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Legal Developments On The Use Of Protected Forest Areas For Geothermal Power

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Abstract

The latest developments related to indirect Geothermal utilization in conservation areas in connection with the issuance of Law Number 11 of 2020 concerning Job Creation, which includes the forestry sector and its amendments through Government Regulation in Lieu of Law Number 2 of 2022 concerning Job Creation. The creation of the facilities provided by the Government can positively impact the ease of Geothermal utilization. The research method used is a normative juridical method. The method of data analysis in this study was carried out qualitatively by elaborating and analyzing various secondary data and legal materials obtained in order to answer each of the problem formulations. Conservation forest areas in the Sumatra region have many animals that must be preserved. Geothermal utilization is required to follow specific standards and norms by not damaging the landscape area of forest areas.

Keywords: Law; Geothermal; Government

Abstrak

Perkembangan terakhir terkait pemanfaatan Panas Bumi secara tidak langsung di kawasan konservasi sehubungan dengan dikeluarkannya Undang-Undang Nomor 11 Tahun 2020 tentang Cipta Kerja yang meliputi bidang kehutanan dan perubahannya melalui Peraturan Pemerintah Pengganti Undang-Undang Nomor 2 Tahun 2022 tentang Cipta Kerja. Terciptanya fasilitas yang diberikan oleh Pemerintah dapat berdampak positif terhadap kemudahan pemanfaatan Panas Bumi. Metode penelitian yang digunakan adalah metode yuridis normatif. Metode analisis data dalam penelitian ini dilakukan secara kualitatif dengan mengelaborasi dan menganalisis berbagai data sekunder dan bahan hukum yang diperoleh guna menjawab setiap rumusan masalah. Kawasan hutan konservasi di wilayah Sumatera memiliki banyak satwa yang harus dilestarikan. Pemanfaatan

panas bumi diharuskan mengikuti standar dan norma tertentu dengan tidak merusak kawasan lanskap kawasan hutan.

Kata Kunci: Hukum; Panas Bumi; Pemerintah

INTRODUCTION

The ratification of laws and regulations following the provisions of the paris agreement is widely implemented in our laws and regulations, especially in the field of natural resources. It has a positive impact on the preservation of natural resources.¹ The potential of Indonesia's vast natural resources, ranging from the beneath the earth's surface to those spread across the surface of the country, the use of especially conservation forests should not damage the environment around these natural resources.²

Therefore, the use of natural resources, which are generally in forest areas, must be considered properly in accordance with the mandate of Article 33 paragraph (3) of the 1945 Constitution. The utilization of natural resources must immediately pay attention to the sustainability of nature for the future. This is for the sake of maintaining the survival of the nation's next generation who will also be

increasingly sophisticated in managing natural resources. In this current condition, the government has started actively socializing the development of alternative energy to reduce dependence on fossil energy sources.³

The results include fossil energy sources that will soon run out, and the negative effects of producing high carbon emissions due to the use of fossil energy can cause world climate change. The use of fossil energy can produce gases that damage the environment and cause global warming, such as carbon dioxide (CO²), methane (CH²), and nitrous oxide (N²O). One way that can do to overcome this problem is to develop alternatives besides fossil energy, namely geothermal.⁴

Geothermal energy is derived from heat contained within the earth's crust and is generally associated with the existence of volcanoes.⁵ Geothermal energy sources are the potential to be utilized because they are

¹ Suvi Borgström, "Reviewing Natural Resources Law in The Light of Bioeconomy: Finnish Forest Regulations as a Case Study," *Forest Policy and Economics* 88 (16 Desember 2017): 12, <https://doi.org/10.1016/j.forpol.2017.10.012>.

² Anshori Ilyas dkk., "Omnibus law in natural resource management: Challenges and the future prospect," *Journal of Critical Reviews* 8, no. 8 (2021): 116, <https://doi.org/10.31838/jcr.07.19.107>.

³ Ing Rainer Speh, *Internationak ETG Congress 2017: The Energiewende* (Bonn: World Conference Center, 2017), 28.

⁴ Zulfatriano Zulfatriano, "Problematika Tindak Pidana Illegal Logging Pada Lahan Milik Masyarakat Berdasarkan Undang-Undang Nomor 41 Tahun 1999 Tentang Kehutanan," *Journal of Criminology and Justice* 1, no. 1 (7 Oktober 2021): 22.

⁵ Berliane Rezty Anggriheny dan Regina Yusticia Nababan, "The Consequence of the Legal Application of Forest Area Defense Principles and Approval Principles," *Lambung Mangkurat Law Journal* 6, no. 2 (11 September 2021): 189, <https://doi.org/10.32801/lamlaj.v6i2.256>.

supported by Indonesia's landscape which has many volcanoes, and it is located on three large tectonic plates, namely Eurasia, Indo-Australia, and the Pacific.⁶

The general characteristics of Geothermal energy include a clean, environmentally friendly, and sustainable energy source that cannot be exported, only used for domestic consumption (indigenous), and is free from the risk of rising (fluctuating) fossil fuels.⁷ It is independent of the fuel supply's weather, supplier, and availability of transportation and handling facilities. It is free from the risk of increasing fossil fuels, able to provide local economic development and local communities. Besides, it only requires a small area of land.

In 1991, based on the Decree of the Minister of Forestry number 144/KPTS/II/1991 dated March 13, 1991, it was declared as Way Kambas National Park, where the management was from the Way Kambas Natural Resources Conservation Sub Center and was directly responsible to the Tanjung Karang Natural Resources Conservation Center II. With the Decree of the Minister of Forestry Number 185/KPTS-II/1997 dated March 13, 1997, where the Way Kambas Natural Resources Conservation Sub Center

was declared as the Way Kambas National Park Office.

The reason for establishing the area as a nature conservation area is to protect a rich area with various wildlife, including tapirs (*tapirus indicus*), Sumatran elephants (*elephants maximus sumatranus*), six species of primates, sambar deer (*cervus unicolor*), antelope (*muntiacus muntjak*), sumatran tiger (*panthera tigris*), and sun bear.

There are several results of research similar to this research, namely from Anggreta, Dian Kurnia, Gumilar Rusliwa Somantri, and Semiarto Aji Purwanto, which state that stakeholders have an essential role in the development of natural resources.

Unlike this research, some points that distinguishes this research with others is that this research has a different location. This research analyzed the laws and regulations regarding using protected forest areas for utilizing geothermal resources, especially in the Lampung region.

The research method used is a normative juridical method,⁸ through a statutory approach, analyze them using conceptual, normative, historical, and comparative approaches to policies on the use of conservation forest areas for Geothermal

⁶ Rina Kristanti dkk., "Institutional Performance of Mining Reclamation in Forest Areas of East Kalimantan," *Jurnal Manajemen Hutan Tropika* 25, no. 2 (20 Agustus 2019): 69, <https://doi.org/10.7226/jtfm.25.2.69>.

⁷ Dady Sulaiman, St Syahdan, dan Siti Maria Ulva, "Characteristics of Bioethanol from *Musa Salaccensis* ZOLL," *International Journal of Science and Society* 3, no. 4 (19 November 2021): 22, <https://doi.org/10.54783/ijssoc.v3i4.389>.

⁸ Suteki Suteki dan Galang Taufani, *Metodologi Penelitian Hukum: Filsafat, Teori, dan Praktik*, 1 ed. (Depok: PT Raja Grafindo Persada, 2018), 65.

power plants use to balance the interests of community welfare and environmental protection, especially in conservation forests in the Lampung region. This research employed secondary legal materials. This study's data analysis method was carried out qualitatively by elaborating and analyzing various secondary data and legal materials obtained to answer each problem formulation.⁹

RESULT AND DISCUSSION

Geothermal by the government as intended is carried out on geothermal for direct utilization (geothermal exploitation activities for non-electrical purposes, such as utilization in the field of agribusiness, industry, tourism, and others) and indirectly (geothermal exploitation activities to produce electrical energy) located in Conservation Forest Areas.¹⁰

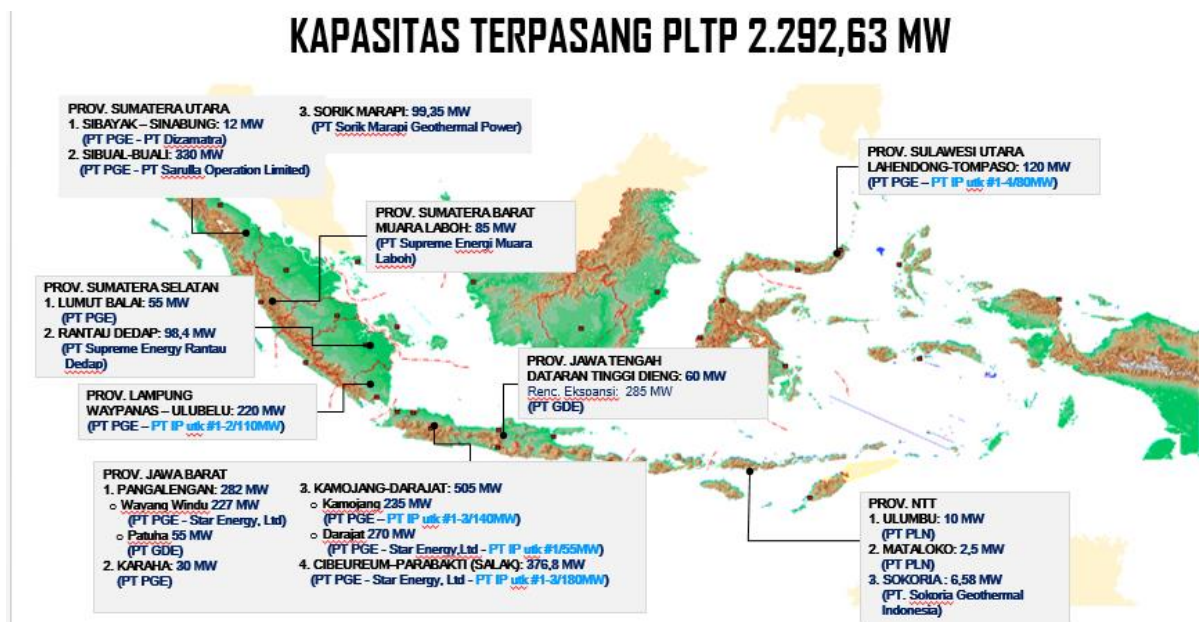


Figure 1. *The PUBM Smart Book by Directorate General of EBTKE Ministry of Energy and Mineral Resources*

The forests utilization for Geothermal is also regulated by amending Law Number 41 Year 1999 on Forestry by amending the Law Number 11 Year 2020 on Job Creation (UUCK) and then its derivative regulations Government Regulation (PP) Number 23 Year 2021 on Forestry Implementation issued

on February 2, 2021. The article 38 paragraph 3 UUCK into, "The provision regarding the utilization of forest areas through temporary use by the central government considering certain area and specific limits and environmental sustainability", has been deleted from the UUCK.

⁹ Muhammad Rijal Fadli, "Memahami Desain Metode Penelitian Kualitatif," *Humanika, Kajian Ilmiah Mata Kuliah Umum* 21, no. 1 (30 April 2021): 33, <https://doi.org/10.21831/hum.v21i1.38075>.

¹⁰ Mentari Mukti dkk., "Geological and Environmental Implications of The Utilisation of Geothermal Energy in The Lahendong Working Area, Indonesia," *Geology, Geophysics and Environment* 48, no. 1 (21 April 2022): 69, <https://doi.org/10.7494/geol.2022.48.1.69>.

This changing forest management paradigm, of course, must be based on the Article 33 paragraph (3) of the 1945 Constitution. Therefore, forest management should involve all stakeholders, namely the government, the society, and the private sector or the business world. In constructing forestry development programs, namely the utilization of forests that do not damage the surrounding environment,¹¹ so that the state is provided the right of attribution, namely the right of state control to have the power in manage and supervise the management or mining of mineral materials, and is obliged to make the greatest use for the prosperity of the people.¹²

The government carries out state control, and its scope is carried out by the government and local governments who have the right to conduct preliminary investigations (including exploration), licensing, guidance, and supervision of geothermal operations following with their respective jurisdictions.¹³ The government issued Government Regulation Number 70 Year 2009 on Policy Renewable Energy Development and Energy Conservation and Presidential Regulation Number 5 Year 2006 on National Energy Policy.

This regulation was issued in order to maintain the sustainability of the management

of renewable natural resources. The reason that must be present in this case is that the government is at the forefront of forming regulations so that the management of natural resources can be managed in an orderly and sustainable manner.

Laws and Regulations that Provide the Ease of Forest Areas Utilization for Geothermal

The Government has issued related regulations as follows Presidential Regulation Number 98 Year 2021 on Implementation of Carbon Economic Value for Achieving Nationally Determined Contribution Targets and Controlling Greenhouse Gas Emissions in National Development, the geothermal field Law Number 21 Year 2014 on Geothermal as amended by UUCK, Government Regulation Number 79 Year 2014 on National Energy Policy, Presidential Regulation Number 22 Year 2017 on the General Plan of National Energy, Regulation of the Minister of Energy and Mineral Resources Number 22 Year 2019 on Guidelines for the Implementation of Inventory and Mitigation of Greenhouse Gases in the Energy Sector, Regulation of the Minister of Energy and Mineral Resources Number 37 Year 2018 on Geothermal Working Area Offering, Geothermal Permit

¹¹ Sukir Maryanto dkk., "Magnetotelluric-Geochemistry Investigations of Blawan Geothermal Field, East Java, Indonesia," *Geosciences* 7, no. 2 (10 Juni 2017): 2, <https://doi.org/10.3390/geosciences7020041>.

¹² Maryanto dkk., 2.

¹³ Dmitry Rudenko dan Georgii Tanasov, "The Determinants of Energy Intensity in Indonesia," *International Journal of Emerging Markets* 17, no. 3 (1 Januari 2020): 833, <https://doi.org/10.1108/IJOEM-01-2020-0048>.

Granting, as well as Geothermal Business Assignment.

Geothermal becomes one of the potential environmental services in conservation areas whose existence is increasingly concern. Geothermal potential in Indonesia is spread to form a 'ring of fire', starting from the islands of Sumatra, Java, Bali, Nusa Tenggara, North Sulawesi, to Maluku. Based on data from the Ministry of Energy and Mineral Resources (ESDM), the length of the line is around 7.500 km and width of 50-200 km, with a potential of around 29.543.5 Mega Watt (MW).¹⁴

The importance of Geothermal development in order to fulfill the national demand for alternative energy, which Indonesia highly requires.¹⁵ The benefits of using Geothermal energy include the Geothermal Power Plant (PLTP) that can provide reliable and sustainable electricity with a capacity factor of 90-95%. The electricity production is stable, not intermittent, and does not depend on fuel supply/logistics. Geothermal is renewable and can operate sustainably by maintaining reservoir balance. The PLTP projects are aligned with the long-term development target of achieving net-zero emissions.

After the issuance of UUCK, the government has also issued Government Regulation Number 5 Year 2021 on the Implementation of Risk-Based Business Licensing and Government Regulation Number 25 Year 2021 on Administration of the Energy and Mineral Resources Sector, related to the implementation of the ESDM sector, including the geothermal sector. Geothermal utilization is divided into 2 (two) types of utilization as follow:¹⁶

- (1) Indirect Utilization is the exploitation of Geothermal utilization through the process of converting heat and/or fluid energy into electrical energy. Geothermal for Indirect Utilization is located throughout Indonesia, including Production Forest Areas, Protected Forest Areas, Conservation Forest Areas, and Marine Areas.
- (2) Direct Utilization is the business activity of utilizing Geothermal directly without converting from heat and/or fluid energy into other types of energy for non-electrical purposes. contained in Article 5 (1) Geothermal Implementation by the Central Government as referred to in Article 4 paragraph (2) for Direct Utilization which is in:
 - a) Across provincial areas, including Production Forest Areas and Protected Forest Areas;
 - b) Conservation Forest Area;
 - c) Conservation areas in waters; and
 - d) Sea area of more than 12 (twelve) miles measured from the coastline

¹⁴ Erly Leiwakabessy dan Rukmuin Wilda Payapo, "The Dynamic Link of Energy Consumption, Economic Growth and Poverty in Eastern Indonesia: Panel VECM and FMOLS Approach," *International Journal of Energy Economics and Policy* 12, no. 2 (2022): 84, <https://doi.org/10.32479/ijeep.12626>.

¹⁵ Nugroho Agung Pambudi, "Geothermal Power Generation in Indonesia, a Country Within The Ring of Fire: Current Status, Future Development and Policy," *Renewable and Sustainable Energy Reviews* 81, no. 2 (1 Januari 2018): 2893, <https://doi.org/10.1016/j.rser.2017.06.096>.

¹⁶ Pambudi, 2893.

towards the high seas throughout Indonesia.

Changes in geothermal in the job creation law are contained in Article 15, which states that "Further provisions regarding norms, standards, procedures and criteria for Geothermal business for Direct Use as referred to in Article 11, including Geothermal energy prices shall be regulated by Government Regulations."

In addition, it is derived from its derivative provisions, namely Government Regulation Number 25 Year 2021 on Administration of the Energy and Mineral Resources Sector, which contains licensing in the form of direct utilization, all of which will later refer to the standard norms of procedures and criteria (NSPK).¹⁷ The licensing mechanism has changed into:

1) The type of geothermal business and licensing itself is divided into two types: direct and indirect geothermal utilization (PLTP). After the issuance of Government Regulation Number 5 Year 2021 on the Implementation of Risk-Based Business Licensing, direct geothermal utilization does not require permission. The licensing is not from the regional government level but from the licensing of entrepreneurs. There was a direct geothermal utilization

permission in the past, but now there is none.

2) Geothermal utilization in marine or coastal areas. After the UUCK, there is no need for a recommendation process to the relevant ministries or sectors:

"In the event that Geothermal business activities for Indirect Utilization are located in conservation areas in the waters, Geothermal License holders must obtain permission from the minister who organizes government affairs in the marine sector."

In order to support geothermal utilization, the government has issued a number of regulations that facilitate its implementation in conservation forests so that there is coordination with forestry and other ministries in efforts to utilize geothermal resources, including several regulations that the government has issued:¹⁸

1. Law Number 5 Year 1990 on the Conservation of Biological Natural Resources and Their Ecosystems

This law regulates the area protection, namely nature reserve areas (KSA) consisting of nature reserves and wildlife reserves and nature conservation areas (KPA) consisting of national parks, nature parks, and forest parks. These designations are one of the efforts to reserve all types of ecosystems and habitat types that are still

¹⁷ Winshery Tan, "The Needs For Public Services Relating To The Legalization of Public Documents In Education," *SASI* 28, no. 4 (30 Desember 2022): 638, <https://doi.org/10.47268/sasi.v28i4.1151>.

¹⁸ Pambudi, "Geothermal Power Generation in Indonesia, a Country within the Ring of Fire," 2894.

intact with sufficient area before they are already damaged.¹⁹

The government ever planned that 10% of the total land in Indonesia would be designated as a conservation area. If fulfilled, the rate and number of species loss can be maintained. The national park is the most complex nature reserve and nature conservation area in terms of biodiversity, area, and problem. It is a nature conservation area with an original ecosystem, managed with a zoning system that is used/for research, science, supporting tourism, and recreation cultivation.²⁰

Article 30

Nature conservation areas have the function of protecting life-supporting systems, preserving the diversity of plant and animal species, as well as sustainable use of biological natural resources and ecosystems.

Article 31

(1) Within national parks, botanical forest parks, and natural parks, activities can be carried out for the purposes of research, science, education, supporting cultivation, culture, and natural tourism.

(2) Activities, as referred to in paragraph (1), shall be carried out without reducing the main functions of each area.

2. Law Number 41 Year 1999 on Forestry as Well as Post-UUCK Regulations

In article 6 paragraph (2) of Law Number 41 Year 1999 on Forestry, the government determines forests based on their main functions into three types: conservation forests, protection forests, and production forests. The explanation of conservation forests is further elaborated into three categories of conservation debt: natural reserve forest areas, nature conservation forest areas, and hunting parks. Forest management includes forest utilization and forest area use.²¹

Meanwhile, the minister grants permission for the use of forest areas for mining/geothermal activities by considering certain area and period limits as well as environmental sustainability. Article 24 stated "The utilization of forest areas can be carried out in all forest areas, except nature reserve forests and core zones as well as forest zones of national parks." This, the use of geothermal is allowed in the law. The legal basis in Article 38, paragraphs 1 and 3 states that "the use of forest areas for development purposes outside forestry activities can

¹⁹ Shafia Zahra dkk., "Review: The Invasion of *Acacia Nilotica* in Baluran National Park, Indonesia, and Potential Future Control Strategies," *Biodiversitas Journal of Biological Diversity* 21, no. 1 (2020): 107, <https://doi.org/10.13057/biodiv/d210115>.

²⁰ SH Dr. Budi Riyanto, *Reformasi Kebijakan Penggunaan Kawasan Hutan: Menuju Sinergitas Kegiatan Sektor Pertambangan Dan Kehutanan* (Bogor: Lembaga Pengkajian Hukum Kehutanan dan Lingkungan, 2023).

²¹ Gunawan Widjaja, "The Role of Adat Forest and Adat Law Community in Environmental Protection in Indonesia," *Journal of Southwest Jiaotong University* 57, no. 3 (2022): 73, <https://doi.org/10.35741/issn.0258-2724.57.3.6>.

only be carried out within production forests and protected forests.”

Meanwhile, the minister grants the utilization of forest areas permission for mining purposes by considering certain area and period limits and environmental sustainability in accordance with Government Regulation Number 23 Year 2021 on Forestry Implementation.

Through the omnibus law concept, the government can revise 79 laws through only one law. This change is included in the forestry law with the issuance of UUCK and then its derivative regulation Government Regulation Number 23 Year 2021 on Forestry Implementation. Here are the changes in forest use:²²

- (1) The UUCK distinguishes the term use of forest areas from the utilization of forest areas. These two terms are familiar because they already exist in Law Number 41 Year 1999 on Forestry. Several articles also mention it in laws. This means that the use of forests is regulated in stewardship which is part of forest planning.
- (2) Article 21 of the forestry law states that forest management includes the utilization of forests and the use of forest areas. Meanwhile, the term of forest utilization is found in articles

23-29. Meanwhile, related to the use of forest areas for mining purposes, the minister granted the permit by considering certain area, period limits, and environmental sustainability.

- (3) The UUCK changes article 38 paragraph 3 to *"the use of forest areas is carried out through borrowing by the central government by considering certain area and period limits as well as environmental sustainability"*. Since permission is no longer granted by the minister, in paragraph 5 of this article, which provides for the granting of permission requires the approval of the House of Representatives (DPR) is deleted.
- (4) As for the forest utilization, the UUCK adds one article, namely article 29A which stated *"the utilization of protected forests and production forests can be with social forestry"*. The technicalities will be further explained in government regulations. Then, the government regulation on this matter was issued on February 2, 2021 of Government Regulation Number 23 Year 2021 on Forestry Implementation. Article 32 only mentions the use of forest areas for development purposes outside forestry

²² Adnan Hamid, "A Critical Study of the Job Creation Law No. 11 of 2020 and Its Implications for Labor in Indonesia," *International Journal of Research in Business and Social Science* 10, no. 5 (8 Agustus 2021): 203, <https://doi.org/10.20525/ijrbs.v10i5.1271>.

activities. The area is restricted only to production forests and protected forest areas. In Government Regulation Number 23 Year 2021 on Forestry Implementation, the use of forest areas is regulated in articles 89-116. It mainly regulates the types of forest land use outside strategic and unavoidable forestry activities, such as mining, power generation, transmission, and distribution electricity, as well as new and renewable energy technologies, public roads, toll roads, railways, reservoirs, dams, defense industries. All activities must not change the function of the forest area.

The use of forest areas with specific purposes is divided into three types or function: the use of forest areas with special purposes, special management, and for food security. This category involves social forestry, rehabilitation, religious purposes, food estate, and research. The use of forests is regulated in articles 126 to 161.

Forest utilization aims to obtain optimal, fair, and sustainable benefits of forest products and services for the welfare of the community. Its activities, among others, are the utilization of environmental services, non-timber products. Forest utilization can be in production, conservation, and protection forests.

3. Presidential Regulation Number 112 Year 2022 on the Acceleration of Renewable Energy Development for Electricity Supply

After the issuance of the UUCK, the government issued Presidential Regulation Number 112 Year 2022 on the Acceleration of Renewable Energy Development for Electricity Supply, to control the utilization, use, and allocation of land and to succeed in targeting national conservation land use opportunities. Previously, in Law Number 5 Year 1990 on Conservation, conservation areas could only carry out three activities, namely: (1) protection of life support systems; (2) preservation of biodiversity and its ecosystems, and (3) sustainable use of biological natural resources and ecosystems.

This article is used as the basis is article 23, paragraph (4) which provides attribution authority to the minister and relevant ministers, particularly in spatial planning (ATR/BPN), heads of institutions, or local governments that are required to provide the necessary support in the development of power plants that utilize renewable energy sources in accordance with their authority.

Article 23, paragraph (4) stated that:

(4)The Minister who organizes government affairs in the field of land and spatial planning shall provide support as referred to in paragraph (1) in the form of giving priority to the

development of power plants that utilize renewable energy sources in planning the allocation of national governance, as well as facilitating licensing in the field of land and spatial planning for the use of Wasted Energy in order to reduce

(5)The Minister who organizes government affairs in the field of environment and forestry provides support as referred to in paragraph (1), regarding the ease of licensing in forest areas and cost relief in the context of developing Renewable Energy.

Procedures for Utilizing Conservation Area Forests

The use of conservation forests for geothermal activities is carried out in stages, including preliminary survey activities, exploration approvals, feasibility studies, exploitation, and utilization.²³ The explanation is as follows:

1. Conduct a Preliminary Survey

Preliminary Survey is an activity that includes collecting, analyzing, and presenting data related to information on geological, geophysical, and geochemical conditions, as well as surveying temperature slopes if necessary to estimate the location and the existence of Geothermal resources.

Before carrying out geothermal activities, a study of the effect and mitigation of geothermal utilization on socio-cultural aspects and biodiversity in

conservation areas is carried out as follows:

- (1) Conduct identification and inventory land and regional conditions, including identifying the actual land cover, both managed by area managers for business activities and in collaboration with other parties including the community.
- (2) Conduct a landscape management analysis of conservation forest areas by considering: (a) Plan for the utilization of Geothermal environmental services in conservation areas (technical considerations). (b) The condition of biodiversity potential in conservation forest areas (ecological considerations). (c) The level of dependence of communities on conservation forest areas (social, economic, and cultural considerations). (d) Identification and analysis of stakeholders' role. And (e) Identification and analysis of stakeholders' role for making models of regional landscape management and social engineering which includes the roles, positions, and authorities as well as the involvement of communities, community leaders,

²³ Donna Asteria dkk., "Forest Conservation by The Indigenous Baduy Community in The Form of Customary Law," *Journal of Cultural Heritage Management and Sustainable Development* 12, no. 1 (1 Maret 2022), <https://doi.org/10.1108/JCHMSD-12-2020-0171>.

indigenous leaders, non-governmental organizations, government agencies, and universities in the management of conservation forest areas.

- (3) Conduct an impact analysis, namely an analysis of the impacts that will occur, including ecological, social, economic, and cultural impacts as well as the influence of stakeholders in order to mitigate possible impacts on the planned implementation of Geothermal exploration activities in conservation areas in the future.
- (4) Preparation for landscape management models and social engineering of conservation forest areas for Geothermal.
- (5) Conduct consultations with stakeholders by consulting with the Ministry of Environment and Forestry, the Geothermal industry, the Ministry of Energy and Mineral Resources, and the community regarding the results of the preparation of area management models and social engineering of conservation forest areas for Geothermal.

2. After Obtaining Approval with Exploration

Exploration is a series of activities that include geological, geophysical, geochemical, test drilling, and exploration well drilling, which aims to obtain information on sub surface geological

conditions to find and obtain estimates of Geothermal reserves.

3. Feasibility Study

Feasibility studies are conducted as studies to obtain detailed information on all aspects related to determining the technical, economic, and environmental feasibility of a proposed geothermal utilization business plan and/or activity.

Within the exploration period as IPB holders are required to conduct a Feasibility Study which includes the activities of: (a) Determination study of reserves in suitable Work Areas for exploitation; (b) Environmental permits; (c) Development well construction plan and reinjection well; (d) Design of steam field facilities; (e) Planned capacity of electric power generation and its generation stages; (f) Economic feasibility; (g) Plans for electric power generation and electric power transmission systems; (h) geothermal resource maintenance plan for exploitation activities; (i) Geothermal environmental services utilization permit plan, if there is a plan for the use of environmental services in conservation forest areas; (j) Occupational safety and health plans; (k) Environmental protection and management plan; and (l) Geothermal post exploitation plan

4. Exploitation

Exploitation is a series of activities in certain working areas, including drilling

development wells and reinjection wells, building fields, supporting facilities, and geothermal production operations.

5. Geothermal Utilization

The implementation of the electricity supply business for the public interest must be in accordance with the national electricity general plan and the electricity supply business plan.

Land Use of Geothermal Power Plant (PLTP) Project

In line with the government's plan, which aims to increase the role of new and renewable energy (EBT)²⁴ The use of technology and land efficiency commitments in the national energy mix, which is targeted to reach 23 by 2025. PLTP projects in conservation areas only require 0.6 hectares of land per MW of power plants.²⁵ So as not to damage forest conservation areas, following with the mandate of Law Number 5 Year 1990 on Conservation, which emphasizes the management of conservation forest areas refers to the following:

1. Ensure the maintenance of ecological processes that support life support systems for the continuity of human development and welfare (protection of life support systems);

2. Ensure the preservation of the diversity of genetic resources and types of ecosystems to support development, science, and technology that enable the fulfillment of human needs that use biological natural resources for welfare (preservation of germ sources);

3. Control the ways of utilizing biological resources so that their sustainability is guaranteed due to the side of unwise science and technology.

Table 1: Geothermal Utilization in Conservation Forest Areas

No	Power Plant	Contractor	Capacity
1	Geothermal power plant (PLTP), PLTP Ulubelu in Lampung (Way Kambas National Park)	PT PLN Gas & Geothermal (PLN GG) will conduct a <i>joint study</i> for the development of Geothermal Power Plants (PLTP) with PT Pertamina Geothermal Energy (PGE).	100 – 110 ha to 110 MW
2	Rantau Dedap Geothermal power plant (PLTP) in Muara Enim, South Sumatra, (protected forest area of Jambul Gunung Patah)	PT Supreme Energy Rantau Dedap (SERD)	50 – 60 ha to 55 MW
3	Salak Geothermal power plant (PLTP) Bogor (in the area of Mount Halimum Salak National Park)	Star Energy Geothermal Salak (SEGS)	228 ha (IPJLPB) to 377 MW

Source: Dian Nugrahani, data processed, 2023.

²⁴ Maw Maw Tun dkk., “Renewable Waste-to-Energy in Southeast Asia: Status, Challenges, Opportunities, and Selection of Waste-to-Energy Technologies,” *applied sciences* 10, no. 20 (19 Oktober 2020): 1, <http://dx.doi.org/10.3390/app10207312>.

²⁵ Eril Sastra Hadi dan Eka Vidya Putra, “Resistensi Masyarakat Terhadap Rencana Pembangunan PLTP (Pembangkit Listrik Tenaga Panas Bumi) Di Gunung Talang Kabupaten Solok,” *Jurnal Perspektif* 2, no. 3 (3 Agustus 2019): 241, <https://doi.org/10.24036/perspektif.v2i3.95>.

Indonesia has quite a lot of conservation exploitation scheme in conservation forest forests. The following is the geothermal areas in Indonesia:

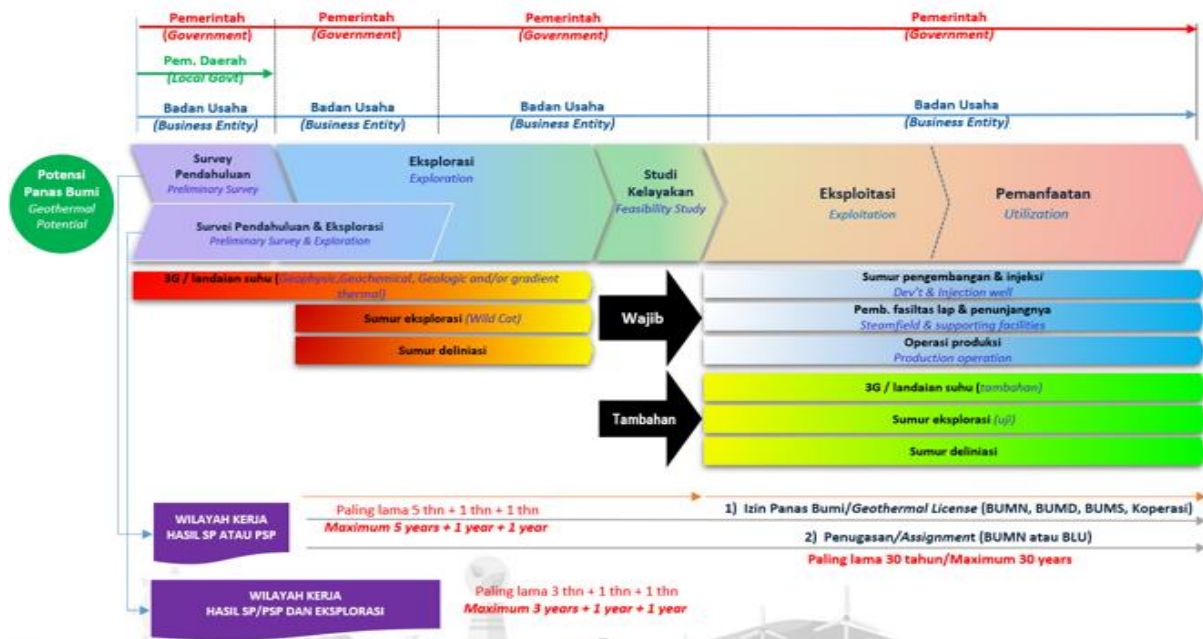


Figure 2. Flow of the PUBM Smart Book Geothermal Utilization Scheme by the Directorate General of EBTKE of the Ministry of Energy and Mineral Resources

Based on the provisions of Article 33 paragraph (3) of the Constitution of the Republic of Indonesia Year 1945 which states that: "Earth and water and the natural resources contained therein are controlled by the state and utilized for the greatest prosperity of the people." The energy sector that has great potential to be maximized is through geothermal utilization that can also be stated to be one of the energy sources that does not cause much damage to the surrounding environment. Law Number 21 Year 2014 on Geothermal which allows for the utilization of Geothermal in conservation areas which previously in Law Number 41 Year 1999 on Forestry Could Not be Carried Out Forestry Activities in Conservation Forest Areas.

This is emphasized in the changes of the UUCK geothermal sector that is given more convenience in using conservation forests, as stated in article 5 (1). The implementation UUCK geothermal by the central government referred to in article 4 paragraph (2), is Geothermal utilization activities for indirect utilization located throughout Indonesia, including production forest areas, protected forest areas, conservation forest areas, and marine areas.

This amendment to the UUCK in Article 15 states that "Further provisions regarding norms, standards, procedures, and criteria for geothermal exploitation for direct utilization as referred to in Article 11 including the price of geothermal energy are regulated by government regulations." The

ease of geothermal investment in direct utilization is no longer requires DPR approval so that the government can directly regulate with government rules only. Of course, it must be addressed with good supervision because species in conservation forests must also be maintained.

Geothermal development by not damaging forest ecosystems, especially in the preliminary survey before the issuance of geothermal permits, has an ecological, social, economic, and cultural impact analysis and stakeholder influence that must be carried out in order to mitigate possible impacts on the planned implementation of geothermal exploration activities in conservation areas in the future. Another factor is that the land use of geothermal power plants (PLTP) could be much higher compared to other energy sectors. It can be an added value from the use of this sector. Thus, it must be accompanied by good post-geothermal exploitation recovery.

The provincial has the authority to formulate regulations in geothermal energy and guide and supervise geothermal across areas. Grant permits for the utilization of geothermal across regions, as well as manage geological information and geothermal potential across areas, inventorying and compiling balance sheets of geothermal resources and reserves in the province.

Governments have the authority to formulate regional regulations on geothermal,

foster and supervise geothermal mining, issue permits and supervise geothermal mining, manage information related to geothermal geology and potential, inventory geothermal resources and reserves, empower local communities working areas with UUCK, go to the center so that the development of geothermal energy in conservation areas will be easier

CONCLUSION

Conservation forest areas in the Sumatra area have many animals that must be preserved. Geothermal utilization is required to follow certain standards and norms by not damaging the landscape area of forest areas. The regulations issued by the government are (1) Law Number 5 Year 1990 on the Conservation of Biological Natural Resources and their Ecosystems, (2) Law Number 41 Year 1999 on Forestry as well as post-UUCK regulations, and (3) Presidential Regulation Number 112 Year 2022 on the Acceleration of Renewable Energy Development for the Provision of Electricity.

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