

Advancing Legal and Policy Strategies for Expeditious Geothermal Energy Integration: A Path towards Clean Energy and Energy Security in Indonesia

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Abstract

This paper delves into the imperative task of advancing legal and policy strategies to expedite the integration of geothermal energy, thereby fostering a pathway toward clean energy and energy security in Indonesia. Recognizing geothermal energy as a renewable and environmentally friendly resource, the research underscores Indonesia's rich potential in this regard. Despite the commitment evidenced by the 2021-2030 Electricity Supply

Business Plan (RUPTL) and Presidential Regulation No. 112/2022, the study identifies persistent challenges hindering the swift development of geothermal energy in the country. Employing a normative legal research method, the study scrutinizes the application of legal norms within positive law. Through an extensive literature review, the research highlights key obstacles and suggests crucial legal and policy interventions for overcoming them. The findings emphasize the need for ongoing energy regime stabilization, and the provision of incentives such as governmental support for exploration, fiscal incentives, and low-cost financing schemes for geothermal projects. The paper advocates for a comprehensive approach to address these challenges, recognizing the pivotal role of legal and policy frameworks in propelling sustainable development. By delineating effective strategies, this research contributes to the discourse on transitioning Indonesia towards clean energy alternatives, ensuring energy security, and mitigating the environmental impact of traditional energy sources.

Keywords

New Renewable Energy, Policy, Environmental Damage, Energy Transition, Geothermal Policy

I. Introduction

Energy is an important factor in the development of a country.¹ Sufficient energy supply is the foundation for economic growth,

¹ Agus Eko Setyono, and Berkah Fajar Tamtomo Kiono. "From fossil energy to renewable energy: a snapshot of Indonesia's oil and gas condition in

improvement of people's quality of life and technological progress. Energy plays an important role in everyday life. Almost all areas of life, from households to industry, transport and the public sector, require energy to operate effectively. Therefore, the availability of reliable and sustainable energy is very important to support economic growth and community welfare² as mandated in Article 33 paragraph (3) of the 1945 Constitution which states that the earth and water and the natural resources contained therein are controlled by the state and used for the greatest prosperity of the people, in this case the state plays an important role in maximizing all the potential possessed by Indonesia.

In an era of globalization and increasingly fierce economic competition, countries that have access to adequate and cheap energy sources will have a great competitive advantage. Government policies in determining the price and availability of cheap and affordable energy allow the industry to grow and develop, create jobs and increase people's income.³ The Government Regulation (PP) on National Energy Policy in 2014 states in article 2 that the national energy policy is an energy management policy based on the principles of justice, sustainability, and environmental insight to achieve energy independence and national energy security. Energy management

2020–2050." *Journal of New and Renewable Energy* 2, no. 3 (2021): 154. <https://doi.org/10.14710/jebt.2021.11157>

² Faisal Faisal. "The urgency of regulating the development of renewable energy as a form of supporting national energy security." *Encyclopedia of Social Review* 3, no. 1 (2021): 19.

³ Alya Triska Sutrisno, Margaretha Hanita, and Donny Yoesgiantoro. "Analysis of Resources Nationalism on Coal Mining Sector Policy on Indonesia's Energy Security." *Journal of National Resilience Strategic Studies* 4, no. 2: 30.

refers to the performance of activities aimed at the provision of strategic reserves, and conservation of energy resources.⁴

Energy policy is currently increasingly moving towards a *demand-side management perspective* consisting of several efforts, namely intensification, diversification, and energy conservation as well as energy indexation.⁵ *Demand side management* is one method to design energy needs in accordance with consumption through planning due to concerns about dependence on petroleum. Indonesia has significant oil reserves, but their availability is limited and estimated to be sufficient for the next 11 to 12 years assuming production of around 700,000 to 800,000 barrels per day. Currently, Indonesia's oil consumption is around 1.5 million barrels per day. This shows that Indonesia is still very dependent on oil imports to meet its energy needs.

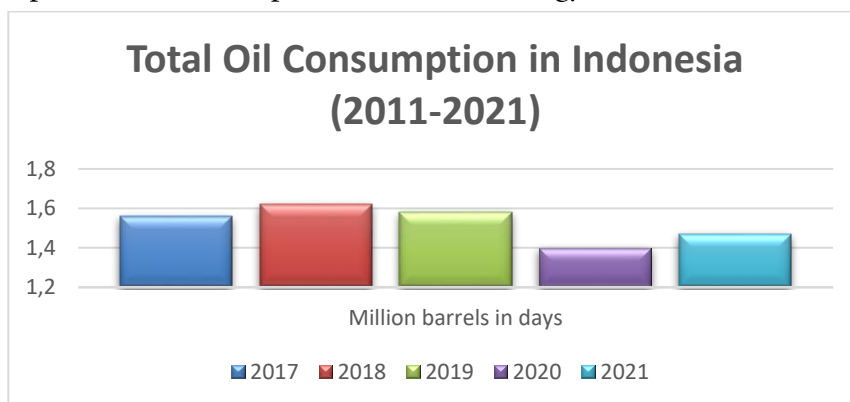


FIGURE 1. Total Oil Consumption in Indonesia

Source: British Petroleum (BP)

⁴ Savira Ayu Arsita, Guntur Eko Saputro, and Susanto Susanto. "The development of Indonesia's national energy policy and new renewable energy." *Journal of Syntax Transformation* 2, no. 12 (2021): 1780. <https://doi.org/10.46799/jst.v2i12.473>

⁵ Arsita, Saputro, and Susanto.

Indonesia's dependence on fossil fuels to meet domestic energy needs is still high.⁶ Indonesia's petroleum consumption in 2021 was 1.47 million barrels per day. Based on the data above, the figure increased 5.22% from last year's figure of 1.4 million barrels per day. Meanwhile, Indonesia's oil production in 2021 is 692,000 barrels per day. Its value fell 6.74% compared to 742,000 barrels per day in the previous year. This means that Indonesia's oil balance is still in deficit. As a result, Indonesia had to import up to 779,000 barrels per day of oil from abroad last year.

TABLE. 1 Oil and Natural Gas Production

Year	Crude oil and condensate	Natural Gas
	(000 barel)	(MMscf)
2011	329249.30	3256378.90
2012	314665.90	2982753.50
2013	301191.90	2969210.80
2014	287902.20	2999524.40
2015	286814.20	2948365.80
2017	292373.80	2781154.00
2018	281826.61	2833783.51
2019	273 494,80	2647985,90
2020	259246.80	2442830.70
2021	240324.50	2433364.00

Source: *Central Bureau of Statistics*

Based on the table above, the number of fossil energy sources, especially oil and gas, continues to decline because efforts

⁶ Siti Allifah, Yusman Syaukat, and Pini Wijayanti. "The Impact of Hydropower and Fossil Fuels on Green Economy Implementation in Indonesia." *Journal of Natural Resources and Environment* 9, no. 3 (2022): 109.

to add new resources are unable to compensate for the rapid decline of existing resources as a result of what is exploited. This situation makes Indonesia vulnerable to fluctuations in energy availability and energy prices in the international energy market. Energy fluctuations in Indonesia have a significant impact on the economy and energy sector, including:⁷

1. Energy Price Increase
2. Supply Instability
3. Economic Dependence
4. Environmental Impact

Along with increasing awareness of the importance of sustainable energy use and environmental protection, governments and energy organizations are beginning to adopt a *demand-side* management approach in energy demand management. Some aspects related to *demand side management* (DSM) include the following:⁸

1. Energy Efficiency: This policy encourages the use of technology and practices for more efficient use of energy.
2. Consumption Reduction, this policy encourages the reduction of energy consumption through changes in behavior and habits.

⁷ Resi Yunita, and Yeniwati Yeniwati. "The Effect of World Oil Price Fluctuations on Indonesia's Macroeconomic Variables." *Journal of Economic and Development Studies* 3, no. 4 (2021): 85. <http://dx.doi.org/10.24036/jkep.v3i4.12382>

⁸ Savira Ayu Arsita, Guntur Eko Saputro, and Susanto Susanto. "The development of Indonesia's national energy policy and new renewable energy." *Journal of Syntax Transformation* 2, no. 12 (2021): 1780. <https://doi.org/10.46799/jst.v2i12.473>

3. Use of Renewable Energy, this policy encourages the use of renewable energy sources such as solar, geothermal, and biomass energy
4. Technological Innovation, this policy encourages the development and introduction of new technologies that help reduce energy consumption.

Dependence on fossil energy must end by utilizing the potential of alternative energy such as water energy, wind energy, geothermal energy, and biomass available throughout Indonesia. One of the potential alternative energy that is very promising utilization is geothermal energy, because the country of Indonesia has the largest reserves in the world and the use of geothermal energy is very efficient, economical and environmentally friendly compared to fossil energy. Located in the Ring of Fire, Indonesia has 40 percent of the world's geothermal resources. Based on data from the Geological Survey of the Ministry of Energy and Mineral Resources, Indonesia's total geothermal potential is estimated at 23.7 GW.⁹

The development of geothermal resources in Indonesia is part of the national energy diversification policy to reduce dependence on domestic oil and natural gas, but also a global problem to reduce air pollution due to increased greenhouse gases. Indonesia also issued Law Number 21 of 2014 concerning Geothermal, Presidential Regulation No. 112 of 2022 concerning the Acceleration of Renewable Energy Development for Electricity

⁹ Directorate General of New Renewable Energy and Energy Conservation, "Geothermal Energy Development Potential in Indonesia", <https://ebtke.esdm.go.id/lintas/id/investasi-ebtke/sektor-panas-bumi/potensi#:~:text=Berada%20di%20kawasan%20ring%20of,diperkir akan%20mencapai%2023%2C7%20GW>.

Supply, Government Regulation Number 25 of 2021 concerning the Implementation of the Energy and Mineral Resources Sector, and Regulation of the Minister of Energy and Mineral Resources (Minister of Energy and Mineral Resources) Number 37 of 2018 concerning Geothermal Working Area Offering. The Central Government also issued a RUEN (National Energy General Plan) based on Presidential Regulation No. 22 of 2017. The RUEN is prepared by the Government and established by the National Energy Council for a period until 2050.

However, even so, the utilization of geothermal energy potential in Indonesia has not reached its true potential. There are still many problems that must be faced and resolved in the use of geothermal energy in Indonesia so that the use of geothermal energy can be one of the solutions in meeting the needs of sustainable energy in the future, providing clean, sustainable, and environmentally friendly energy. These problems include:

1. Lack of Geology, Geochemistry, and Geophysics data because accuracy in determining the amount of potential is not sufficient.¹⁰
2. High level of resource risk (in the upstream sector)
High risks may hinder the development of geothermal resources upstream. If the development of upstream geothermal resources is hampered, dependence on other

¹⁰ Lia Putriyana, Ayuta Fauzia Ladiba, and Hari Soekarno. "Simulation of Sirung Pantar Geothermal Field Development, Alor Regency, East Nusa Tenggara." *Electricity and Renewable Energy* 20, no. 1 (2021): 2.

energy sources such as oil, gas, or coal is likely to remain high.¹¹

3. Investment costs are high while energy prices are less competitive, equity funds are limited, and funding mechanisms and incentives are limited.
4. Fiscal incentives for geothermal exploration are less desirable. The lack of adequate tax incentives for the expansion of geothermal energy reduces the incentive of companies to invest in geothermal projects.¹²

Departing from this background, in this paper the author will try to examine how the direction of Indonesia's regulations and policies in efforts to develop geothermal energy and the role and strategy of the Indonesian government in facing the demands of energy transition through geothermal energy in an effort to achieve clean and affordable energy.

II. Method

In this paper, the authors use a type of research that is normative juridical, namely research that examines the application of legal rules or norms in positive law. Basically, normative legal research focuses on legal inventory of principles, legal doctrine, legal discovery, legal systematics, degree of synchronization,

¹¹ Dara Salsabila, and Yulinda Adharani. "Reconstructing the legal political direction of geothermal licensing development for indirect use." *Journal of Sharia Economic Law* 4, no. 1 (2021): 91.

¹² Arfyana Citra Rahayu, "Geothermal Exploration Fiscal Incentives Are Not Attractive Enough", <https://industri.kontan.co.id/news/insentif-fiskal-eksplorasi-panas-bumi-belum-cukup-diminati>.

comparative law and legal history.¹³ In addition, examining formal legal sources such as laws and court decisions (jurisprudence), this paper uses various literature relevant to the discussion in this paper.

The data collection technique used is secondary data collection consisting of primary legal materials and secondary legal materials that correlate with the problems in this paper, namely the acceleration of new renewable energy through geothermal energy in achieving clean, affordable, environmentally friendly energy. The model of collecting legal materials used is the *library research* model or also known as literature study, by finding and examining various legal sources needed.¹⁴ This includes laws and regulations, books, journals, and internet news as long as they are related to the writing of this paper.

III. Indonesia's Policy Scheme in Energy Transition through the Development of New Renewable Energy Based on Geothermal Energy

A series of problems are the definite answer to the massive use of fossil energy which until now has not found a solution in minimizing the effects of its use. In this case, the government realizes that the long-term use of fossil energy has a negative impact, especially on the environment and the national economy.

¹³ A. Muhammad, *Law and Legal Research*, (Jakarta: PT. Citra Aditya Bakti 2004).

¹⁴ Z Ali, *Legal Research Methods*, (Jakarta: Sinar Grafika 2010).

In a real effort to minimize this, the government presents an energy transition scheme by utilizing clean and environmentally friendly energy, namely EBT. One of the NRE that has become the government's focus to be utilized in energy transition efforts is geothermal energy. This is based on the great potential of geothermal energy spread in the Indonesian region. The distribution of geothermal potential in regions in Indonesia is as follows:

Table. 2 Distribution of Geothermal Potential in Indonesia

No	Province	Potential						Total
		Resources			Backup			
		<i>Speculative</i>	<i>Hypothetical</i>	Total	<i>Possible</i>	<i>Probable</i>	<i>Proven</i>	
1.	West Java	1.225	934	2159	1687	543	1535	3765
2.	Sumatera Utara	300	134	434	1996	-	320	2136
3.	Lampung	600	643	1243	1319	-	20	1339
4.	Sumatera Selatan	273	645	918	964	-	-	964
5.	Jawa Tengah	130	387	517	949	115	280	1344
6.	Sumatera Barat	532	269	801	1035	-	-	1035
7.	East Nusa Tenggara	226	403	629	748	-	15	763
8.	Jawa Timur	105	257	362	1012	-	-	1012
9.	Bengkulu	357	223	580	780	-	-	780
10.	Aceh	640	340	980	332	-	-	332
11.	Jambi	340	74	422	566	15	40	621
12.	North Sulawesi	55	74	128	540	150	78	768
13.	North Maluku	190	7	197	480	-	-	580
14.	Sulawesi Tengah	349	36	385	368	-	-	368
15.	Maluku	370	84	454	220	-	-	220
16.	Banten	100	161	261	365	-	-	365

No	Province	Potential						
		Resources			Backup			
		<i>Speculative</i>	<i>Hypothetical</i>	Total	<i>Possible</i>	<i>Probable</i>	<i>Proven</i>	Total
17.	West Sulawesi	316	53	369	162	-	-	162
18.	South Sulawesi	172	120	292	163	-	-	163
19.	Bali	70	22	92	262	-	-	262
20.	Southeast Sulawesi	200	25	225	98	-	-	98
21.	Gorontalo	129	11	140	110	-	-	110
22.	West Nusa Tenggara		6	6	169	-	-	169
23.	Bangka Belitung	100	6	106	-	-	-	
24.	Papua Barat	75	-	75	-	-	-	
25.	West Kalimantan	65	-	65	-	-	-	
26.	South Kalimantan	50	-	50	-	-	-	
27.	North Kalimantan	20	30	50	-	-	-	
28.	Riau	41	-	41	-	-	-	
29.	East Kalimantan	18	-	18	-	-	-	
30.	Yogyakarta	-	-	-	-	-	-	
	Total	7055	4943	11998	14435	823	2288	17546

Source: *Appendix I of Presidential Regulation Number 22 of 2017 concerning Rencana Umum Energi Nasional*

With the huge potential of geothermal energy and spread almost throughout Indonesia so that it can be a driver to achieve energy transition for people's lives. In addition, geothermal energy also has a myriad of advantages that can support government policies in reducing the greenhouse effect that causes global warming and the use of geothermal energy can make an active contribution to the development of infrastructure and the economy of geothermal energy owners, this is based on the

location of geothermal energy in areas that have hardly been reached by development by the government. The other excess instruments related to the use of geothermal energy as the main energy in the energy transition, namely:¹⁵

- 1) *Indigeneous*; Can be utilized directly in the place where geothermal resources are found or by going through the process first.
- 2) *Renewable*; It can be renewed by maintaining water reserves that enter the geothermal system so that the process of evaporation of water by heat sources continues. Geothermal resources, if not immediately utilized, can experience a drastic decrease in temperature and can even be lost due to time and simply missed.
- 3) *Sustainable*; can be utilized continuously on an ongoing basis because it can be updated in a relatively short period of time.
- 4) *Economy*
 - 1) Construction of plants sourced from geothermal energy requires a narrower area.
 - 2) The cost of using geothermal energy is cheaper than fossil fuels.
- 5) *Environmentally friendly*
 - 1) The technique of reinjecting wastewater into the bowels of the earth will bring double benefits, namely in addition to avoiding water pollution also to replenish condensate water (coolant) into the reservoir so that water heating can still take place continuously.

¹⁵ W. Setyaningsih, "The potential of Gedongsongo Geothermal Field as an alternative energy source and support the regional economy". *Journal of Geography*, 8 no. 1 (2011): 11–20. <https://doi.org/10.15294/jg.v8i1.1652>

- 2) Compared to fossil fuel exhaust gas that causes global temperature rise and ozone damage, waste gas from geothermal energy is safer because most of the exhaust gas is in the form of CO₂ (96%) which can be used as an additional material for the process of making canned drinks such as *soft drinks*, *making dry ice* and so on.

With the great potential and advantages of geothermal energy, in this case to optimize the use of geothermal energy, the government has presented schemes in the form of policies and legal products based on green *legislation*. Conceptually, green legislation-based policies strongly consider the interests of public health and safety through environmental quality assurance in every industrial development and others. Green legislation places emphasis on principles committed to the environment and places them in development, design, production, work management and way of life. Thus, the concept of regional green legislation is a concept of formulation, planning and enforcement of green principles at the regional or regional level.¹⁶ One form of application of the concept of green legislation in legal products is contained in Article 15 paragraph (1) of Law Number 32 of 2009 concerning Environmental Protection and Management (PPLH Law). Article 15 paragraph (1) of the PPLH Law regulates the central and regional governments to make a Strategic Environmental Assessment (KLHS) instrument which is a policy in the form of an instrument to prevent pollution and / or

¹⁶ Fitrana Z. M., D. V. Isabella, and L. Sari, *Regional Green Legislation to Achieve the Energy Sector Sustainable Development Goals 2030*.

environmental damage as stipulated in Article 14 letter a of the PPLH Law.¹⁷

For this, in supporting the use of geothermal energy based on the concept of green legislation-based, the government has presented schemes and policies including:

1. Law Number 30 of 2007 concerning Energy, mandates the procurement of geothermal energy in order to support sustainable national development and improve national energy security. In addition, this law provides special arrangements in terms of the authority to utilize and procure geothermal energy implemented by the Central Government and Regional Governments to the formation of the National Energy Policy within the framework of the National Energy General Plan (RUEN) formed by the National Energy Council (DEN).
2. Law Number 21 of 2014 concerning Geothermal provides a mandate for geothermal exploitation which is environmentally friendly energy with enormous potential. Geothermal empowerment is intended to support national energy security through the utilization of NRE, which in the process of use does not cause damage to the environment, does not cause climate change, global warming and can be used continuously.
3. Government Regulation Number 79 of 2014 concerning National Energy Policy, in this policy the use of geothermal energy, discusses efforts to encourage the use and optimization of geothermal energy use and minimize the use of fossil energy. This PP also regulates the achievement of national

¹⁷ *Ibid.*

energy policy targets for NRE, namely the achievement of an optimal primary energy mix in 2025 with a role of at least 23% (twenty-three percent) of NRE and in 2050 at least 31% (thirty-one percent) as long as the economy is fulfilled.

4. Government Regulation of the Republic of Indonesia Number 7 of 2017 concerning Geothermal for Indirect Utilization, provides regulations related to geothermal utilization exploitation activities through the process of converting from thermal and/or fluid energy.
5. Presidential Regulation Number 22 of 2017 concerning the General Plan of National Energy, discusses central government policies related to energy management based on equitable, sustainable, and environmentally sound principles in order to create energy independence and national energy security. The policy in the Presidential Decree of the General Plan of National Energy (RUEN) concerns government policies and strategies in utilizing, optimizing and utilizing geothermal energy.
6. Presidential Regulation Number 112 of 2022 concerning the Acceleration of Renewable Energy Development for Electricity Supply, discusses the utilization of geothermal energy as part of producing electrical energy for the community, in which in this case EBT including geothermal energy is the top priority in purchasing electricity by PT. The State Electricity Company (PLN) is accommodated in the Electricity Supply Business Plan (RUPTL).
7. Regulation of the Minister of Energy and Mineral Resources of the Republic of Indonesia Number 50 of 2017 concerning the Utilization of Renewable Energy Sources for the Supply of Electricity as amended several times recently by the

Regulation of the Minister of Energy and Mineral Resources Number 4 of 2020 concerning the Second Amendment to the Regulation of the Minister of Energy and Mineral Resources Number 50 of 2017 concerning the Utilization of Renewable Energy Sources for the Supply of Electricity, The presence of this arrangement is intended to accelerate the development of NRE including geothermal energy in supporting the interests of national electricity.

The presence of the regulation is intended to be an effort to accelerate the optimization of the use of geothermal energy which is carried out as part of encouraging the energy transition. This is a form of government responsibility in striving for the creation of clean, affordable and environmentally friendly energy.¹⁸ In addition, the government has prepared several strategies to accelerate geothermal development, including the following:

- a) Preparation of incentive schemes or tariff arrangements that consider the economics of Geothermal Power Plant projects.
- b) Conducting geothermal exploration to drilling in order to improve the quality of geothermal area data that will be offered to business entities.
- c) Synergy of institutions/ministries and State-Owned Enterprises (SOEs) related to geothermal development.
- d) Optimization of the utilization of geothermal resources in the Mining Working Area (WKP) that has been producing with

¹⁸ Faisal Faisal. "The urgency of regulating the development of renewable energy as a form of supporting national energy security." *Encyclopedia of Social Review* 3, no. 1 (2021): 22.

the development / expansion and development of small-scale plants.

- e) Developing geothermal resources in eastern Indonesia.
- f) Demand creation in areas that have high geothermal resources but low demand.
- g) Synergy with communities and local governments to manage social/resistance issues in geothermal development.
- h) Monitoring and evaluation of the implementation of geothermal projects nationally involving the Ministry of Energy and Mineral Resources (Geological Agency, Director General of New Renewable Energy and Energy Conservation, Director General of Electricity), Ministry of Environment and Forestry, Ministry of Finance, National Development Planning Agency, Ministry of Industry, Investment Coordinating Board, Local Government, and so on.
- i) Join *study* and *knowledge sharing* between *stakeholders* in geothermal development.

IV. Efforts to Revitalize Geothermal Energy Acceleration Policy in Achieving Clean Energy and Energy Security in Indonesia

Investment in the use of clean and efficient energy encourages the government to strengthen the role of new and renewable energy (EBT) in maintaining the resilience of the national energy system. The wider use of NRE is expected to reduce dependence on fossil fuels that are dwindling, more environmentally friendly, and can also reduce greenhouse gas emissions. Currently, the government has set a target of 23% of energy that must come from renewable

energy by 2025 and 31% by 2050, and investment in the use of clean and efficient energy is an important factor to achieve this target¹⁹. This is important to maintain the stability and sustainability of the national energy system, because energy security is an important part of maintaining the stability of energy supply and a healthy environment. Therefore, the government must more aggressively encourage the use of new renewable energy sources (EBT) and invest in the use of clean and efficient energy. Thus, energy security can be maintained and long-term and sustainable benefits for society and the environment can be generated.²⁰

Indonesia's energy security study is conducted using an energy security model with a 4A perspective, namely *Availability* (availability of energy sources both from domestic and abroad), *Affordability* (affordability of energy investment costs, ranging from exploration, production and distribution costs to consumer affordability of energy prices), *Accessibility* (ability to access energy sources, energy grid infrastructure, including geographic and geopolitical challenges), *acceptability* (use of energy that cares for land, sea and air environments including nuclear-related public acceptance, and so on).²¹

¹⁹ Article 9 letter (f) of Government Regulation Number 79 of 2014 concerning National Energy Policy

²⁰ Article 1 point 10 of Government Regulation Number 79 of 2014 concerning National Energy Policy

²¹ National Energy Council. 2022. Indonesia Energy Outlook 2022. Jakarta: Secretariat General of the National Energy Council.



FIGURE 2. Energy Security Model
Source: *Energy Security Indonesia, 2019*

As stipulated in Article 33 paragraph (3) of the 1945 Constitution, which in the Article contains 3 (three) important elements, namely: substance (natural resources), status (controlled by the state), and objectives (for the greatest prosperity of the people). Therefore, the existence of management and utilization of natural resources is an important and fundamental issue for the life of the nation and state.²²

The availability of clean and affordable energy has become one of the Sustainable Development Goals of 2030, where energy sustainability is a global issue and requires the commitment of governments and local governments to help achieve these goals.²³

²² Ahmad Redi, and Luthfi Marfungah. "Perkembangan Kebijakan Hukum Pertambangan Mineral dan Batubara di Indonesia." *Undang: Jurnal Hukum* 4, no. 2 (2021): 473-506.

²³ Fajar Puja Pangestu, Nadia Shelvia Rahmadiani, Nike Tanzila Hardiyanti, and Ermita Yusida. "Pancasila Economy as a Guideline in the Sustainable Development Goals (SDGs) 2030." *In Proceedings of the National Seminar on Development Economics*, vol. 1, no. 3: 217. 2021.

In Indonesia, new energy and renewable energy guidelines are further regulated in Government Regulation No. 79 of 2014 concerning national energy policy (KEN). The arrangement sets new and renewable energy targets of 23% by 2025 and a minimum of 31% by 2050. On the other hand, dependence on oil and coal will be reduced by 20 and 25 percent, respectively. To achieve this goal, various efforts and programs are needed whose formulation and implementation are outlined in the National Energy General Plan (RUEN) and the Regional Energy Master Plan at the state level (RUED-P). This study aims to examine the potential of new and renewable energy sources (EBT) in line with the goals of SDG 2030.

Geothermal energy as a new and renewable energy (EBT) that is environmentally friendly and renewable can play an important role in reducing dependence on fossil fuels. Indonesia has great potential for geothermal development because it is located on the Pacific Ring of Fire.²⁴ Geothermal resources are spread almost evenly in Indonesia, based on existing data there are more than 300 geothermal hotspots stretching from Sabang to Merauke. Geothermal energy can replace non-renewable energy sources such as fossil fuels in power generation and transportation. The use of geothermal energy reduces and contributes significantly to the supply of electrical energy which is currently a problem that has not been resolved by the Indonesian government.²⁵ Therefore,

²⁴ Yuli Ermawati, Eriyana Yulistia, and Fetty Zulyanti. "Geothermal potential as alternative energy in realizing a carbon-free Indonesia." *Unbara Environmental Engineering Journal (UEEJ)* 2, no. 02 (2021): 42. <https://doi.org/10.54895/ueej.v2i02.1266>

²⁵ D. S. Nurwahyudin & U. Harmoko, "Utilization and Policy Direction of Geothermal Energy Planning in Indonesia as a Sustainability of New

increasing the use of new renewable energy sources (EBT) through geothermal energy is one solution to overcome the problem of electricity supply in Indonesia.

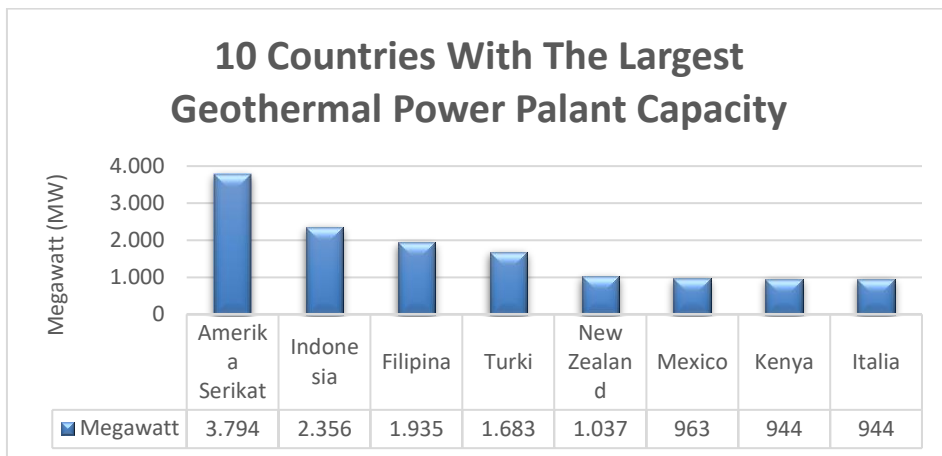


FIGURE 3. 10 Countries with the Largest Geothermal Power Plant Capacity

Source: *ThinkGeoEnergy Research (2023)*

At the end of 2022, Indonesia has an installed capacity of 2,356 MW. Therefore, geothermal utilization must be increased following the National Energy Policy (KEN) in 2025. Geothermal utilization in Indonesia in 2022 recorded that there was only the utilization of geothermal energy processed into electricity from Geothermal Power Plants (PLTP) of 2,342.63 Mega Watts (MW). This means that it has only utilized 9.8% of the total existing resources of 23,965.5 MW.

Some regions in Indonesia have considerable geothermal potential so that they can be utilized by the surrounding

Renewable Energy Maximization”. *Journal of New and Renewable Energy*, no. 3 (2020): 111–123. <https://doi.org/10.14710/jebt.2020.10032>.

community. One of them is in the geothermal field area, Garut regency, West Java. This geothermal area is located on a volcanic plateau from the west, namely Mount Rakutak to the east, namely Mount Guntur. Based on data from previous studies using the convection heat loss calculation method, the geothermal potential in the region is around 48.2 MWe. Then there is also the district of Empat Lawang, South Sumatra, namely the Kelinsar water geothermal field. Meanwhile, in North Sumatra Province, low enthalpy geothermal potential of 170 MWe and high enthalpy of 2253 MWe was found. Of the total potential, as many as 12 MW are used as power plants in Sibayak and 330 MW as power plants in Sarulla.²⁶

However, the utilization of geothermal energy potential in Indonesia has not reached its true potential. There are still many problems that must be faced and resolved in the use of geothermal energy in Indonesia so that the use of geothermal energy can be one of the solutions in meeting the needs of sustainable energy in the future, providing clean, sustainable, and environmentally friendly energy.²⁷ In facing the problem of geothermal energy, concrete and fast solutions are needed to meet the increasing energy needs. Geothermal energy is a reliable renewable energy source, but there are still several problems that need to be overcome to maximize its potential with policies that can be taken by the government as follows:

²⁶ Auzan Fildzah Hakim, et. al. Potential and Utilization of Geothermal Energy in Indonesia. *Indonesian Journal of Conservation* 11, no. 2 (2022): 72. <https://doi.org/10.15294/ijc.v11i2.40599>

²⁷ Abadi Poernomo, et al. "An overview of Indonesia geothermal development-current status and its challenges." *Proceedings World Geothermal Congress*. 2015.

1. Acceleration of Exploration Implementation by the Government

In this case, the acceleration of exploration plays an important role in the development of geothermal energy, because the exploration to be carried out determines the total potential of geothermal energy that can be utilized optimally. With the acceleration of this exploration implementation, it is expected to determine Indonesia's geothermal potential more accurately and quickly. The government has a development strategy that aims to develop and expand geothermal potential as an energy source in support of sustainable national development. One of the strategies used is to develop regulations and policies aimed at opening opportunities for investors in the geothermal sector in Indonesia. The goal is to encourage investment in new renewable energy, including geothermal.²⁸

2. Completion of the legal framework of geothermal energy applications

The improvement of the legal framework of geothermal utilization is very important and must be done now. In this regard, the government must issue clear and structured regulations and policies to regulate geothermal development in a fair and sustainable manner.²⁹ With a clear legal framework, risks can be minimized, a conducive environment can be created and other problems related to geothermal energy development in Indonesia can be solved.

²⁸ Dara Salsabila, and Yulinda Adharani. "Reconstructing the legal political direction of geothermal licensing development for indirect use." *Journal of Sharia Economic Law* 4, no. 1 (2021): 96.

²⁹ Adrian Sutedi, *Mining Law*, (Jakarta: Sinar Grafika, 2011), 112.

In addition, it is imperative to improve the legal framework of the national energy policy (KEN). Energy policy development must be based on sustainable aspects to ensure energy supply that meets the current and future needs of society. Regarding geothermal energy, increasing the availability of clear regulations and guidelines can accelerate the development of geothermal potential in Indonesia and create a conducive investment climate. By improving the legal framework of the national energy policy, it is expected to encourage the use of environmentally friendly renewable energy sources with the aim of increasing the use of new and renewable energy in Indonesia.

3. Information Exchange and Public Discussion in Geothermal Energy Development

Information exchange and public discussion are indeed very important to overcome social problems in geothermal energy development. In this case, the community must have space to express their opinions and contributions about the potential for geothermal energy development in their area.

Sharing information can also help raise public awareness about local communities' geothermal development plans and the risks and benefits associated with the project. Open and community-involved public discussions can help reduce conflict between developers and communities and pave the way for the best solutions to existing problems. Community participation in geothermal development and development can help ensure the sustainability of geothermal resource management and utilization and improve the welfare of communities in the area.

To avoid intra-community conflicts in geothermal energy development, *Free Prior of Informed Consent* (FPIC) is required. FPIC is a public communication mechanism that prioritizes negotiations to reach agreements so that its position is balanced. The FPIC principles reflect that democratic states have an obligation to respect and protect the rights of indigenous peoples, not discriminate and give freedom to communities, including indigenous peoples, to participate in development without pressure and manipulation. This space of³⁰ relation and influence is assumed in a persuasive, equal and fair communication space, such a communication space is formed by FPIC mechanisms, not a one-way form of communication, nor a manipulative form of communication such as policy. Development In the New Order era, the current reform era prioritizes participation and equality.³¹ The role of FPIC in geothermal management is as follows:

- a) Protection of Community Rights, FPIC protects the rights of indigenous peoples or local communities in decision-making that impacts their land, natural resources, and livelihoods. Communities have the right to grant or deny approval for geothermal projects in their area.

³⁰ Wahyudi, Hery. "The Role of Local Government in the Settlement of Land Administration" *Journal of the Pulpit of Justice* 16, no. 2: 151. <https://doi.org/10.30996/mk.v16i2.8022>

³¹ Alvin Yulityas Sandy, "Kebijakan Komunikasi Pada Proyek Eksplorasi Panas Bumi di Baturaden dalam Perspektif FPIC [Communication Policy of Geothermal Exploration at Baturaden on FPIC Perspective]." *Jurnal Penelitian Pers dan Komunikasi Pembangunan* 19, no. 1 (2015): 1-10. <https://doi.org/10.46426/jp2kp.v19i1.23>

- b) FPIC encourages active participation and community involvement in the geothermal decision-making process. This includes providing clear and adequate information to the community about the project, its implications, and possible alternatives. Communities also have the right to participate in negotiations and benefit from geothermal development.
 - c) Fairness and Transparency, FPIC emphasizes the principles of fairness and transparency in decision making. This principle ensures that communities have access to meaningful and adequate information about geothermal projects, including their potential positive and negative impacts. In this way, society can make informed decisions and consider its own interests.
 - d) Conflict Avoidance: By involving communities in FPIC's decision-making process, conflicts that may arise between developers and local communities can be avoided or mitigated. FPIC enables open dialogue and mutual understanding between all parties, thus enabling more harmonious and sustainable solutions. In geothermal implementation, FPIC is not only a legal obligation, but also an ethical and responsible approach to sustainable geothermal development.
4. Encouraging investment and infrastructure in Geothermal Energy development

In the development of geothermal energy, investment and infrastructure factors are very important. Indonesia has great geothermal energy potential, so the government must attract investment and build the necessary infrastructure to maximize the utilization of this geothermal energy source. In

this regard, steps should be taken to increase investor and industry stakeholders' awareness of Indonesia's geothermal energy potential and create adequate incentives and facilities to attract investment in the geothermal sector. In addition, infrastructure development in areas with geothermal potential must be strengthened to facilitate accessibility and maximize its utilization.

The availability of infrastructure is also very important to support the sustainability of existing geothermal power plants and ensure a stable electricity supply. With the development of sustainable and cheap geothermal energy, new opportunities for ecological energy utilization are opened, national energy independence can be increased and the welfare of people in available places can be improved.³²

5. Geothermal Sector Infrastructure Financing Scheme

In developing geothermal business, the government strives through the Geothermal Sector Infrastructure Financing (PISP) and Geothermal *Resource Risk Mitigation* (GREM) schemes. The PISP scheme will be implemented by PT Sarana Multi Infrastruktur (SMI) which is a State-Owned Enterprise (BUMN) under the supervision of the Ministry of Finance. The PISP scheme is regulated through the Minister of Finance Regulation (PMK) Number 62 of 2017 concerning the Management of Geothermal Sector Infrastructure Financing Funds at the Company (Persero) PT. Multi Infrastructure Facilities. The PKM was issued in order

³² A. R. Razak, "Community participation in development". *Authority: Journal of Government Science* 3, no. 1 (2013). <https://doi.org/10.26618/ojip.v3i1.54>

to regulate the management of PSIP funds to be managed by PT. SMI. PSIP financing, or *Geothermal Fund*, is the government's effort to increase geothermal development in Indonesia through financial assistance.³³ The purpose of the funding is to support geothermal activities, one of which is exploration activities. Assistance implemented by PT. This SMI is a loan fund, capital participation, and the provision of geothermal data and information where for the provision of geothermal data and information, PT. SMI can cooperate with international institutions.³⁴

The next scheme is the *Geothermal Resource Risk Mitigation Project* (GREM), this scheme focuses on capital participation and facilitates lending to developers in the geothermal power-based electricity sector through *blended soft loans*.³⁵ The GREM program is a financial assistance from *the World Bank, Green Climate Fund (GCF), Clean Technology Fund (CTF), Energy Sector Management Assistance Program (ES-MAP), Global Infrastructure Facility (GIF), and PISP funds*.³⁶

With the presence of the scheme initiated by the government, it is hoped that problems related to financing in

³³ Salma Zafirah Wisriansyah, Dorman Purba, and Arnaldo Napitu. "Keunggulan, Tantangan, dan Rekomendasi Kebijakan akan Pengembangan Energi Panas Bumi di Indonesia." *Jurnal Nasional Pengelolaan Energi MigasZoom* 2, no. 2 (2020): 31-46.

³⁴ *Ibid.*

³⁵ Maharani Ayuningtyas, Harianto Harianto, and Arief Safari. "Development of strategies on geothermal value chain activities (study at PT Geo Dipa Energi (Persero))." *Journal of Business Strategy* 28, no. 1 (2019): 64.

³⁶ Salma Zafirah Wisriansyah, Dorman Purba, dan Arnaldo Napitu, *Op.cit*, 41.

the context of developing geothermal energy exploitation can be resolved, where financing problems become an important part in hampering the development and development of geothermal energy. In the PISP scheme, exploration risk is not only the responsibility of the company but will involve the government and the GREM scheme can help companies that carry out geothermal exploration get a loan of 50% if exploration fails.

In geothermal exploitation financing schemes, the private sector can take part in the construction of geothermal projects. One method that can be used is a *power purchasing agreement* (PPA). PPA is an agreement between the government and the developer of a renewable energy project that stipulates that the government will buy all electricity generated by power plants. By implementing PPAs in renewable power plants, project financing provides investors with risk-free financing. In this case, to protect the owner or developer from unexpected failures that result in the development of such power plants not continuing.³⁷

6. Strengthening Fiscal Incentives

Fiscal incentives can be an effective tool to encourage investment in the geothermal sector. Here are some forms of strengthening fiscal incentives that can be given to support geothermal development:

- a) Tax Deduction: The government can provide income tax deductions or exemptions to companies that invest or

³⁷ Afif Akbar Syawala, and Estro Dariatno Sihalo. "The impact of electrification on the economy and financing strategies for the development of renewable electricity sources for sustainable development in Indonesia." *Journal of Economics and Business* 8, no. 1 (2023): 11.

operate in the field of geothermal energy. These tax breaks can help boost corporate profits and make geothermal investments more attractive. The tax cut is a government measure to reduce the tax burden for companies or individuals investing in the geothermal sector. In the context of tax incentives, the government can provide certain tax deductions or exemptions to economic actors who invest or operate in desired industries.³⁸

- b) Exemption from Duties and Levies, in addition to tax deductions, states can provide exemptions or exemptions from certain taxes and costs associated with geothermal development. This can help reduce investment costs and remove obstacles that companies face when developing geothermal projects.
- c) Subsidies, the Government can support companies that invest in geothermal energy in the form of subsidies or financial support. The financing can reduce operational costs or initial investment that must be made by the company. The government can also support geothermal technology research and development through subsidies or low-cost financing. In the development of geothermal energy, research and development of new technologies are very important to increase efficiency and reduce production costs. By providing incentives that focus on research and development, the government can encourage innovation and accelerate geothermal development.

³⁸ Richard Jatimulya Alam Wibowo, "Review of Legal Policy on Tax Incentives in the Energy and Transportation Sectors to Support Net Zero Emissions by 2060 in Indonesia." *Indonesian Tax Review* 7, no. 1 (2023): 92. <https://doi.org/10.31092/jpi.v7i1>

d) Strengthening the Role of Geothermal DBH to Increase Clean Energy Utilization. The central government seeks to offer solutions to these problems by providing Profit Sharing Funds (DBH) to the community. DBH provided by the central government will be channeled through local governments, where local governments get revenue sharing on revenues derived from state revenues in the geothermal sector. From state revenues from geothermal, as much as 80% will be given to the regions. This is also by considering regional performance through performance allocation which is divided into two performance allocations, namely first, support performance for optimizing state revenue in the form of fulfilling regional obligations to carry out tax reconciliation and regional support in optimizing excise revenue and second, environmental maintenance performance in the form of environmental quality indicators. The performance of the area is 10% of the total 80% of Geothermal DBH distributed based on environmental maintenance performance. The performance aspect allocated by the central government is expected to be able to accommodate local governments receiving geothermal DBH to resolve problems related to community rejection. In addition, in order to achieve the successful implementation of the performance allocation, the central government provides conditions for the preparation of programs related to the causes of community rejection of the development of geothermal exploitation infrastructure. The form of the program must target qualifications in the form of socialization to

the community and community empowerment around the development of geothermal exploitation infrastructure.³⁹

FIGURE. 3 DBH Allocation Policy for 2023

Kebijakan Alokasi DBH Tahun 2023



Source: *Ministry of Finance of the Republic of Indonesia*

- e) This could include loosening licensing procedures and regulations for companies investing in geothermal energy. The government can speed up the licensing process, cut red tape, and provide legal certainty for companies that want to develop geothermal projects. The ease of licensing also has an impact on delays in geothermal development, which can be shortened for development funding. Currently, from the availability point of view, the ease of

³⁹ Directorate General of Financial Balance, "Regional Economic & Fiscal Development Report", Ministry of Finance of the Republic of Indonesia (Jakarta, 2023), 27.

geothermal utilization licensing alone cannot increase the availability of PLTP energy because the construction of PLTP is prohibited in the *Tropical Rainforest Heritage of Sumatra* (THRS) Area.⁴⁰

- f) Public Private Collaboration, the Government can collaborate with private parties to develop geothermal projects. Through these partnerships, governments can offer tax incentives such as tax exemptions or subsidies to private companies involved in geothermal projects.

With the right tax incentives, geothermal development is expected to be a solution to meet sustainable energy needs, reduce greenhouse gas emissions, and support inclusive economic development.

Thus, Indonesia has a myriad of hopes to develop and increase geothermal energy. As one of the largest countries in the world that has geothermal potential, the development of geothermal energy can make a significant contribution to achieving the target of 23 percent renewable energy (EBT) by 2025. Governments and industry must commit to investing more in energy expansion and geothermal utilization. In addition, programs and policies are needed to help increase public access to knowledge and skills related to geothermal development technology. Another hope in accelerating geothermal energy is to realize national energy independence to reduce dependence on fossil fuels, especially petroleum. With the sustainable

⁴⁰ Mila Utami Sari, Mohamad Sidik Boedoyo, and Pujo Widodo. "Geothermal licensing policy as a power plant to support national energy security." *Energy Security* 8, no. 2 (2022): 28.

development of geothermal energy, Indonesia can increase energy self-sufficiency and meet domestic energy needs accompanied by significant economic growth.

V. Conclusion

Accelerating the use of geothermal energy to ensure clean energy and energy security is an important step in efforts to reduce dependence on fossil energy sources and overcome climate change. By utilizing geothermal energy, countries can reduce dependence on fossil fuels whose prices and availability fluctuate. Geothermal energy is a reliable and sustainably available energy source that can guarantee a secure energy supply in the long term. The government must take concrete steps to encourage the development of geothermal energy potential by preparing various policy instruments and legal products that include laws and other strategies.

Indonesia's geothermal potential must be utilized properly. The utilization of geothermal potential must be further developed and maximized to benefit Indonesia and produce clean and green energy by combining renewable energy. The acceleration of geothermal potential exploitation also needs to consider social and environmental aspects and a thorough investigation into possible ecological and social impacts is needed. This is important to ensure geothermal energy is developed responsibly and sustainably so that it does not harm society or the environment.

VI. Recommendations

The use of renewable energy is becoming increasingly important to maintain sustainable development and reduce environmental impact. One possible renewable energy source is geothermal energy. However, there is still a lot of geothermal energy potential that has not been optimally utilized. Therefore, in this article, the author will provide recommendations for accelerating the use of geothermal energy as follows:

- a) Increased Research and Development, to accelerate the utilization of geothermal energy, it is necessary to increase research and development in this field. Sufficient investment funds must be provided to support research and development of geothermal technology that is more efficient, economical and environmentally friendly.
- b) Infrastructure Improvement, investment is needed to support adequate infrastructure development.
- c) Increased awareness and education, very important to increase public awareness and understanding of the opportunities and benefits of geothermal energy.
- d) Increased support policies, the government must implement policies that support the use of geothermal energy. This could include tax incentives such as tax exemptions or subsidies to encourage investment in geothermal development and utilization.
- e) Collaboration and Partnership, to encourage the utilization of geothermal energy, cooperation between the state, private sector and research institutions is very important.

Through increased research and development, development of appropriate infrastructure, increased awareness and education, policy support as well as strong collaboration and partnerships, we can optimize geothermal potential and encourage energy and environmental sustainability in achieving clean energy and energy security in Indonesia.

VII. References

- Ali, Z. *Legal Research Methods* (Jakarta: Sinar Grafika 2010).
- Allifah, Siti, Yusman Syaukat, and Pini Wijayanti. "The Impact of Hydropower and Fossil Fuels on Green Economy Implementation in Indonesia." *Journal of Natural Resources and Environment* 9, no. 3 (2022).
- Arsita, Savira Ayu, Guntur Eko Saputro, and Susanto Susanto. "The development of Indonesia's national energy policy and new renewable energy." *Journal of Syntax Transformation* 2, no. 12 (2021).<https://doi.org/10.46799/jst.v2i12.473>
- Ayuningtyas, Maharani, Harianto Harianto, and Arief Safari. "Development of strategies on geothermal value chain activities (study at PT Geo Dipa Energi (Persero))." *Journal of Business Strategy* 28, no. 1 (2019).
- Citra Rahayu, Arfyana. "Geothermal Exploration Fiscal Incentives Are Not Attractive Enough", <https://industri.kontan.co.id/news/insentif-fiskal-eksplorasi-panas-bumi-belum-cukup-diminati>.
- Directorate General of Financial Balance, "Regional Economic & Fiscal Development Report", Ministry of Finance of the Republic of Indonesia (Jakarta, 2023).
- Directorate General of New Renewable Energy and Energy Conservation, "Geothermal Energy Development Potential in Indonesia", <https://ebtke.esdm.go.id/lintas/id/investasi-ebtke/sektor-panas->

- Razak, A. R. "Community participation in development".
Authority: Journal of Government Science 3, no. 1 (2013).
<https://doi.org/10.26618/ojip.v3i1.54>
- Redi, Ahmad, and Luthfi Marfugah. "Perkembangan Kebijakan Hukum Pertambangan Mineral dan Batubara di Indonesia." *Undang: Jurnal Hukum* 4, no. 2 (2021): 473-506.
- Republic of Indonesia. *Constitution of the Republic of Indonesia Year 1945*
- Republic of Indonesia. *Government Regulation Number 25 of 2021 concerning the Implementation of the Energy and Mineral Resources Sector*
- Republic of Indonesia. *Law Number 21 of 2014 concerning Geothermal*
- Republic of Indonesia. *Law Number 30 of 2007 concerning Energy*
- Republic of Indonesia. *Law Number 32 of 2009 concerning Environmental Protection and Management*
- Republic of Indonesia. *Presidential Regulation No. 112 of 2022 concerning the Acceleration of Renewable Energy Development for Electricity Supply*
- Republic of Indonesia. *Regulation of the Minister of Energy and Mineral Resources (Minister of Energy and Mineral Resources) Number 37 of 2018 concerning Geothermal Working Area Offering*
- Salsabila, Dara, and Yulinda Adharani. "Reconstructing the legal political direction of geothermal licensing development for indirect use." *Journal of Sharia Economic Law* 4, no. 1 (2021).
- Sandy, Alvin Yulityas. "Kebijakan Komunikasi Pada Proyek Eksplorasi Panas Bumi di Baturaden dalam Perspektif FPIC [Communication Policy of Geothermal Exploration at

- Baturaden on FPIC Perspective]." *Jurnal Penelitian Pers dan Komunikasi Pembangunan* 19, no. 1 (2015): 1-10.
<https://doi.org/10.46426/jp2kp.v19i1.23>
- Sari, Mila Utami, Mohamad Sidik Boedoyo, and Pujo Widodo. "Geothermal licensing policy as a power plant to support national energy security." *Energy Security* 8, no. 2 (2022).
- Setyaningsih, W. "The potential of Gedongsongo Geothermal Field as an alternative energy source and support the regional economy". *Journal of Geography*, 8 no. 1 (2011): 11–20.
<https://doi.org/10.15294/jg.v8i1.1652>
- Setyono, Agus Eko, and Berkah Fajar Tamtomo Kiono. "From fossil energy to renewable energy: a snapshot of Indonesia's oil and gas condition in 2020–2050." *Journal of New and Renewable Energy* 2, no. 3 (2021): 154.
<https://doi.org/10.14710/jebt.2021.11157>
- Sutedi, Adrian. *Mining Law* (Jakarta: Sinar Grafika, 2011).
- Sutrisno, Alya Triska, Margaretha Hanita, and Donny Yoesgiantoro. "Analysis of Resources Nationalism on Coal Mining Sector Policy on Indonesia's Energy Security." *Journal of National Resilience Strategic Studies* 4, no. 2 (2021).
- Syawala, Afif Akbar, and Estro Dariatno Sihaloho. "The impact of electrification on the economy and financing strategies for the development of renewable electricity sources for sustainable development in Indonesia." *Journal of Economics and Business* 8, no. 1 (2023).
- Wahyudi, Hery. "The Role of Local Government in the Settlement of Land Administration" *Journal of the Pulpit of Justice* 16, no. 2 (2023).
<https://doi.org/10.30996/mk.v16i2.8022>
- Wibowo, Richard Jatimulya Alam. "Review of Legal Policy on Tax Incentives in the Energy and Transportation Sectors to Support Net Zero Emissions by 2060 in Indonesia."

Indonesian Tax Review 7, no. 1 (2023).
<https://doi.org/10.31092/jpi.v7i1>

Wisriansyah, Salma Zafirah, Dorman Purba, and Arnaldo Napitu. "Keunggulan, Tantangan, dan Rekomendasi Kebijakan akan Pengembangan Energi Panas Bumi di Indonesia." *Jurnal Nasional Pengelolaan Energi MigasZoom* 2, no. 2 (2020): 31-46.

Yuli Ermawati, Eriyana Yulistia, and Fetty Zulyanti. "Geothermal potential as alternative energy in realizing a carbon-free Indonesia." *Unbara Environmental Engineering Journal (UEEJ)* 2, no. 02 (2021).
<https://doi.org/10.54895/ueej.v2i02.1266>

Yunita, Resi, and Yeniwati Yeniwati. "The Effect of World Oil Price Fluctuations on Indonesia's Macroeconomic Variables." *Journal of Economic and Development Studies* 3, no. 4 (2021). <http://dx.doi.org/10.24036/jkep.v3i4.12382>

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