Analysis of Indonesia and New Zealand geothermal regulation

B Bramantio*, S H Sumantri, S Thamrin and N A Sasongko

Energy Security, Indonesian Defense University, IPSC Area, Sentul, 16810, Indonesia

E-mail: bagusbramantio@gmail.com

Abstract. Regulation is the important things as the framework and reference for developer to conduct a business such as geothermal development legally in line. Geothermal regulation is needed in developing geothermal power plant as renewable energy from green energy for cleaner environment. The purpose of this research was to analyse the geothermal regulation in Indonesia and compare with New Zealand regulation. This research was conducted using a qualitative descriptive research method. The data used in this study were taken through in-depth interviews with an expert and literature study from various relevant sources data related with Indonesia and New Zealand geothermal regulation. One of geothermal regulation in Indonesia is related to the Geothermal Working Area (GWA), where basically issued from two regimes of geothermal law, that are GWA formed prior Act No. 27/2003 and GWA formed afterward Act No. 27/2003, those geothermal regulations was changed time by time. While New Zealand has regulations namely Resource Management Act (RMA) 1991 which is the main environmental law in New Zealand. Therefore, from this research was analysed that clear regulation is needed to conduct geothermal development which is more applicable and provide benefits to geothermal developers who are fully supported by the government and stakeholders.

1. Introduction

Geothermal resource represents a clean and renewable source of energy from various types of energy in the world. It can provide an alternative energy as a step towards achieving sustainable development to reduce the dependence on fossil fuel as primary energy for electricity generation. Indonesia is a country with enormous geothermal energy potential with approximately 40% of the world geothermal energy resources. With an impressive 23,765 MW potential, and about 1,189 MW has been installed in 2010 from existing Geothermal Working Area (GWA) and currently in 2020 only 2,130 MW has been installed from existing and new GWA, which is only less than 9% of 23,765 MW[1].

Recent technology, geothermal energy sources cannot be exported, their utilization is primarily intended to meet domestic energy needs that can provide added value in terms of optimizing the utilization of renewable energy sources in Indonesia[2]. Geothermal resources potential spreads along the entire trajectory of volcanoes in Indonesia which is usually found only in remote locations, therefore requires adequate facilities as well as infrastructure development. Due to their specific locations, they help to bring about numerous benefits to Indonesia through developing and improving people's standard of living, as a result of and implementation of geothermal development which must be conducted in accordance with the prevail rules.

This definition of energy security is contained in Government Regulation Number 79 of 2014 which discusses the National Energy Policy (KEN). New renewable energy developed to support national
energy security is one of the new renewable energy geothermal. Legislation in Indonesia derived in different forms, the types and official hierarchy of Indonesian legislation according to the Act No. 10/2004 can be identified as follows:

- Constitution of the Republic of Indonesia year 1945
- Act / Government Regulation in Lieu of Law
- Government Regulation (GR)
- Presidential Regulation (PR), previously also recognized as Presidential Decree (PD)
- Local Regulation (LR)

In the implementation, Government of Indonesia (GOI), through its technical departement or ministerial, may also issued certain implementing regulations, such as Ministerial Decree (MD), Ministerial Regulation (MR) and other implementing regulations, with the provision that the implementing regulations should not contradict with the higher level of regulation[3].

One of geothermal regulation in Indonesia is about Geothermal Working Area (GWA), where basically issued from two regimes of law, that are GWA formed prior Act No. 27/2003 and GWA formed afterward Act No. 27/2003 and currently is Act No. 21/2014, those geothermal regulations was changed time by time. While New Zealand has regulations namely The Resource Management Act (RMA) which is the main environmental law in New Zealand, which regulates environmental management and regulates water, land and water including geothermal fluid utilization since 1991.

2. Method
The data used in this study were taken through in-depth interviews with an expert and literature study from various relevant sources. This research using evaluation theory, the data and parameter will be adopted from appropriate resource, i.e., data analysis methodology, validation data, and other data related with Act No. 27/2003 and The Resource Management Act (RMA) 1991.

3. Results And Discussion
3.1. Regulatory prior act no. 27/2003
3.1.1. Resource owned by the state
The legislation related to the energy which is as basic law has stipulated in Constitution of the Republic of Indonesia year 1945 article 33 that the land, water and natural treasured resources within it are under the state ownership and utilized for the general prosperity of the community, and should be owned and managed by the state.

Establishment for the first Geothermal Law in 2003 (Act No. 27/2003). This regulation regulates the transition in humming schemes for Geothermal Working Area (GWA), where existing GWA consist of “Concession Authority” (owned by Pertamina/”Kuasa Pengusahaan”) and “Joint Operation Contract” (JOC) into New GWA through “Geothermal Business Permit (GBP/”IUP”)”, meanwhile currently (Act No. 21/2014) known as “Geothermal Permit” (GP/”IPB”). In Geothermal Law Number 27 of 2003, geothermal enterprising was still considered as mining activity, due to its correspondence to Mining Law, therefore geothermal development in conservation area is prohibited. Geothermal Working Area (GWA) is established by Central Government/ MEMR. Furthermore, Regional Government has the authority to announce and to conduct open GWA tendering in order to attract interest. Then Regional Administrator will issue GBP to the winner of GWA tendering process.

3.2. Regulatory Afterward Act No. 27/2003
3.2.1. New GWA
To meet the national energy demand and to support Presidential Decree No. 76/2000, Government of Indonesia (GOI) at that point had to enforce Act No. 27/2003 which is related to geothermal, where Pertamina no longer have a monopoly in the exploitation of geothermal energy. Exploration and exploitation can be conducted by any other legal entity. Legal entity is allowed to conduct the geothermal development activities in “New GWA” which will be established by government through minister. Minister of EMR (MOEMR) will make planning, preparation and determining of new GWA based on
reports of preliminary survey or exploration data. The GWA was formed later through Act No. 27/2003 hereinafter referred to as the “New GWA” [4].

3.2.2. Existing GWA. Act No. 27/2003
States that all cooperation contracts of the geothermal resources exploitation that existed prior to the enactment of this act shall have the power to continue to work until the expiration of the contract. In transitional provision article of Government Regulation No.70/2010 related on geothermal activities states if the existing GWA has not completed all exploitation activities up to 21 October 2010, otherwise the authority and the existing GWA shall be returned to the government [5].

3.2.3. Energy mix
Geothermal development is definitely addressed in Indonesian by Act No. 59/2007 which relates to geothermal business activities. Presidential Regulation No. 5/2006 related to national energy policies whose goals are materialization of optimal energy mix in 2025, namely the role of each type of energy relative to the national energy whose consumption of geothermal energy exceeds 5%, of oil less than 5%, of natural gas more than 30%, of fired coal more than 33%, of biofuel more than 5%, of new energy more than 5%, of liquefied coal and more than 2%.

3.2.4. Geothermal development activities in new GWA
It is stipulated in Act No. 27/2003 that sequence of geothermal development activities in Indonesia are classified into Preliminary survey, Exploration, Feasibility study, Exploitation, Utilization. According to Government Regulation No. 59/2007 as implementation of Act No. 27/2003, the preliminary survey (PS) will be conducted by government, and the minister may assign to “other party” to conduct PS. “Other party” is any business entity which has expertise and ability to carry out the assignment of preliminary survey, however the assignment of PS is not given directly to get the new GWA. Other party or business entity can obtain new GWA through the process of GWA bidding which is part of the requirements to obtain Geothermal Business Permit (GBP).

Some regulations were released asking more information related to geothermal implementation for new GWA. Ministerial Regulation of EMR No. 11/2008 related to procedure of determining the GWA, Ministerial Regulation of EMR No. 02/2009 related to guidelines for the assignment of geothermal preliminary survey from geology, geophysics, and geochemist analysis to submission of exploration long term plan to the government [7], and Ministerial Regulation of EMR No. 11/2009 related on guideline for the implementing of geothermal utilization.

According to existing regulations. i.e., Act No. 27/2003, Government Regulation No. 59/2007, Ministerial Regulation of EMR No. 11/2008, Ministerial Regulation of EMR No. 02/2009 related to the guidelines of assignment to geothermal preliminary survey, and Ministerial Regulation of EMR No. 11/2009 related to the implementation guidelines for geothermal activities from exploration phase to utilization phase [8], then by adopting the contents of existing legislation as mentioned, it is intended to draw flow chart representing the process of geothermal activities in new GWA which is divided in two ways:
- Geothermal development implementation of new GWA which PS by “government”.
- Geothermal development implementation of new GWA which PS by “other party”.

3.2.5. Environmental Impact Assessment (EIA)
Minister Regulation of Environment No. 11/2006 states that the type of business or activity must be complemented by EIA which is related to geothermal development activities conditions are: exploitation and geothermal energy development ≥ 55 MW, construction of transmission line ≥ 150 kV, and activities in protected forest area. In preparation of EIA has to be poured into sequence documents consisting of: Terms of Reference of EIA (TOR of EIA), Environmental Impact Statement (EIS), Environmental
Management Plan (EmaP), and Environment Monitoring Plan (EMoP)

Possible causes of delay from the time limit can be derived from several factors such as lack of environmental impact analysis assessment system, lack of competency assessment and environmental impact analysis author, or the bureaucracy or political factors and inconsistency of policy between province and district level. In addition there are constraints on the approval of the EIA has not been fully integrated with the process of development activities permitting plan, so there is no clarity whether the EIA can be used to reject or approve a plan of development activities. EIA document is expected to minimize the negative impacts generated by the activities, and maximized the positive impacts to achieve the development of geothermal source as environmentally friendly. Those potential impacts will require some mitigation and monitoring measures that will be contained in the document of EMoP & EMaP, and for smaller scope projects will be summarized as a unity in the document of EMaE & EmoE. Environmental issues have the potential sensitivity to the parties of community which will be affected by the project.

3.3. New Zealand Geothermal Regulation

In general, as the identified in this research of article which shows the synchronization between planning activities and regulatory framework is an important factor in considering ways to enhance the development in Indonesia. With this in mind, it is necessary needed to find out the application of geothermal regulatory in New Zealand as reference with an experienced country in geothermal development for more than 60 years. In 2011, renewable energy resources contributed to 77% for New Zealand’s electricity generation output where 10% from geothermal energy, however the Government have released the New Zealand Energy Strategy in 2007 whose target is generating 90% from renewable source by 2025. One of the reasons that geothermal development is increasing is its initial developments on geothermal fields has given investors sufficient confidence to warrant further expanded investment in proven sites [10].

3.3.1. Resource Management Act (RMA) 1991

The Resource Management Act (RMA) 1991 is the principal environmental legislation in New Zealand, which is an integrated outline for the environment management and sets about air, land, and water including geothermal fluid utilization [4]. The purpose of the RMA is to endorse the management of natural and physical resources sustainability.

The RMA is effects-based, which manages the effects of activities and typically the legislation that applies for applying resource consent to undertake an activity that may affect the environment. Each regional council has responsibility to ensure sustainable management of natural and physical resources in its region. The application of RMA is an initiation in the policy documents of the regional and district councils to which the RMA delegates its purposes, responsibilities and authorities [3]. The Regional Council has to developed the Regional Policy Statement (RPS) and Regional Plan (RP) where deliver the outline of the integrated resource management issues for the natural and physical resources of the region, and policies to regulate activities by providing methods about utilization of natural and physical resources [9].

3.3.2. Geothermal System Classification

Waikato Regional Council (WRC) is one of regional councils that was formed in 1989 and responsible for 70% of the geothermal resources in New Zealand. In order to develop and use geothermal resources prompted Environment Waikato through the plan and RPS has classified the geothermal systems region into five categories [6]: development system, limited development system, research system, protected system, and small system

3.3.3. Resource Consents

In order to conduct the “development system” of geothermal will require the “resource consent” that has to be fulfilled by the developer. Resource consents are permits that allow you to use or take water, land
or coastal resources, the discharge of water or wastes into air, water or onto land. Resource consents include special conditions to protect the natural and physical resources environment. There are five types of resource consents that will be issued by WRC [6], among them: land use consents, water consents, discharge consents, coastal consents, subdivision consents.

The developer can apply for the resource consents into 2 (two) pathways, by applying to the Regional Council (RC) and District Council (DC) as known by “standard” process, or applying to the Environmental Protection Agency (EPA), to be heard either by a Board of Enquiry or the Environment Court as known by “call-in” process. The call-in process is for national importance matter.

3.4. Comparison with the Indonesian geothermal regulations

Every permit associated in Indonesian and New Zealand geothermal development activities has been set in separately and sequentially regulation, and each permit application has its own requirements and different process which must be approved by the relevant authority. It has been argued that geothermal development relevant to the permits lacks certainty in time of permit process, thus the problems which were identified in the projects included time delays in the process of issuance of permits and the high costs associated to the delay time. Meanwhile, New Zealand is protected by broad for environmental management legislation in Resource Management Act 1991 due to geothermal energy are treated as water, therefore not owned by the Crown. As comparison the implementation of geothermal regulation between Indonesia and New Zealand will be interpreted in Table 1.

| Comparison          | Indonesia                                                                 | New Zealand                                                                 |
|---------------------|---------------------------------------------------------------------------|----------------------------------------------------------------------------|
| Regulation related permission or consent | • The official hierarchy of Indonesia legislations that associated with geothermal energy development are:  
    – Constitution of the Republic of Indonesia year 1945  
    – Act (Act No. 27/2003)  
    – Government Regulation (GR)  
    – Presidential Regulation (PR), previously also recognized as Presidential Decree (PD)  
    – Ministerial Regulation (MR)  
    – Local Regulation (LR)  
    • There are also other implementing regulations recognized and have legal binding force that are commanded by the higher legislations and not contradictory to the laws, and each permit will be associated with appropriate regulation, and will be approved by the head of institution or agency with their authority | • The Resource Management Act (RMA) 1991 is the principal environmental legislation the taking and use of geothermal fluid and energy  
    • The detail of legislation is found in the policy documents of the regional and district councils, to which the RMA devolves its functions, powers and duties  
    • Application of the RMA integrated management is interpreted at regional council through Regional Policy Statement (RPS) and Regional Plan (RP) |
| Geothermal Working Area | • GWA in two regimes by “Existing GWA” and “New GWA”  
    • “Existing GWA” issuance from the Minister of Mining and Energy  
    • “New GWA” issuance from the Minister of EMR  
    • Bidding process for “new GWA” by bidding committee consisting of the agency representatives from provincial, district and municipality  
    • GBP for “new GWA” granted by the minister, governor, regent or mayor in accordance with his authority | • Geothermal projects operated under “resource consent” applied to undertake an activity that may affect the environment  
    • There is no bidding system for geothermal energy resource development  
    • “Consent Resource” application by applying to the Regional Council (RC) and District Council (DC) for “standard” process, or applying to the Environmental Protection Agency (EPA) for “call-in” process  
    • Planning document for propagate “resource consent” generally consist of:  
    – Resource Consent Application (RCA)  
    – Assessment Environmental Effect (AEE)  
    – System Management Plan (SMP) |
Table 1. (Continued)

| Public consultation, notification, submission, decision and appeal | Environmental |
| --- | --- |
| - Public notification and consultation will be conducted as part of process for EIA and land acquisition activities | - Environmental based on baseline, potential impact, mitigation and monitoring |
| - The opinion from public will be considered in accordance with laws and regulations | - In two pathways through “EIA” or “EMaE & EMoE” |
| - There are not phases for submission, decision and appeal | - EIA consists of: |
| |  - TOR of EIA |
| |  - EIS |
| |  - EMaP |
| |  - EMoP |
| | - “Consent of TOR of EIA” issuance by the environmental agency |
| | - “Consent of EIA” issuance by environmental agency |
| | - “Consent of EMaE & EMoE” issuance by the environmental agency |
| | - The “environmental agency” which is divided into: |
| |  - In central is The MOE |
| |  - In regional is The Governor / Regent |
| Public consultation is not mandatory | Environmental assessment based on potential effects, mitigation, and monitoring |
| Resource consent applications would be “publicly notified” to community who are likely to be directly affected | As part of AEE and SMP, which are included in consent resource planning document |
| “Submissions” can be made in support, in opposition, or neutral to the application | The SMP will be reviewed by peer review panel |
| If there is in “opposition submissions”, then a “hearing” is required | |
| “Decision” in “standard” process will be made through: |
|  - Regional and District Council, if there was no submission |
|  - Hearing Committee, a hearing was held |
|  - Environment Court, if there was appeal |
| “Decision” in “standard” process will be made through: |
|  - the Minister for the Environment may decide in cases of national importance to appoint a Board of Enquiry (BOE) or require the Environment Court (EC) to hear the application |

4. Conclusion

Geothermal energy is one of renewable energy that potentially can be developed in Indonesia with enormous geothermal energy for substantial resources to contribute to the national electricity demand and government roadmap target. With the obstacles in permitting geothermal development in Indonesia, this will have an impact on national energy security in terms of the new renewable energy mix. The central and local government relations that have not been optimal integrated between the upstream and downstream, such as: the readiness of local regulations regarding the GWA auction, the auction committee and the supervisory.

Implementation of geothermal development in New Zealand has been supported by a central government legislation and regulation of its implementation in the region, where the rule set is an integrated system in the permitting process for development of geothermal power production. The recommended improvement in the regulations should be easily understood and can be applied. Integrate the permits system associated with development of a geothermal system into a one stop service, like in New Zealand where all relevant licenses are packaged in a resource consent application process with involved and supported of all stakeholders.

References

[1] Tetty M R 2017 *National Resilience Journal* 23 217-237
[2] Setyaningsih W 2011. *The Potential of the Gedongsongo Geothermal Field as an Alternative Energy Source and Supporting the Regional Economy* (Semarang: Unnes)
[3] Setyawan Agus 2019 *Geothermal Energy* of *geophysics* (Semarang: Universitas Diponegoro)
[4] Act No. 27 2003 Related to the Geothermal
[5] Government Regulation No.70 2010 Related to the Amendment of Government Regulation No.59 / 2007 Related on Geothermal Activities
[6] Luketina K 2010 *Sustainability and the Democratic Process*

[7] Ministerial Regulation of Energy and Mineral Resource No. 02 2009 *Related to the Guidelines of Assignment to Geothermal Preliminary Survey*

[8] Ministerial Regulation of Energy and Mineral Resource No. 11 2009 *Related to the Implementation Guidelines for Geothermal Activities*

[9] Waikato Regional Council 2012 [http://www.waikatoregion.govt.nz](http://www.waikatoregion.govt.nz)

[10] White B R 2009 *Upcoming Geothermal Energy Development In New Zealand*

**Acknowledgements**

We sincerely thank all colleagues and stakeholders for sourcing the data, making the data compatible and persistence also sincerity to arrange this article to be good for publishing. We also thank the anonymous referees for their helpful comments on a previous draft until publishment.