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<https://doi.org/10.5109/7236821>

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出版情報 : Evergreen. 11 (3), pp.1676-1694, 2024-09. 九州大学グリーンテクノロジー研究教育センター

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# Target An Assertive Geothermal Power Development from Indonesia's Omnibus Law: A Critical Review

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(Received January 10, 2024: Revised May 17, 2024: Accepted August 5, 2024).

**Abstract:** This study aims to analyze the degree to which the Omnibus Law (OL) has a facilitative role in expediting the geothermal development target and what key factors the government should focus on to drive the OL's facilitative role to expedite the development target. Article is analyzed using a qualitative method with a literature study. This study states that the OL may not drive to expedite the geothermal development target. The OL has the potential to expedite the development target along with robust economic growth, increase in per capita and national electricity consumption, and achieving the 2060 NDC and NZE targets.

Keywords: economic growth; geothermal development; literature study; NZE; Omnibus Law

## 1. Introduction

Indonesian House of Representatives finally passed Law No. 11 of 2020 on Job Creation in early November 2020 as a result of the heated parliamentary debates on it, which turned into a heated public discussion. Using the omnibus law (OL) strategy, the law, which regulates ten key policy areas, is comprised of 186 articles and substantially amends and repeals 79 laws about development and investment<sup>1</sup>. This law is viewed as a legal breakthrough aimed at resolving several issues, including those associated with the simplification and improvement of the investment ecosystem and the acceleration of national strategic projects. One of these strategic projects is the electricity infrastructure development (locally '*Pembangunan Infrastruktur Ketenagalistrikan*' or 'PIK'), which includes all projects linked to power generation, transmission, distribution, substations, and other supporting facilities. Acceleration of PIK entails the production of 35,000 MW and the installation of a 46,000-kilometer transmission network. This PIK acceleration prioritizes the use of renewable energy to support the reduction of greenhouse gas (GHG)

emissions and the achievement of the national energy mix, elaborated under the Electricity Supply Business Plan (locally '*Rencana Usaha Penyediaan Tenaga Listrik*' or 'RUPTL')<sup>2,3</sup>). Reducing GHG emissions must be carried out to prevent an increase in global warming, climate change, and other natural disasters due to high GHG emissions<sup>4-6</sup>. Additionally, Indonesia's target achievement in Net-Zero Emmission target (NZE) in 2060<sup>7</sup>.

Indonesia is a country with great geothermal potential, with a capacity of about 29,000 MW, situated on the seismic line known as the "ring of fire"<sup>8,9</sup>). Therefore, development geothermal source reflects one of the PIK project's targets, regarding the RUPTL. Several provisions of Law No. 21 of 2014 on Geothermal were altered, deleted, and repealed by the OL. These amendments are primarily motivated by the suboptimal performance of geothermal power development (GPD). The strategic significance of the GPD can be attributed to the fact that Indonesia possesses 2.8 GW of geothermal reserves potential. Besides, to reach the renewable energy mix of 23% by 2025, the government set a goal to develop geothermal power generation to 7.2 GW by 2025<sup>3,10</sup>.

Until 2020, the installed capacity of this generation attained 2.27 GW, or 73.3% of the 3.10 GW of the National Energy General Plan (RUEN) projected for 2020<sup>11)</sup>. Based on the RUEN, the government has set the GPD for 2020 at 3.10 GW and for 2025 at 7.20 GW<sup>12)</sup>. The OL creates a new optimism for accelerating the GPD in order to reach the target for 2025 and beyond. By phasing out several articles of Law No. 21 of 2014 and Law No. 30 of 2009 on Electricity, the OL may create a more business-friendly environment to encourage more private sectors to bid on GPD projects. This optimism for such a GPD promotion stems from the following factors: the centralization of the GPD projects and more business-friendly licensing. Changing environmental permits to environmental approval, for instance, is anticipated to increase the development of geothermal sources.

Democratic socialism can be used as a reference for understanding the critical role of OL, which reflects the importance of state intervention in the economy and strategic public issues to encourage GPD<sup>13,14)</sup>. GPD is time-consuming. This perspective becomes a concern for decision-makers with limited terms of office if other energy sources can supply more quickly and affordably. Besides, geothermal is non-transferable, expensive to produce, and restricted in capacity<sup>15-18)</sup>. From the standpoint of the energy transition, the significance of the state's role in driving GPD is also apparent<sup>18-20)</sup>.

Two nations have adopted this OL strategy to accelerate the GPD<sup>21)</sup>. In the United States, employing the strategy to overcome the dynamics of a fragmented legislative process has a favorable and considerable impact on legislative productivity<sup>22)</sup>. Since the Carter administration in 1979, the United States has implemented OL legislation. The Geothermal Coordinating Council, a federal cross-ministerial institution responsible for planning and executing initiatives to enhance geothermal utilization, has proposed a geothermal energy omnibus law. This legislative endeavor attempts to thoroughly handle numerous problems stemming from multiple laws and regulations, as well as prepare an unresolved incentive system for the energy bill<sup>22)</sup>. The goals include the permanent elimination or minimization of regulatory and legal impediments and the provision of temporary inducements to encourage the rapid demonstration of the many potential applications of geothermal resources for various uses. The United States' installed geothermal power generation reaches 3.7 GW by 2020, the most remarkable installed capacity in the world<sup>23)</sup>. Also, the government has utilized additional specific policies. Illustrative instances encompass the renewable portfolio standard (RPS) or renewable energy standard (RES) scheme, risk-sharing procedures during the exploratory phase, and governmental financial aid. State-level RPS policies are responsible for generating over 50% of renewable energy in the United States<sup>24,25)</sup>.

Likewise, in the Philippines. The government adopted a proactive approach to GPD after learning from the

private limited involvement. Beginning with the sale of PNOC-EDC, the state-owned geothermal contractor, to private investors, the privatization of the National Power Corporation (NPC) aimed at achieving, in part, the benefit of promoting the inflow of private capital. The Geothermal Resources Act of 1994 revisions have also had a substantial impact on the GPD. Following Presidential Decree No. 1442 of 1978, the nation has engaged in GPD initiatives since 1978. In practice, however, the incentives have proven unattractive to the private business sectors and the PNOC-EDC. The Geothermal Resource Act 1994 modifies the decree and gives enhanced financial incentives to stimulate private sector engagement further. These incentives substantially increase the cash flow and return on investment of geothermal service providers<sup>26)</sup>. Statistics indicate that by 2020, the installed capacity of the ge will reach 1.92 GW, the third-largest capacity in the world<sup>25)</sup>. This success strengthens the government's confidence in managing the national energy security issue because GPD contributed 18.4% of its national energy mix in 2006<sup>27)</sup>. As it occurs in any geothermal-rich countries, energy security from this renewable energy source becomes an important policy agenda to maintain economic development and energy sustainability<sup>28)</sup>. The agenda to mobilise optimally renewable energy source is also due to the lessons learnt from the disruptive structural changes. Japan, for example, does such a policy, after the great east earthquake and feed-in tariff system modification<sup>29,30)</sup>. However, if we look at the geothermal potential, which only reaches 4 GW, its utilization has contributed approximately 18.4% in 2006<sup>27)</sup> and 11% of the national electricity supply mix until 2020<sup>23,26)</sup>. This review article examines the potential facilitative roles the OL could play and major factors the government should give political impetus to accelerate GPD in Indonesia by 2025 and beyond. This article aims to (1) review the OL's facilitative role in accelerating GPD through 2025 and beyond; (2) identify the role the OL may take to accelerate the GPD beyond 2025; and (3) assess what major factors the government should prioritize to hasten the GPD through 2025 and beyond.

## 2. Materials and Method

### 2.1. Data types and data sources

The data gathered in this study is derived from secondary sources. The data is sourced from academic literature and official documents released by institutions such as the Indonesian Ministry of Energy and Mineral Resources, Indonesian National Energy Agency, and state-owned companies like the Indonesian State Electricity Company (PT PLN), PT SMI, and PT Geo Dipa Energi. These sources specifically cover issues related to energy generation development. The data include information from inter-governmental and non-governmental foreign entities, such as the United Nations, IEA, IRENA, REN21, and other relevant organizations.

## 2.2. Data analysis

This review article underwent analysis utilizing a qualitative methodology, employing a literature study approach. The data was critically analyzed to address the key issues raised by the breakthrough policy implemented by the OL. This policy aims to expedite the utilization of geothermal sources as a strategic power generation project in Indonesia, with the goals of reducing GHG emissions, achieving the national energy mix by 2025 and beyond, and reaching the NZE target by 2060. The analysis aims to identify the facilitative role of the OL in achieving the GPD target in the short term. Additionally, it seeks to determine how the OL can catalyze the GPD target and the specific factors the government should prioritize to enhance the OL's facilitative role in expediting the long-term development target. This is in response to the robust economic growth, increase in per capita and national electricity consumption, and the achievement of the Nationally Determined Contribution (NDC) and Indonesia's Net Zero Emission (NZE) targets by 2060.

## 3. Results and Discussion

### 3.1. Geothermal laws and policies

Indonesia has retrospectively established a distinct legislative framework for geothermal harnessing for electricity under Law No. 27/2003. In addition to the law specified by Energy Law No. 30/2007, the government embraced the National Energy Policy, commonly referred to as the NEP under Government Regulation No. 79/2014. Under NEP, the government establishes the proportion of renewable energy within the overall national energy composition to be 23% by the year 2025 and 31% by the year 2050. Following the RUEN, the contribution of GPD targeted 7.2 GW or 15.93% of the 45.2 GW power generation target or 25% of the national geothermal potential in 2025. Endorsement of this aim is reflected in the General Plan of National Electricity (RUKN) and the RUPTL of The state-owned electricity company (PLN). Following Law No. 27/2003, the GPD remained a component of the mining industry, and thereby, geothermal sources can not be developed in conservation forests. This provision is crucial because 18% of the geothermal potential exists in this forest area<sup>31)</sup> and as the issue of severe environmental problems due to the mining activities continues to take place in Indonesia, this new provision could facilitate directly the GPD<sup>32)</sup>. The passage of Law No. 21/2014 on Geothermal, which replaced Law No. 27/2003, was a breakthrough, at least since geothermal energy projects are no longer deemed as the mining industries, are subject to centralized business

licensing, and are given more business-friendly power pricing. The Indonesian Geothermal Legal and Institutional Framework can be seen in Fig. 1.

The growth of GPD links to several legislative frameworks. The initial legislation to be discussed is Law No. 30/2007 pertaining to the field of energy. The aforementioned legislation institutes the NEP, and the RUEN. These institutions represent several political affirmations, including the central and regional governments' priority of delivering energy to underdeveloped, isolated, and rural areas using local energy sources, notably renewable ones (Article 20, Section 2). Moreover, firms and individuals who generate power from renewable sources are eligible to receive government facilities and incentives for a predetermined duration until the economic benefits are fully realized (Article 20, Section 5). Facilities encompass the streamlining of licensing protocols and concession requirements, whereas incentives may encompass financial support in the form of capital, tax relief, and fiscal assistance. This article pertains to the political will towards the idea of energy use in order to achieve a harmonious integration of technology, socioeconomic, and ecological considerations (Article 21, Section 1 point b).

Based on the energy law, technical ministerial decrees also strengthen the execution of renewable physical activities. The reinforcement of Law No. 32/2009 on Protection and Management of the Environment, the ratification of the Paris Agreement (Law No. 16/2016), and Law No. 41/1999 on Forestry is necessary for all these legislative frameworks. Furthermore, the enactment of Law No. 30/2009 on Electricity provides a solid basis for the implementation of the GPD. Many operational strategies for the generation, including electricity supply business activities (KUPTL) and the PIK facilitate the GPD projects. Several legislation and operational regulations about RUKN, RUPTL, and the critical aspects of the agreement on power purchase, as well as renewable energy resources for electricity, are in hand. Third, Law No. 21/2014 on Geothermal. This law marks a turning point in the geothermal industry. Further accomplishments included the establishment of the Geothermal Fund Facility, improving the geothermal assignment mechanism, and preliminary government studies and drillings<sup>33)</sup>. The implementation of a governmental funding system for exploration, coupled with a risk-sharing mechanism in the event of exploratory failures, signifies a notable progression. This development is noteworthy since the exploratory phase is the most critical in geothermal power projects.

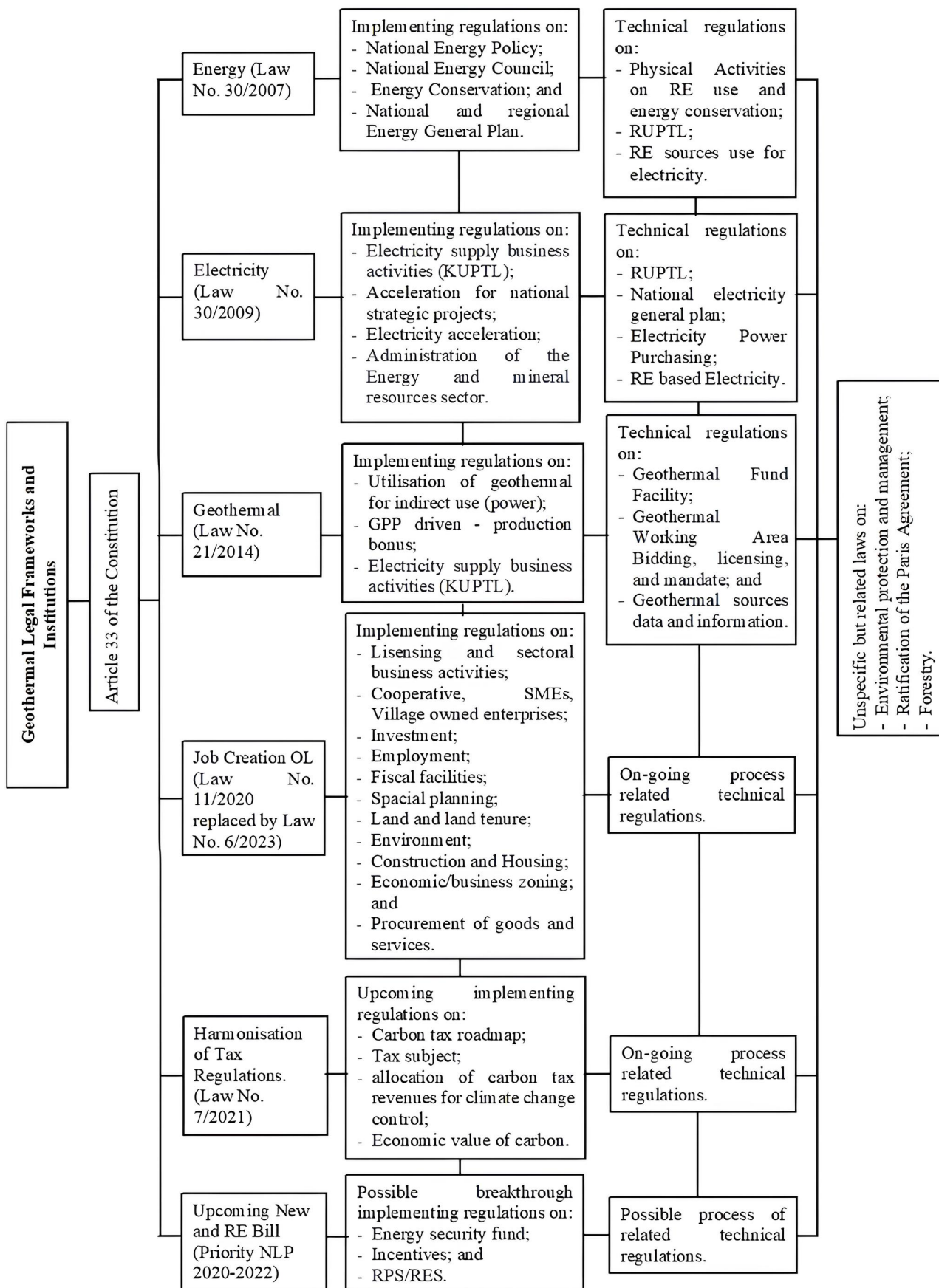


Fig. 1: Indonesian geothermal legal and institutional framework.

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As stated previously, the OL has provided optimism for the GPD. The optimism includes more centralized provisions for the GPD, as demonstrated by a firmer central hand to local governments on the licensing issue. Moreover, it also pertains to business-friendly licensing. Shifting the business license system to one more particular can attract more private sectors to participate in the GPD projects. Besides, the OL resolves the issue of overlapping policies vertically or horizontally<sup>34</sup>). Therefore, the

fundamental reasoning of the OL may correct the current suboptimal performance of the GPD and accelerate more adequate contributions to installed geothermal and any other renewable power generation<sup>35,36</sup>). The government guarantee on risky business licensing, taxation, land acquisition, accessible business on strategic projects, and spatial policies also constitutes a significant innovation of the OL. The Constitutional Court's decision to accept a portion of the lawsuit against the OL raises the pros and cons of implementing the OL even though all implementing policies and regulations have existed. The Decision of the Constitutional Court No. 91/PUU-XVIII/2020 on the OL in 2021 sparked a swift response from business sectors concerning the risk of business certainty, which began to grow after nearly all its implementing policies and regulations were in place. For them, the OL is essential for fostering a business-friendly environment, competitiveness, and investment. Undoubtedly, the reason stands on the intent of its provisions to eliminate high-cost economic practices by reducing overlapping rules and regulations and cumbersome procedures.

The government affirmed that during the Court-mandated revision process, all implementation policies and regulations will remain in effect. Following Article 185 of the OL, the implementing policies and regulations must be available within three months after the law's entry into force on November 2, 2020. The government has completed 51 policies and regulations, divided primarily into eleven regulatory clusters, as shown in Table 1. It demonstrates that the agenda for structural reform, deregulatory measures, and deregulation will continue following the spirit of the OL provisions<sup>37</sup>).

Table 1. The OL implementing policies and regulations<sup>37</sup>).

No.	Regulation cluster	Type of OL implementing policies and regulations	
		Government Regulation	Presidential Decree
1	Licensing and sectoral business activities	15	
2	Cooperative, MSMEs and village-owned enterprises	4	
3	Investment	5	1
4	Employment	4	
5	Fiscal facility	3	
6	Spatial planning	3	1
7	Land and land tenure	5	
8	Environment	1	
9	Construction and housing	5	1
10	Economics/business zoning	2	
11	Procurement of goods and services		1
Total		47	4

The controversial presidential constitutional decree, known locally as 'Peraturan Pemerintah Pengganti

Undang-Undang’ or Perpu No. 2/2022, has been ratified and is now officially Law No. 6/2023. This development brings a definitive resolution to any uncertainties about the implementation of these policies and regulations on the OL. In addition, the implementation of Law No. 7/2021 on the Harmonization of Tax Rules bolsters the breakthrough the OL may pose to mobilize carbon tax sources to strengthen climate finance. The Indonesian parliament approved the law on October 7, 2021, which controls the imposition of carbon taxes on individuals and corporations that produce or consume carbon-containing tax objects beginning in 2022. As a critical sector that this law will target, renewable energy development aimed at pursuing the national energy transition, without a doubt, opens up supportive space for the GPD.

Following the Law No. 7/2021, Presidential Regulation No. 98/2021 on the Implementation of Carbon Economic Values for Achieving NDC Targets and Control of GHG Emissions in National Development becomes the technical basis for imposing the carbon economic values (CEV) through carbon trade, result-based payments, and carbon charges carbon taxes, excises, and other state levies (Article 47). Several technical derivative regulations of the carbon tax roadmap and related ministerial regulations NDC, CEV, tariffs, and the carbon tax subject are in the making process after Indonesia undertakes a voluntary carbon trading experiment in 2021 and becomes the first country in Southeast Asia to adopt mandatory carbon trading, optimism regarding the implementation of the carbon tax increases.

### 3.2. Indonesian geothermal development

The performance of the GPD has been influenced by a variety of factors, encompassing the legal and institutional framework, management of social issues, and challenges related to low levels of private investment. The potential solution to the aforementioned issues could be achieved through the amending of Law No. 27/2003 in accordance with Law No. 21/2014<sup>31)</sup>. In addition to the attainment of this objective, the government implemented the RUEN strategy in 2025, resulting in a revision of its GPD target from 9.5 GW to 7.2 GW. Several policy breakthroughs can be identified based on Law No. 21//2014. One aspect to consider is the administrative centralization of geothermal sources for electricity, as outlined in Article 5, Section 1 point b. The objective of this provision is to enable the optimal usage of geothermal sources, given the inherent characteristics of their development, which involve significant risks, high costs, and a prolonged period for capital recovery. By using this approach, the government has the potential to address many obstacles in the GPD projects, specifically pertaining to issues such as funding, licensing, incentives, land acquisition, and other relevant factors. Due to their high-risk nature and difficult geographical conditions, GPD projects in rural areas necessitate substantial state backing. The newly implemented legal framework enhances the government's

involvement in the process of exploration drilling. *Second*, geothermal utilization is no longer part of mining activities. As stipulated by Law No. 41/1999 on Forestry, mining activities are exclusively permitted within productive and protected forests. This provision poses a hindrance to the GPD projects within conservation forests. Out of the total geothermal potential in Indonesia, which amounts to 28.6 GW, it has been determined that approximately 21% of this potential is located within conservation forests<sup>31)</sup>. *Thirdly*, the process of determining geothermal prices is based on economic prices. One of the challenges faced by geothermal developers in the context of the GPD project initiatives pertained to the insufficient motivation resulting from the selling price of geothermal-generated steam and power. The implementation of a feed-in tariff policy is seen as a good strategy to incentivize private investment in the GPD projects by stabilizing the economic price level.

The breakthrough of the policy mentioned above has yet to be able to promote the growth of installed GPD projects. As of the year 2020, the installed capacity of geothermal power plants has reached a mere 2.4 GW, which accounts for a mere 7.3% of the total geothermal potential. According to Table 2, the annual average increase in the installed GPD project was recorded at 99.2 MW. According to the business-as-usual projection, the maximum increase in geothermal power plants by 2025 is estimated to be 0.8 GW, or 2.9 GW.

Table 2. Indonesia’s installed geothermal capacity 2009-2020<sup>11,38-39)</sup>.

Year	Installed capacity (MWe)	Annual development progress (MWe)
2009	1,189	-
2010	1,189	0
2011	1,226	37
2012	1,336	110
2013	1,343.5	7.5
2014	1,403.5	60
2015	1,438.5	35
2016	1,643.5	205
2017	1,808.5	165
2018	1,948.5	149
2019	2,130.7	182.2
2020	2,443.1 <sup>38)</sup> /2,185 <sup>39)</sup>	140
<b>Average</b>		<b>99.2</b>

This scenario encompasses several noteworthy concerns. Firstly, it is anticipated that the installed capacity target outlined in the RUEN policy will not be achieved by 2025. Consequently, this poses a risk to the attainment of the 45 GW power generation objective for renewable sources by the same year. Secondly, there is a pressing need for an exceptional approach to incentivize the performance of the GPD. Overall, as long as the energy security does not include the mandatory option not to import energy overseas, pragmatism to energy supply at the most effective cost remains to exist. Japan indicates

such a phenomenon<sup>9)</sup>. Lastly, as a means of preserving political reputation, the government may need to reconsider the GPD target or the overall contribution of renewables in the national energy mix. Therefore, it may be deduced that the OL was designed with the purpose of expediting the achievement of the GPD targets.

### 3.3. Facilitative role of the Omnibus Law

The Constitutional Court's case against the OL was a significant initial obstacle to the OL's implementation, but it has not been dismissed. The Court ordered the government to modify the statute within two years of the decision's release. Consequently, the Court's decision will uphold the OL legal breakthrough and enact various implementing policies and regulations. This optimism is based on at least two significant factors: (1) the court ruling is not reversible, but the government was given up to two years to alter it. This decision was the first time in the history of court decisions that every lawsuit for the constitutionality of any or all of the contents of a law becomes final and binding, (2) the court decision did not make a precise determination as to whether or not the promulgated implementing policies and regulations remained binding. All of these remained enforceable for the government<sup>37)</sup>. From this standpoint, some breakthrough clauses and the spirit of the OL may have positive legal and empirical effects on the GPD projects. Unfortunately, it is too soon to evaluate these effects.

The following points serve to bolster the substantiated and empirical basis for the analysis indicated previously: (1) power generation goal and (2) annual limited performance of the installed capacity. As indicated in the Green RUPTL 2021-2030, the installed GPD target remains unaltered. Paradoxically, the target stated in this RUPTL is reduced by 1,252 MW relative to the RUPTL 2019-2028 (Table 4). The government has proposed a policy initiative to revise the RUEN targets through the implementation of a novel Grand National Energy Strategy. Through this policy plan, the government intends to implement fourteen significant programs, including boosting renewable generation by 38 GW by 2035—solar and other renewable energy sources<sup>40-42)</sup>. The demand for energy in 2060 will reach 1,922 TWh, generated with a combined capacity of 708 GW<sup>42)</sup>. Geothermal is projected to provide 22 GW to the total capacity, making it the sixth largest capacity after solar, wind, hydro, biogas, and nuclear power generation<sup>43)</sup>.

Given a scenario of attaining 73.3% of the RUEN 2020 target (3.10 GW) and an optimistic scenario of achieving 80% of the 22 GW target in 2060 (17.60 GW), the installed capacity of the GPD projects each decade must reach at least 4 GW within four decades (2030-2060). Using the RUPTL 2021-2030 target as a benchmark, which is 3.36 GW within four decades to 2060 plus 2.27 GW of installed capacity in 2020, the total installed capacity has recently surpassed 71% of the new 22 GW target at 15.59 GW (13.42 GW + 2.27 GW). Two

significant variables can function to evaluate the target's optimism: (1) the GPD target under the RUEN (7.20 GW) in 2025 and (2) the RUPTL 2021-2030 target. These characteristics represent a tough objective. Considering the significance of political factors in the energy transition<sup>19)</sup> to encourage the necessary investment illustrates four parameters of investment priorities and risks in seven Southeast Asian countries as a strategy to achieve the transition. Indonesia still faces formidable obstacles (Table 3). These issues are exemplified by two significant obstacles, namely the high potential risk barrier for investment and the delayed improvement of two dimensions of the power sector: sustainability and the integrated approach<sup>44)</sup>. The historical statistics on GPD illustrate the extent of the difficulty. Indonesia has been developing GPD projects since 1982, when the Kamojang's first installed geothermal power plant began operation in 1982, through 2020, when the installed capacity reached 2.20 GW<sup>38,45)</sup>. In twelve years (2009-2022), the average installed capacity development rate will barely approach 100 MW per year (Table 2). According to the RUPTL 2021-2030, to meet the additional GPD objective of 3.36 GW (Table 4), Indonesia must be able to install approximately three-and-a-half times the average achievement of the previous decade over the following decade. This condition indicates an urgent need for tackling institutional issues, funding, and political backing from the government. Regarding geothermal development, non-technical concerns necessitate political compulsion. There are several reasons for it. Despite maintaining relations with the existing government, the urgent national priority agenda includes the rapid development of infrastructure in the new capital, which will continue to receive political attention from the next new government. Indeed, it is logical given one of the key campaign promises of the next government is to uphold the idea of relocating the capital. Therefore, it is likely that the political trajectory of renewable power generation will continue to be business as usual, as it has been in recent years. Furthermore, the government's political focus on the expansion of renewable energy generation, particularly solar and biomass, and perhaps hydrogen-based, is reinforced by the direction of the national energy transformation process. This can be observed in a collection of government energy policy and energy transition documents, as well as in the selection of specific people within the ministry of energy and mineral resources<sup>46)</sup>. In addition, the government's resources may be allocated towards preparing institutions for the development of nuclear power generation in Indonesia by 2030, in order to achieve the goal of achieving NZE. This effort is a continuation of the government's mandate to establish the Nuclear Energy Program Implementing Organization (NEPIO), which was initiated in 2021<sup>47)</sup>.

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(1) power generation goal and (2) annual limited performance of the installed capacity. As indicated in the Green RUPTL 2021-2030, the installed GPD target remains unaltered. Paradoxically, the target stated in this RUPTL is reduced by 1,252 MW relative to the RUPTL 2019-2028 (Tabel 4). The government has proposed a policy initiative to revise the RUEN targets through the implementation of a novel Grand National Energy Strategy. Through this policy plan, the government intends to implement fourteen significant programs, including boosting renewable generation by 38 GW by 2035—solar and other renewable energy sources<sup>40-42</sup>). The demand for energy in 2060 will reach 1,922 TWh, generated with a combined capacity of 708 GW<sup>42</sup>). Geothermal is projected to provide 22 GW to the total capacity, making it the sixth largest capacity after solar, wind, hydro, biogas, and nuclear power generation<sup>43</sup>).

Given a scenario of attaining 73.3% of the RUEN 2020 target (3.10 GW) and an optimistic scenario of achieving 80% of the 22 GW target in 2060 (17.60 GW), the installed capacity of the GPD projects each decade must reach at least 4 GW within four decades (2030-2060). Using the RUPTL 2021-2030 target as a benchmark, which is 3.36 GW within four decades to 2060 plus 2.27 GW of installed capacity in 2020, the total installed capacity has recently surpassed 71% of the new 22 GW target at 15.59 GW (13.42 GW + 2.27 GW). Two significant variables can function to evaluate the target's optimism: (1) the GPD target under the RUEN (7.20 GW) in 2025 and (2) the RUPTL 2021-2030 target. These characteristics represent a tough objective. Considering the significance of political factors in the energy transition<sup>19</sup>) to encourage the necessary investment illustrates four parameters of investment priorities and risks in seven Southeast Asian countries as a strategy to achieve the transition. Indonesia still faces formidable obstacles (Table 3). These issues are exemplified by two significant obstacles, namely the high potential risk barrier for investment and the delayed improvement of two dimensions of the power sector: sustainability and the integrated approach<sup>44</sup>). The historical statistics on GPD

illustrate the extent of the difficulty. Indonesia has been developing GPD projects since 1982, when the Kamojang's first installed geothermal power plant began operation in 1982, through 2020, when the installed capacity reached 2.20 GW<sup>38,45</sup>). In twelve years (2009-2022), the average installed capacity development rate will barely approach 100 MW per year (Table 2). According to the RUPTL 2021-2030, to meet the additional GPD objective of 3.36 GW (Table 4), Indonesia must be able to install approximately three-and-a-half times the average achievement of the previous decade over the following decade. This condition indicates an urgent need for tackling institutional issues, funding, and political backing from the government. Regarding geothermal development, non-technical concerns necessitate political compulsion. There are several reasons for it. Despite maintaining relations with the existing government, the urgent national priority agenda includes the rapid development of infrastructure in the new capital, which will continue to receive political attention from the next new government. Indeed, it is logical given one of the key campaign promises of the next government is to uphold the idea of relocating the capital. Therefore, it is likely that the political trajectory of renewable power generation will continue to be business as usual, as it has been in recent years. Furthermore, the government's political focus on the expansion of renewable energy generation, particularly solar and biomass, and perhaps hydrogen-based, is reinforced by the direction of the national energy transformation process. This can be observed in a collection of government energy policy and energy transition documents, as well as in the selection of specific people within the ministry of energy and mineral resources<sup>46</sup>). Additionally, the government's resources may be allocated towards preparing institutions for the development of nuclear power generation in Indonesia by 2030, in order to achieve the goal of achieving NZE. This effort is a continuation of the government's mandate to establish the Nuclear Energy Program Implementing Organization (NEPIO), which was initiated in 2021<sup>47</sup>

Table 3. Main changes to policy ambitions since 2019 and key investment priorities and risks in selected ASEAN countries<sup>44,48-51</sup>).

Country	Main changes to policy ambitions since 2019	Investment priorities			
		Power sector sustainability	Project bankability	Financing & cost capital	Integrated approach
Cambodia	Long-term strategy not updated, though no new coal power plants are to be developed (beyond committed ones).	● =	● =	● =	● =
Indonesia	Planning for NZE by 2060. More renewable power is in the long-term plan, though coal still represents almost 65% of generation by 2030.	● =	● ↑	● =	● =
Malaysia	The government announced a goal to become carbon neutral by 2050 and stop building new coal-fired plants.	● =	● =	● =	● =
Philippines	Long-term strategy not updated	● ↓	● =	● ↑	● =

Country	Main changes to policy ambitions since 2019	Investment priorities			
		Power sector sustainability	Project bankability	Financing & cost capital	Integrated approach
Singapore	Long-term strategy not updated, though a 2030 Green Plan was published in early 2021 to expand a range of clean energy initiatives.	● =	● =	● =	● =
Thailand	Announced intention to develop a plan for NZE by 2065. The updated power expansion plan has reduced dependency on coal in favour of natural gas	● =	● =	● =	● =
Viet Nam	NZE by 2050 target announced at COP26. Substantial capital is mobilised to renewable power, especially solar, while coal capacity is still planned to expand by 2030.	● =	● ↑	● ↑	● =

Notes: ● Low risk/supportive factor for investment      ↓ Improvements since SEAO 2019  
 ● Potential risk factor/barrier for investment      ↑ Regressions since SEAO 2019  
 ● High potential risk factor/barrier for investment      = No changes since SEAO 2019

Table 4: GPD projects by PLN's RUPTL, 2019–2028\* and 2021–2030\*\*38,41).

RUPTL PLN 2019–2028											
Period	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	Total
PLN			32	115	10	50	275	45	80	10	617
IPP	190	151	115	340	235	170	1.759	-	55	45	3.060
Unallocated***						195	725		10		930
Total	190	151	147	455	245	415	2.759	45	145	55	4.607
RUPTL PLN 2021–2030											
Period	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total
PLN	-	-	-	5	155	120	25	195	15	-	515
IPPs	136	108	190	136	715	170	98	255	225	808	2.840
Total	136	108	190	141	870	290	123	450	240	808	3.355

Note:

\* Ministerial Decree of Energy And Mineral Resources, the Republic of Indonesia No. 39 K/20/MEM/2019 on PLN's RUPTL 2019-2028.

\*\* Ministerial Decree of Energy And Mineral Resources, the Republic of Indonesia No. 188.K/HK.02/MEM.L/2021 on Green PLN's RUPTL 2021-2030.

\*\*\* New projects for which potential developers and sources of funds have yet to be determined and can be built by PLN or IPPs or in a special form of cooperation where PLN is not a full offtake.

### 3.3.1. Funding issues

Concerning funding challenges, reference can be made to the anticipated implementation of government-facilitated international multi-source funding schemes through the SDG Indonesia One platform, which provides four pillars for donors and investors (facility schemes for development, de-risking, financing, and equity funds) to support the attainment of SDGs through sustainable infrastructure projects<sup>52</sup>. At least three of the five schemes on this platform provide finance for GPD projects, including the upstream geothermal energy development project (GEUDP), the Geothermal Resource Risk Mitigation (GRRM), and regional funding schemes such as ADB<sup>53,54</sup>. The Clean Technology Fund (CTF) and the World Bank's Global Environment Facility (GEF) will fund the GEUDP initiative<sup>52</sup>. This plan is consistent with Article 17 of Law No. 79/2014 about the government's role in geothermal exploration. It is anticipated that four to five projects will be funded through this program. They

include surveys, environmental and social research, infrastructure construction, drilling, and well testing. In eastern Indonesia, however, only one (ISEI project) has been completed with a total financial value of \$49 million plus government matching funds<sup>55</sup>.

The Geothermal Exploration Finance Facility (GEFF) is a financial mechanism developed by the International Bank for Reconstruction and Development (IBRD) in collaboration with the government of Indonesia through PT Sarana Multi Infrastruktur (PT SMI). One distinctive feature of the GREM program is the inclusion of a de-risking facility or risk-sharing program, which serves to provide reimbursement to developers for exploration failures in relation to both risks and expenses. The purpose of this facility is to cater to state-owned companies and their subsidiaries through the GREM Public Window, as well as to the private sector through the GREM Private Window<sup>53</sup>. The total financial commitment for GREM amounts to \$651.25 million, derived from a blend of

foreign sources such as the IBRD, the Green Climate Fund (GCF), and the Clean Technology Fund (CTF), as well as government-funded Geothermal Sector Infrastructure Development Funds (PISP) (Ministry of Finance Regulation No. 62/2017 and No. 80/2022 (Fig. 2). The de-risking component of the public window scheme is supported by PISP funds totaling \$150 million. In contrast, the private window is supported by reimbursable GCF and CTF grants from the IBRD totaling \$122.5 million. The financial agreements pertaining to the GREM facility have been duly executed and are currently in force<sup>53</sup>). However, PT SMI's official sources have yet to provide how much this source of financing has absorbed, both the public and private window schemes.

Facilitation of government funding through PISP certainly strengthens government support in GPD projects. Since 2017, the Indonesian government, under the purview of the Ministry of Finance, has implemented a fiscal measure known as the PISP facility. The aforementioned initiative operates as a revolving fund with the primary objective of promoting the maximization

of geothermal exploitation opportunities. The provision of funds through the PISP facility is anticipated to provide a viable remedy for the substantial risks and expenses encountered during the exploration phase, thereby alleviating the barriers that have impeded private involvement in the GPD projects. However, with the expansion of the PISP facility to include a private window scheme, no data shows how much this scheme is absorbed.

Regionally sourced finance, namely the Asian Development Bank (ADB), is also utilized to facilitate funding. PT Geo Dipa (Persero) will manage this program, one of the Special Mission Vehicles (SMV), in collaboration with PT Penjaminan Infrastruktur Indonesia (PT PII), which offers government guarantee facilities for the construction of power generation projects. PT Geo Dipa and PT PII have signed a contract with the ADB for the Dieng Plant-2 and Patuha Plant-2 GPD projects. PT Geo Dipa has concluded finance efforts for the construction of the 55 MW Dieng Plant-2 and Patuha Plant-2<sup>56</sup>).

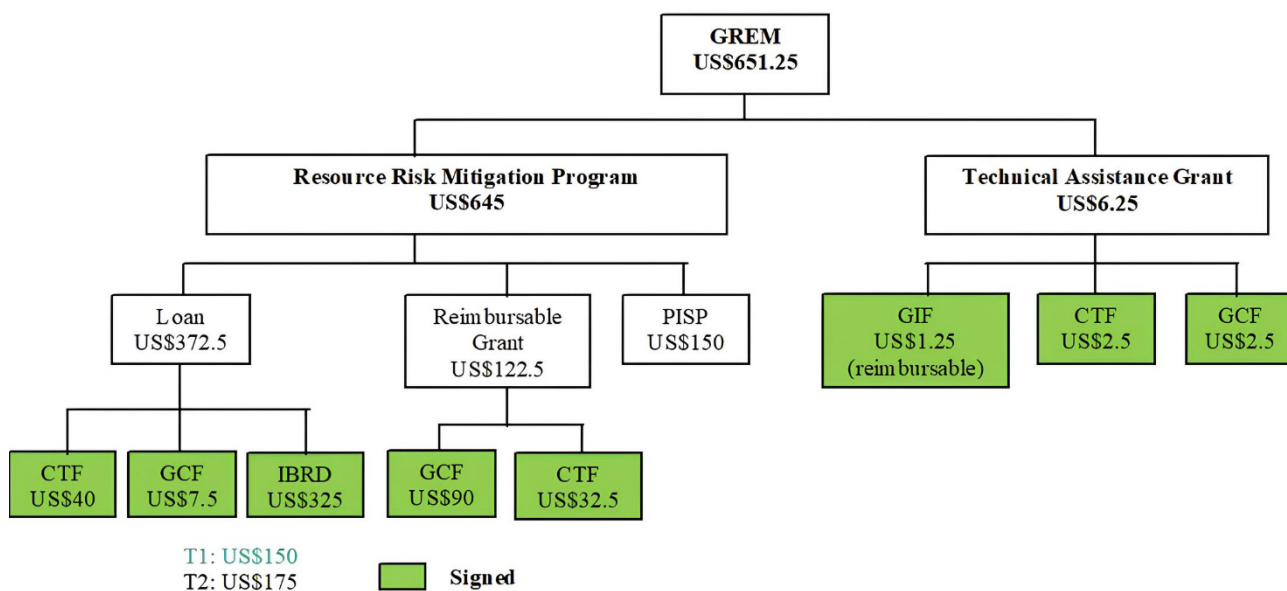


Fig. 2: Financing scheme under the GREM program (US\$ million)<sup>53</sup>).

### 3.3.2. Catalyst impact of the OL in the post-2025/30

Observing the GPD plan through 2030 demonstrates that positioning the OL as an institutional accelerator is less pertinent. Positively, as an institutional catalyst, the installed GPD projects could only be achievable in the context of its post-2025/30 GPD projects, as outlined in the upgraded NDC plan and other policies relevant to the strategy for attaining NZE 2060<sup>48,57</sup>). Thus, observing the direction of the Green RUPTL 2021-2030 policy, which is predicated on the national economic and energy consumption growth rate, and the PLN power generating development plan are less important. The OL would play a facilitative role in the post-2025/2030 GPD projects following the increasing national economic growth and higher energy end-users

program to increase national electricity consumption. A 6-7% growth in national electricity consumption will inspire PLN to boost the development of electrical infrastructure in an optimistic scenario. The post-2025 institutional consolidation of the OL will undoubtedly be completed following the Constitutional Court's lawsuit against the OL. The government confirmed this optimism after in mid-March 2023, the parliament finally ratified the Government Regulation in lieu of Law (Perpu) into Law No. 6/2023 with the support of the majority of political forces in parliament. Thus, the consolidation of the OL is politically ready to be implemented with all implementing policies and regulations.

The energy sector's role for achieving Indonesia's

NDC 2030 is the last but not least. Under the conditional mitigation scenario, renewable power generation of 708 GW will reduce GHG emissions by 446 MtCO<sub>2</sub>e, or 15.5%, compared to the business as usual scenario of 1,669 MtCO<sub>2</sub>e<sup>43,49,57</sup>. Considering its huge potential, non-intermittent nature, and baseload producing source<sup>58</sup>. GPD has played a key role up to this time<sup>41,43</sup>. It is projected that the installed geothermal power generation will contribute 22 GW to the NZE in 2060. The government pledges to support new business models and economical and competitive technical advancements, including deep drilling development, enhanced geothermal systems, and offshore geothermal. The target seems more achievable<sup>43</sup>. The government's proposal of a new policy for the national energy grand strategy, aimed at ensuring energy availability, serves as an adjustment to the RUEN target and contributes to the enhancement of optimism<sup>40</sup>.

Obviously, as a strategic mission in achieving a low carbon development agenda and reducing emissions, the government still needs to focus on several important factors that will drive the facilitative impacts the OL may pose to accelerate GPD projects by 2025 and beyond. Otherwise, the OL may exist as what Fujisaki studies about the Green Paradox in Japan where the issues of inaffordability to electricity and the rising mixed renewable energy do not exist<sup>59</sup>. First is the mutual reinforcement of geothermal policies and regulations. Indonesia has demonstrated notable advancements in its legal efforts to use geothermal resources, hence bolstering its regulatory framework pertaining to the development of renewable energy. The draft legislation on renewable energy, now under consideration in the parliamentary agenda, should primarily address the concerns related to the development of renewable energy sources, with a specific focus on facilitating the practical implementation of geothermal energy harnessing. While there may be instances where geothermal deployment legal frameworks intersect with other laws and implementing policies and regulations, they must be applied synergistically. Thus, it is vital to make appropriate adjustments and track their timely execution.

The second consideration pertains to the funding issue. The cost of geothermal energy is rather high as a result of its substantial capital investment needs, demanding technical prerequisites, and protracted time frame for generating returns. Thus, rapid geothermal deployment depends on significant funding, especially from the private sector. Hence, public and non-public funding schemes are required to enhance finance sources and fiscal and non-fiscal incentives. Private sector data indicates that actual geothermal investment was \$0.83 billion, or 67.48% of the investment objective for 2019. Even though investment in the

renewable energy sector rose from \$1.5 billion in 2018 to \$1.8 billion in 2019, there was no investment in the GPD project. This investment underperformed owing to commercial operation date delays and social concerns<sup>38</sup>. Similarly, investment realization was just US\$0.55 billion, or 75% of the investment plan for 2021<sup>39</sup>. Considering this situation, the PISP program's scope and coverage must be expanded. Therefore, it is crucial to continually enhance several facets related to pricing determination, corporate operations, power purchase and sale agreements, energy security funds, and other forms of incentives. It indicates that the newly enacted Presidential Regulation No. 112/2022 on the Acceleration of Renewable Energy Development for Electricity Supply has robust legal momentum.

The third aspect concerns managing social issues<sup>60-63</sup>. Since the 2000s, numerous research on social issues in geothermal development indicates that this issue remains problematic. Based on the causes, these problems arise from the community's attitude toward the GPD projects alone, changes in the physical environment in the development area, the socioeconomic backdrop of the community, and the role of the government<sup>15,35,64</sup>. A recent research of numerous European countries revealed varying degrees of adoption of geothermal energy. It is believed that the amount of knowledge, the possibility for geothermal utilization, and government support influenced social acceptance<sup>65</sup>. Depending on how people are objectively and subjectively affected by risk, intervention, and the prevention of hazardous situations, the likelihood of societal acceptability varies. There is more need to develop an institutional framework for socially, economically, and environmentally defending local communities<sup>35,66,67</sup>. Similar to unlawful mining, distributive and procedural fairness, and trust are acknowledged as fundamental ideas for handling social issues<sup>68</sup>. The question is how to measure the standard perspective of each key stakeholder. With procedural fairness, for instance, the question is the extent to which community participation in decision-making in any GPD project is based on a voluntary and mutually agreed regulatory and institutional framework. The mechanism of prior, free, informed consent becomes applicable in this case<sup>69,70</sup>. Creating a participatory institution would be consistent with achieving distributive justice, procedural fairness, and trust in the context of the energy transition<sup>71</sup>.

The fourth factor refers to the legal and political consolidation of the OL in the post-presidential constitutional decree on job creation that the president announced at the end of December 2022. As previously stated, the Constitutional Court's Decision No. 91/PUU-XVIII/2020, dated November 25, 2021, mandated the government to revise the OL within two years by emphasizing the formal aspects of drafting a law and greater public engagement. Instead of

amending the OL, the government issued a Perpu No. 2/2022 during a parliamentary recess on December 2, 2022. Under a case of emergency, the president can issue the Perpu based on Article 22 of the State Constitution, which carries the same force as legislation. The Perpu must have legislative approval within one term of a parliamentary session to be binding; otherwise, it is null and void. Conventionally, the president's subjective discretion is the criterion for a state of emergency. In this instance, the legal and political requirements pertain to the global dynamics induced by rising energy and food costs, climate change, and supply chain disruptions, which have resulted in a slowdown in global economic growth. The government believes this crisis may exert a substantial influence on the overall state of the country's economy. The Perpu mandates a policy mix to boost national competitiveness and investor attractiveness via economic transformation (The Perpu No. 2/2022). The ruling of Constitutional Court decision No. 91/PUU-XVIII/2020 has a significant impact on the domestic and international commercial sectors. When the government continues to seek IDR1,200 trillion (US\$80 billion; US\$1 = IDR 15,000) in investments to support economic development in 2023, the scenario is unquestionably extremely unfavorable<sup>71</sup>). The final political consolidation of the OL immediately after the ratification of the Perpu OL into Law No. 6/2023 with the support of the majority of political forces in parliament provided sufficient political power for the government to implement the OL regulations immediately.

For private sectors and the government, the consolidation of OL is more about emphasizing the significance of legal certainty in geothermal source deployments. In light of the spirit of the OL to increase investment and employment possibilities, legal certainty is becoming increasingly important. In 2021, the geothermal sector contributed IDR1,929.11 billion (unaudited) to the national money derived from sources other than taxation (*Penerimaan Negara Bukan Pajak* or *PNPB*) (US\$128 million, US\$1 = IDR15,000). This amount contributes 3.65% of the national non-oil and gas *PNPB* of IDR52,813.23 billion, or 134.14% of the 2021 State Budget target. Although it achieved the state revenue target and was unaffected by the pandemic, the geothermal sector's contribution has declined or witnessed only a modest gain in the last three years: IDR2,281 billion (2018), IDR1,926 billion (2019), and IDR1,962 billion (2020)<sup>39</sup>).

The GDP projects also offer significant employment generation opportunities. As was the case study in southern Italy, the utilization of geothermal energy has promise as a viable option, GPD projects have a notable influence on the perceptions of the general public,

interested parties, and individuals responsible for making decisions<sup>72</sup>). In addition to considering potential hazards, the equitable allocation of benefits, such as enhanced employment opportunities, plays a crucial role in assessing the acceptance of GPD project initiatives within the local community<sup>72,73</sup>). There is a need for more official data on how many jobs are directly or indirectly supported by geothermal projects on a national scale. Based on global employment absorption data within the industry, it is projected that the renewable energy sector will potentially generate up to 12 million direct and indirect jobs in the year 2020<sup>74,75</sup>). It represents a 4.35% increase in job absorption compared to the 2019 figure of 11.5 million workers. Since 2012, there has been a notable upward trend in the employment rate, with the number of jobs increasing from 7.3 million in 2012 to 8.5 million in 2013 and further rising to 12 million in 2020. This indicates an average annual growth rate of 0.59 million jobs throughout the period 2012 to 2020<sup>74</sup>). In 2008, just 25,000 individuals had access to employment options<sup>50</sup>). Therefore, this data is encouraging. In the geothermal industry alone, direct and indirect employment rates approach 96,000 worldwide<sup>74</sup>). Taking 14.5 GW of total installed global capacity as a point of reference, the employment rate attains a level of 6,621 jobs per gigawatt (GW). When the installed geothermal power capacity in Indonesia reaches 2.3 GW in 2020, roughly 15,300 jobs will be created. Utilizing statistics from the Philippines' installed GPG capacity of 1.92 GW<sup>23</sup>), and employment of 8,300 persons<sup>75</sup>), it can absorb an average of 4,323 jobs per GW. With the installed geothermal power capacity in Indonesia reaching 2.3 GW in 2020, roughly 9,944 jobs should have been created. This data does not cover the direct usage of geothermal energy in the form of medium or small-scale hot spring tourism.

Societal opposition to the Perpu is also crucial. Civil society forces, Migrant CARE (Indonesian migrant worker NGO) and YLBHI (Indonesian legal Foundation), which had previously filed a lawsuit against the OL against the Constitutional Court, viewed the Perpu as a decision that violates the Court's decision and its adherence to the principle of the rule of law. Instead of complying with the Court's order to fix the OL's formal deficiencies within two years, the government issued the Perpu<sup>76</sup>). Actually, the Perpu is not a crucial issue for the private sector because the terms of the OL and Perpu have remained the same (Table 5). Even though the parliament finally approved the Perpu as law, the issue of social opposition in this case remains an essential part of the dynamics of implementing a law even though legally the government can confirm that the issue of social opposition can be declared resolved.

Table 5. Amended/repealed provisions of the geothermal law by the OL/Perpu.

No.	Amended/abrogated Provisions	Law No. 21/2014 on Geothermal	The OL (Law No. 11/2020)	Perpu No. 2/2022*†
1.	General geothermal management authorities (Art. 4-8, 11, 23, 36-38, 42, 59)	Government	Central government	Central government
2.	Local government authorities subject to central government (norm, standard, procedure, and criteria/NSPC) (Art. 5-8, 11)	Given to the local government	Subject to NSPC provided by the central government	Subject to NSPC provided by the central government
3.	Direct and undirect permit/license (Art. 6-8, 11, 23-24, 36-38, 40, 42-43, 47, 50, 67-68, 70-73)	1. Direct use permit (direct use) 2. Geothermal license (indirect use/power)	Business license (direct and indirect use)	Business license (direct and indirect use)
4.	MEMR authorities (Art. 6, 11-12, 23-26, 36-38, 42, 48, 59-60)	Several MEMR authorities returned to the central government	All MEMR authorities returned to the central government	All MEMR authorities returned to the central government
5.	Environment license for direct use (Art. 11)	Environment license	Environment permit	Environment permit
6.	Geothermal fees for direct use (Art. 11)	Direct use fees: 1. Production fee 2. Retribution 3. Local tax	Direct use fees: 1. Retribution 2. Local tax	Direct use fees: 1. Retribution 2. Local tax
7.	Local government authorities in direct use (Art. 12-13)	Local government authorities in direct use	Abrogated	Abrogated
8.	Direct use geothermal price (Art. 14)	Direct use geothermal price set by the government	Abrogated	Abrogated
9.	1. Local governments monitoring authority to direct-use permit use holders 2. Local governments mandatory report to MEMR (Art. 60)	1. Local governments monitoring authority to direct-use permit use holders 2. Local governments mandatory report to MEMR	Abrogated	Abrogated
10.	Fines to any party blocking the geothermal license holder (indirect use) (Art. 74)	Fines to any party blocking Geothermal license holder (indirect use)	Abrogated	Abrogated

Note: \* To become law, *Perpu* needs parliament approval in one session time of parliament only.

† Indonesia's parliament approved the *Perpu* to become Law (Law No. 6/2023) on March 21, 2023.

In the context of a national agenda that has the potential to create complex socioeconomic and political dynamics, the question of the OL (Law No. 6/2023) implementation on the ground will be of greater importance. In 2024, there has been legislative and presidential elections. Due to the conclusion of the current administration's term in office, a future administration transition could affect this political dynamic for the corporate sectors. Also planned for 2024 is the relocation of the nation's capital. The upcoming government's emphasis on centralizing infrastructure development in the capital city is expected to impede the

advancement of renewable energy generation initiatives in the foreseeable future. Furthermore, there is an immediate need for a preparation team to build the NEPIO in order to provide support for achieving the NZE target.

Considering the paramount importance of political considerations in the process of energy transition<sup>19)</sup>, breakthrough efforts to the geothermal sources harnessing through the OL or the law ratifying this *Perpu* (Law No. 6/2023) will also impact its implementation, particularly in the context of a complex and ambiguous legal framework.

Fifth, and certainly not least, is the level of economic development of the nation. A dynamic degree of national economic development can expedite the process of energy consumption per capita, boost purchasing power, and stimulate national economic expansion<sup>51)</sup>. In the NZE 2060 scenario, for instance, it is necessary to raise power consumption per capita and transform end-user electricity consumption<sup>43)</sup>. Considering the scenario rate for average business-as-usual economic growth of 5.2% per year, Indonesia faces difficulty in achieving its 2045 goal of escaping the middle-income trap and becoming a developed nation. Hence, the economic growth scenario must aim at achieving an average annual growth rate of at least 5.9-6% until 2045, and the per capita income level targeted at \$12,695<sup>77,78)</sup>. Under the NZE 2060 agenda, decarbonization in the energy and electricity-producing sectors must be supported by a transition from fossil fuels to electricity with a lower carbon footprint in the end-use sector<sup>79-81)</sup>. In the pessimistic scenario (S-1), the annual power usage per capita is 5,500 kWh. In the optimistic scenario (S-2), it is 6,500 kWh per year in 2060, which is still somewhat below the level of energy consumption per capita in industrialized nations, which exceeds 7,000 kWh. Following the RUPTL 2021-2030 and NZE 2060 objectives, the greater per capita and national electricity consumption must be met by renewable sources, primarily hydropower, geothermal, biomass, solar, wind, and nuclear power. Nevertheless, some fossil-based energy generation is still necessary. Given the high GPD goal of at least 22 GW to achieve the 708 GW target of renewable power generation towards NZE<sup>31,78)</sup>, legal and institutional frameworks such as the OL are gathering momentum to accelerate the GPD projects. The government's commitment to promoting the facilitating function of the OL in the long run is becoming increasingly evident.

#### 4. Conclusion

In Indonesia, the legislative practice of the OL approach aims to eliminate issues with the legal framework system and its execution. This review examines the possible role of the OL in accelerating the advancement of GPD in Indonesia, both in the year 2025 and in subsequent years, as well as the issues that the government should prioritize to facilitate a positive impact of the OL. Legally, the Constitutional Court's case against the OL was the primary impediment to its implementation. The promulgation of implementing policies and regulations, along with the issuance of the presidential constitutional decree (Perpu) in response to the Court's ruling, continues to foster optimism. From this perspective, the OL is both legally and factually beneficial for speeding up GPD.

Nevertheless, this conclusion alone is insufficient to conclude that the OL has been able to accelerate GPD in the short term. Positively, as an institutional catalyst for GPD, the OL would play a facilitative role in the post-2025/2030 GPD to achieve NZE 2060 in line with the

plans to convert electricity usage for end-users to increase electricity consumption, in step with the rising national economic growth. In an optimistic scenario, PLN will be compelled to expedite the development of electrical infrastructure due to the rapidly expanding national electricity consumption. Another argument is that the post-2025 institutional consolidation of the OL will unquestionably be completed after the parliament finally approves the Perpu to become Law No. 6/2023.

The significant decrease in GHG emissions by 15.5% in comparison to the business-as-usual scenario highlights the importance of GPD in attaining the goal of achieving NZE by 2060. With its renewable, vast potential, non-intermittent, and baseload generator source, the ambitious GPD could contribute to achieving the NZE objective. The viability is supported by the government guarantee to stimulate new business schemes, competitive and economical technology advancements in geothermal resource utilization, and the newly proposed policy of the national energy grand strategy plan.

To speed the development of installed geothermal power plants by 2025 and beyond, the government must focus on several critical factors. The first is mutually reinforcing institutions and legal systems. Indonesia's legal framework for harnessing geothermal sources has advanced significantly, enhancing its legal framework for renewable energy. The second factor relates to the financial issue, as geothermal resource exploitation necessitates relatively high costs and non-quick yields. Hence, improving finance sources and fiscal and non-fiscal incentives is paramount. Management of social issues is another component, as this issue remains a formidable obstacle due to its evident socioeconomic and environmental implications, especially in its early development phases. There is an urgent need for increased involvement of local communities in the decision-making process and the successful application of legal frameworks. The fourth aspect pertains to the incorporation of the OL into the post-presidential constitutional decree, which was approved by the parliament and subsequently enacted as Law No. 6/2023. This legal measure serves as a significant advancement in ensuring legal certainty for business sectors, as well as fostering growth in investment and employment opportunities. Concern over the issue of legal certainty will intensify, leading to a robust national agenda, such as parliamentary and presidential elections slated for early 2024 and the agenda for relocating the national capital, also scheduled for 2024. In light of the significance of political factors in the energy transition process, breakthrough efforts to the geothermal harnessing through the OL will also affect its implementation, particularly in the context of a relatively complex and ambiguous legal framework. Lastly, a factor relates to national economic growth. A dynamic degree of national economic development can accelerate per capita and national electricity consumption, enhance buying power and spur



national economic growth. The stage for geothermal sources to meet the power generation need is a viable option.

### Nomenclature

CTF	The Clean Technology Fund
EBTKE	The New and Renewable Energies and
KESDM	Energy Conservation, Ministry of Energy and Mineral Resources
GCF	The Green Climate Fund
GEF	Global Environment Facility
GEUDP	The Upstream Geothermal Energy Development Project
GHG	Greenhouse Gas
GPD	Geothermal Power Development
GREM	The Geothermal Resource Risk Mitigation
GW	Gigawatt
IBRD	International Bank for Reconstruction and Development
KUPTL	The Electricity Supply Business Activities
NDC	Nationally Determined Contribution
NPC	The National Power Corporation
NZE	Net Zero Emission
OL	Omnibus Law
Perpu	The Government Regulation in lieu of Law
PIK	The Electricity Infrastructure Development
PLN	The state-owned electricity company
PNBP	The National Money Derived From Sources Other Than Taxation
PNOC-EDC	Philippines National Oil Company- Energy Development Corporation
RPS	Renewable Portfolio Standards
RUEN	The National Energy General Plan
RUKN	The General Plan of National Electricity
RUPTL	The Electricity Supply Business Plan
SMV	The Special Mission Vehicles

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