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An Update on Indonesia's Geothermal Activities

Madjedi Hasan and Anton S Wahjosoedibjo

PT Pranata Energi Nusantara (PENConsulting) Graha Niaga, Lantai 17, Jalan Sudirman Kav 58 Jakarta, 12190, Indonesia

mh98@centrin.net.id; antonw@penconsulting.com

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ABSTRACT

In late 2014, the Government of Indonesia promulgated a Law Nr. 21/2014 on Geothermal, to replace the Law Nr. 27/2003. The new law addresses the major issues impeding Indonesia's geothermal resources development that included the inappropriate and conflicted regulations that have created uncertainty over its implementation. These include removing geothermal undertaking as mining activities and improved the structure of geothermal transactions.

The following article highlights changes of Law Nr. 27/ 2003 to Law Nr. 21/2014 and Government's efforts to accelerate geothermal development in Indonesia, including but not limited to issuance of geothermal feed-in-tariff, streamlining permit and license processes, overcoming land indemnification issue, and government participation in mitigating exploratory risk. The new Law Nr. 21/2014 provides improvements to some of the issues that have hindered geothermal projects in Indonesia, namely distribution of authority of government institutions over direct and indirect use of geothermal resources, licensing procedures and resolving forestry issues in geothermal development. These include improved process and procedure for tender of working areas and direct utilization licenses. Also, the declassification of geothermal as "mining activity" allows greater latitude for the geothermal development in the protected and conservation forests.

While the new geothermal law has indeed made fundamental changes to the process and procedures related to geothermal development in Indonesia, however, its effectiveness remains to be seen, as the new law will still require implementing regulations for execution in the form of Government, Presidential and Local Government regulations. These regulations will provide the guidelines on the process and procedures for tender of working areas by the Central Government and direct utilization licenses. Also, the forestry law may need to be further amended before the provisions of the new geothermal law related to the conduct of geothermal activities within forest areas can be effectively implemented.

Equally important is the bidding process of selecting potential developer, which is to be reviewed diligently. Also, local people's resentment may hamper the development of the geothermal resources; accordingly the plan for geothermal development shall be designed by integrating local people aspects.

1. INTRODUCTION

Indonesia has abundant geothermal resources that can help meet the country's rising electricity demand and increase electrification rates. Although it is renewable, the production of these natural resources would deplete the reserves thereby they must be preserved and managed properly for the people or nation benefit.

This paper updates the issues and problems associated with the development of geothermal energy resources in Indonesia. The discussions also include laws and regulations associated with geothermal resources development. For Indonesia, the effort to stabilize the supply of energy resources – renewable and non-renewable – is critical to help in achieving the objective and goal of Welfare State as mandated by the Constitution.

2. INDONESIA'S GEOTHERMAL RESOURCES DEVELOPMENT

The early 1990s saw the awarding of eleven contracts for development of geothermal power plants, with a total committed capacity of 3,417 MW and original completion dates between 1998 and 2002. As a result of the 1997-1998 financial crisis, the Government suspended nine conventionally powered Independent Power Projects (IPPs) and seven geothermal projects. The government has been attempting to resuscitate the seven contracts and to increase geothermal development activities by changing the laws and regulations, but with partly success.

In 2003, the Law Nr. 27/2003 on Geothermal was promulgated. The law mandated that the future development of geothermal fields must be transparently and competitively tendered. This was followed by establishment of Directorate of Geothermal Energy and a road map to develop 6,000 MW of geothermal power capacity by 2020. Master Plan Study for Geothermal Power Development in Indonesia was initiated in 2006, which further solidifying knowledge and understanding about developing Indonesia's geothermal resources.

A review of statistical data shows that from 2010–2013, only 135 MW was added and no power purchase agreements (PPAs) were signed under the 2012 FIT. Table 1 below shows the geothermal installed capacity by field.

Table 1

Installed Geothermal Power Plant

Location	Operator	Installed Capacity
Kamojang, West Java	PERTAMINA	220 MW
Lahendong Tompaso, Celebes	PERTAMINA	80 MW
Sibayak, North Sumatra	PERTAMINA	12 MW
Ulubelu, South Sumatra	PERTAMINA	110 MW
Darajat, West Java	Chevron	270 MW
Gunung Salak, West Java	Chevron	377 MW
Wayang Windu, West Java	Star Energy	227 MW
Dieng, Central Java	Geodipa	60 MW
Ulumbu, East Nusa Tenggara	PLN	5 MW
Total Capacity		1,361 MW

Source: Pertamina

Additional capacity in the immediate future is Sarulla geothermal power plant in North Sumatra, which is designed to have a total net guaranteed delivery capacity of around 330 MW for a period of 30 years. While the plant would ultimately cost USD 1.6 billion, the project has been delayed due to severe bureaucracy and lack of financial resources, the groundbreaking for this project was finally conducted in June 2014. The plant is expected to start operations in 2016 and will be fully completed by 2018.

Another factor that hampered the geothermal resources development is high prices of electricity sold to PLN (State Owned Electricity Company). As PLN, needs to keep electricity prices low because the government cut the energy subsidy bill, while the company is also tasked to build the infrastructure to meet the Central Government's ambitious goal of adding 35,000 MW of power capacity by 2019.

Also, based on the analytic work supported by the World Bank and/or Global Environment Facility Geothermal Power Generation Development Project, the Ministry of Energy and Mineral Resources (MEMR) in 2014 issued a Feed-in Tariff (FIT) policy for geothermal electricity. This was followed by a new Geothermal Law Nr. 21/2014 to replace the Law Nr. 27/2013. However, the new law still is yet to bear fruit and to be streamlining with other government and ministerial regulations. As of this writing, such regulations have not been issued, thereby the impact of new regulation on geothermal activities is not known.

3. LAWS AND REGULATIONS ON GEOTHERMAL DEVELOPMENT

The geothermal undertaking in Indonesia was initially regulated under the Law Nr. 44/Prp/1960 on Oil Mining and supplemented by Presidential Decree (PD) Nr 22/1981 and complemented later by PD Nr 37 and Nr 45 of 1991, which formed the legal basis for Independent Power Producers (IPPs). The Law Nr. 44/1960 has a goal to lay down the foundation for promoting oil exploration and exploitation activities in accordance with the Indonesian Constitution. Based on the law, the multinational company has no longer the concession holder who owns the oil or coals underground, but can serve only as contractor.

The PD Nr. 45/1991 outlined two alternative paths for geothermal energy development in Indonesia. Under the first, the oil state owned company, PERTAMINA signed a Joint Operation Contract (JOC) with a contractor to explore, develop and operate the steam field and selling the steam to State Electricity Company (PLN) or other parties for electricity generation. The second alternative allows PERTAMINA or its contractors to generate electricity as well as develop and operate the steam field, with the electricity produced sold to either PLN or other consumers. PLN buys electricity on the basis of an Energy Sales Contract (ESC), which is normally denominated in dollars and obligates PLN to purchase electricity on a take-or-pay basis for a period of 30 years or more.

Over a span of 20 years, PLN signed 11 geothermal power sales contracts with total capacity of 3,417 MW, but only three have moved forward. The planned projects were previously expected to come on stream between 1998 and 2002. Seven of the contracts were suspended after 1998, and are being restructured through a process of negotiation.

In 2000 following the fall of Suharto's government, the very attractive incentive decrees of the mid-1990 were replaced with PD Nr. 76/2000, in which the GOI proposed to take all or part of the exploration activities. Tax payments, however, would be in accordance with general tax law rates, i.e., 47% instead of 34% under previous PDs. No exploration activities have taken place since the enactment of PD Nr. 76/2000.

In late 2001, Indonesia passed Law Nr. 22/2001, which replaced the Law Nr. 44/Prp/1960 on Oil and Law Nr. 8/1971 regarding PERTAMINA and removed geothermal as an area of regulation, requiring the Indonesian Government to develop a new legislative basis quickly for geothermal. In the meantime, PD Nr. 22/1981 which later amended by PD Nr. 45/ 1991, continued to regulate geothermal energy exploitation until the new Law Nr. 27/2003 on Geothermal was promulgated.

The Law Nr. 27/2003 regulates the undertaking of geothermal resources, both as mining commodity (including accessory minerals) and as energy resources for direct and indirect use (electricity). The law opens up the geothermal development to private participation through competitive tendering, to be conducted by the government authority responsible to issue the geothermal mining area (*Wilayah Kuasa Pertambangan* or WKP). Under the new law, provincial and local governments are given the authority to regulate, supervise and license geothermal energy developments. Under this provision, the geothermal working areas are to be tendered by regional administrations. The basis for the award has been based on the lowest electricity price, although it is not specified.

Under the Law Nr. 27/2003, the geothermal business consists of six (6) phases, namely preliminary study, tendering of new WKP, exploration, feasibility study, exploitation and utilization of resources (for power or others). This differs with the old law (Law Nr. 44/1960), in which the geothermal business is not split into phases, and has been carried out in a single contract between PERTAMINA and Investor (Contractor). Following the introduction of this new policy PERTAMINA transferred to the Minister of Energy and Mineral Resources (through the Director General of Geology and Mineral Resources), all governmental functions and returned the authority to develop geothermal resources and working areas, except for those areas that have been developed and are producing.

Note that under the Law No. 27/2003 on Geothermal, the geothermal activities were lawfully defined as a mining activity (Law No. 27/2003) which implied that it was prohibited to be conducted in protected forest and conservation areas (Law No. 41/1999), despite the fact that geothermal mining activities only have a minor impact on the environment (compared to other mining activities). However, as about 80 percent of Indonesia's geothermal reserves are located in protected forest and conservation areas, it was therefore impossible to tap this potential. In August 2014, the GOI passed Geothermal Law Nr. 21/2014 (replacing Law Nr. 27/2003) separating geothermal from other mining activities and thus paving the way for geothermal exploration in the country's protected forest and conservation areas. The passing of this law is an important breakthrough. However, at the time of writing (December 2015) this new law still needs to be complemented with government and other regulations for execution.

Also note that in 2011, the GOI has also established Geothermal Fund Facility (GFF) with more than $200 million of initial capitalization to mitigate resource risks related to geothermal development by way of:[1]

1) Enhancing data and information obtained during the preliminary surveys that have been conducted by the government agency, including Magnetic Telluric (MT) survey and other geological and geophysical surveys to better locate the site of first deep well(s).

2) Drilling the first deep well(s) to acquire better geological information, including but not limited to pressure and temperature gradient, fluid chemistry, steam quality, reservoir permeability, and exploratory proven reserves. The information and data obtained are used to improve the definition of the working area and will be made available during the tendering process.

The GFF is managed by Pusat Investasi Pemerintah (PIP) or Government Investment Agency. However, while USD 200 million has been allocated from the Government Budget no GFF has been used. This was due to that consistent with its vision and mission PIP decided to change slightly the purpose of GFF. Under the original plan, the establishment of the GFF was initially intended to provide potential developers and investors with sufficient, high quality information (temperature and chemical characteristics, and potential reserves) of pre-selected green field geothermal sites that will be offered during the tendering process of new areas, but later it was extended to support the Indonesian company with fund for conducting drilling first well. The program, however, has not proceeding well as many domestic investors have difficulties to meet the collateral for the fund. Also, many exploration permits have expired and many requests for extension have been delayed due to the promulgation of new geothermal law.

Such bitter experiences are not surprising, looking at PERTAMINA's experiences in early days with non-performing Technical Assistance Contract (TAC) involving domestic oil contractors. Besides having limited fund for start-up (including payment of bonus) many of the Indonesia TAC holders seemed to have lack of appreciation for the risk. This suggests that in awarding the geothermal license, the financial capability of company needs to be reviewed diligently in the bidding process and by closely supervised the fulfillment of their commitment in the execution in the form of work program and investment.

4. HIGHLIGHT OF LAW NR. 21/2014

The new geothermal law introduces two types of license based on its types of utilization, namely:

1) Geothermal License (*Izin Panas Bumi*) for indirect geothermal utilization for the purposes of producing electricity; and

2) Direct Utilization License (*Izin Pemanfaatan Langsung*) for direct geothermal utilization for purposes other than for producing electricity such as tourism agribusiness industry.

This differs with the Law Nr. 27/2003 where there is only one type of license for both utilization types, i.e. the Geothermal Mining Business License (Izin Usaha Pertambangan Panas Bumi - IUP) for the two types of activity. The new law also provides that supervision authority of IUPs which was within the authority of the local government is transferred to the Central Government upon conversion of the IUPs to be Geothermal Licenses. Under the new law, tenders for geothermal projects are called by the Central

[1] A. Wahjosoedibjo and M. Hasan, *Geothermal Fund for Hastening the Development of Indonesia's Geothermal Resources*. A paper presented to the 37th Workshop on Geothermal Reservoir Engineering. Sanford University, California. January 2012.

Government (Minister of Energy and Mineral Resources) instead of by local administrations (Governor or major/regent) under the old law. Under the new law governors and regents/mayors will only issue Direct Utilization Licenses (*Izin Pemanfaatan Langsung*).

Also, indirect utilization activities are no longer classified as mining activities, which means that producers of geothermal power can more easily work in forest conservation areas, based on a permit from the Minister of Forestry in the form of a Borrow and Use Permit (*pinjam pakai*) for geothermal activities within production forest areas or protected forest areas; or a license to utilize conservation forest areas (in the form of an environment utilization service license) if the activities are within conservation forest areas. The geothermal activities shall mean to include surveys and drilling as construction of access road to the well and power plant site.

Other pertinent items in the new geothermal law include:

1) The size of a working area is no longer capped, but it must take into account the geographical extent of the geothermal system. The new act also provides the government with the leeway to regulate this aspect through regulation.

2) The maximum term of a Geothermal License is 37 years, and can be extended for a maximum of 20 years for each extension. The maximum exploration period (which includes the period for a feasibility study) is five years, extendable twice for one year each time. This compares with the old law, which provides that there was (i) a maximum of three years exploration period which could be extended twice for one year each time; (ii) a maximum of two years for feasibility studies; and (iii) a maximum of 30 years for exploitation which could be extended. The Old Geothermal Law does not provide a specific time limit on how long the exploitation period can be extended for.

3) A geothermal license (IUP) cannot be transferred to another party. This differs with the old geothermal law that allows the transfer of geothermal license (IUP) to an affiliated company (holds at least 25% of the shares).

4) An IUP holder may transfer its shares on the Indonesia Stock Exchange after conducting exploration upon approval from the MEMR. Such provision for transfer will require more detailed Government or Ministerial Regulations.

5) Local governments in the area where the geothermal working area is located will receive a portion of the revenues derived from geothermal resources under the so-called production bonus scheme. This bonus is provided based on a percentage of the Geothermal License holders' gross income from when the first unit operates commercially. This compares to the old law, which states that IUP holders must pay state income tax and non-tax state income (including bonuses). However, the old law did not provide any further details regarding this obligation - i.e. who was the recipient of the bonus, how the bonus would be calculated etc.

6) In transitional provisions, the new law provides that all existing geothermal operation authorizations, geothermal joint operation agreements, and geothermal operation permits will remain in force provided exploitation commences at the latest on 31 December 2014.

    a) This requirement previously was included in the implementing Government Regulation issued under the old law. As it is now stipulated at the level of law (as opposed to a Government Regulation), it will be more difficult for any extension of this deadline to be granted. It is not entirely clear whether this deadline will also be imposed on IUPs issued under the old law (the vast majority of which will not commence exploitation by 31 December 2014). Despite the lack of clarity in the wording of the transitional provisions, in view of the Ministry of Energy and Mineral Resources having recently issued its Regulation No. 17 /2014 to facilitate the commencement of exploration activities on a number of the installed IUP-based projects, it is unlikely that the Government will implement strictly this provision in a way which would result in cancellation of IUP-based projects.

    b) Provided exploitation has commenced by 31 December 2014, the existing geothermal operation authorizations (held by PT Pertamina Geothermal Energy) remain in force until the expiration of their term periods. After the term expires, geothermal operation authorizations, geothermal joint operation agreements, and geothermal operation permits may be extended as Geothermal Licenses.

    c) The existing IUPs remain in force until the expiration of their term periods and that all existing IUPs will be converted to Geothermal Licenses and for this purpose governors and regents/mayors are obliged to submit issued IUPs documents to the MEMR within six months after the enactment of the new law.

    d) Companies that conduct direct geothermal utilization activities before the enactment of the new law are deemed to have obtained licenses, but within three years after the enactment of the new law, those companies must obtain a Direct Utilization License or convert the existing license into a Direct Utilization License.

    e) Existing geothermal operation authorizations, geothermal joint operation agreements, geothermal operation permits, and IUPs are allowed to conduct activities in conservation forest after obtaining an environment utilization service license.

In summary, the new geothermal law (Law Nr 21/2014) revised the authority to manage the geothermal energy resources to the Central Government, similar to currently practiced for oil and gas. This should reduce the uncertainty, therefore assisting in accelerating the geothermal resources development. The law, however, has not considered to undertaking the exploration and exploitation for geothermal in the form of contract (like in oil and gas), instead of business permit. With the business permit system that was prompted in facing the globalization and liberalization, there will be essentially no difference in the roles of SOE and private company (national and foreign).

Note that although the new geothermal law has considered the geothermal is not mining activities; however, the relevant forestry regulations is still classify geothermal as mining activities, thereby the forestry law may need to be further amended before the provisions of the new geothermal law related to the conduct of geothermal activities within forest areas can be effectively implemented.

5. IMPLEMENTING REGULATIONS

The new geothermal law has made considerable process to remove the barrier. However, its effectiveness remains to be seen, as how the new law will be implemented. Indonesia is a Civil Law Country, which has a legal norm that is structured in tiers and is hierarchical in nature particularly that lower norm is based on the higher norm until the point where it meets the highest norm which then becomes the basic norm. Under such a legal system, the following lists the official hierarchy of legislation:

1) 1945 Constitution
2) Undang-Undang (Law) and Peraturan Pemerintah Pengganti UU (Government Regulation Substituting a Law)
3) Peraturan Pemerintah (Government Regulation) to implement the respective law
4) Peraturan Presiden (Presidential Regulation) which takes its source in Government Regulation
5) Peraturan Daerah (Provincial Government Regulation)

Ministerial decrees and the decrees of non-departmental heads do not have the binding power as regulations. They are binding in their respective sectors as administrative decision. Also, certain types of legislation such as Laws and Government Regulations are accompanied by an official explanatory memorandum called the Elucidation (Penjelasan), which is generally authoritative for purposes of interpretation. In this system no law of a lower rank can be contradictory of a law of higher rank.

Given such hierarchy, there are still considerable government regulations to be issued to implement Law Nr. 21/2014. Such government regulations must be issued within two years after the law passes. Among others these include (i) the tendering process and procedures for working areas by the Central Government; (ii) the process and procedures for issuance of forestry licenses due to exclusion of "geothermal activities" from mining activities; and (iii) the process and procedures for issuance of Geothermal Licenses by the Central Government and Direct Utilization Licenses by the central and local governments. Note that although the new geothermal law has considered the geothermal is not mining activities; however, the relevant forestry regulations is still classify geothermal as mining activities, thereby the forestry law may need to be further amended before the provisions of the new geothermal law related to the conduct of geothermal activities within forest areas can be effectively implemented.

Furthermore, unlike fossil fuel projects the geothermal projects require integrated efforts and risk management between upstream and downstream activities. The installation of power plants will involve various stages of work and clearances, including project identification, project allotment, land indemnification, pre-feasibility report, detailed project report, techno-economic clearance, environmental and other clearances, financial closure, finalizing contracts for civil and mechanical work, and commencement of construction.

Out of many steps and clearances required to set up a power project, making land available is a major challenge since there is many a stakeholder with varied forms in interest in the making this possible. Under such circumstances the government may still need to provide assistance in securing the land. Also, several barriers must still be overcome for the country to reach its full potential. One of the factors which has potential for conflict in the execution relate to the facts that developments of various energy sources are found in various laws and regulations. Accordingly, the results in implementing Law Nr. 21/20014 remain to be seen.

6. ELECTRICITY TARIFF

Another important issue in promoting geothermal activities is Indonesia's uncompetitive electricity tariffs. Through government subsidies, these tariffs are kept low. Moreover, PLN holds a monopoly on the distribution of electricity in Indonesia and therefore electricity from independent power producers is required to be sold to PLN. The 2012 FIT was a first attempt to unlock the sector. But this FIT raised as many new questions as it solved, and it is generally agreed that much more needed to be done to consult with stakeholders than had been done before. For this reason, MEMR has engaged extensively with stakeholders in the consultations for a new tariff issuance.

In 2009 Indonesia introduced the concept of a ceiling price (USD 9.7 cent/kWh), below which the winning tender bid would automatically be accepted, but above which the bid was subject to negotiation with PLN. Given a ceiling price will ensure that the bid price is reasonable and does not exceed the benefits of the project. This of course, if there are no defects in the tender process due to insufficient competition, collusion among bidders, or unrealistic bids offered by inexperienced bidders. Ceilings on competitively bid prices for renewable energy are widely used in international practice (Brazil, Peru, South Africa).

Note that most international auction experience has been with small hydro and wind, where auctions were for a large number of sites that bid for the right to a long-term PPA at the bid price. For both these technologies, establishing the size of the resource is easy compared to that required for geothermal energy. The ceilings in most cases are based on estimates of production costs, which for small hydro, wind, and solar power projects are straightforward. Tenders for Indonesian geothermal projects are of an altogether different type, where one has (ideally) many bidders for a single site about which there is much resource uncertainty.

In June 2014 the Ministry of Energy and Mineral Resources (MEMR) issued a new regulation Nr 17, which reverts back to a previously used geographically based tariff regime enhanced with an added dimension of the timing of reaching a particular project's commercial operation date (to cater for inflationary effects). Three regions are determined based on main generation sources. Region 1 consists of Sumatra, Java, and Bali, in which geothermal would replace power from large coal-fired power plants. Region 2 includes other areas where small coal-fired power plants are planned to be the main source of power such as Sulawesi, West Nusa Tenggara, East Nusa Tenggara, etc. Region 3 covers any areas where isolated diesel generation is the primary source of power. The values of the new ceiling prices (MEMR's Regulation Nr. 17/2014), which appear to be based on avoided costs is shown in Table 3.

Table 2

New Ceiling Prices (USD cent/kWh)

Year	Region 1	Region 2	Region 3
2015	11.8	17.0	25.4
2016	12.2	17.6	25.8
2017	12.6	18.2	26.2
2018	13.0	18.8	26.6
2019	13.4	19.4	27.0
2020	13.8	20.0	27.4
2021	14.2	20.6	27.8
2022	14.6	21.3	28.3
2023	15.0	21.9	28.7
2024	15.5	22.6	29.2
2025	15.9	23.3	29.6

The subject regulation also makes clear that the responsibility for constructing transmission lines to connect with geothermal projects rests with the PLN, which has also a task to prepare a 'model' PPA for geothermal power projects.

7. CAPITAL MOBILIZATION

Another area of importance for Indonesia's geothermal resource development is capital mobilization as geothermal undertaking is capital-intensive. This would require concerted and coordinated action in all areas simultaneously to unlock the sector. For example, as estimated by Asian Development Bank in order to achieve an additional geothermal capacity of 3,000 MW in the foreseeable future Indonesia would require capital nearly USD 15 billion (assuming USD 4,500/kW). Given 30% equity, this would require USD 10.5 billion in debt finance.[2]

Problems associated with debt finance are that many banks are reluctant to fund up-front exploration and typically will provide financing only once 50% or more of the steam resource is proven. Also, geothermal exploration in Indonesia is hampered by poor infrastructure development in the country's isolated regions, local communities' opposition to these projects and bureaucracy (lengthy and costly permit procedures that involve central, provincial and district-level authorities).

8. COMMUNITY CHALLENGES

Equally important consideration in the execution of geothermal resource development is the fact that a geothermal project has often been challenged by local community or affected by the so-called NIMBY (not in my backyard) syndrome. Recent examples included the two geothermal projects in West Java (Tampomas) and Lampung that were delayed following the protests by the community, which claimed that development of the project would damage the social structure of the community. This is not unique for Indonesia as such phenomena also occur in many places in the world.

According to Dewi Yuliani, the community resistance is caused by inappropriate entry point, late efforts of socialization, and weak strategy of project initiators. The impact of resistance for the community has triggered the deformation and restructuring of power relation, conflict among people, and trauma. The resistance builds over time and there is a threshold for resistance which is a point of no return. Accordingly, the plan for geothermal development shall be prepared by integrating local people aspects and implementation of complementary nature of various kinds of planning into substantive of sector planning. [3]

9. CONCLUSIONS

The new Law Nr. 21/2014 and tariff regulation have indeed provided improvements to some of the issues that have hindered geothermal projects in Indonesia, namely distribution of authority of government institutions over direct and indirect use of geothermal resources,

[2] Asia Development Bank and World Bank, *Unlocking Indonesia Geothermal Potential*, 2015
[3] Dewi Yuliani, "*Dinamika Resistensi Komunitas Dalam Perencanaan,* Doctor Dissertation , Institut Teknologi Bandung , 2013

licensing procedures and resolving forestry issues in geothermal development. The declassification of geothermal as "mining activity" allows greater latitude for the geothermal development in the protected and conservation forests. However, the result remains to be seen, as the new law will require implementing regulations for execution.

Also, Indonesia needs to eliminate the inconsistencies in the law and regulation that have forestalled the development of a geothermal energy infrastructure. The GOI may still need to provide assistance in securing the land and in mitigating local people's resentment that have also hampered the development of the geothermal resources. Finally, given the importance of consensus, the plan for geothermal development shall be designed by integrating local people aspects.

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