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Current Status Geothermal Energy in the Indonesia: Exploring Issues and Solutions

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ABSTRACT

Geothermal energy is a renewable resource that is environmentally friendly (clean energy) compared with fossil energy sources. Based on data from the Indonesia National Geological Agency (INAGA), the potential for geothermal approximately 28.994 MWe (equivalent to 13 billion in the oil, which is the largest in the world). However, the realization of most of the geothermal power plant project does not go as planned. Problems often arise in the development of geothermal inventoried in 6 strategic issues, namely, 1) the data is not adequate (technical), 2) the length of the stages of PSP procedures, 3) overlapping forestry land, 4) investment less attractive, 5) prices have not yet reached the economic, 6) negotiations take a long time, it is necessary to find a solution on each strategic issue. Comparison purposes geothermal electricity production countries, namely the USA and Philippines. The results of this analysis can be a benchmark for geothermal solutions to problems in Indonesia.

1. INTRODUCTION

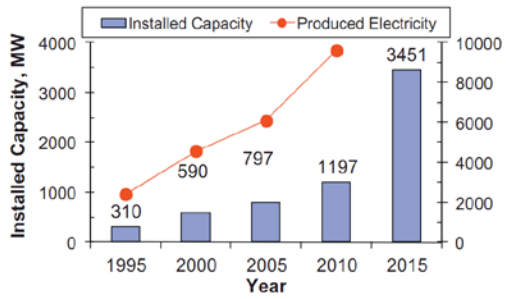


Figure 1. Installed capacity and electricity in Indonesia (Bertani, 2012)

Geothermal energy is a renewable resource that is environmentally friendly (clean energy) compared with fossil energy sources. Based on data from the National Geological Agency of Indonesia (NGAI) , the potential for geothermal approximately 28.994 MWe (equivalent to 13 billion in the oil , which is the largest in the world) . There are 256 potential geothermal areas , 84 locations located in Sumatra , Java located in 76 locations , 51 locations located in Sulawesi , 21 locations located in Nusa Tenggara , Papua, located in 3 locations , 15 locations located in the Moluccas , and 5 locations located in Borneo (Surya , 2010) . Of the total potential is only 4 % (1,196 MWe) which has been used as electrical energy and accounts for about 2 % in electrical energy consumption nationwide. However, as evident from (**Figure 1)** this tremendous increase in installed capacity in only five years is unlikely. A value in the range of 2-2.4 GW can be considered as an affordable and realistic goal. In the last five-years term (2005-2010), the installed capacity increase of 400 MW, corresponding to an increment of about 50%. With the issuance of the Minister of Energy and Mineral Resources (ESDM) No.2/2010 mentioned power plant to be developed to 2014 from a total capacity of 10,153 MW , geothermal (geothermal) used by 39 percent of the composition of primary energy in development projects of 10,000 MW phase II.

2. DEVELOPMENT OF INDONESIAN GEOTHERMAL INDUSTRY (Surya, 2010)



Figure 2. Geothermal development and project opportunities in Indonesia

Indonesia has embarked on a geothermal power plant construction and exploration. Di tahun 2005, ada beberapa plants dalam tahap commissioned yaitu 110 MW at Derajat, 117 MW at Wayang Windu, 2x20 MW at Lahendong, 60 MW at Kamojang, and 10 MW at Sibayak, reaching a total installed capacity of about 1.2 GW (including the upgrading of the six units of Salak, 60 MW and two in Darajat, 15 MW). The few who had reached the geothermal production stage include: Sibayak (12 MW), Kamojang (210 MW), Wayang Windu (220 MW), GN Salak (360 MW), Darajat (255 MW), Dieng (60 MW), Ulumbu (2.5 MW), Mataloko (1.5 MW), Lahendong (80 MW).

2.1. New areas

At Sarulla, in North Sumatra, the development of three 110 MW projects has been assigned to an international consortium, including Medco Power, Itochui, Ormat, Kyushu Electric, and Pertamina as field operator. The plan is to reach 330 MW in 2013.

In Central Sumatra, Hulu Lais field has been explored and a development plan has been initiated.

In Ulu Belu, South Sumatra, the liquid reservoir at 240-260 ^{0}C is at an advanced exploration stage, and four 55 MW unit will be commissioned in the coming years. A similar development is scheduled for the areas of Lumut Balai and Sungai Penuh, where the first units are expected in 2012.

At Pathua, Java, the original exploration was done before the economic crisis. After the arbitration, the resource

was transferred to Geodipa. Three 60 MW units are planned, with the first 30 MW for 2012.

Finally, in Sulawesi two new projects at Kotamobagu and Tompasu identified a 250-290 ^{0}C reservoir; 120 MW in total are planned.

3. ISSUES AND SOLUTIONS

Development of geothermal working areas (geothermal) with a total capacity of 2,500 megawatts (MW) is still hampered. Fact until 2025 the government targeted the development of installed capacity of geothermal power plant (PLTP) of 6,500 MW in Indonesia. However, the realization of most of the thermal power plant project does not go as planned. Problems often arise in the development of geothermal inventoried in 6 strategic issues, namely, 1) the data is not adequate, 2) the long-term of the stages of PSP procedures, 3) overlapping forestry land, 4) investment less attractive, 5) prices have not yet reached the economic, 6) negotiations take a long time, it is necessary to find a solution on each strategic issue.

3.1. the data is not adequate

Majority of geothermal resources are in / near the national park and protected area. Need for cross-sectorial coordination role functioning planning work with relevant units (Geological Agency, Legal and Public Relations, Government, etc.). The results of this cross-cutting work planning is established in the Act clear , so the success of the hot tapped earth is not free from government work units alone , but the business sector , civil society organizations and local communities . The success of cross- sectorial work plan has been implemented in Philippines country.

In addition, issues concerning the data are still not adequate for at least the HR expert geothermal. Indonesia is still a shortage of experts in the field of reservoir engineering techniques and cures. The New Zealand government seeks to return to the geothermal business in Indonesia through human resource development. The human resource development program has been conducted since the last 2 years and Indonesia would get more education than cooperative this time. With the improvement of Indonesian human resources would facilitate the development of geothermal power plants projects so that other developer. will have no difficulty getting workers.

3.2. The long-term of the stages of PSP procedures

Preliminary Survey Assignment (PSP) are activities involving the collection, analysis, and presentation of data related to information geological, geophysical, and geochemical data to estimate the location and existence of geothermal resources and work area. Stages PSP procedure is currently considered optimal. PSP can be proposed governor, regent / mayor / BU to do SP. Director General preparing assignments SP region. Then the minister set the SP region after the director general assignment offers PSP area and last announcements through print, electronic and other media or promotion in national and international forums.

The Long-term stages of the PSP procedure less attractive to investors. Need for revision regulation of the Minister of Energy and Mineral Resources No. 02/2009 on Guidelines for Preliminary Survey Assignment.

3.3. Overlapping forestry land

One of the geothermal potential of the characters are quite unique as well as a challenge for Indonesia is the location of geothermal resources in the area of protected debt. Approximately 42 % or more than 12 GW of total geothermal resources located in Forest Protected Areas (Ministry of Energy and Mineral Resources 2012) are protected under the Law of the Republic of Indonesia. Eight articles in Law No.27/2003 on geothermal ready revised. The articles will be revised are considered a barrier to develop geothermal energy.

The article not only changed, but there are additions to certain points. In addition, there is a word that is removed is ' mine ' are almost in every chapter. This change in order not to clash with Law No.5/1990 on the Conservation of Natural Resources and Law No.41/1999 on Forestry Conservation Area . In addition , the need for preparation NSPK (Norms, Standards , Procedures , and Criteria) as well as legislation governing local government licensing commitments regarding completion of geothermal utilization.

3.4. Investment less attractive,

Investments in the form of Foreign Direct Investment (FDI) believed to be very potent in accelerating the phase II program of 10,000 Mw. Efforts to attract foreign investors to invest in Indonesia is still one of the government's agenda , especially foreign direct investment (Foreign Direct Investment) FDI which has close economic ties with Indonesia (Rahayu 2005) . Presence of foreign capital into a source of energy, especially in the field of technological development, the growth of exports and employment. That the need for efforts to attract investment for the creation of pro-growth and pro-job, one of them with incentives.

Provision of tax incentives is a policy or discretion can apply for a business sector. Types of tax incentives are applied in Indonesia and is best suited for the energy industry sector of corporate FDI Incentives for investment is a reduction of net income , due to the tendency of investors prefer to receive incentives directly reduces the tax burden than other forms of incentive tax burden reduction is only temporary . Giving incentive tax exemption has been done in the Philippines that make use of geothermal energy to 1930.89 megawatts (MWe) which is about 70 percent of its total geothermal .

3.5. Prices do not achieve of economies

Determination of the current electricity tariff refers to the general rules of the electricity industry, starting with calculating the allowable cost. PLN as a single buyer cost. Cost determines an efficient and reasonable in setting the price of electricity to customers. Allowable costs are direct costs and indirect agreed as a key element in the production process of electricity supply that is fair and just charged to the customer. The concept is only allowable costs used to calculate the selling price of electricity, and is not a picture of the results of operations of PLN as generally reflected in profit / loss. By using the concept as a basis for calculating allowable cost of electricity , then the customer will only pay / bear the costs associated with the production of electricity is consumed and does not have to also bear the costs PLN unproductive . On the other hand, it shall also be calculated revenue requirement PLN.

Requirement revenue is total revenue required by PLN in order to obtain a reasonable rate of return on the investment effort. But the priority electricity tariff (TDL) that PLN cannot cover all expenses, let alone make a profit . Therefore, the Revenue Requirement does not underlie the

formation of TDL consideration. For the current electricity tariff calculation that has not been in accordance with the economic value of electricity and not attractive to investors. TDL apply uniform (centralized), but every region has been characteristic are not uniform. In line with the decentralization mechanism for regional development and decentralization of authority in the mechanism, then the appropriate local government policies to spur investors to jointly meet the expected electricity demand.

3.6. negotiations take a long time

The main obstacle is the development of geothermal contract negotiations take a long time especially negotiating the price of geothermal electricity. Obscurity geothermal electricity price negotiation is a risk and that risk is a cost for investors. The solution is above the government must ensure the feasibility of the PLN, the government through the PMK No.139/PMK.011/2011. In addition to the standard criteria for preparing the feasibility of obtaining assurance (JKU) is required to meet the needs of developers.

4. CONCLUSIONS

Development of geothermal working areas (geothermal) with a total capacity of 2,500 megawatts (MW) is still hampered. As for some of the constraints in the development of geothermal energy in Indonesia, inventoried in 6 strategic issues, namely, 1) the data is not adequate (technical), 2) the length of the stages of PSP procedures, 3) overlapping forestry land, 4) investment less attractive, 5) the price yet achieve economics, 6) negotiations take a long time.

In each issue has a different solution anyway. This issue over a non-technical solution. Such as changing the policy direction geothermal act. It is expected that the solutions offered can be a reference to the acceleration of 10000 MW phase II in particular on Geothermal Power Plant (PLTP).

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