INDONESIA'S GEOTHERMAL ENERGY: CURRENT CONDITIONS AND CHALLENGES DEVELOPMENT

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Abstract

Indonesia has abundant geothermal potential is mostly spread along the volcanic line starting from the island of Sumatra, Java, Bali, NTB, NTT, North Sulawesi and North Maluku. In addition to the volcanic line, Indonesia also has a type of non-volcanic geothermal scattered in Bangka-Belitung, Kalimantan, Sulawesi, Maluku and Papua.

Current conditions, the utilization of geothermal energy for electricity remains very low, amounting to 1493.5 MW or still less than 5% of the total potential of geothermal resources in Indonesia. The low installed capacity generated from geothermal power plants is because of many obstacles faced in its development.

The government seriously and constantly strive to accelerate the development of geothermal Indonesia to create programs that accelerate the development of national power through the National Energy Policy in order to find appropriate solutions to the problems encountered.

Keywords: geothermal energy, potential, volcanic, non-volcanic, installed capacity, national energy policy.

INTRODUCTION

Indonesia has geothermal resources are very large, spread over Indonesia Region.The potential of geothermal resources such great a gift and a challenge for the Indonesian nation. The Indonesian government has targeted the development of geothermal Indonesia amounted to 7,200 MW in 2025 and 16,500 in 2050 according to the scenario development of geothermal plants in the National Energy Policy.

Currently, the potential of geothermal resources are very large are yet to be fully utilized to electrical energy, only 1493.5 MW of electricity generated from power plants, or about 5% of

the geothermal resources available. This is due to the many obstacles encountered in the development of geothermal energy resources both in terms of resources or of the business has.

The Government intends that the development of geothermal energy in Indonesia to run well, so the geothermal role as a pillar of national energy security. It is seen through the establishment of Presidential Decree No. 5 of 2006 on National Energy Policy. In the Presidential Decree, the Government targets the contribution of geothermal energy in 2025 amounted to 5% of national energy consumption, equivalent to 9,500 MW. Furthermore, in Government Regulation No. 79 Year 2014 on National Energy Policy, the government based on the results of the evaluation and studies targeting about 7,200 MW comes from geothermal power plants, this figure is more realistic given the many obstacles in the development of geothermal energy in Indonesia.

CURRENT CONDITIONS OF GEOTHERMAL ENERGY INDONESIA

Based on the results of geological, geochemical, geophysical and / or drilling, until recently (status August 2016) in Indonesia there are 330 geothermal sites. This location is spread mostly along the volcanic line starting from the island of Sumatra, Java, Bali, NTB, NTT, North Sulawesi and North Maluku. In addition to the volcanic line, Indonesia also has a type of non-volcanic geothermal scattered in Bangka-Belitung, Kalimantan, Sulawesi, Maluku and Papua. Estimated total Indonesia's geothermal energy potential of about 30,000 MW of approximately 11,500 MW including 18,500 classes of resources and reserves, including class, in more detail as shown in Figure 1 and Table 1.

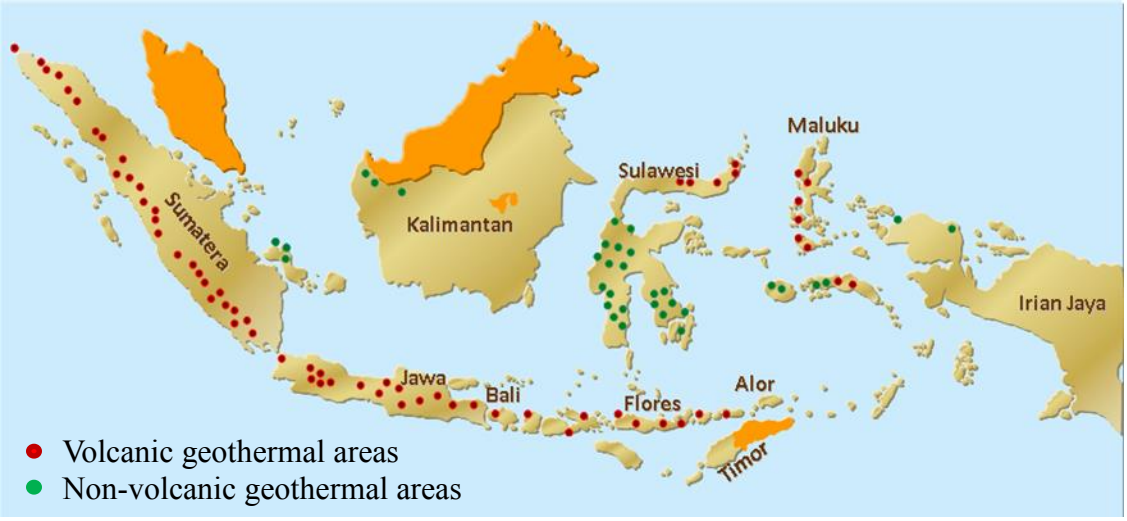


Figure 1. Map of Indonesia's geothermal potential (status, August 2016)

Table 1: Potential of Geothermal Indonesia (status, August 2016)

No	Island	Number of Locations	Energy (Mwe)					Installed	Total
			Recources		Reserves				
			Speculative	Hypothetic	Possible	Probable	Proven		
1	Sumatera	97	3191	2032	5982	930	917	177	13052
2	Jawa	73	1460	1739	3868	1373	1865	1224	10305
3	Bali	6	70	22	122	110	30	0	354
4	Nusa Tenggara	27	225	409	829	0	15	12.5	1478.5
5	Kalimantan	14	152	30	0	0	0	0	182.5
6	Sulawesi	77	1221	318	1441	80	140	80	3200
7	Maluku	33	560	91	800	0	0	0	1451
8	Papua	3	75	0	0	0	0	0	75
Total		330	6954	4641	13042	2493	2967	1493.5	30097
			11595		18502				
			30097						

Today, the installed power capacity in Indonesia amounted to 1493.5 MW originating from eleven geothermal power plants, namely: 1) Ulu Belu geothermal power plant (165 MW), 2) Sibayak geothermal power plant (12 MW), 3) G. Salak geothermal power plant (377 MW), 4). Lahendong (80 MW), 5) Geothermal Patuha (55 MW), 6) Wayang Windu (227 MW), 7) Geothermal Darajad (148 MW), 8) Geothermal Kamojang (235 MW), 9) Dieng (60 MW), 10) Ulumbu (10 MW), and 11). Mataloko geothermal power plant (2.5 M. shown in Figure 2.

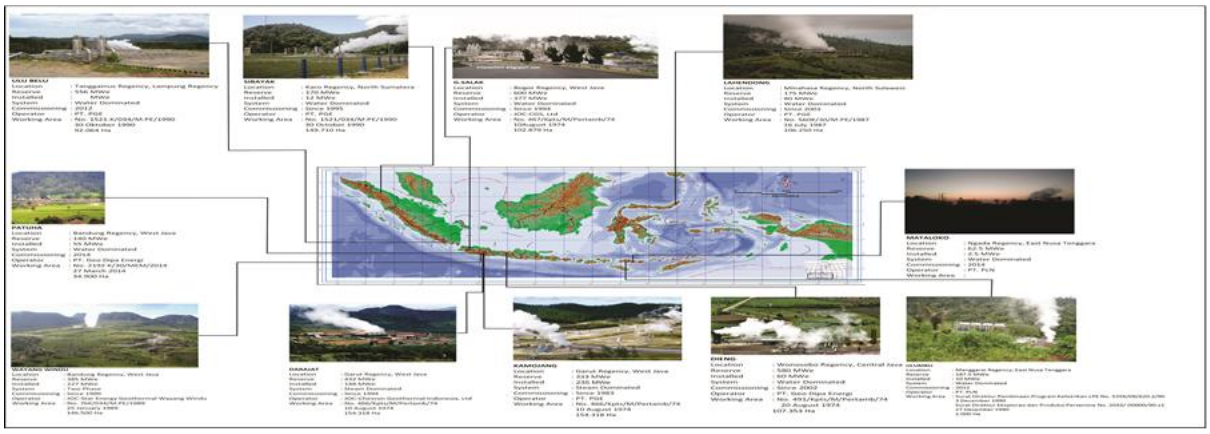


Figure 2. Geothermal power plants and installed capacity in Indonesia (status, August 2016)

GEOTHERMAL DEVELOPMENT

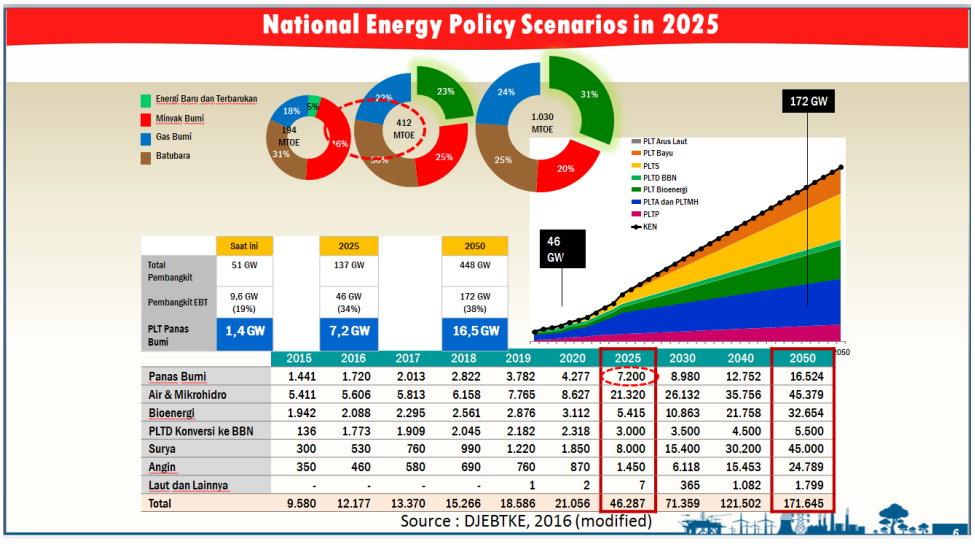
Indonesia's geothermal energy potential which is large is a blessing and a challenge for the whole Indonesian nation. Support and role of government is needed to encourage increased energy needs environment-friendly and sustainable.

Although the activities of the development of geothermal Indonesia is long enough to do, but the government's involvement started in 1975, with the commencement of exploration

Kamojang by Pertamina, which continued with the operation of mono block Kamojang with a capacity of 250 kW in 1978 and then in the early '80s was inaugurated plant geothermal Power plant (PLTP) Kamojang unit-1 with a capacity of 30 MW which is the first geothermal power plant in Indonesia.

Until now, it was about four decades geothermal development underway in Indonesia, but the development of geothermal utilization for new geothermal power plants generate electricity by 1493.5 MW or still less than 5% of total Indonesia's geothermal potential is identified. Despite the issuance of the Law on Geothermal No. 27 of 2003 with all the rules below, but until now there is no electricity production from the new fields of the Act, only recently geothermal field trials Mataloko generate 2.5 MW of electricity. Furthermore, the government issued Law No. 21 Year 2014 regarding Geothermal in lieu of Law No. 27 of 2003. The Government is currently finalizing the rules below with regard to the issuance of the Law on Geothermal, expected in the not long before all the rules have been settled.

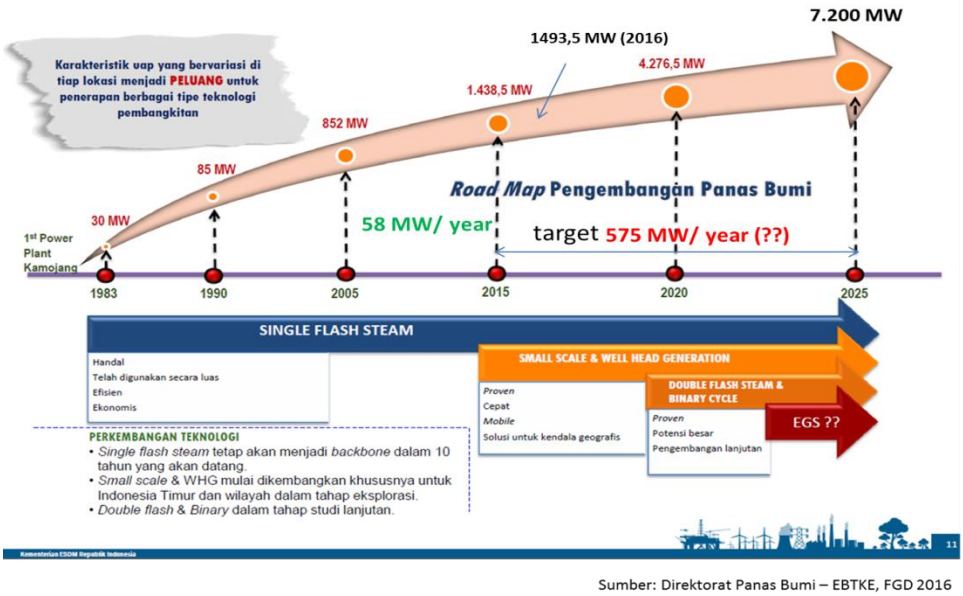
The Indonesian government has a huge desire for the development of geothermal Indonesia, it is stipulated in Presidential Decree No. 5 of 2006 on National Energy Policy, by targeting the contribution of geothermal energy in 2025 amounted to 5% of national energy consumption, or about 9,500 MW. Furthermore, in Government Regulation No. 79 Year 2014 on National Energy Policy of government based on the results of evaluations and studies targeting about 7,200 MW by 2025 comes from geothermal power plants, this figure is more realistic given the many obstacles in the development of geothermal energy in Indonesia, shown in Figures 3 and 4.



	Saat ini	2025	2050
Total Pembangkit	51 GW	137 GW	448 GW
Pembangkit EBT	9,6 GW (19%)	46 GW (34%)	172 GW (38%)
PLT Panas Bumi	1,4 GW	7,2 GW	16,5 GW

	2015	2016	2017	2018	2019	2020	2025	2030	2040	2050
Panas Bumi	1.441	1.720	2.013	2.822	3.782	4.277	7.200	8.980	12.752	16.524
Air & Mikrohidro	5.411	5.606	5.813	6.158	7.765	8.627	21.320	26.132	35.756	45.379
Bioenergi	1.942	2.088	2.295	2.561	2.876	3.112	5.415	10.863	21.758	32.654
PLTD Konversi ke BBN	136	1.773	1.909	2.045	2.182	2.318	3.000	3.500	4.500	5.500
Surya	300	530	760	990	1.220	1.850	8.000	15.400	30.200	45.000
Angin	350	460	580	690	760	870	1.450	6.118	15.453	24.789
Laut dan Lainnya	-	-	-	-	1	2	7	365	1.082	1.799
Total	9.580	12.177	13.370	15.266	18.586	21.056	46.287	71.359	121.502	171.645

Figure 3. Scenario National Energy Policy in 2025



Sumber: Direktorat Panas Bumi – EBTKE, FGD 2016

Figure 4. Roadmap Geothermal Indonesia

Based Geothermal Law number 21 of 2014, Geothermal Business activities for utilization of indirect (electricity) include: exploration, exploitation and utilization. In general flow of Geothermal Business activity are as follows: Government and / or the appropriate local government authority did Preliminary Survey. The government can also perform geothermal exploration activities in order to help reduce the risk of geothermal investment that may occur. The results of these activities serve as the basis in placing the Geothermal Working Area (WKP) by the Government. Preliminary government in conducting surveys or preliminary survey and exploration may assign other parties / Enterprises. Furthermore, Enterprise License holders Geothermal (IPB) shall conduct Exploration, Exploitation and Utilization of the Operational Area, shown in Figure 5.

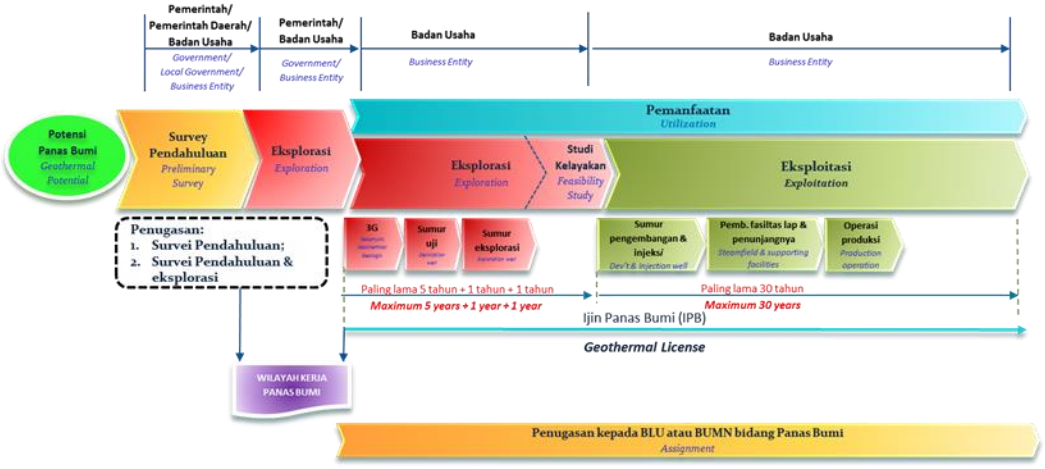


Figure 5. Flow Indonesia Geothermal Business activity

GEOTHERMAL WORKING AREA (WKP)

Efforts to achieve the targets as set out in the National Energy Policy and realizing the plan as stated in the road map of geothermal is to boost the production of electricity from existing WKP and set new WKP to be developed, in pursuing the goal of adopting WKP new Government and / or the regional government Preliminary surveys or conduct geothermal exploration in all areas of Indonesia. In accordance with their mandate, the Agency for Geology and Mineral Resources was appointed as representing the Government in conducting research, survey and exploration in an effort to improve the quality and quantity of data geothermal to reduce the risk of investment in the upstream. The government can also commissioned Preliminary survey or preliminary survey and exploration to other parties or entities that engaged in the geothermal field.

Data and information geoscience result of of this survey and other data (especially land use) will be used as the basis for the preparation and establishment of WKP. WKP ordinances already regulated by the government through the Minister of Energy and Mineral Resources No. 11 of 2008. Currently, the number of Work Areas Geothermal Indonesia amounted to 69 WKP which consists of 19 existing WKP (before Law No. 27 of 2003) and 50 new WKP (after Law No. 27 of 2003) in the hope of generating electrical energy respectively 1715 MW and 3376 MW. To meet the target of 7200 MW by the year 2025 still takes about 8 new WKP until 2018, shown in Figure 6.

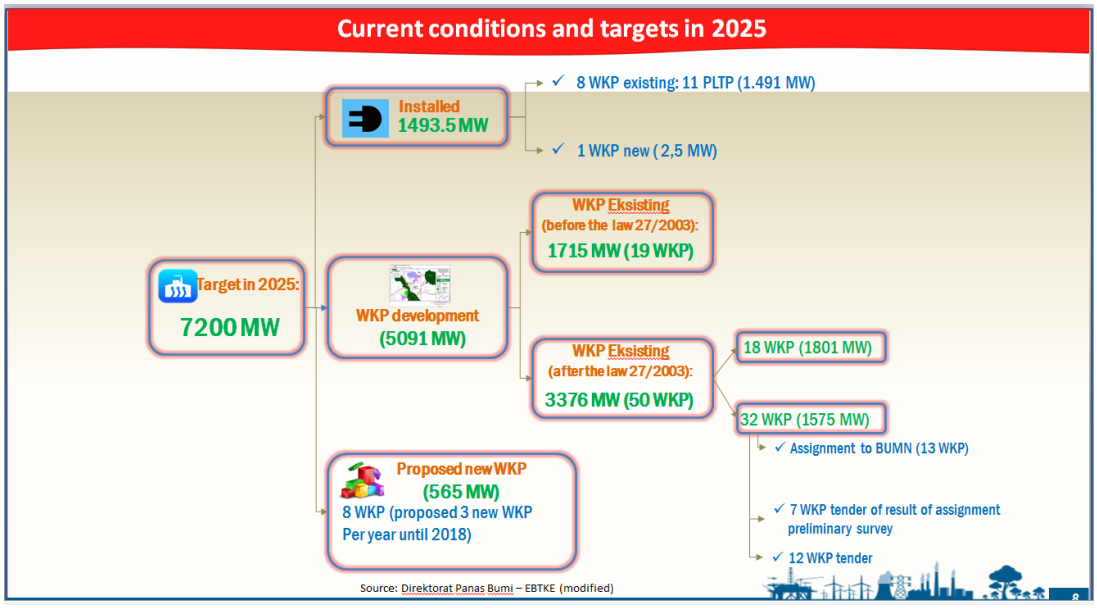


Figure 6. Current conditions and targets in 2025

BARRIERS

Current conditions, the utilization of geothermal energy for electricity remains very low, amounting to 1493.5 MW generated from eleven of geothermal power plants. Not achieving the target of installed geothermal capacity in addition due to licensing constraints, land, selling price negotiations with PLN developers, and clashes between laws. In addition, management is quite complex because across ministries, among others the Ministry of energy and mineral resources, the Ministry of Environment and Forestry, the Ministry of Finance, the Ministry of state-owned enterprise, and even local governments.

GOVERNMENT EFFORTS IN DEVELOPING GEOTHERMAL

The Government intends that the development of geothermal Indonesia can work well, so that geothermal can act as a pillar of national energy security. It is seen through the establishment of Presidential Decree No. 5 of 2006 on National Energy Policy. In the Presidential Decree, the government expects the contribution of geothermal energy in 2025 amounted to 5% of national energy consumption, equivalent to 9500 MW. Furthermore, the Government seriously and constantly strive to accelerate geothermal development by finding appropriate solutions to overcome existing problems, including the issuance of Law No.21 of 2014 on Geothermal giving a greater role to the Government in the development of geothermal and Minister of Energy and Mineral Resources No. 17 on Purchase of Electricity from Geothermal Power Plants and Geothermal Steam for Geothermal Power Plant by State Electricity Company (PT PLN), it is expected to attract businesses to develop geothermal Indonesia. Currently, from the regulatory side is completing rules related to geothermal development, such as the revision of Government Regulation on. Geothermal, plans to revise/ replace regulations on the price of electricity with feed in tariff and others.

Besides through preparation, determination, and the new WKP tender, to accelerate the development of geothermal energy government also accelerated power development program of 10,000 MW phase II which is based on Presidential Decree No. 4 Year 2010. Presidential Decree will become the foundation for accelerated development of power plants that use renewable energy, coal, and gas by 2014. Geothermal energy as the one included in the category of renewable energy had a role in the 3977 MW power plant project development acceleration electricity. But many obstacles in its development, so that the accelerated development of 10,000 MW power plant is not reached.

Furthermore, the Government launched the construction of 35,000 MW Electricity Project in the period 2015-2019, of which 1,160 MW comes from geothermal electricity (PLTP), many people are pessimistic about the program will be achieved. Doubt was constituted by the delay in power projects of 10,000 MW (fast track program / FTP) stages I and II, the necessary breakthroughs that 35,000 MW Electricity Project can be realized.

Government based on the results of the evaluation and assessment of the electricity development program, especially from geothermal energy trying to be more realistic in electricity set a target to be achieved in the development of geothermal energy in the future. This was stated in the scenario of the National Energy Policy and the Road map geothermal targeting around 7,200 MW to be generated from geothermal power plants by 2025.

The government made efforts breakthrough in accelerating the development of electrical energy derived from geothermal power plant in order to realize the target of 7,200 MW by 2025, as follows: 1) Assignment of geothermal on State-Owned Enterprises (BUMN) / Public Service Agency (BLU); The government will give Assignment of State-Owned Enterprises (BUMN)/ Public Services Agency in the field of geothermal to develop Geothermal Working Area (WKP) without a bidding process, 2) Preparation of geothermal electricity pricing policy scheme Feed-in Tariff (FIT); The price of electricity Geothermal will be established by the Government (FIT with sliding mechanism price) so that the tender phase WKP based work plans and commitments Exploration, and 3) Assignment Preliminary Survey (PSP) + Exploration (PSP + E) Government opens opportunities for developers to get the Assignment Preliminary Survey and conduct exploration. Developers get the privilege in the auction stage through the mechanism of direct election. In addition, the government tried to supplement the data with drilling exploration (deep slim hole / standard hole) prior to the auction WKP in the future, so as to reduce the risk of geothermal resources.

CONCLUSION

Indonesia's geothermal development still face many obstacles in its development, both in terms of resources and Geothermal Business. This condition is a challenge for the Government in realizing the targets that have been implemented through the National Energy Policy, which is about 7,200 MW by 2025. It takes effort breakthroughs to accelerate geothermal development in Indonesia.

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