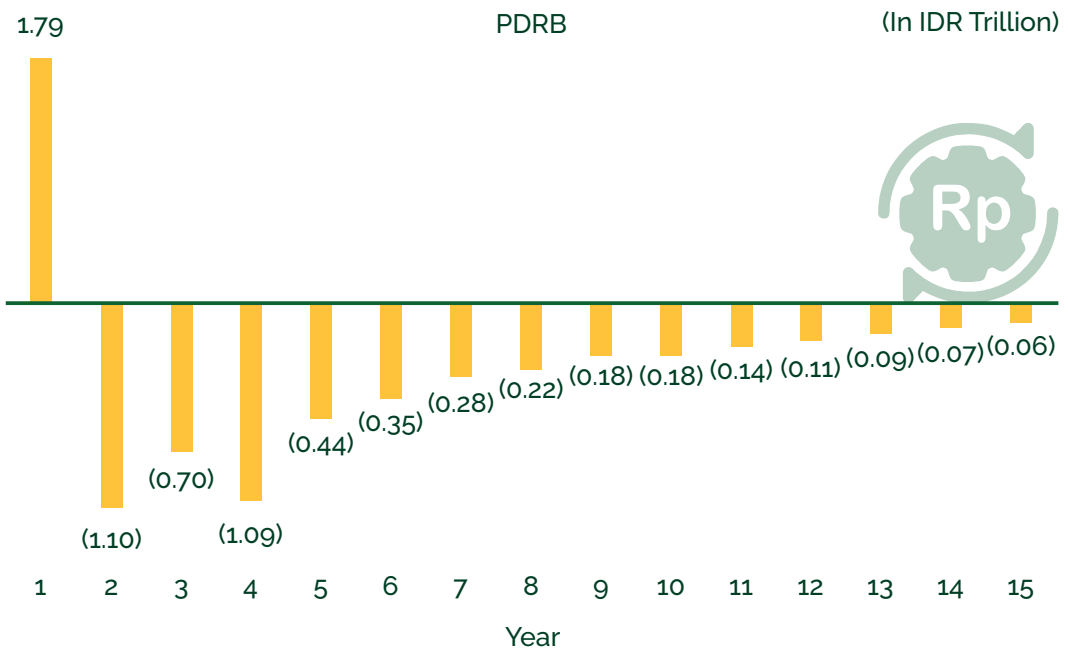
Ulumbu GPP Project



The development of the geothermal project in Ulumbu has a higher impact on the national economy compared to the project in Wae Sano. In the long-term calculation, this project has a

much greater negative impact due to the disruption of agricultural productivity, reduced community income, and water issues.

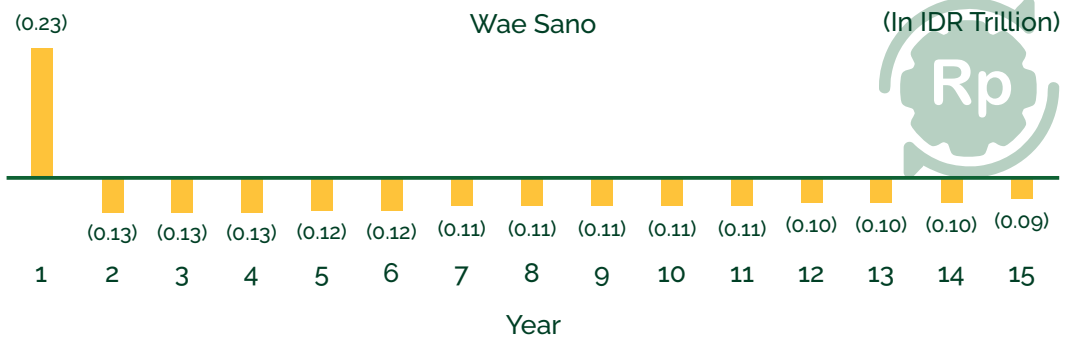
b. The Impact on the Provincial Economy (East Nusa Tenggara)



Just as the increase in the national economy, the region where the GPP is built in East Nusa Tenggara has positive impacts only in the early stages of construction. However, the

positive impact tends to decrease as there is no physical development activity. In the fourth year, the economic loss for East Nusa Tenggara is estimated to reach Rp1.09 trillion.

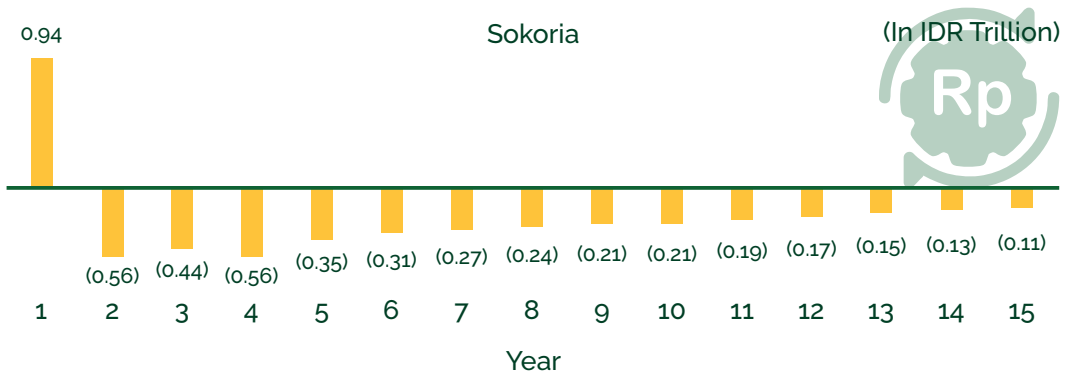
Wae Sano GPP Project



In the construction of the geothermal project in Wae Sano, the impact on the East Nusa Tenggara economy was only IDR 230 billion, but only in the first year experienced a positive

impact, the rest experienced a negative impact due to reduced agricultural productivity and water production.

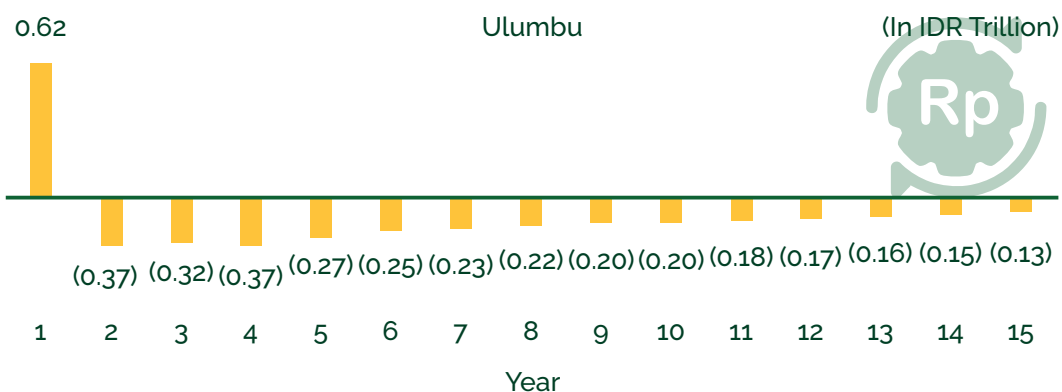
Sokoria GPP Project



The growth of the geothermal project in Sokoria, as well as the influence on the national economy, has a greater impact on the economy of East Nusa

Tenggara than the projects in Wae Sano and Ulumbu. However, the subsequent impact is also greater.

Ulumbu GPP Project



The development of the geothermal project in Ulumbu has a higher impact on the economy of East Nusa Tenggara compared to the project in Wae Sano. Although the subsequent impact is also greater.

c. The impact of the Wae Sano Geothermal Project on the Sectoral Economy of East Nusa Tenggara

First Year Sectoral Impact

Economic Sector	Additional GRDP (in IDR Million)
Agriculture, Forestry and Fisheries	(958,997)
Mining and Excavation	175,926
Manufacturing Industry	123,043
Procurement of Electricity and Gas	41,924
Water Supply, Waste Management, Waste and Recycling	(12,753)
Construction	1,655,888
Wholesale and Retail Trade; Car and Motorbike repair	256,907
Transportation and Warehousing	202,376
Provision of Accommodation and Food and Beverages	3,067
Information and Communication	98,657
financial and insurance services	100,002
Real Estate	70,732
Company Services	15,407
Government Administration, Defense and Mandatory Social Security	2,576
Education Services	2,541
Health and Social Activity Services	(1,040)
Other Services	10,927
Total	1,787,182

In the first year of development, in total there was an additional Gross Regional Domestic Product (GRDP) of IDR 1.8

trillion. Meanwhile, the added value of the agriculture, forestry and fisheries sectors decreased by IDR 1 trillion.

2nd Year Sectoral Impact

Economic Sector	Additional GRDP (in IDR Million)
Agriculture, Forestry and Fisheries	(972,396)
Mining and Excavation	(248)
Manufacturing Industry	(4,540)
Procurement of Electricity and Gas	(4,739)
Water Supply, Waste Management, Waste and Recycling	(12,203)
Construction	(2,498)
Wholesale and Retail Trade; Car and Motorbike repair	(51,262)
Transportation and Warehousing	(13,075)
Provision of Accommodation and Food and Beverages	(678)
Information and Communication	(5,244)
financial and insurance services	(16,294)
Real Estate	(4,247)
Company Services	(1,437)
Government Administration, Defense and Mandatory Social Security	(238)
Education Services	(503)
Health and Social Activity Services	(5,705)
Other Services	(2,615)
Total	1,097,922

The Gross Regional Domestic Product (GRDP) decreased by Rp1.1 trillion in the second year of development. Agri-

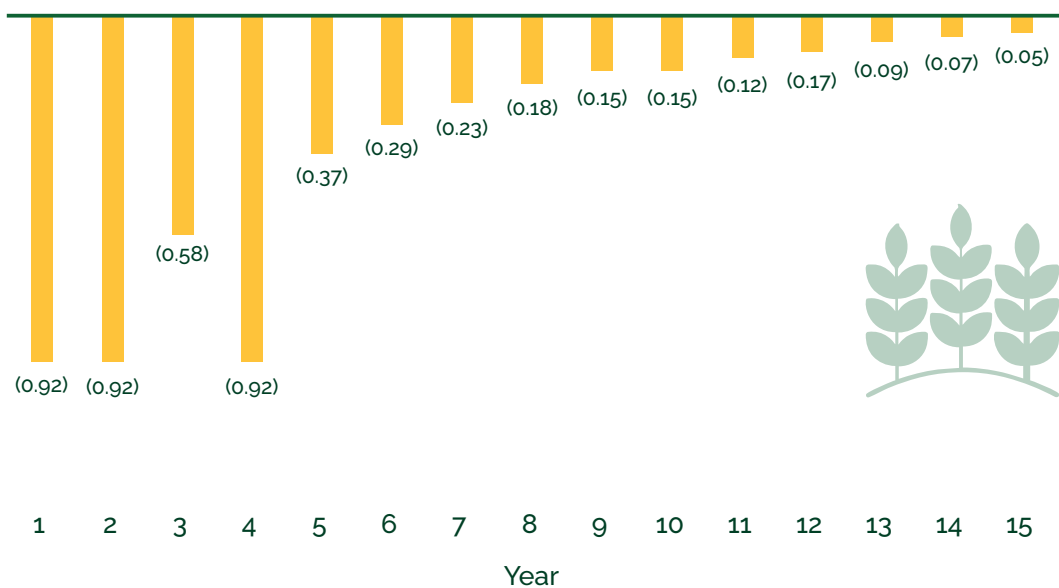
culture, forestry, and fisheries saw the greatest decline, totaling to Rp972 billion.

d. The Impact on Agriculture in East Nusa Tenggara

Ulumbu GPP Project

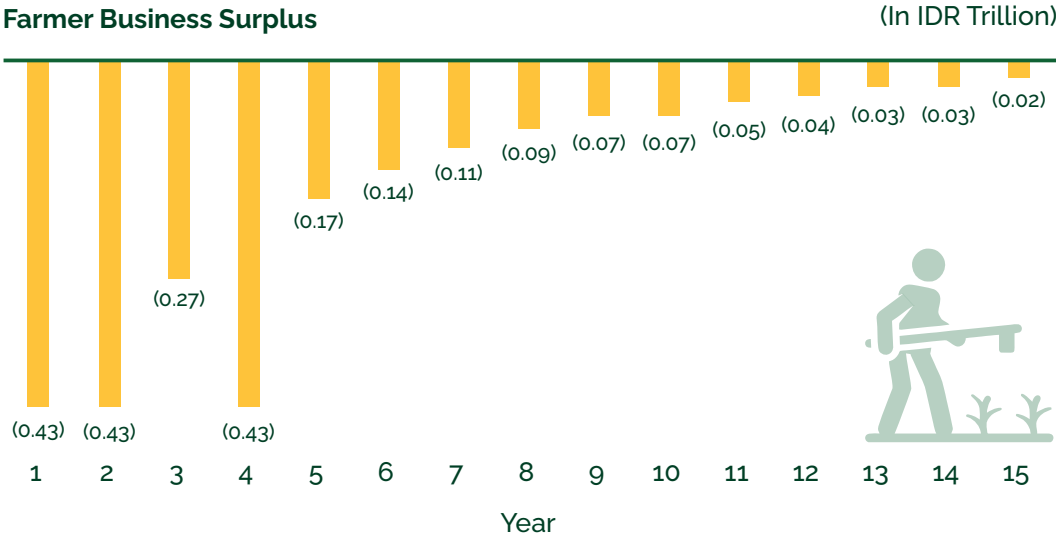
Agricultural Value Added

(In IDR Trillion)



In the initial year, the GPP construction process resulted in a shift of land and labor from agriculture to construction and its supporting sectors. As a result, the productivity of

East Nusa Tenggara's food agriculture land decreased, leading to a decline in the added value of food crop agriculture.



As a result, farmers' income in East Nusa Tenggara is reduced by Rp430 billion during the construction year, and it gradually recovers after the fifth year. However, the revenue of farmers in East Nusa Tenggara food crop farming points in a direction that undermines the food sovereignty strategy.

community's agricultural output.

Since 2006, people in Mataloko, Ngada Regency, East Nusa Tenggara Province, have felt the negative impacts of geothermal development projects that do not prioritize the precautionary principle and ignore social and environmental impact assessments that must be carried out carefully and transparently. As a result, it was the people who became victims of the steam and hot mud which resulted in a decline in the local

Mataloko has long been regarded as a vegetable-growing region. Agriculture is one of the most important economic sectors in this region, including agricultural commodities such as corn, coffee, almonds, and a variety of other seasonal plants. Even though the maize and candlenut plants were growing, they were not full, the bamboo and palm palm plants were also killed due to a lack of water, and the residents' fish ponds could no longer be used. The town's agricultural and horticultural output results are practically ruined as a result of the geothermal project's utter disregard for the community.

e. The Impact of Each Project on Farmer's Income

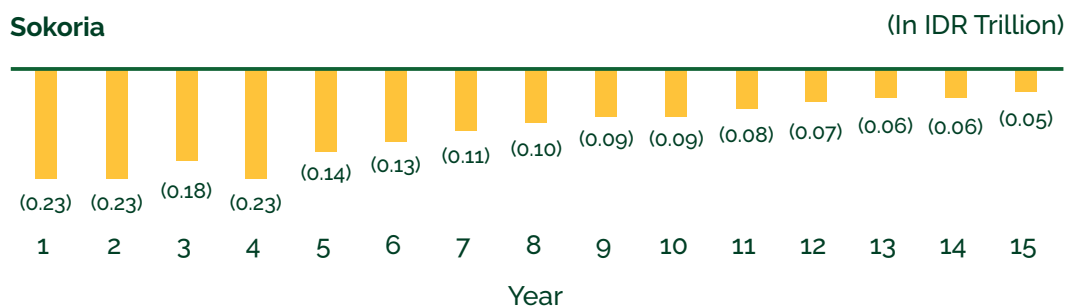
Wae Sano GPP Project



Farmers' income losses as a result of the Wae Sano geothermal project reached IDR 50 billion, though this

figure is expected to decline as agricultural productivity recovers.

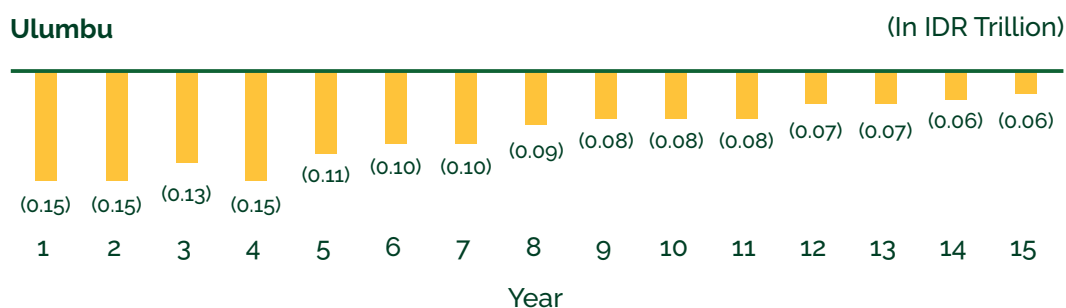
Sokoria GPP Project



The losses incurred by farmers due to the Sokoria geothermal project are the highest, primarily due to the substantial environmental damage.

Farmers' losses amount to Rp230 billion, even though the decline is relatively faster compared to other areas.

Ulumbu GPP Project

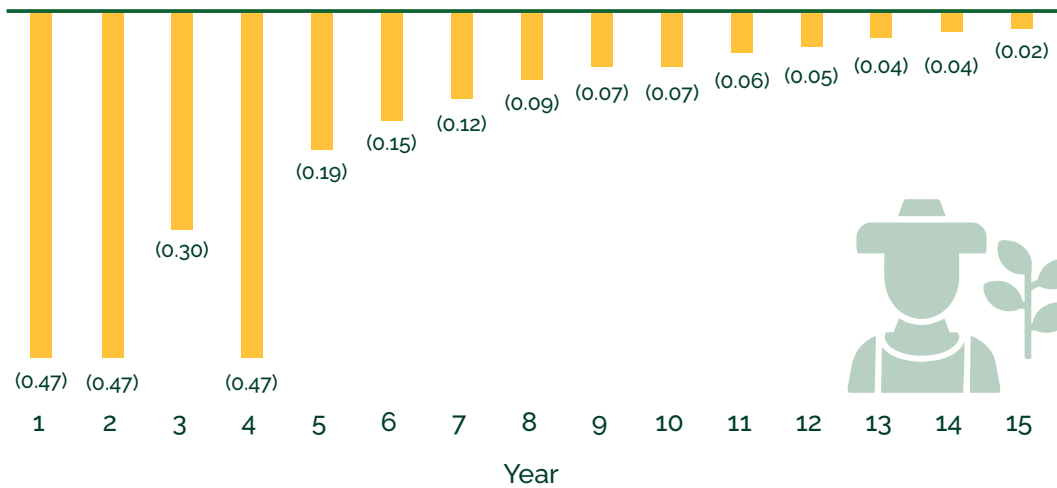


The losses incurred by farmers due to the Ulumbu geothermal project are quite high, with farmers experiencing

losses amounting to Rp150 billion, and the decline is relatively slower.

Agricultural Labor Income

(In IDR Trillion)



Likewise, the income of farm laborers or workers in the agricultural sector saw their aggregate income decrease

by IDR 470 billion in the year the geothermal project was built.

f. Impact of Each Project on the Economy of East Nusa Tenggara

Wae Sano GPP Sectoral Impact on on its First Year

Economic Sector	Additional GRDP (in IDR Million)
Agriculture, Forestry and Fisheries	(121,405)
Mining and Excavation	22,272
Manufacturing Industry	15,577
Procurement of Electricity and Gas	5,307
Water Supply, Waste Management, Waste and Recycling	(1,615)
Construction	209,629
Wholesale and Retail Trade; Car and Motorbike repair	32,523
Transportation and Warehousing	25,620
Provision of Accommodation and Food and Beverages	388
Information and Communication	12,490
financial and insurance services	12,660
Real Estate	8,954
Company Services	1,950
Government Administration, Defense and Mandatory Social Security	326
Education Services	322
Health and Social Activity Services	(132)
Other Services	1,383
Total	226,250

In the first year of development, an additional GRDP of IDR 226 billion was generated. Meanwhile, the

agricultural, forestry, and fisheries industries' added value decreased by IDR 121 billion.

Sectoral Impact of GPP Wae Sano on its 2nd Year

Economic Sector	Additional GRDP (in IDR Million)
Agriculture, Forestry and Fisheries	(123,069)
Mining and Excavation	(28)
Manufacturing Industry	2,432
Procurement of Electricity and Gas	(438)
Water Supply, Waste Management, Waste and Recycling	(1,796)
Construction	(328)
Wholesale and Retail Trade; Car and Motorbike repair	(5,817)
Transportation and Warehousing	(1,460)
Provision of Accommodation and Food and Beverages	(82)
Information and Communication	(576)
financial and insurance services	(1,906)
Real Estate	(425)
Company Services	(146)
Government Administration, Defense and Mandatory Social Security	(27)
Education Services	(59)
Health and Social Activity Services	(708)
Other Services	(333)
Total	134,764

In the second year of construction, there was a total decrease in Gross Regional Domestic Product (GRDP) by Rp134.8 billion. The agriculture,

forestry, and fisheries sector experienced the most significant decline, amounting to total Rp123.1 billion.

GPP Sokoria Sectoral Impact on its First Year

Economic Sector	Additional GRDP (in IDR Million)
Agriculture, Forestry and Fisheries	(506,486)
Mining and Excavation	92,914
Manufacturing Industry	64,984
Procurement of Electricity and Gas	22,142
Water Supply, Waste Management, Waste and Recycling	(6,736)
Construction	874,543
Wholesale and Retail Trade; Car and Motorbike repair	135,683
Transportation and Warehousing	106,883
Provision of Accommodation and Food and Beverages	1,620
Information and Communication	52,105
financial and insurance services	52,815
Real Estate	37,357
Company Services	8,137
Government Administration, Defense and Mandatory Social Security	1,360
Education Services	1,342
Health and Social Activity Services	(549)
Other Services	5,771
Total	943,885

In the first year of construction, there was a total increase in Gross Regional Domestic Product (GRDP) by Rp943.9 billion. However, the value added in the agriculture, forestry, and fisheries sector decreased by Rp506.5 billion.

GPP Sokoria Sectoral Impact 2nd Year

Economic Sector	Additional GRDP (in IDR Million)
Agriculture, Forestry and Fisheries	(513,422)
Mining and Excavation	(109)
Manufacturing Industry	10,155
Procurement of Electricity and Gas	(1,767)
Water Supply, Waste Management, Waste and Recycling	(7,008)
Construction	(1,309)
Wholesale and Retail Trade; Car and Motorbike repair	(24,198)
Transportation and Warehousing	(6,044)
Provision of Accommodation and Food and Beverages	(338)
Information and Communication	(2,362)
financial and insurance services	(7,895)
Real Estate	(1,748)
Company Services	(598)
Government Administration, Defense and Mandatory Social Security	(110)
Education Services	(245)
Health and Social Activity Services	(2,949)
Other Services	(1,366)
Total	(561.312)

In the second year of construction, there was a total decrease in Gross Regional Domestic Product (GRDP) by Rp561.3 billion. The agriculture, forestry, and fisheries sector had the most significant decline, amounting to Rp513.4 billion.

Ulumbu GPP Sectoral Impact 1st Year

Economic Sector	Additional GRDP (in IDR Million)
Agriculture, Forestry and Fisheries	(325,900)
Mining and Excavation	476
Manufacturing Industry	102,450
Procurement of Electricity and Gas	15,065
Water Supply, Waste Management, Waste and Recycling	14,475
Construction	(4,404)
Wholesale and Retail Trade; Car and Motorbike repair	592,748
Transportation and Warehousing	131,721
Provision of Accommodation and Food and Beverages	6,303
Information and Communication	576
financial and insurance services	68,427
Real Estate	162
Company Services	24,421
Government Administration, Defense and Mandatory Social Security	5,319
Education Services	889
Health and Social Activity Services	877
Other Services	(359)
Total	633,247

In the first year of construction, there was a total increase in Gross Regional Domestic Product (GRDP) by Rp633.3 billion. However, the value added in the agriculture, forestry, and fisheries sector decreased by Rp325.9 billion.

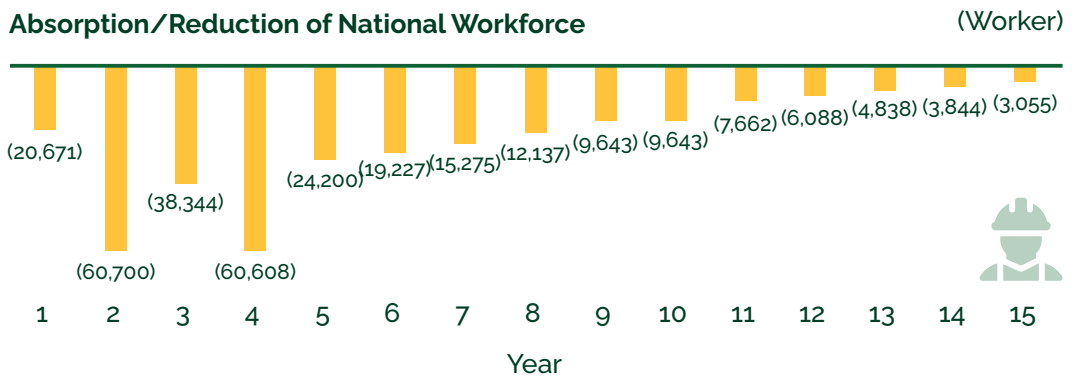
Ulumbu GPP Sectoral Impact 2nd Year

Economic Sector	Additional GRDP (in IDR Million)
Agriculture, Forestry and Fisheries	(335,641)
Mining and Excavation	(73)
Manufacturing Industry	6,636
Procurement of Electricity and Gas	(1,173)
Water Supply, Waste Management, Waste and Recycling	(4,725)
Construction	(873)
Wholesale and Retail Trade; Car and Motorbike repair	(15,840)
Transportation and Warehousing	(3,965)
Provision of Accommodation and Food and Beverages	(222)
Information and Communication	(1,556)
financial and insurance services	(5,177)
Real Estate	(1,150)
Company Services	(394)
Government Administration, Defense and Mandatory Social Security	(73)
Education Services	(160)
Health and Social Activity Services	(1,929)
Other Services	(900)
Total	(367,217)

In the second year of construction, there was a total decrease in Gross Regional Domestic Product (GRDP) by Rp367.2 billion. The agriculture,

forestry, and fisheries sector had the most significant decline, amounting to Rp335.7 billion.

g. The Impact of Each Project on Labor Absorption

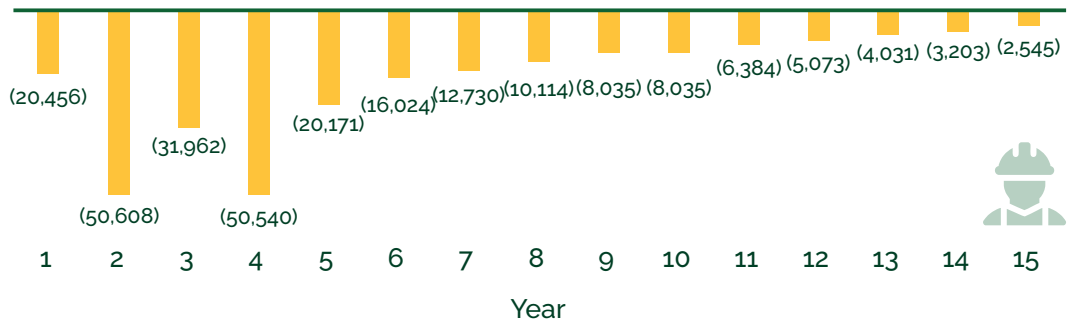


There was a reduction in national employment by 20,671 workers due to the environmental damage to

agriculture and water caused by the development of geothermal projects in East Nusa Tenggara.

Absorption/Reduction of East Nusa Tenggara workforce

(Worker)

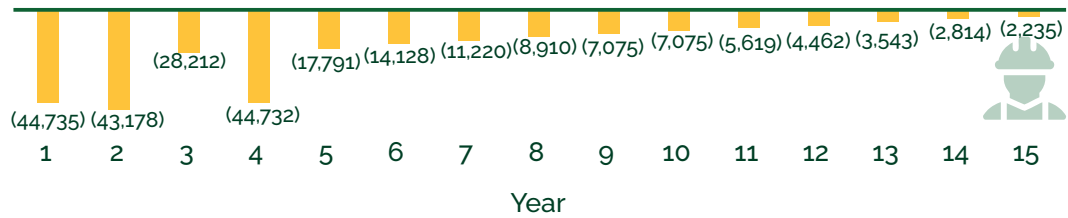


There is a reduction in employment of 20,456 workers in East Nusa Tenggara caused by damage to the

agricultural and water environment from geothermal development.

Absorption/reduction of East Nusa Tenggara agricultural workforce

(Worker)



A total of 43,187 agricultural workers will be reduced due to the development of geothermal projects in East Nusa Tenggara. In the initial years, some workers are assumed to transition to the construction sector.

However, after the completion of geothermal development, the agricultural workforce will continue to decrease due to the reduction in land area.

h. Impact of GPP Labor Absorption in Wae Sano, Sokoria, and Ulumbu Year 1

Economic Sector	Employment (number of worker)
Agriculture, Forestry and Fisheries	(43,187)
Mining and Excavation	3,707
Manufacturing Industry	1,119
Procurement of Electricity and Gas	453
Water Supply, Waste Management, Waste and Recycling	(104)
Construction	10,278
Wholesale and Retail Trade; Car and Motorbike repair	3,386
Transportation and Warehousing	1,449
Provision of Accommodation and Food and Beverages	33
Information and Communication	1,114
financial and insurance services	781
Real Estate	342
Company Services	123
Government Administration, Defense and Mandatory Social Security	35
Education Services	46
Health and Social Activity Services	(46)
Other Services	19
Total	(20,456)

In the first year of development, there was a reduction in the workforce by 20,456 people. Meanwhile, the agricultural sector's workforce decreased by 43,187 people, resulting in a much

larger loss in terms of employment, despite an additional 10,278 workers in the construction sector.

I. Impact of GPP Labor Absorption in Wae Sano, Sokoria and Ulumbu 2nd Year

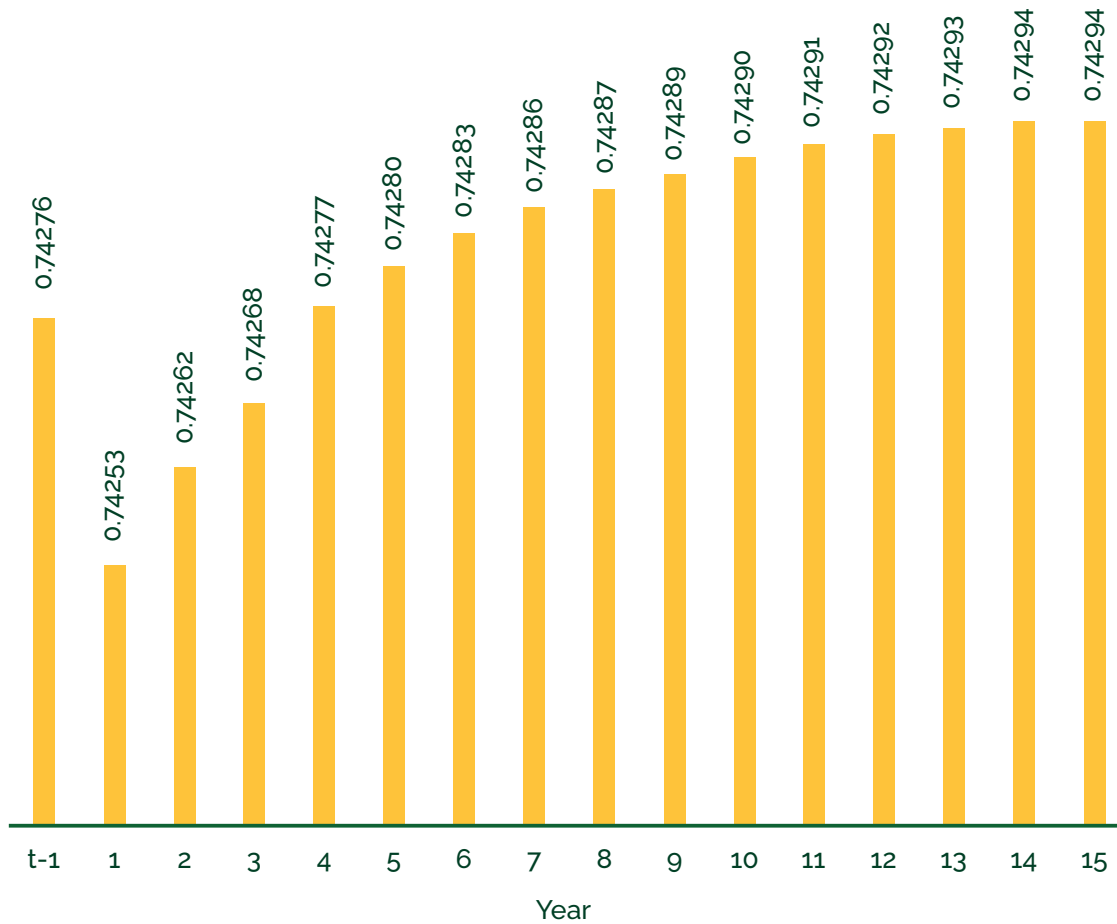
Economic Sector	Employment (number of worker)
Agriculture, Forestry and Fisheries	(44,735)
Mining and Excavation	(19)
Manufacturing Industry	(1,185)
Procurement of Electricity and Gas	(257)
Water Supply, Waste Management, Waste and Recycling	(112)
Construction	(101)
Wholesale and Retail Trade; Car and Motorbike repair	(2,050)
Transportation and Warehousing	(852)
Provision of Accommodation and Food and Beverages	(23)
Information and Communication	(245)
financial and insurance services	(490)
Real Estate	(117)
Company Services	(118)
Government Administration, Defense and Mandatory Social Security	(8)
Education Services	(18)
Health and Social Activity Services	(109)
Other Services	(169)
Total	(50,608)

After physical construction is assumed to decrease, there is an aggregate reduction in employment by 50,608 people. The largest decrease occurs in

the absorption of labor in the agricultural sector, with a decrease of 44,735 people.



Measuring Inequality in Geothermal Project Results using Williamson Index



- The Williamson Index explains the income per capita disparity between regions with a range of values from 0 (no disparity) to 1 (absolute disparity).
- The higher the value of the Williamson Index, the greater the disparity in income per capita between regions.
- Due to the geothermal project, the income disparity between regions is worsening, indicating an accumulation of benefits from capital investment not to the areas around the geothermal location but to areas outside of East Nusa Tenggara. Baseload energy development models like geothermal, which are capital-intensive, tend to exacerbate inequality between the local population and companies. There is a pattern where the benefits of baseload electricity sales flow to creditors or companies outside the geothermal project area.

CHAPTER 4

ANALYZING GEOTHERMAL PROJECTS THROUGH A SOCIO-CULTURAL LENS: THE ABANDONED AND THE RESISTANCE

“The geothermal project threatens the integrity of our living space. Currently, we live in a situation of anxiety and fear because this project continues to be imposed in various ways. Therefore, when the World Bank becomes involved in financing this project, they are implicated and have a share in committing crimes against humanity.”

Yosef Erwin Rahmat

Wae Sano villager, East Nusa Tenggara



Until today, every narrative related to the government-built energy transition tends to prioritize investment issues and national economic growth. It is only appropriate for us to ask: Who is this geothermal project actually intended for? Because GPP construction projects, initially touted as projects for the common good, are increasingly transforming into businesses

built solely to pursue profit from the buying and selling of electricity. The realization of a just and sustainable energy transition in a socio-ecological context is no longer prioritized. However, the most fundamental urgency towards energy sovereignty is to establish the energy needs of each region according to its own potential, with no one left behind.

Environmental and social aspects must be seen as a unified entity in a geothermal development project. The process undoubtedly has both direct and indirect impacts on the quality of various livelihoods, as well as the capacity and resilience to support the life of the local community. Therefore, geothermal exploration and exploitation for energy provision must not disregard the social and environmental impact factors it may have on indigenous peoples and local communities (IPLCs), especially vulnerable groups, particularly when it threatens the sustainability of their livelihoods.

Reflecting on the conflicts related to Geothermal Power Plants (GPPs) in several

regions of Indonesia, there have been no concrete steps taken by the government and developers to anticipate the resulting impacts. Indigenous peoples and local communities are often relegated to the role of observers in the complexities of energy procurement. The development of these geothermal projects further marginalizes local communities in the broader landscape of national energy transition. This is tantamount to neglecting the principle of public participation, intentionally done by the government and development companies. Ideally, in the context of energy transition, the development of geothermal power plants should be based on a roadmap for a fair and sustainable energy transition.

Geothermal Power Plant: From Violations of Rights, Deprivation of Living Space to Criminalization,



The difficulty of identifying the location for infrastructure construction is a regular occurrence in the development of geothermal projects. Protests and even rejections by the community are always based on stakeholders' or the

government's failure to incorporate the community in the GPP development plan from the start. When the community's criticisms or objections are ignored, the problem gets more serious.

In the rejection by the residents of Karangtengah Village, Banyumas, against the construction of the Baturraden GPP, for example, the issue escalated due to the threat to the living space faced by the community in the form of environmental damage, which impacts daily life needs and the businesses of the residents. The conflict over living space between the residents and PT. Sejahtera Alam Energy (SAE) became one of the main driving forces behind the residents' rejection⁶⁹.

Armed with the Exploration Permit based on the Minister of Energy and Mineral Resources (MEMR) Decree Number 1557.K/30/MEM/2010 and the Mining Business License (MBL) through the Central Java Governor's Decree Number 541/27/2011, PT SAE came to the southern slope of Mount Slamet located in Cilongok District, Banyumas Regency, to conduct well drilling to find a geothermal heat source. However, their arrival was unknown to the surrounding residents, and there was no socialization about what they were doing and what they were planning to build.

According to reports conducted by the Save Slamet Alliance Research Team, which included students, environmental activists, non-governmental groups, academics, religious organizations, local residents, and others, PT SAE only conducted outreach in 2016-2017, or 5-6 years after exploration began⁷⁰. The same report also explains that PT SAE

conducted socialization after residents felt environmental impacts, such as muddy river water (precisely in the Tepus and Prungut sub-districts) and the influx of wild animals from the mountain damaging the farmland of the residents around the southern slope of Mount Slamet. This incident is attributed to the activities of PT SAE, which involved clearing land in the protected forest area and cutting hills for road access.

Soil sedimentation that fell into the river due to landslides and piles of road infrastructure that were dumped haphazardly, has changed the content of the river bed, which was previously rock, replaced by mud deposits. This causes the river below to become murky.

"The phenomenon of muddy water disrupts the daily activities of the community. The residents of the village usually use the Prukut River for bathing, washing, sanitation, drinking, and cooking. With the turbidity of the Prukut River water, some residents in the villages of Karangtengah, Panembangan, Pernasidi, Karanglo, and Cikidang are facing difficulties in accessing clean water. In several instances of community audiences and actions, PT SAE itself has acknowledged that this issue is due to technical errors in the cut and fill process on the hills along the construction of road facilities and wellpads."⁷¹

⁶⁹ L. Darmawan dalam Masih Terjadi Pro dan Kontra Pembangunan GPP Baturraden, Adakah Solusi?. Available at: <https://www.mongabay.co.id/2017/07/31/masih-terjadi-pro-dan-kontra-pembangunan-GPP-baturraden-adakah-solusi/>

⁷⁰ Mufflih Fuadi, Dian Hamdani, Panji Mulkillah, Selamatkan Gunung Slamet Dari Ancaman GPPB Baturraden, Sebuah Bacaan Pengantar. Aliansi Selamatkan Slamet, Banyumas (September 2017). Page. 49.

⁷¹ Ibid., Page. 23.

The opening of protected forest areas also encourages wild animals to seek new living spaces in the surrounding areas. The most dominant influx includes wild boars and monkeys entering the agricultural and plantation lands of the residents, taking anything that grows on them. This situation has given rise to a new conflict between wildlife and local farmers. The two conditions experienced by the residents—a shortage of clean water and the onslaught of wild animals damaging crops—have prompted the residents around the slopes of Mount Slamet to stage a major protest involving various elements of the community.

The protests and objections of the community are always ignored and seemingly deemed insignificant because the government and developers consistently place them within the context of achieving the target of the 35,000 MWe accelerated energy development project. From the perspective of the government and developers, the efforts made by the community are considered efforts to 'hinder development' or 'oppose the government.'

In the latest regulations in 2022, the government has declared 17 geothermal exploration and exploitation areas for the procurement of electrical energy as National Vital Objects (Obvitnas)⁷². By granting permits to State-Owned Enterprises or Private-Owned Enterprises labeled Obvitnas for geothermal areas, it means that their management has special legal status and is protected by law. The consequence is that security from security forces (Indonesia National

Police and Indonesian National Armed Force) is increasingly easily accessible to geothermal developers.

The accessibility of security forces under the pretext of securing the geothermal project corresponds to the potential criminalization of the community. The possible criminalization of the community, stemming from opposition to the geothermal project, has the potential to evolve into a controversial and intricate matter. This signifies a clash between the right to articulate opinions and engage in the democratic process and the safeguarding of environmental integrity and citizens' rights. The Salingka Gunung Talang community in Solok Regency has already witnessed the repercussions of the excessive deployment of security forces.

Since September 2017, the Salingka Gunung Talang community has initiated large-scale protests against the planned construction of the Gunung Talang Bukit Kili GPP. As the developer, PT. Hitay Daya Energy, only invited the residents once for a presentation without allowing them to express their opinions or objections. In response, the community has undertaken a series of actions, leading to an incident where the company's vehicles were set on fire, resulting in 12 people being designated as DPO (Wanted Persons) by the West Sumatra Regional Police, with three individuals being detained.

⁷² Decree of the Minister of Energy and Mineral Resources Number 270.K/HK.02/MEM.S/2022 in the section on New, Renewable Energy and Energy Conservation. Available at: <https://jdih.esdm.go.id>

There were administrative irregularities in the process, as the examination, designation, and detention of the three suspects were conducted on the same day without examining and considering the statements of available witnesses. Furthermore, the pre-trial legal efforts undertaken by the residents in February 2018 were deemed invalid and in violation of the law⁷³.

Similar experiences were encountered by the residents of Talikuran Village, Tompaso District, Minahasa. Since January 2017, affected residents who identify themselves as the Tompaso Raya Community Alliance have undertaken various actions in front of the GPP Lahendong units 5 and 6 facilities. They criticized PT. Pertamina Geothermal Energy (PGE) Lahendong for being allegedly non-transparent in workforce recruitment and not favoring local labor. Regardless of the numerous protests, PGE remained unresponsive and continued to deny its obligations regarding the management of water sources, road repairs, irrigation construction, as well as indigenous rights to village roads and plantations.

The latest news involves the villagers of Poco Leok in Satar Mese District, Manggarai Regency, who have blocked PLN officers. PLN officers, escorted by armed authorities, were attempting to stake out the drilling spot for the expansion of GPP Ulumbu from 7.5 MW to 40 MW. Authorities attempted to disperse the indigenous population,

which originated in four areas (called "gendang" in the community): Lungar, Tere, Racang, and Rebak. Despite the rain, the indigenous population continued to block access roads and seize authorities' equipment⁷⁴.

The facts stated in the preceding cases show that the growth of GPPs in Indonesia prioritizes the interests of developers, both private and government owned. Critical aspects, such as involving communities in planning and determining the WKP (Working Areas) and assessing the impact on people managed regions that serve as sources of community livelihood, no longer appear to be essential requirements in the geothermal power plant development process.

Not only that, with the issuance of Law No. 21 of 2014 regarding Geothermal, the determination of geothermal working areas for exploration can freely encroach on buffer zones such as protected forest areas, nature reserves, and even biosphere reserves. Moreover, the formulation and enactment of the Omnibus Law on Job Creation (UU Cipta Kerja) further demonstrate the government's favoritism towards protecting this business. In addition to perpetuating land grabbing and encroachment on communities' living space in the name of renewable energy, the community's control role will be deliberately cut down by the presence of the Omnibus Law on Job Creation.

⁷³ From the article "Gugatan Warga Salingka Gunung Talang Ditolak." Available at: <https://www.harianhaluan.com/internasional/pr-10205441/gugatan-warga-salingka-gunung-talang-ditolak>

⁷⁴ Yohanes Manasye in "Warga Adat Adang Petugas PLN Ke Lokasi Pengeboran Geothermal". Available at: <https://mediaindonesia.com/nusantara/588338/warga-adat-adang-petugas-pln-ke-lokasi-pengeboran-geothermal>

The authority of local governments is massively curtailed by the central government, including those dealing with the development of geothermal power plants. Authorities ranging from supervision, guidance, to the management of geological information data are taken over by the central government, allowing permitting officials to easily restrict access to information for the public.

Even while the Central Government has administrative control, the true social and environmental consequences are the responsibility of local communities. What the Central Government sees as an energy investment becomes a terrifying phantom for the local population. Geothermal projects manifest as ghosts, causing various diseases, claiming lives, resulting in failed harvests, seizing and

killing community livelihoods, polluting water sources, resulting in a loss of access to clean water, reducing biodiversity, resulting in a decline in environmental sustainability, and making social life in communities inconvenient as it can trigger suspicion and even conflicts among the people.

The negative impact of geothermal power plant development, which neglects the precautionary principle, has a compounded effect on women at the local level. Women, being the most vulnerable group, are disproportionately affected by the damage and pollution caused by geothermal development, particularly concerning access to clean water, livelihood resources for their families, and disruptions in access to education and healthcare services for themselves and their families.

Geothermal Projects Have the Most Impact on Women's Groups



The extensive narrative of resistance against geothermal projects in Indonesia, that emerge through the struggles of women's groups, must be considered as a crucial record. Women, being the most impacted by the declining environmental capacity, bear the brunt of disruptions. They suffer the most when clean water sources are disturbed or contaminated. They are burdened with the need to seek additional income when their primary livelihoods are disrupted or lost. Additionally, they are the ones most adversely affected by the loss of easy and affordable access to education and healthcare facilities for their families.

In the social structure, women are burdened with various domestic responsibilities. They are expected to take on traditional roles as homemakers and family supporters, including household chores such as cooking, cleaning, and caring for family members. Moreover, in families with low economic levels, women are often faced with the demands of outside employment to contribute to the family's economy. This creates layered burdens for them. The multiple roles of women, closely tied to domestic affairs—which involve the supply of food, water, etc., and are intertwined with the daily fulfillment of family needs—establish a closer relationship between women and the environment. Consequently, any disruptions, no matter how small, that occur in the environment are noticed and felt firstly by women.

However, women's contributions do not correspond to the treatment they receive in social spaces, particularly when it

comes to spatial planning decision making processes that involve environmental ecosystems, water resources, and land use, which are inextricably linked to people's living spaces and main sources of livelihood. Men continue to dominate planning and decision making processes, and patriarchal features and power dominance are still prominent in Indonesia today. Women's marginalization in this situation can be seen as evidence of structural repression.

In the year-end report of 2021, Solidaritas Perempuan (SP) highlighted that patriarchy and power domination have perpetuated a select few individuals in determining various agendas that have the potential to further consolidate power, sidelining women and the majority of other vulnerable communities. The agendas they pursue often masquerade under the guise of development, the people's interests, addressing the climate crisis, and solutions for recovering from the pandemic. In reality, various cases of violence, suppression, as well as the confiscation of living spaces and life resources owned by women, continue to occur amid the 'recovery' process according to the state's current version.

Women are left to manage patriarchal politics and multifaceted challenges on their own. Various laws, initiatives, and official acts that the government says are remedies in fact impinge on women's sovereignty over their bodies and lives. In this environment, women's vibrancy through various collective struggle efforts is aimed not only at survival but also to bring about change and reclaim their sovereignty. These activities can be seen in many kinds of resistance by women farmers and coastal communities whose living places have been stolen, women who articulate their concerns and obtain

attention, influencing decision-making, creating groups, and initiatives to encourage economic self-sufficiency⁷⁵.

Based on these facts, women are frequently driven to launch radical environmental battles in various places. This can be seen in the efforts of Nai Sinta boru Sibarani in Porsea, North Sumatra, against PT Inti Indorayon Utama; Mama Yosepha Alomang in Amungme, Papua, against Freeport; and Mama Aleta in East Nusa Tenggara, who defends the land of the indigenous Molo Tribe against a marble mining firm.



Women at The Forefront: Resisting Geothermal Project



Source: Floresa.co

The figure of women leading the resistance against geothermal projects has emerged in various regions in Indonesia. Take, for example, East Nusa Tenggara, West Sumatra, Central Java, and Banten. This movement is propelled by the realization that the most serious impact recipients of

geothermal power plant development projects are women, given the vulnerability of their identities within the social structure.

⁷⁵ Andriyeni et al. (2021). Catatan Akhir Tahun Advokasi Solidaritas Perempuan 2021: Geliat Perjuangan Perempuan Melawan Dominasi Kuasa di Tengah Pemulihan Palsu Negara. Jakarta: Solidaritas Perempuan.

In the article written by Anno Susabun, many stories are recounted regarding the rejection of geothermal projects triggered by the socialization process and the expansion activities of the Ulumbu Geothermal Power Plant (GPP) in Poco Leok, often overlooking the voices of women. A woman from Kampung Mocok confirmed that they did not know how to reject the geothermal project because they never had a place in official forums that were all attended by men. The shared restlessness and unease experienced by women in the villages of Poco Leok continued to escalate⁷⁶.

Women and mothers were at the forefront of multiple instances of obstructing company and local government officials in the villages of Lungar and Tere. Women's groups were also present in action forums in other villages such as Jong, Mesir, Cako, Nderu, Ncamar, Mori, Mocok, and Mucu. The primary cause for the rejection by women's groups is linked to the Manggarai people's cosmology.

Firstly, sovereignty over the land as the "mother" and the sky as the "father" makes the women of Poco Leok strongly believe that geothermal extraction will destroy the *mother earth*. The Manggarai people also have a local philosophy that indicates their connection to the earth and nature. "*Langkok laing tana, tending laing awang*" implies that the earth or land is the foundation, and the sky is the protective roof. According to the beliefs of the Poco Leok community, just like the inseparable relationship between husband and wife or father and mother, so

too are the sky and earth. The integral relationship between the sky and earth will be flawed or even destroyed if humans attempt to separate them. Another expression is that if the land is hurt, our mothers' hearts are also hurt. In their local cosmology, there is a phrase "*tana hitu ende dami*," which means the land as our mother. In their culture, women represent the earth based on their shared role as the foundation of family life, from kitchen affairs to managing fields for food.

Secondly, for the women of Poco Leok, the ground or earth serves as a source of sustenance for family life. Those who have been assured of field produce for food and other agricultural items such as coffee, cloves, sweet potatoes, corn, bananas, and palm sugar would no longer be able to maintain themselves if land is destroyed due to geothermal extraction.

Thirdly, the sovereignty over the land as a life-giver is inseparable from the larger concept of living space, which includes 6 elements: traditional houses (*gendang*), ancestral gardens, village yards or play areas, an altar with offerings in the middle of the village, the source of life in springs, and ancestral graves. If any of these six elements is lost, a culture or village loses its significant meaning.

⁷⁶Anno Susabun in Para Perempuan Poco Leok Pertahankan Tanah dari Proyek Geothermal. This article is the first winner of the Anti-Mining Day Article Competition, a collaboration between the Mining Advocacy Network, Indonesia.id, and Mongabay Indonesia. Available at: <https://www.mongabay.co.id/2023/06/12/para-perempuan-poco-leok-pertahankan-tanah-dari-proyek-geothermal/>



Source: Floresa.co

The planned drilling points by the company are very close to the six main points in the living space of the Poco Leok residents, especially those related to water sources and the graves of the community's ancestors.

The struggle of the women of Poco Leok, grounded in shared concerns and aimed at defending their land and living space from the threat of the geothermal project, signifies that the ambition for clean energy investments, touted as the government's best choice, does not align with the resilience of local communities for the sustainability of their livelihoods. The flames of resistance will continue to intensify until all parties are aware and convinced that the land is the "mother" providing life and living space.

The role of women as the "martyrs of the environment" can also be witnessed in West Sumatra. Asnir Umar (72 years old), a resident of Selayo Tanang, Bukit Sileh Kanagarian Satu, Solok Regency, is a driving force behind the resistance to the geothermal project in Gunung Talang.

There are 18 villages in the area, and 17 of them reject the construction of the geothermal power plant. If the 27,000 hectares of land on Gunung Talang, which has been the living space for the community, is replaced by the geothermal project, people are concerned about losing the farmland that has been the source of income for the community. Whenever the company attempts to enter Gunung Talang, Asnir Umar stands at the forefront, leading thousands of residents from 17 villages in prayers from morning until night.

The concept of women in Minangkabau custom is employed to analyze the reasons why women engage in social movements in opposition to the geothermal development on Mount Talang⁷⁷. In Minangkabau, women are referred to as "*bundo kanduang*," which translates to the true mother. Thus, women embody the true mother with maternal and leadership qualities. *Bundo kanduang* plays a role as a highly respected figure and a source of moral virtues for her children.

⁷⁷Virna P. Setyorini dalam Perempuan, Sang Martir untuk Lingkungannya. Available at: <https://kalsel.antarane.ws.com/berita/94248/perempuan-sang-martir-untuk-lingkungannya>

Additionally, in Minangkabau, *bundo kanduang* also plays a role in the preservation of ancestral heritage. One of the considered ancestral heritages that women in Minangkabau are tasked with safeguarding and preserving is the Customary Land.

The women of Salingka Gunung Talang feel that the environmental and economic impacts caused by the construction of the GPP project have the potential to lead to the loss of agricultural land, a decrease in the productivity of agricultural land, and crop failures. Additionally, there is a risk of increased living costs, including the higher expenses for repairing property buildings due to damage from acid rain on zinc roofing. From these observations, it is evident that the women are acutely aware of the ecological threats and the loss of their sources of income, making it difficult for them to sustain their livelihoods peacefully⁷⁸.

Similar patterns of resistance occur in many other regions. In a case study on the impact of the GPP development on women's lives in the Banyumas Regency (Widhianto, 2020), it is noted that;

The reciprocal interaction between humans and nature has been woven throughout civilization, giving rise to various dynamics in life. This pattern of interaction is not only reflected in the utilization of nature by humans but also manifests in various forms of social, economic, cultural, and spiritual life of communities. Women in the village of

Karangtengah are accustomed to directly utilizing nature through water resources from the slopes of Mount Slamet to meet domestic consumption needs. This, in turn, shapes a unique experience due to the domestic role of women and their relationship with water resources. The land clearing process for the GPP development project on Mount Slamet, which is part of the discourse on the development of new and renewable energy projects, has posed challenges. During this process, issues arose due to soil sediment runoff resulting from deforestation and hill cutting on Mount Slamet into the river, ultimately affecting the community's, especially women's, difficult access to clean water⁷⁹.

The resilience of women's struggle is also evident in Padarincang, Serang Regency, Banten Province, which has maintained the spirit of resistance since 2010 to reject the GPP development project on Mount Prakasak (Mount Karang). Eha Suhaini or Umi Eha (58 years old) tirelessly continues to seek information about the adverse effects of the geothermal project's development if it is continued, while disseminating this information to the community⁸⁰. Leveraging information about the adverse effects in Sorik Marapi, Mandailing Natal, North Sumatra, and on Mount Slamet, Umi Eha signals that there is a potential for disasters and risks that cannot be compensated for by any means due to the forced implementation of the geothermal project in those areas.

⁷⁸ Sari Martha Yolanda et al., "Gerakan Perempuan Salingka Gunung Talang dalam Menolak Pembangunan Geothermal di Kabupaten Solok", *Jurnal Tanah Pilih*, Vol. 1 No. 1 (2021).

⁷⁹ Ajar Widhianto, "Perempuan dan Ekologi (Studi Kasus Tentang Dampak Pembangunan Pembangkit Listrik Tenaga Panas Bumi Gunung Slamet terhadap Kehidupan Perempuan di Kabupaten Banyumas)", thesis S1 Sociology Study Program FISIPOL Jenderal Soedirman University, 2020.

⁸⁰ Dayat Wijanarko dalam Perjuangan Perempuan Menolak Industri Ekstraksi untuk Kelestarian Ekologi di Padarincang. Available at: <https://rahma.id/perjuangan-perempuan-menolak-industri-ekstraksi-untuk-kelestarian-ekologi-di-padarincang/>



THE WORLD BANK

CHAPTER 5

FAILURE OF GEOHERMAL PRACTICES



The Failure Behind the Romanticism of Curacautín Geothermal Exploration Project - Tolhuaca, Chile

Given its geographical location in an active tectonic zone, the Andean Subduction Zone, Chile is alleged to have a large geothermal potential. This potential is detected in the northern, central, and southern regions of the country, which is the path of the Pacific Ring of Fire. One of them is around Tolhuaca Volcano, which has attracted a lot of investment for the exploration of geothermal potential for national electricity supply.

The exploration process began in 2009 when GeoGlobal Energy Chile (GGE) obtained a one year exploration license and began drilling the first slim hole 1,000 meters from the surface. The

project, titled Central Geotérmica Curacautín, is administratively located on private land in Tolhuaca with an elevation ranging from 1,600-2,000 meters.

A year later—in 2010—GGE was granted a non-expiring exploitation license on the land. With the license, they began building transportation routes to the point high on the slopes of the Tolhuaca Volcano and drilled their second slim well. Two 2,500-meter slim wells followed in 2013 after an environmental permit from the Environmental Assessment Service (SEIA) was applied for in 2011 and approved in 2012⁸¹.

Not long after, there was a handover in the management of the Curacautín Geothermal Plant. Previously under the auspices of GGE, the management changed under the authority of Mighty River Power (MRP, now called Mercury Energy), a New Zealand power operator. MRP projects that Central Geotérmica Curacautín will be able to generate up to 70 MW of power.

In 2016, this exploration project was officially discontinued. Apart from the restructuring process within MRP, the high operational costs of supporting project workers were also the main reason for the shutdown. This was especially true in the winter with frequent snowstorms and temperatures dropping to -18°C in the highlands. The high altitude and dry environment in the north made it difficult to supply logistics for the workers' camps and extraction sites. On the other hand, the glacial morphology in the south makes access difficult and lengthens the time for geothermal exploitation work⁸².

Another technical aspect relates to the distance from the generator sites, most of which are located high in the Andes Mountains, to the consumption centers or main lines of the electricity system. This required the geothermal management of the project to build several relatively long distance high voltage transmission lines⁸³. The high base production cost of electricity from the Central Geotérmica Curacautín project, coupled with the absence of subsidies from the Chilean government, makes its price uncompetitive for the market⁸⁴.

These financial problems canceled the exploration project by MRP. In fact, for several years, there was no exploration activity at all in Curacautín. It was only in 2019 that Chile's Ministry of Energy granted Transmark Chile SpA an exploitation license in the Peumayén concession area covering the Quilaco District and the Curacautín District⁸⁵.

⁸¹ Vargas-Payera, et al. "Factors and dynamics of the social perception of geothermal energy: Case study of the Tolhuaca exploration project in Chile." *Geothermics* 88 (2020): 101907.

⁸² Barría, Carlos. "Geothermal energy in Chile." *Global Geothermal Development Plan Roundtable: The Hague, The Netherlands* (2013).

⁸³ <https://www.piensageotermia.com/rudiger-trenkle-repasa-las-posibilidades-y-retos-que-afrenta-la-geotermia-en-chile/> accessed on August 24, 2023 at 12.20

⁸⁴ Ormad, 2013

⁸⁵ <https://www.transmark-renewables.com/news/transmark-chile-published-its-peumayen-exploitation-license-tolhuaca-geothermal-field>



Geothermal Power Station Closure in Cooper Basin, South Australia: Not Always an Economic Benefit



Source: arena.gov.au/HabaneroGeothermalProjectFieldDevelopmentPlan

In July 2010, the Australian government risked US\$32 million to invest in Australia's first demonstration GPP. The project kicked off and was celebrated with much fanfare as a renewal of geothermal mining methods that were considered far more environmentally friendly. Five years later, however, the project was forced to shut down, having operated for only 160 days.

The Cooper Basin Geothermal Project began in 2010. The project promotes a method that is claimed to be different from other geothermal extraction methods. While conventional GPPs rely on volcanic geology, Geodynamics is studying a new technology known as

Enhanced Geothermal Systems (EGS). This technology does not rely on volcanic systems but uses granitic bedrock that is hot enough to generate electricity. Hot granite rocks in Cooper Basin, South Australia, can reach temperatures exceeding 280°C. This geothermal energy source is accessed by drilling wells up to 4-5 kilometers deep into the granite rock. High-pressure water is then pumped into the rock to open up a natural fracture system. The water then flows through injection wells into the hot rock, through the granite, and back up through production wells⁸⁵. The geothermal water energy generated at the surface is then used to drive steam turbines and generate electricity.

⁸⁵ <https://www.transmark-renewables.com/news/transmark-chile-published-its-peumayen-exploitation-license-to-lhuaca-geothermal-field>

⁸⁶ <https://arena.gov.au/projects/cooper-basin-enhanced-geothermal-systems-heat-and-power-development/> accessed on September 30, 2023

In theory, this project is considered to have a bright future, especially considering that most areas of the earth's crust throughout Australia are very hot and ideal for use as an unconventional energy source. It is therefore possible that such a project could be developed in other similar areas, both in Australia and other countries with similar landscape characteristics, without having to rely on the volcanic characteristics of the area. However, in reality, the Habanero 1 MWe pilot plant operated for only 160 days in 2013 and prior to the closure of the trial, the plant was operating at a production rate of 19kg/s with a maximum temperature of 215°C.

*"This technology is successful, but unfortunately, the costs of implementing the technology and also the expenses for transmitting the generated electricity to the market are greater than the revenue stream we can generate."*⁸⁷ This statement was made by the Chief Executive of Geodynamics, Chris Murray. The initial results of the trial of the Habanero geothermal power plant are quite promising and have successfully influenced the broader view of the potential and role of EGS in the future of the renewable energy mix in Australia. However, the expansion of transmission and the requirement for "significant capital investment" ultimately pose significant obstacles to the development of this power plant⁸⁸. The issue lies not in the lack of heat but in how to economically harness and utilize it⁸⁹.

In countries rich in active volcanoes, hot water along with its steam can easily rise through wells with minimal energy-intensive pumping processes. However, for countries like Australia, the exploration process typically involves drilling two wells. One is used to pump high-pressure cold water, and the other is employed to pump preheated water, with the hope that the rock between the two wells has sufficient fracturing (permeability) to allow the flow of water capable of collecting heat. The challenge lies in companies' inability to precisely determine the permeability of a particular area without prior well drilling, each of which incurs a cost of \$20 million. For Geodynamics Limited, it took a total cost of \$144 million to ascertain that the wells drilled 4-5 kilometers into the Cooper Basin were not financially viable.

In addition, the decreasing demand, largely due to the increasing number of rooftop solar photovoltaic panel installations, was another cause of the decision to close the Habanero Project. The increasingly low price of solar photovoltaics makes it difficult for other types of renewable energy to compete. This contributes to the reason why geothermal energy development is not considered worthwhile, especially in terms of exploration and operational costs.

⁸⁷ <https://www.abc.net.au/news/2016-08-30/geothermal-power-plant-closes-deemed-not-financially-viable/7798962> accessed on September 30, 2023

⁸⁸ <https://www.thinkgeoenergy.com/geodynamics-planning-now-small-scale-commercial-project-at-cooper-basin/> accessed on September 30, 2023

⁸⁹ <https://www.theguardian.com/sustainable-business/2016/nov/04/the-heat-is-there-is-there-a-future-for-geothermal-energy-in-australia> accessed on September 30, 2023

Geodynamics Energy Company has finally closed and recovered the locations of several test wells and GPPs in the Cooper Basin after deciding that it was not financially viable to continue. The project was closed with a recorded loss of US\$80 million. The impairment resulted in the company reporting a net loss of US\$95 million for the 2012-2013 financial year.

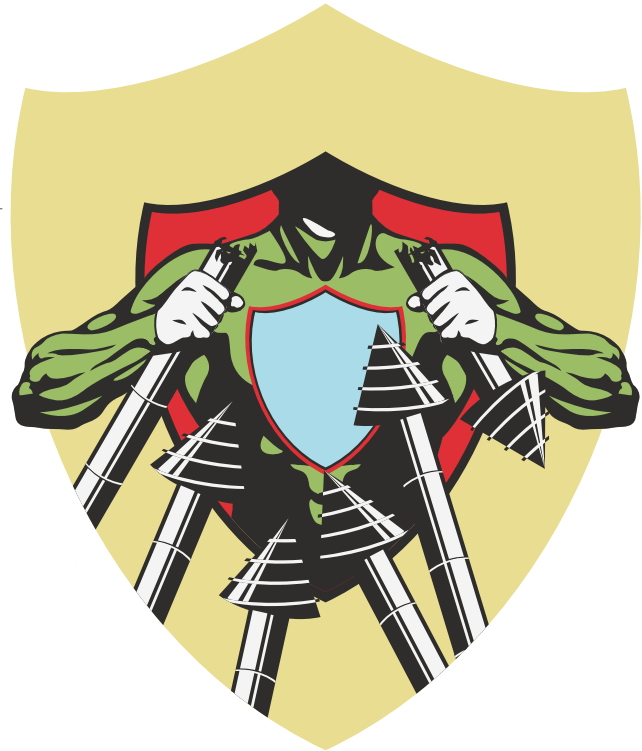
From the long journey of geothermal exploration and exploitation, we can see that these projects are extremely costly.

Not only in financial terms, but there are also environmental and social costs that must be taken into account. Geothermal exploitation requires large investments in infrastructure development and maintenance, which can be a heavy financial burden. This failure should raise questions about the role played by stakeholders, including government, industry and financial institutions: is procuring energy from geothermal exploitation a reasonable answer to creating national energy sustainability?



BAB 6

POINT OF RECOMENDATION



We are all striving for a rapid, just, inclusive, and affordable transition from fossil fuels to renewable energy, with the goal of limiting the global temperature increase to less than 1.5°C and achieving global net-zero emissions by 2050. We believe that decisive and immediate action is crucial to maintaining the achievement of these goals. Acts that promote justice and equity are not only morally right but also practically and politically necessary. Therefore, energy development must adhere to the following principles:

1. Energy is not a Commodity; It Is a Right

The right to universal energy access is a fundamental principle that underpins human sustainability and dignity. All energy generation is derived from nature, and as a shared resource, energy should not be colonized by corporate interests. The energy system should be placed as the foundation for meeting the needs of the community, not for the sake of capital accumulation. Energy is not merely a commodity; it is a "common good" that transcends monetary value. As energy development is inherently intended to advance the lives, dignity, and aspirations of the majority of the population.

Ecological restoration (including land and water systems, as well as public health) should be viewed as an integral part of the development of clean and renewable energy systems, especially considering the destruction and loss caused by fossil fuel systems. Nevertheless, replacing dirty energy sources controlled by financiers with 'sustainable' energy sources that serve the same profit seeking interests is also not the direction we should be heading.

Energy should be viewed as a common good, not a form of oligarchic investments and government elites. The environmental and social costs that will arise from all forms of energy generation, such as geothermal, must be understood by everyone in the local environment and region.

Balancing the demands of the right to energy and pursuing a sustainable

energy system requires careful consideration and cooperation. Therefore, affected communities should have a voice in determining acceptable and controllable impacts in the energy generation system. In the same spirit, people ought to be able to refuse any energy system, no matter what kind, that puts their livelihood and environmental security in jeopardy.



2. Energy is not a Commodity; It Is a Right

The development of renewable energy systems must not be carried out at the expense of human rights, including the rights of women, workers, communities, indigenous peoples, and other vulnerable identities. Energy projects have been the subject of resistance and social protests from communities and societies

due to their adverse effects on the right to land, food, water, livelihood, and access to energy. In many cases, governments and companies respond to community rejection with intimidation, attacks, the use of excessive force (police, military, paramilitary, and even criminalization).

The government and authorities must ensure that the principles of the Universal Declaration of Human Rights, the International Convention on Civil and Political Rights, and the Int-

ernational Covenant on Economic, Social and Cultural Rights, as well as the Human Rights Law, are being upheld in the development of the electricity sector in Indonesia.

3. Protection of Land, Water, and Oceans, As Well As Community-based Area Management

The government should adopt and enforce policies that prioritize the use of primary agricultural land and freshwater resources for staple foods, health, and the well-being of its citizens. The government must ensure that an appropriate and diverse energy system is developed—in scale and technology—that does not conflict with these priorities. Distributed and decentralized energy systems will have the least impact on these priorities.

Comprehensive and effective policies and management of land and water use must be established and implemented to address competition for land and water use, including between food and energy systems. Policies and management should prioritize the needs and realization of the community's rights to sufficient food, water, as well as clean and renewable energy.

All Policies and management must involve full input and participation (not

just quasi-participation!) of affected communities, both directly and indirectly affected. Therefore, every development of the energy system must take into account the impact on seasonal farmers, herders, fishermen, and other groups whose livelihoods depend on the sustainability of natural functions.

The government must ensure clear regulations to protect and support the rights of farmers, fishermen, and other community land managers over land, the ancestral rights of indigenous communities over their territories, and the rights of forest residents over their homes and sustainable livelihoods. These policies must include social and environmental assessments as well as protection efforts and mechanisms to prevent the usurpation of land and water resources for all types of energy development, including geothermal energy.

4. Protection of Ecological Integrity and Regeneration, and Biodiversity

Renewable energy systems must preserve and contribute to ecological integrity and regeneration, which includes the protection of forests, biodiversity, native and endangered species, nature reserves and the biosphere, and natural heritage. Various energy sources now being explored, including geothermal, can have an influence on biodiversity owing to habitat alteration/loss, over exploitation, introduction of invasive species,

pollution, and climate change (relating to the impact of energy such as geothermal on the local climate).

Even though both objectives may aim at the same place, policies that support energy development and biodiversity conservation have up to now been developed independently.

Most of the Geothermal Working Areas are in protected and conservation forest areas. This overlap indicates that Protected and Conservation Areas are not managed adequately to effectively protect them from energy plant development that disrupts ecosystems, causes deforestation, and other damaging ecological impacts.

The government ought to create new protected areas, extend those that already exist, safeguard and construct conservation corridors that link protec-

ted areas, and enhance protected area administration. Energy development should not be developed/occupy protected areas and other critical biodiversity areas, governments and other decision makers should monitor where the goals of biodiversity conservation and renewable energy expansion overlap to avoid compromising conservation efforts for the sake of energy development.



5. Mitigation and Defense Against Disaster Risks

There are several issues that need to be considered in the development of geothermal projects, particularly in terms of disaster aspects and safety risks to communities. Pollution from geothermal power plants poses a threat to public health. The water pumped from underground reservoirs contains contaminants that may affect the water consumed by the local community. Air emissions generated from the heat extraction process also pose serious health risks and economic threats, such as acid rain that can damage the agricultural commodities of the community. Additionally, the increased risk and frequency of earthquakes during drilling should be taken into account, especially since geothermal power plants are often located in 'hot spots' with a higher risk of earthquakes.

The government must adhere to the provisions of Law No. 21 of 2008 concerning Disaster Management. This is to ensure that the implementation and enforcement of spatial planning are carried out to control spatial utilization in accordance with regional spatial planning to avoid an increase in disaster risk. It also ensures that any development activities with high disaster risk must be accompanied by a disaster risk analysis. If a development plan poses a high risk, such as a Geothermal Power Plant (GPP), the implementation of development that may threaten the safety of the community should not be forcibly carried out.



OPERASI • PLTP DITUTUP • DILARANG BEROPERASI

DILARANG BEROPERASI • PLTP DITUTUP • DILARANG

OPERASI • PLTP DITUTUP • DILARANG BEROPERASI

CONCLUSION

In the midst of climate crisis concerns, we are bombarded with jargon and big ideas related to energy, where low carbon emission output seems to be the only thing that guarantees a good and sustainable energy option. We often forget that the concept of sustainability is closely related to the process towards equality and justice. Therefore, being critical and sane in further examining the energy needs and how far we should go is a must.

Geothermal Power Plants (GPPs) are one of the many energy plants that are often considered a solution to the need for clean and sustainable energy. However, our study shows otherwise. GPP projects in various countries, including Indonesia, in fact cause more negative impacts from social, economic and ecological aspects. This fact is often denied, including by the Indonesian government, state-owned enterprises and financial institutions.

The effort to eject geothermal from the mining sector and replace it with "utilization of environmental services" through the revision of Law of the Republic of Indonesia Number 27 of 2003 on Geothermal Power into Law of the Republic of Indonesia Number 21 of 2014, is one proof of how the government turns a blind eye to the threat of losses caused by the GPP. In addition, Law of the Republic of Indonesia No. 11 of 2020 on Job Creation made changes to 35 articles in the Geothermal Law. These policy changes ultimately only lead to other extractive practices that are just as dangerous as other mineral extraction. The potential for

deforestation will be wider, agrarian conflicts will increase, criminalization, and de-democratization (decentralization of governance) will be more and more we face; and all under the label of investment.

Currently, most of the funding for GPP exploration and development comes from grants and loans from the World Bank (WB), through the Japan Bank for International Cooperation (JBIC), Mizuho Bank Ltd, Bank of Tokyo-Mitsubishi UFJ, Sumitomo Mitsui Banking Corporation, and the Asian Development Bank (ADB). The central role of international financial institutions in the energy transition has so far been driven by emissions and investment ambitions, often forgetting the impact on local communities.

In order to produce 1 MWe of electricity, geothermal mining activities require at least 40 liters of water/second, or around 6,500-15,000 liters of water for each MWh. The need for water is equivalent to the need for 59 times the period of corn planting⁹⁰—one of the commodities on which the people of East Nusa Tenggara depend on, whose living space is currently threatened by the GPP project. With the GPP project, East Nusa Tenggara residents must be prepared to lose at least IDR1.1 trillion in the second year of the geothermal project operation. Therefore, the geothermal project must be seen not only as an effort to destroy forests and waterscapes, but also the destruction of people's living space, and also an structural poverty alleviation.

⁹⁰ The average amount of water needed in one planting period is 256.66 mm. Meanwhile, the average planting period for corn is around 90 days. See: Sirait Sudirman et al, Analisis Neraca Air dan Kebutuhan Air Tanaman Jagung (Zea mays L.) Berdasarkan Fase Pertumbuhan di Kota Tarakan, 13, Rona Teknik Pertanian, p1.



Environmental Impact	Socio-cultural Impact	Economic Impact
Escalation of seismic activity/earthquakes	Horizontal conflict	The geothermal project operating in Wae Sano, Sokoria, and Ulumbu is expected to cause an economic loss of IDR 1.1 trillion in its second year of operation.
Landslide risk	Marginalization/alienation of indigenous and local communities.	The agriculture, forestry, and fisheries sectors experienced the greatest loss in economic activity, totaling to IDR 972 billion.
Water source competition between local communities needs and GPP that leads drought potential	Multiplied repression for vulnerable gender groups	At the starting point of development, East Nusa Tenggara Province experienced a drop in community income from agricultural and plantation commodities of IDR 470 billion.
Soil contamination correlates with a decrease in agricultural/plantation productivity	Criminalization of indigenous people/local communities	There will be a nationwide reduction of 20,671 jobs caused by environmental damage to agriculture and water resulting from the development of geothermal projects in East Nusa Tenggara.
Biodiversity loss		The geothermal project in East Nusa Tenggara created an significant increase in inequality of 0.74 at the 15th year, calculated using the Williamson Index.
Release of toxic gases, air pollution, and health risks (Acute Respiratory Infections)		
Loss of life due to the leakage of toxic gas from GPP operations.		
Greenhouse gas emissions from GPP's plant cycle and fuel cycle worsen the climate catastrophe.		

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APPENDIX

Amendments to Articles on Geothermal in the Job Creation Law

Geothermal Act	Job Creation Law
<p>General Provisions (Article 4)</p> <ul style="list-style-type: none"> • Geothermal is a national wealth controlled by the state and used for the greatest prosperity of the people. • Geothermal Control by the state as referred to in paragraph (1) is organized by the Government, provincial governments, and regency/city governments in accordance with their authority and based on the principle of utilization. 	<p>Amended to:</p> <ul style="list-style-type: none"> • Geothermal is a national wealth controlled by the state and used for the greatest prosperity of the people. • The control of Geothermal by the state as referred to in paragraph (1) is carried out by the Central Government, provincial Regional Governments, and regency/city Regional Governments in accordance with their authority and based on the principle of utilization.
<p>Authority to Implement Geothermal (Article 5)</p> <ul style="list-style-type: none"> • The implementation of Geothermal by the Government as referred to in Article 4 paragraph (2) is carried out on: <ul style="list-style-type: none"> • Geothermal for Direct Utilization located in: <ul style="list-style-type: none"> • across provincial boundaries including production forest areas and protected forest areas; • Forest conservation area; • conservation areas in waters; and • sea area of more than 12 (twelve) miles measured from the coastline towards the open sea throughout Indonesia. • Geothermal for Indirect Utilization located in all regions of Indonesia, including production forest areas, protected forest areas, conservation forest areas, and marine areas. 	<p>Amended to:</p> <ul style="list-style-type: none"> • The implementation of Geothermal by the Central Government as referred to in Article 4 paragraph (2) is carried out on: <ul style="list-style-type: none"> • Geothermal for Direct Utilization located in: <ul style="list-style-type: none"> • across provincial boundaries including production Forest Areas and protected Forest Areas; • conservation forest area; • conservation areas in waters; and • sea areas of more than 12 (twelve) miles measured from the coastline towards the open sea throughout Indonesia. • Geothermal for Indirect Utilization located in all regions of Indonesia, including production forest areas, protected forest areas, conservation forest areas, and marine areas.

Geothermal Act	Job Creation Law
<p>Authority to Implement Geothermal (Article 5)</p> <ul style="list-style-type: none"> • The implementation of Geothermal by the provincial government as referred to in Article 4 paragraph (2) is carried out for Direct Utilization located in: <ul style="list-style-type: none"> • across regencies/municipalities in one province including production forest areas and protected forest areas; and • The farthest sea area is 12 (twelve) miles measured from the coastline towards the open sea and/or towards the archipelagic waters. • The implementation of Geothermal by the regency/city government as referred to in Article 4 paragraph (2) is carried out for Direct Utilization located at: <ul style="list-style-type: none"> • districts/cities including production forest areas and protected forest areas; and • sea area is at most 1/3 (one-third) of the sea area of the provincial authority. 	<ul style="list-style-type: none"> • The implementation of Geothermal by the provincial Regional Government as referred to in Article 4 paragraph (2) in accordance with the norms, standards, procedures, and criteria set by the Central Government is carried out for Direct Utilization located in: <ul style="list-style-type: none"> • across regencies/cities in one province, including production forest areas and protected forest areas; and • sea area at a maximum of 12 (twelve) miles measured from the coastline towards the open sea and/or towards archipelagic waters. • The implementation of Geothermal by the Regency / City Government as referred to in Article 4 paragraph (2) in accordance with the norms, standards, procedures, and criteria set by the Central Government, is carried out for Direct Utilization located in: <ul style="list-style-type: none"> • district/city, including production forest areas and protected forest areas; and • sea area at most 1/3 (one-third) of the sea area under provincial authority.

Geothermal Act	Job Creation Law
<p>Authority to Implement Geothermal (Article 6)</p> <ul style="list-style-type: none"> • The authority of the Government in the implementation of Geothermal as referred to in Article 5 paragraph (1) includes: <ul style="list-style-type: none"> • national policy making; • regulation in the field of Geothermal; • granting of Geothermal License; • granting Direct Utilization Permits in the area under its authority; • guidance and supervision; • management of geological data and information as well as Geothermal potential; • inventory and preparation of a balance sheet of Geothermal resources and reserves; • implementation of Geothermal Exploration, Exploitation, and/or utilization; and • encouragement of research activities, development and engineering capabilities. • The Government's authority in the implementation of Geothermal as referred to in paragraph (1) is carried out and/or coordinated by the Minister. 	<p>Amended to:</p> <p>The authority of the Central Government in the implementation of Geothermal as referred to in Article 5 paragraph (1) includes:</p> <ul style="list-style-type: none"> • national policy making; • regulation in the field of Geothermal; • Business Licensing in the field of Geothermal; • development of norms, standards, guidelines, and criteria for Geothermal exploitation activities for direct utilization; • guidance and supervision; • management of geological data and information as well as Geothermal potential; • inventory and preparation of balance sheet of Geothermal resources and reserves; • implementation of Geothermal Exploration, Exploitation, and/or utilization; and • encouragement of research activities, development, and engineering capabilities.
<p>The Authority to Implement Geothermal: Provincial Government (Article 7)</p> <p>The authority of the provincial government in the implementation of Geothermal as referred to in Article 5 paragraph (2) includes:</p> <ul style="list-style-type: none"> • establishment of provincial legislation in the field of Geothermal for Direct Utilization; • granting Direct Utilization Permits in the area under its authority; • guidance and supervision; • management of geological data and information as well as Geothermal potential in the provincial area; and • inventory and preparation of a balance sheet of Geothermal resources and reserves in the provincial area. 	<p>Amended to:</p> <p>The authority of the provincial Regional Government in the implementation of Geothermal as referred to in Article 5 paragraph (2) is carried out in accordance with the norms, standards, procedures, and criteria set by the Central Government including:</p> <ul style="list-style-type: none"> • the establishment of provincial laws and regulations in the field of Geothermal for Direct Utilization; • granting Business Licenses related to direct utilization in the area under its authority; • guidance and supervision;

Geothermal Act	Job Creation Law
<p>The Authority to Implement Geothermal: Provincial Government (Article 7)</p>	<ul style="list-style-type: none"> • management of geological data and information as well as Geothermal potential in the provincial area; and • inventory and preparation of a balance sheet of Geothermal resources and reserves in the provincial area.
<p>The Authority to Implement Geothermal: Regency/City Government (Article 8)</p> <p>The authority of the regency/city government in the implementation of Geothermal as referred to in Article 5 paragraph (3) includes:</p> <ul style="list-style-type: none"> • the establishment of regency/city laws and regulations in the field of Geothermal for Direct Utilization; • granting Direct Utilization Permits in the area under his authority; • guidance and supervision; • management of geological data and information as well as Geothermal potential in the district/city area; and • inventory and preparation of a balance sheet of Geothermal resources and reserves in the district/city. 	<p>Amended to:</p> <p>The authority of the Regency / City Government in the implementation of Geothermal as referred to in Article 5 paragraph (3) is carried out in accordance with the norms, standards, procedures, and criteria set by the Central Government, including:</p> <ul style="list-style-type: none"> • the establishment of regency/city laws and regulations in the field of Geothermal for Direct Utilization; • granting Business Licenses related to direct utilization in the area under its authority; • guidance and supervision; • management of geological data and information as well as Geothermal potential in the district/city area; and • inventory and preparation of a balance sheet of Geothermal resources and reserves in the district/city area.

Geothermal Act

Geothermal Utilization for Direct Use (Article 11)

- Every person conducting Geothermal exploitation for Direct Utilization as referred to in Article 9 paragraph (1) letter must first have a Direct Utilization Permit.
- The Direct Utilization Permit as referred to in paragraph (1) is granted by the Minister for Direct Utilization located in:
 - across provincial boundaries including production Forest Areas and protected Forest Areas;
 - conservation forest area;
 - conservation areas in waters; and
 - sea area of more than 12 (twelve) miles measured from the coastline towards the open sea throughout Indonesia.
- Direct Utilization Permit as referred to in paragraph (1) is granted by the governor for Direct Utilization located in:
 - across regencies/cities in one province including production forest areas and protected forest areas; and
 - sea area at a maximum of 12 (twelve) miles measured from the coastline towards the open sea and/or towards archipelagic waters.
- Direct Utilization Permit as referred to in paragraph (1) is granted by the regent/mayor for Direct Utilization located at:
 - district/city areas including production forest areas and protected forest areas; and
 - sea area at most 1/3 (one-third) of the sea area under provincial authority.

Job Creation Law

Amended to:

- Every person conducting Geothermal exploitation for Direct Utilization as referred to in Article 9 paragraph (1) letter must first have a Business License related to Direct Utilization.
- Business Licenses related to direct utilization as referred to in paragraph (1) are granted by the Central Government for Direct Utilization located in:
 - across provincial boundaries, including production Forest Areas and protected Forest Areas;
 - conservation forest area;
 - conservation areas in waters; and
 - sea areas of more than 12 (twelve) miles measured from the coastline towards the open sea throughout Indonesia.
- Business Licensing related to Direct Utilization as referred to in paragraph (1) is granted by the governor in accordance with the norms, standards, procedures, and criteria stipulated by the Central Government for Direct Utilization located at:
 - across regencies/cities in one province, including production forest areas and protected forest areas; and
 - sea area at a maximum of 12 (twelve) miles measured from the coastline towards the open sea and/or towards archipelagic waters.

Geothermal Act	Job Creation Law
<p>Geothermal Utilization for Direct Use (Article 11)</p> <ul style="list-style-type: none"> • Direct Utilization Permit as referred to in paragraph (2), paragraph (3), and paragraph (4) shall be granted based on application from any Person. • The Direct Utilization Permit is granted after each Person as referred to in paragraph (5) obtains an environmental permit in accordance with the provisions of laws and regulations in the field of environmental protection and management. • In the event that Geothermal exploitation activities for Direct Utilization as referred to in paragraph (2), paragraph (3), and paragraph (4) are located in the Forest Area, the Direct Utilization Permit holder must obtain a permit from the minister who administers the affairs of the Forest Area. • government in the forestry sector. 	<ul style="list-style-type: none"> • Business Licensing related to Direct Utilization as referred to in paragraph (1) is granted by the regent/mayor in accordance with the norms, standards, procedures, and criteria established by the Central Government for Direct Utilization located at: <ul style="list-style-type: none"> • district/city, including production forest areas and protected forest areas; and • sea area at most 1/3 (one-third) of the sea area under provincial authority. • Business Licenses related to Direct Utilization as referred to in paragraph (2), paragraph (3), and paragraph (4) are granted based on an application from any Person. • Business Licenses related to Direct Utilization are granted after each Person as referred to in paragraph (5) has obtained environmental approval in accordance with the provisions of laws and regulations in the field of environmental protection and management.

Geothermal Act	Job Creation Law
<p>Geothermal Utilization for Direct Use (Article 12)</p> <ul style="list-style-type: none"> • In the event that Geothermal exploitation for Direct Utilization is carried out in an area designated as a Working Area, the governor or regent/mayor before granting a Direct Utilization Permit as referred to in Article 11 paragraph (3) and paragraph (4) must obtain the Minister's approval. • In the event that Geothermal exploitation for Direct Utilization will be carried out in an area that has not been designated as a Working Area, the governor or regent/mayor before granting a Direct Utilization Permit as referred to in Article 11 paragraph (3) and paragraph (4) must coordinate with the Minister. 	<p>deleted</p>
<p>Geothermal Utilization for Direct Use (Article 13)</p> <ul style="list-style-type: none"> • Any Person holding a Direct Utilization Permit shall conduct Geothermal exploitation for Direct Utilization at the location specified in the permit. • Every Person holding a Direct Utilization Permit shall carry out Geothermal exploitation in accordance with its designation. 	<p>deleted</p>
<p>Geothermal Utilization for Direct Use (Article 14)</p> <p>The price of Geothermal energy for Direct Utilization is regulated by the Government.</p>	<p>deleted</p>
<p>Geothermal Utilization for Direct Use (Article 15").</p> <p>Further provisions regarding the utilization of Geothermal for Direct Use as referred to in Article 11 and Article 12, as well as the regulation of the price of Geothermal energy as referred to in Article 14, are stipulated in Government Regulations.</p>	<p>Amended to: Further provisions regarding norms, standards, procedures, and criteria for the utilization of Geothermal for Direct Use as referred to in Article 11, including the price of Geothermal energy, are regulated in Government Regulations.</p>

Geothermal Act	Job Creation Law
<p>Geothermal License (Article 23)</p> <ul style="list-style-type: none"> • Business entities engaging in Geothermal for Indirect Use as referred to in Article 9 paragraph (1) letter b must first obtain a Geothermal License. • The Geothermal License as referred to in paragraph (1) is granted by the Minister to Business Entities based on the results of the Working Area bidding. 	<p>Amended to:</p> <ul style="list-style-type: none"> • Business Entities engaged in Geothermal for Indirect Use as referred to in Article 9 paragraph (1) letter b must first obtain a Business License in the field of Geothermal. • The Business License in the field of Geothermal as referred to in paragraph (1) is granted by the Central Government to Business Entities based on the results of the Working Area bidding. • Further provisions regarding the issuance of Business Licenses in the field of Geothermal for Indirect Use are regulated by Government Regulation.
<p>Geothermal License (Article 24)</p> <ul style="list-style-type: none"> • The Geothermal License as referred to in Article 23 paragraph (2) must include at least the following provisions: <ul style="list-style-type: none"> • Company name; • Company's taxpayer identification number; • Type of business activity; • Duration of the Geothermal License; • Rights and obligations of the Geothermal License holder; • Working Area; and • Stages of the return of the Working Area. • In the event that geothermal utilization for Indirect Utilization is located in a Forest Area, the holder of the Geothermal Permit is obliged to: <ul style="list-style-type: none"> • Will get: <ul style="list-style-type: none"> • borrow the right to use Production Forest Areas or Protected Forest Areas; or • permit to utilize Conservation Forest Areas, • from the minister in charge of government affairs in the forestry sector; and 	<p>Amended to:</p> <p>In the event that geothermal utilization for Indirect Utilization is located in a Forest Area, the holder of the Business License in the Geothermal sector must obtain a Business License in the forestry sector in accordance with the provisions of the prevailing laws and regulations.</p>

Geothermal Act	Job Creation Law
<p>Geothermal License (Article 24)</p> <ul style="list-style-type: none"> • conduct geothermal business activities while considering the primary goal of sustainable forest management as stipulated in the regulations. • The permit to utilize the area as referred to in paragraph (2) letter a number 2 is obtained through an environmental services utilization permit. 	
<p>Geothermal License (Article 25)</p> <p>In the event that the activities of utilizing Geothermal for Indirect Utilization are located in a conservation area in waters, the holder of the Geothermal Permit is required to obtain a permit from the minister responsible for marine affairs.</p>	deleted
<p>Geothermal License (Article 36)</p> <ul style="list-style-type: none"> • The Minister may revoke the Geothermal Permit as referred to in Article 33 letter c if the holder of the Geothermal Permit: <ul style="list-style-type: none"> • violates any of the provisions stated in the Geothermal Permit; and/or • does not fulfill the provisions of laws and regulations. • Before revoking the Geothermal Permit as referred to in paragraph (1), the Minister shall first provide an opportunity within a period of 6 (six) months for the Geothermal Permit holder to fulfill the stipulated provisions. 	<p>Amended to:</p> <ul style="list-style-type: none"> • The Central Government may revoke the Business License in the field of Geothermal Energy as referred to in Article 33 letter c if the business actor in the field of Geothermal Energy: <ul style="list-style-type: none"> • violates any provisions stipulated in the Business License in the field of Geothermal Energy; and/or • fails to fulfill the provisions of laws and regulations. • Before revoking the Business License in the field of Geothermal Energy as referred to in paragraph (1), the Central Government shall first provide an opportunity within a period of 6 (six) months for the business actor in the field of Geothermal Energy to fulfill obligations in accordance with the provisions stipulated in this Law.

Geothermal Act		Job Creation Law
Geothermal License (Article 37)	<p>The Minister may cancel the Geothermal License as referred to in Article 33 letter d if:</p> <ul style="list-style-type: none"> • the holder of the Geothermal Heat License provides data, information, or statements that are untrue in the application; or • The Geothermal Heat License is declared null and void based on a court decision. 	<p>Amended to:</p> <p>The Central Government may cancel the Business License in the Geothermal sector as referred to in Article 33 letter d if:</p> <ul style="list-style-type: none"> • Business actors in the Geothermal sector provide incorrect data, information, or information in the application; or • Business Licensing in the field of Geothermal
Geothermal License (Article 38)	<ul style="list-style-type: none"> • In the event that the Geothermal License expires for the reasons as referred to in Article 33, the Geothermal License holder must fulfill and settle all its obligations in accordance with the provisions of the laws and regulations. • The obligations of the Geothermal License holder as referred to in paragraph (1) are deemed fulfilled after obtaining approval from the Minister. • The Minister determines the approval of the termination of the Geothermal License after the Geothermal License holder carries out environmental restoration in its Working Area and other obligations as referred to in paragraph (1). 	<p>Amended to:</p> <ul style="list-style-type: none"> • In the event that the Business License in the field of Geothermal expires for the reasons as referred to in Article 33, the business actor in the field of Geothermal must fulfill and settle all its obligations in accordance with the provisions of the laws and regulations. • The obligations of the business actor in the field of Geothermal as referred to in paragraph (1) are deemed fulfilled after obtaining approval from the Central Government. • The Central Government determines the approval of the termination of the Business License in the field of Geothermal after the business actor in the field of Geothermal carries out environmental restoration in its Working Area and other obligations as referred to in paragraph (1).

Geothermal Act	Job Creation Law
<p>Administrative Sanctions (Article 40)</p> <ul style="list-style-type: none"> • Business entities holding a Geothermal License that fail to comply with or violate the provisions as referred to in Article 26 paragraph (2), Article 27 paragraph (1) and paragraph (3), Article 31 paragraph (3), and/or Article 32 paragraph (2) shall be subject to administrative sanctions. • The administrative sanctions as referred to in paragraph (1) include: <ul style="list-style-type: none"> • written warning; • temporary cessation of all Exploration, Exploitation, or utilization activities; and/or • revocation of the Geothermal License. • Further provisions regarding the procedures for imposing administrative sanctions as referred to in paragraphs (1) and (2) are regulated in Government Regulations. 	<p>Amended to:</p> <ul style="list-style-type: none"> • Business entities holding a Business License in the field of Geothermal Energy that violate or do not comply with the provisions referred to in Article 11, Article 20 paragraph (2), Article 23 paragraph (1), Article 26 paragraph (1) or paragraph (2), Article 27 paragraph (1) or paragraph (3), Article 31 paragraph (3), or Article 32 paragraph (2) are subject to administrative sanctions. • Administrative sanctions as referred to in paragraph (1) in the form of: <ul style="list-style-type: none"> • Written warning; • Temporary suspension of all activities; • Administrative fines; and/or • Revocation of the Business License. • Further provisions regarding the criteria, types, amounts of fines, and procedures for imposing administrative sanctions as referred to in paragraph (2) are regulated in the Government Regulation.
<p>Land Use (Article 42)</p> <ul style="list-style-type: none"> • In the case of using state land, land rights, customary land, and/or Forest Areas within the Working Area, the holder of the Direct Utilization Permit or the Geothermal Permit must first settle the land use with the land user on state land or the holder of rights or permits in the forestry sector in accordance with the provisions of the laws and regulations. 	<p>Amended to:</p> <ul style="list-style-type: none"> • In the event of utilizing state land, land rights, customary land, and/or Forest Areas within the Working Area, the Business Permit holder for direct utilization or the Business Permit holder for geothermal activities must first settle the land use with the land user on state land or the rights holder or the Business Permit holder in the forestry sector in accordance with the provisions of the laws and regulations.

Geothermal Act	Job Creation Law
<p>Land Use (Article 42)</p> <ul style="list-style-type: none"> • In the event that the Minister conducts Exploration to determine the Working Area as referred to in Article 17 paragraph (1), before conducting Exploration, the Minister settles the land use with the land user on state land or the holder of rights or permits in the forestry sector in accordance with the provisions of the laws and regulations. • The settlement as referred to in paragraphs (1) and (2) is carried out through deliberation and consensus by means of buying and selling, exchanging, appropriate compensation, acknowledgment, or other forms of replacement to the land user on state land or the rights holder. • In the event that the geothermal business activities are carried out by a state-owned enterprise specifically assigned by the Government, land provision is carried out in accordance with the provisions of the laws and regulations. 	<ul style="list-style-type: none"> • In the event that the Central Government conducts Exploration to determine the Working Area as referred to in Article 17 paragraph (1), before conducting Exploration, the Minister settles the land use with the land user on state land or the rights holder or the Business Permit holder in the forestry sector in accordance with the provisions of the laws and regulations. • Settlements as referred to in paragraph (1) and paragraph (2) are conducted through deliberation and mutual agreement, including through buying and selling, barter, fair compensation, acknowledgment, or other forms of replacement to the land user on state land or the rights holder. • In the event that geothermal business activities are carried out by a state-owned enterprise assigned a specific task by the Government, land provision is conducted in accordance with the provisions of the laws and regulations.

Geothermal Act

- Land Use (Article 43)
- Direct Utilization Permit Holders or Geothermal Permit Holders before conducting Geothermal exploitation on state land, land rights, customary land, and/or Forest Areas must:
 - Able to show:
 - Direct Utilization Permit or a certified copy; or
 - Geothermal License or a certified copy;
 - notify the purpose and place of the activities to be carried out; and
 - make a settlement or guarantee of settlement approved by the land user on state land and/or the right holder as referred to in Article 42.
 - If the Direct Utilization Permit holder or Geothermal Permit holder has fulfilled the conditions as referred to in paragraph (1), the land user on state land and/or the right holder shall allow the Direct Utilization Permit holder or Geothermal Permit holder to carry out Geothermal exploitation on the land concerned.

Job Creation Law

- Amended to:
- Holders of Business Licenses related to Direct Utilization or Holders of Business Licenses related to Geothermal before conducting Geothermal exploitation on state land, land rights, customary land, and/or Forest Areas shall:
 - Able to show:
 - Business Licenses related to Direct Utilization or a certified copy; or
 - Business Licenses related to Geothermal or a certified copy;
 - informing the purpose and location of the activities to be carried out; and
 - settling or providing an approved settlement guarantee to the land user on state land and/or rights holder as referred to in Article 42.
 - If the holder of the Business License for Direct Utilization or the holder of the Business License for Geothermal, as referred to in paragraph (1), has fulfilled the provisions, land users on state land and/or rights holders must allow the holder of the Business License for Direct Utilization or the holder of the Business License for Geothermal to carry out geothermal business activities on the relevant land.

Geothermal Act	Job Creation Law
<p>Land Use (Article 46)</p> <p>Every Person is prohibited from obstructing or hindering the Geothermal exploitation that has been held:</p> <ul style="list-style-type: none"> • Direct Utilization Permit; or • Geothermal License • and has fulfilled the obligations as referred to in Article 42. 	<p>Amended to:</p> <p>Anyone is prohibited from obstructing or hindering geothermal operations that have obtained a Geothermal Business License and fulfilled the obligations as referred to in Article 42.</p>
<p>Rights of Direct Utilization Permit Holders (Article 47)</p> <p>The Direct Utilization Permit Holder is entitled to carry out Geothermal exploitation in accordance with the permit granted.</p>	<p>Amended to:</p> <p>Direct Utilization business actors are entitled to carry out Geothermal exploitation in accordance with the Business Licenses granted.</p>
<p>Obligations of Direct Utilization Permit Holders (Article 48)</p> <p>Direct Utilization Permit holders shall:</p> <ul style="list-style-type: none"> • Understanding and complying with regulations in the field of occupational safety and health, as well as environmental protection and management, and meeting applicable standards; • Implementing control of environmental pollution and/or damage, including prevention, mitigation, and restoration activities; • Submitting work plans and budget plans to the Minister, governor, or regent/mayor in accordance with their authority; and • Providing periodic written reports on the implementation of work plans and budget plans, as well as geothermal utilization activities, to the Minister, governor, or regent/mayor in accordance with their authority. 	<p>Amended to:</p> <p>Direct Utilization Permit holders shall:</p> <ul style="list-style-type: none"> • Understanding and complying with regulations in the field of occupational safety and health, as well as environmental protection and management, and meeting applicable standards; • Implementing control of environmental pollution and/or damage, including prevention, mitigation, and restoration activities.

Geothermal Act

Obligations of Direct Utilization Permit Holders (Article 49)

- The Direct Utilization Permit Holder must fulfill the following obligations:
 - production contribution;
 - local taxes; and
 - regional retribution.
- The obligation to fulfill regional taxes as referred to in paragraph (1) letter b and regional retribution as referred to in paragraph (1) letter c shall be carried out in accordance with the provisions of laws and regulations.
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Obligations of Direct Utilization Permit Holders (Article 50)

- Every Person holding a Direct Utilization Permit who does not fulfill or violates the provisions as referred to in Article 48 letter b, letter c, letter d, and/or Article 49 paragraph (1) is subject to administrative sanctions.
- Administrative sanctions as referred to in paragraph (1) in the form of:
 - Written warning;
 - Temporary cessation of all activities related to direct geothermal utilization; and/or
 - Revocation of the Direct Geothermal Utilization Permit.
- Further provisions regarding the procedures for the imposition of administrative sanctions as referred to in paragraph (1) and paragraph (2) shall be regulated in a Government Regulation.

Job Creation Law

Direct Utilization business actors must fulfill obligations in the form of:

- local taxes; and
- local retribution.

Amended to:

- Every person conducting Geothermal exploitation for Direct Utilization who does not meet or violate the provisions as referred to in Article 48 letter a or letter b or Article 49 is subject to administrative sanctions.
- Administrative sanctions as referred to in paragraph (1) in the form of:
 - written warning;
 - temporary suspension of all Geothermal exploitation activities for Direct Utilization; and/or
 - Revocation of Business License.
- Further provisions regarding the procedures for the imposition of administrative sanctions as referred to in paragraph (1) and paragraph (2) shall be regulated in a Government Regulation.

Geothermal Act	Job Creation Law
<p>Obligations of Geothermal License Holders (Article 56)</p> <ul style="list-style-type: none"> • Business Entities holding Geothermal Licenses that do not fulfill or violate the provisions as referred to in Article 52 paragraph (1) letter b, letter c, letter d, letter g, letter h, letter i, and letter j, Article 53 paragraph (1), and/or Article 54 paragraph (1) and paragraph (4) are subject to administrative sanctions. • Administrative sanctions as referred to in paragraph (1) in the form of: <ul style="list-style-type: none"> • written warning; • temporary suspension of all Exploration, Exploitation, and utilization activities; and/or • revocation of Geothermal License. • Further provisions regarding the procedures for the imposition of administrative sanctions as referred to in paragraph (1) and paragraph (2) shall be regulated in a Government Regulation. 	<p>Amended to:</p> <ul style="list-style-type: none"> • Business Entities holding Business Licenses in the Geothermal sector that violate or do not fulfill the provisions as referred to in Article 52 paragraph (1) letter b, letter c, letter d, letter g, letter h, letter i, or letter j, Article 53 paragraph (1), or Article 54 paragraph (1) or paragraph (4) are subject to administrative sanctions. • Administrative sanctions as referred to in paragraph (1) in the form of: <ul style="list-style-type: none"> • written warning; • temporary suspension of all Exploration activities, • Exploitation, and utilization activities; and/or • Revocation of Business Licenses. • Further provisions regarding the criteria, types, amount of fines, and procedures for imposing administrative sanctions as referred to in paragraph (2) shall be regulated in a Government Regulation.
<p>Guidance and Supervision (Article 59)</p> <ul style="list-style-type: none"> • The Minister conducts guidance and supervision of the implementation of Geothermal for Direct Utilization carried out by the provincial government and reGENCY/city government. • The Minister may delegate to the governor to conduct guidance and supervision of the implementation of Geothermal for Direct Utilization implemented by the reGENCY/city government. 	<p>Amended to:</p> <ul style="list-style-type: none"> • The Central Government conducts guidance and supervision of the implementation of Geothermal for Direct Utilization. • Further provisions regarding the guidance and supervision of the implementation of Geothermal for Direct Utilization are regulated in a Government Regulation.

Geothermal Act	Job Creation Law
<p>Guidance and Supervision Article 60</p> <ul style="list-style-type: none"> • The Minister, governor or regent/mayor in accordance with their authority shall provide guidance and supervise the implementation of Geothermal exploitation for Direct Utilization carried out by the Direct Utilization Permit holder. • The governor and regent/mayor in accordance with their authority shall report the implementation of Geothermal for Direct Utilization every year to the Minister. 	<p>deleted</p>
<p>Criminal Provisions (Article 67)</p> <p>Any person who intentionally conducts Geothermal exploitation for Direct Utilization without a Direct Utilization Permit as referred to in Article 11 paragraph (1) shall be punished with a maximum imprisonment of 2 (two) years or a maximum fine of Rp6,000,000,000.00 (six billion rupiah).</p>	<p>Amended to: Any person who intentionally conducts Geothermal exploitation for Direct Utilization without a Business License as referred to in Article 11 paragraph (1) which results in victims/damage to health, safety, and/or the environment shall be punished with a maximum imprisonment of 2 (two) years or a maximum fine of Rp6,000,000,000.00 (six billion rupiah).</p>
<p>Criminal Provisions (Article 68)</p> <p>Any person holding a Direct Utilization Permit who intentionally conducts Geothermal exploitation for Direct Utilization not at the location stipulated in the Permit as referred to in Article 13 paragraph (1) shall be punished with imprisonment of 2 (two) years 6 (six) months or a maximum fine of Rp7,000,000,000.00 (seven billion rupiah).</p>	<p>Amended to: Every person who has a Business License related to Direct Utilization as referred to in Article 11 paragraph (1) who intentionally conducts Geothermal exploitation for Direct Utilization not at the location stipulated in the Business License which results in victims/damage to health, safety, and/or the environment, shall be punished with a maximum imprisonment of 2 (two) years 6 (six) months or a maximum fine of Rp7,000,000,000.00 (seven billion rupiah).</p>

Geothermal Act		Job Creation Law
Criminal Provisions (Article 69)	Any person holding a Direct Utilization Permit who intentionally conducts Geothermal exploitation that is not in accordance with its designation as referred to in Article 13 paragraph (2) shall be punished with imprisonment for a maximum of 3 (three) years or a maximum fine of Rp10,000,000,000.00 (ten billion rupiah).	Amended to: Any person who intentionally conducts Geothermal exploitation for Direct Utilization that is not in accordance with its designation, resulting in victims/damage to health, safety, and/or the environment shall be punished with imprisonment for a maximum of 3 (three) years or a maximum fine of Rp10,000,000,000.00 (ten billion rupiah).
Criminal Provisions (Article 70)	A Business Entity holding a Geothermal License that intentionally conducts Exploration, Exploitation, and/or utilization not in the Working Area as referred to in Article 20 paragraph (2) shall be punished with a maximum imprisonment of 7 (seven) years or a maximum fine of Rp70,000,000,000.00 (seventy billion rupiah).	Amended to: Business Entities holding Business Licenses in the Geothermal sector that intentionally conduct Exploration, Exploitation, and/or utilization not in the Working Area as referred to in Article 20 paragraph (2) shall be punished with a maximum fine of Rp70,000,000,000.00 (seventy billion rupiah)
Criminal Provisions (Article 71)	Criminal Provisions (Article 71) Business Entities that intentionally conduct Geothermal exploitation for Indirect Utilization without a Geothermal License as referred to in Article 23 paragraph (1) shall be punished with imprisonment for a maximum of 6 (six) years or a maximum fine of Rp50,000,000,000.00 (fifty billion rupiah).	Amended to: Business Entities that intentionally conduct Geothermal exploitation for Indirect Utilization without a Business License in the field of Geothermal as referred to in Article 23 paragraph (1) which results in victims/damage to health, safety, and/or the environment shall be punished with a maximum fine of Rp50,000,000,000.00 (fifty billion rupiah)

Geothermal Act		Job Creation Law
Criminal Provisions (Article 72)	A Business Entity holding a Geothermal License that intentionally uses a Geothermal License not in accordance with its designation as referred to in Article 26 paragraph (1) shall be punished with a maximum imprisonment of 10 (ten) years or a maximum fine of Rp100,000,000,000.00 (one hundred billion rupiah).	Amended to: The Business Entity holding a Business License in the Geothermal sector that intentionally uses a Business License in the Geothermal sector not in accordance with its designation as referred to in Article 26 paragraph (1) shall be punished with a maximum fine of Rp100,000,000,000.00 (one hundred billion rupiah).
Criminal Provisions (Article 73)	Any Person who intentionally obstructs or hinders the exploitation of Geothermal for Direct Utilization of the Direct Utilization Permit holder as referred to in Article 46 letter a shall be punished with imprisonment for a maximum of 1 (one) year or a maximum fine of Rp100,000,000.00 (one hundred million rupiah).	Amended to: Any person who intentionally obstructs or hinders the Geothermal exploitation of the holder of a Business License in the Geothermal sector as referred to in Article 46 shall be punished with a maximum imprisonment of 7 (seven) years or a maximum fine of Rp70,000,000,000.00 (seventy billion rupiah).
Criminal Provisions (Article 74)	-	deleted



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INDONESIA'S GEOTHERMAL CHALLENGE

Amidst Potential and Exploitation
in the Name of Energy Transition



CELIOS



Wahana Lingkungan Hidup Indonesia