Proceedings World Geothermal Congress 2010
Bali, Indonesia, 25-29 April 2010

Geothermal Working Region, Steam, and Electricity Tariff Bidding Round Principles

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Keywords: Legal and Regulatory Aspects

ABSTRACT

Although Indonesia has been known to have more than 40% of high enthalpy world geothermal resources and has enacted Law No. 27 Year 2003 on Geothermal Energy, the development of geothermal resources for power generation in Indonesia is still facing many challenges. There has been no green field development since the past 15 years. To-date geothermal resources contribute only 1,050 MW of the total Indonesia power generation capacity of approximately 30,000 MWe. The National Energy Policy has targeted 9,500 MWe of geothermal power supply or 5% of the energy mix by 2025 and the Government of Indonesia is launching the second accelerated 10,000 MW power supply project to be commercially operational by 2012-2018, 48% of which will be geothermal power projects.

In Indonesia, the law provides only normative, conceptual stipulations of regulatory perspectives. To make it implementable the law requires subsequence government regulations. For example, to implement the Law No. 27/2003, it requires at least five government regulations, one of which Government Regulation (GR) No. 59 on Geothermal Business Activities which was issued in 2007. The GR 59/2007 requires at least subsequently 14 Ministerial regulations/decrees, three of which have been released to address preliminary survey, assignment of geothermal working areas, and determination of geothermal electricity prices. More Government Regulations (GR) derived from electricity law, tax law, environmental law, forestry law, and regional autonomy law will have to be synchronized to provide certainty of laws and to attract private sector investments in accelerating the geothermal power development.

This paper discusses critical issues and barriers to geothermal development that should be well addressed, coordinated and synchronized for the upcoming regulations that may be issued by various ministries. It also exposes the need to have common perception among geothermal stakeholders covering geothermal upstream and downstream development costs which includes the understanding on technical and economic principles as well as social, economical and technical benefits to developers, surrounding communities and Indonesia's economy. The paper moreover will portray three most crucial issues for geothermal green-field development in Indonesia: transaction for geothermal business license and power purchase agreement, geothermal steam and electricity tariff, and bidding process for geothermal working regions. Another issue to be considered as pre-requisite to the success of geothermal development in Indonesia is the high electricity price generated by geothermal power plants, as compared to other types of power plants, which could hinder development of geothermal energy for electricity generation as electricity tariff in Indonesia is still heavily subsidized. The utilization of geothermal energy over the long-term, however, benefits Indonesia by substituting non-renewable energy sources such as oil, gas and coal, which can be directly exported.

In order to steamroll the process of geothermal working region bidding round, permitting, and license; coordination between central and regional governments and among various ministries on land use, environmental impact study, and eligibility to obtain carbon emission reduction credit through Clean Development Mechanism, fiscal and non-fiscal incentives become utmost importance.

1. INTRODUCTION

The geothermal development position in Indonesia after the enactment of Law No. 27/2003 on geothermal had been expected to be more convincing as the hierarchy of the law carried more weight than the presidential and ministerial decrees applied in the earlier period. Under existing geothermal law, the Government of Indonesia (GOI) has an obligation to carry out the preliminary (initial) survey and early phase of exploration activities. GOI may also award the preliminary survey to interested third party or business entity to carry out the survey on its own risk and cost. GOI will use results of preliminary survey to define the Geothermal Working Region ("WKP").

Minister of Energy and Mineral Resources released Ministry Regulation (MR-MERM) No. 005/2007 on geothermal preliminary survey assignment guidelines. The Ministry Regulation stipulates among other things that the third party conducting the preliminary survey will be granted the first right if the WKP defined by results of the corresponding survey is auctioned through open tender or obtained replacement the survey cost from the winner of the tender.

By December 2008, there were six (6) geothermal locations that have been investigated by the third party with total initial resources estimation of 1,009 megawatt (Table 1).

Table 1: Preliminary Survey Assignment Locations.

#	Location	Province	Resources		Prob.
			Spec	Hyp	Reser
			MW	MW	MWe
1	Guci	Central Java	-	-	100
2	Muara Laboh	West Sumatra	-	-	194
3	Baturaden	Central Java	-	-	185
4	Pematang	Lampung Sumatra	225	-	-
5	Kalianda	Lampung	-	40	40
6	Rantau Dedap	So. Sumatra.	225	-	-
Sub Total:			450	40	519
Grand Total:					1,009

Minister of Energy and Mineral Resources also released Minister Regulation No. 11/2008 on the determination of Geothermal Working Regions based on results of preliminary surveys. In the same year, GOI announced nine (9) new geothermal working regions ready to be put on auction, with total target capacity of 680 MW, as shown in Table 2.

Table 2: 2008 - Nine (9) Geothermal Working Areas

No	Field	City/Regency	Province	Target
1	Seulawah A	Aceh Besar	Aceh	160
2	Jailolo	Halmahera	Maluku	75
3	Telaga Ngebel	Ponorogo	E. Java	120
4	Unggaran	Semarang	C. Java	50
5	Tampomas	Sumedang	W. Java	50
6	Cisukarame	Sukabumi	W. Java	45
7	Tang.Perahu	Subang	W. Java	100
8	Jaboi	Sabang	Aceh	50
9	Sokoria	Ende	NTT	30
Total Estimated Capacity [Megawatt]:				680

The government activities in the 2009 and 2010 work programs shows that there will be more geothermal preliminary surveys conducted by the Government Geology Body and offered to the third party and consequently more geothermal working regions to be defined and offered to private sector through open tender process. Regional governments will be very busy to facilitate the geothermal bidding round as soon as the government declares the new geothermal working regions. On the subject of geothermal electricity pricing issue, work are in progress to formulate geothermal electricity price which meet the criteria of its *fair economic values* as stated in Law No. 30/2007 on Energy.

GR No. 59/2007 Article 20 Section 1 in relation to the geothermal tender offer states the minister on behalf of the government shall determine a benchmark of geothermal electricity price for certain geothermal working regions. This is applied if the buyer, in this case PLN, a heavily subsidized State Owned Utility Company, would not be willing to buy electricity higher than the fair economic price of geothermal energy. The benchmark electricity price information shall be kept up to date, in order to attract competent and financially capable geothermal developer for the long-term investment commitment in geothermal power projects. Moreover, the price is based on the rightness and fairness of economics cost to support the geothermal development sustainability. The transparent, fair, and clear geothermal bidding round process is required to meet both the business goals and the government objectives.

The Indonesian Renewable Energy Society (METI) in cooperation with the Indonesian Geothermal Association (API/INAGA) and the Indonesian Electrical Power Society (MKI), through their board of experts, jointly prepare this report paper based on the feedback from geothermal stakeholders, in efforts to provide inputs and recommendations to the Minister of Energy and Mineral Resources to establish guidelines for implementation of geothermal bidding round process as mandated in the GR No. 59/2007.

2. ORIENTATION OF GEOTHERMAL WORKING REGION BID EVALUATION

GR No. 59/2007 stipulates the auction to obtain the business permit ("IUP") to explore and exploit geothermal resource in a geothermal working region to generate electricity.

Minister of Energy and Mineral Resources, Governor, or Regional Head, depending on the coverage area of the geothermal working region establish the Geothermal Working Region Auction Committee to carry out the auction.

In general, the business entity participating in the geothermal working region bidding round shall meet administrative, technical, and financial capacity requirements. In evaluating the bid documents, the Auction Committee will use two-step evaluation or two-envelop method. The first step is the pre-qualification and the second step is the electricity price bidding proposal. In the pre-qualification, the Auction Committee evaluates bidders' administrative, technical, and financial support qualification submitted inside the first sealed envelop. Those meeting the pre-qualification assessment will be short-listed. The second envelop contains the financial bid in term of offered geothermal electricity price. Only the second envelops of the short-listed participants will be opened by the Auction Committee to determine the winner.

The administrative requirements include IUP application letter to the Minister, Governor or regent pursuant to their authority, company article of association, company profile, tax payer number, and statement of ability to pay for compensation of data. The technical evaluation covers the technical plan and schedule for exploration and feasibility study activities. Tender participants shall also demonstrate funding capacity to carry out the exploration program and submit bid-bond amounting to 2.5% of the exploration expenditure for the first year.

The Geothermal Working Region Auction Committee determines the winner of the auction based on evaluation results of the technical and financial qualification and the lowest, technically sound and justifiable prices of steam or electricity offer.

2.1 Criteria for the Evaluation Towards Compliance on the Administrative Requirements

The government is required to establish two types of geothermal tender process (regular tender and direct proposal tender) that has similarity with the oil and gas business in Indonesia. As stated in the Article 6 to Article 14 of the GR No. 59/ 2007, the government of Indonesia can award an assignment for preliminary survey and explorations to a third party or a company who is a successful participant (bidder). The explorations cost recovery mechanism has therefore to be applied in a future regulations and the instrument can be carried out by the conversion to the electricity price escalation if the field is commercially developed. The main objective is to immediately develop the Indonesia geothermal project, with the similar concept to the exploration of oil and gas business scheme.

A direct tender will have a joint study framework with the agencies (business entity or permanent establishment) to implement the preliminary survey assignment for the new geothermal area. In direct proposal, an applicant withholds the first priority (first right refusal) in the acquisition process of the area. The study is conducted jointly by the Directorate General of Mineral, Coal and Geothermal and

the business entity or permanent establishment (investor). Moreover, the business entity or permanent establishment submits their proposal for open acreage or available geothermal work area, describing area boundaries with geographical coordinates, info memo of geology, other important data, and company profile. This is noted that if there are two companies that have the same interest, the area shall normally be reserved for the regular tender. The rest process of direct proposal tender shall stay on the regular tender process.

Both requirements, regular and direct proposal tenders, need the qualified party or parties, as a consortium that have interest as the geothermal IPP power plant with build, own and operate (BOO) scheme. The preparation process will in the early days require coordination between central and regional governments for the geothermal bidding round working area license and permits, and among various ministries on land authorization, environmental worthiness decision and authorization for others such as the Clean Development Mechanism process, as well as fiscal and non-fiscal incentives.

a). A pre-qualification is based on the applicant's satisfactory presentation of the consortium member(s) experiences in project execution; EPC contractor on the steam field and power plant; and financial capability, including the legal business entity. Furthermore, to expedite a bid tender of the geothermal working area and an implementation of the post-auction, the auction packet is completed with the 'contract model' of power sale and purchase agreement (PPA) as the total project development. An outline of contract model is attached to the details agreement by, among others, using assumptions in the guidelines which refer to the geothermal electricity price.

b) A profile of consortium member(s), a business entity or permanent establishment, is a regional investor or an International investor in partnership with the regional investor. The combination may be important to support geothermal business sustainability. If participants represent a tender consortium of several companies, that will form a business partnership of special project vehicle, they shall be based on the clear and transparent process among those consortium members, in order to avoid the future conflict of the contract agreement. The board and executive members of the lead member (a business partnership of special project vehicle/company) cannot be changed until the project development is completely done. Here, the central government and the regional government shall ensure to award the geothermal working area, with power sale and purchase agreement, to the developer.

c) The participant of auction tender shall purchase the bid auction document-packet (including a preliminary data survey depending on the number of geologic preliminary information) from the committee. For the consortium member(s), it is required to purchase the data package for each member. If it is two (2) members, the payment shall be different charges from the three (3) or four (4) members. This formulation is common to the oil/gas bidding round of license fee data package transaction.

d) A profile of consortium member(s) shall have experience in financing and developing geothermal IPP Project or general IPP project, with total power plant capacity requested by tender committee over and above the geothermal or oil and gas upstream experiences. An experience in the oil/gas upstream (exploration and exploitation) for the electricity project development is taken into consideration in the pre-qualification criteria. For the newcomer, the company profile presented shall be able to demonstrate a reliable support of the competent human resources in the geothermal business activities.

e) The business entity or permanent establishment is credible and has a financial capability (Net Profit) as evidenced by audited financial report for the last three (3) years. The Lead member shall have minimum EBITDA of project investment in the last three (3) years Financial Report.

f) For the direct proposal tender (the joint study approach), in the beginning step of application, unlikely applied to the regular tender proposal, shall submit considerable amount of the joint study performance bond, from a prime bank in Indonesia, with validity the same as the joint study period. The recommended amount of this performance bond submitted is at least fifty percent (50%) of the regular exploration-well cost.

To ensure the commitment of successful applicant, the successful participant is necessary required to submit performance securities, to open and to maintain an escrow account with the minimum amount of 10% of the total investment in the prime bank in Indonesia. The board of executives also cannot be altered till the project is completely finished. This requirement is to make certain that the applicant is 'bonafide' (actual and valid) and qualified permanent establishment in the development of geothermal mining work area.

2.2 Criteria for Evaluation of Technical Competence

A size of geothermal power plant is basically determined by the mass volume of geothermal resource itself. In the technical evaluation, the government/regional government, as the tender committee, shall firstly assess the 3 (three) years of technical (explorations) proposal in addition to financial support and company capabilities proposed by the participants. If the preliminary geologic survey and the exploration commitment are in the main role of geothermal bid winner, similar to the oil/gas business, a successful participant (bidder) who shall provide finance, technology and risks, is encouragingly supported to do the exploration drillings campaign of the new field based on G&G evaluation and technical justification. Thereafter, a cost recovery of the preliminary geologic survey and the exploration drillings campaign (wildcat wells) is applied only beyond the geothermal commerciality production.

The government of Indonesia awards an assignment for the preliminary survey and the exploration to the third party or a company as stated in the Article 6 to Article 14 of the GR No. 59/2007.

a). A cost recovery mechanism in the regulation form shall be explicitly required to be in the future regulations. This is similar to the oil and gas business that the main objective is to attractively invite developer for the Indonesia geothermal project with the similar concept of exploration in the oil and gas business scheme.

The regulation of cost recovery on the exploration works is important to make the Indonesia geothermal development more attractive. A similar success story as in the oil/gas business, a successful geothermal bidding round applicant recovers the geologic preliminary survey and the wildcat wells (i.e. 3 (three) wells) costs from a particular geothermal working area, while the project is commercially approved by the tender committee. Both, a successful applicant and the government/regional government, as the tender committee,

during this stage shall work closely, in order, to have successful programs of the preliminary survey and the explorations campaign, because the objective of this phase is to prove that the reserve be in agreement to the feasibility study and the cost recovery mechanism. A cost recovery of the explorations shall then be converted to the electricity price escalation.

b). Several development schemes shall be described detail in the feasibility study report on the top of the feasibility's study contents indicated in the article 15 paragraph 4 of the GR No. 59/2007. Three (3) scenarios of the project development (high, medium and low cases) plans are common approach to be in the feasibility study report. This is important parameter as the size of power plan is based on the mass volume of the geothermal proven reserves. The bankable feasibility study shall be justified to the selection of a tender winner.

Both the three (3) years technical (explorations) proposal for the geothermal bidding round purpose and the comprehensive feasibility study report shall have an estuary to the geothermal electricity price. Three (3) project scenarios made (high, medium, and low case) is common required for the bidding round and the project development evaluations described in the geothermal feasibility study. As the successful applicant exposes to high explorations and exploitations risks, the three (3) scenarios approach (high, medium, and low case) overviews the conservative and most likely sides of the project development.

During the three (3) years program (explorations) execution, both parties, tender committee and business entity, shall definitely have a frequent meeting and submit report of monitoring plan to the government/regional government. This obligation shall accordingly be regulated in the Ministerial Regulations.

2.3 Criteria to Evaluate the Financial Capacity

A significant amount of signature bonus is one of appraisal indication set on the tender bidding evaluation. The financial capability to support the development commitment through the comprehensive 3 (three) years technical plan (explorations), including the feasibility study plan, is important to be placed in the annual financial statements of consortium member(s) or lead member audited by a public accountant or bank reference as indicated in the section above (Criteria for The Evaluation Towards Compliance on The Administrative Requirements).

It is suggested to facilitate the selection; both the regular tender and the direct tender applicants in the beginning are required to submit a significant amount of bid bond in the range of fifty percent (50%) of signature bonus fee. The successful bidder or the winner shall then submit full amount (100%) of the signature bonus to the prime bank in Indonesia. If the successful bidder or the winner fails to fulfill this obligation as contemplated in the application agreement, the tender committee can automatically terminate without prior or further notice, and the Winner place is downgraded to the second place.

The successful participant shall submit Performance Security of approximately ten percents (10%) of the total committed investment as an escrow account and maintain this minimum 10%. If the successful participant fails to open the escrow account with the amount of 10% of the total investment, then the geothermal working area with geothermal power purchase agreement shall become automatically terminated without prior or further notice, and the agreement will be awarded to the second winner.

2.4 Criteria for Evaluation of Electricity Price Offered to Geothermal Working Region

An auction winner for the geothermal working area is not solely determined from the lowest electricity rates offered, but the prices must be reasonable, justifiable also must meet economics value throughout the life of the project. The other and most important evaluations, shall be considered, is the commitment for the action to target implementation on the exploration activities, including the comprehensive feasibility study report and the post-tender. Project funding is the most important key factor.

The electricity price described in the geothermal bidding round for the action tender proposal and feasibility study report shall be based on the three (3) scenarios (high, medium, and low case) of the resources capacity estimation as mentioned above. A high case is probable an estimated figure of the electricity price offered from the tender committee which is based on the initial/original resources estimate. Medium (most likely) and low cases are estimated figures after the explorations are done. The electricity price figures of medium (most likely) and low cases are more certain than the high case figure; this is due to the fact that the medium and low cases of the geothermal proven reserves volume and risk perspectives are typically more certain than the high case (original/initial resource estimate before any drilling well).

The geothermal bid tender outside of the Joint Operation Contract area with Pertamina is commonly high risk, frontier area. This geothermal electricity price offered in the tender is commonly based on the high case figure that still has high risk, frontier area. In order to determine the tender winner, the tender evaluation shall be based on the reasonable electricity price proposal. If the explorations eventually indicate unsuccessful proven reserves or less reserve than the original estimated calculation, the electricity price offered shall be likely high. The feasibility study report which is agreed by the tender committee shall explain this high case figure in detail so the electricity price offer has the valid justification. The part of comprehensive geothermal feasibility study is referred to Notification of Reserves Confirmation and Notification of Intent Development. These main reports are the detail of key answer for the electricity price negotiation tool.

The effort to implement the regulations issued by various ministries shall be obviously coordinated and synchronized, in order to make the geothermal stakeholders to have the same and equal perception covering geothermal upstream and downstream development costs. This moreover includes the understanding on technical and economics principle, as well as, social, economical and technical benefits to developers, surrounding community and Indonesia's economy which are importantly required to have in the future geothermal regulations.

3. ORIENTATION OF GEOTHERMAL STEAM AND ELECTRICITY PRICE BID EVALUATION

The Energy Law No. 30/2007, Article 7, paragraph 1 states that energy cost is determined based on the economic value that is rational and fair. The economic value is price of the equilibrium between demand and supply. Incentive is in the form of capital assistance, taxation, and/or fiscal. Then, the incentive of business may be given in term of simplification of procedures, licensing, and enterprise requirements.

The geothermal steam and electricity price that is mandated by the GR No. 59/2007 is based on rational and fair economic value as stipulated in the Energy Law No. 30/ 2007. From the developer's point of view, economic value is the value that meets a reasonable return on investment taking into account to the risk factors and other factors, including but not limited to the aspects of engineering, economy, taxation, and fiscal as well as incentives. For that reason, the guidelines on establishment of the geothermal steam price for generating electric power established in the Ministerial Regulations shall be legal assurance on the price of geothermal electricity; therefore with this definition, the regulation is able to attract private sector participations for the geothermal business activities. The guideline furthermore reflects the aspect of transparency, fairness, and rationality for the geothermal stakeholders. Ministerial Regulations are required to cover a tariff or electricity price produced by geothermal power plants as a result of the 'total project' scheme, which is geothermal business activity of the integrated upstream to downstream.

In the common guideline, the benchmark price of geothermal power shall be the levelized price of electricity for the 30-year production, expressed in Rupiah / kWh or equivalent to US cent / kWh, beginning the commercial operation date of the power plant. The lowest geothermal electricity price offered shall consider the 30 years operation (life of project). This lowest price must meet with the explanation above on the value of a reasonable return investment, taking into account to the risk factors and the project development meets to the government objectives.

Most applicants/ participants expect the geothermal bidding round is done with one cycles process from working area bid acquisition to the electricity price contract. The successful applicant may need only to renegotiate the geothermal electricity price with the State Electricity Company, PLN when the agreed electricity price, estimated and agreed in the beginning cannot be ran in the actual project development. Moreover, the initial well assumptions may have a difference conclusion with the actual drilling results. By a comprehensive result of feasibility study report and its detail reports (Notification of Reserves Confirmation and Notification of Intent Development), the successful applicant requests to get a renegotiation and the process is to propose the notification to the tender committee/ government and PLN for a renegotiation subject.

The most important evaluation in the geothermal bidding round is the electricity price. This is determined as the justifiable, reasonable worth and meets with economics value throughout the life of project.

3.1 Guidelines for the Geothermal Electricity Price

In general, the amount of the price used in the geothermal steam power plant is a calculated price of geothermal steam based on the assumption of upstream and downstream costs for one of the geothermal working area. This is not a new parameter but this is important to list it out for the mutual understanding. It is noted that the geothermal electricity price generated from one geothermal working area to the others is different (not the same).

The geothermal upstream cost, normally, is the expenses of the geothermal upstream activities, such as:

1. Preliminary Survey (Geology, Geosciences, and Geophysics).
2. Environmental study.
3. Land exemption and road development.
4. Exploration well and testing.
5. Resources assessment.
6. Exploitation (production) well and testing.
7. Injection well and testing.
8. Pipeline and production facility.
9. Development of public facility.
10. Etc.

While the downstream cost is the expenses of the geothermal steam field development (Pipelines installation system, etc.) that includes such as:

1. Land exemption and road development.
2. Engineering Procurement Construction.
3. Commissioning.

3.2 Assumptions Used in the Geothermal Electricity Pricing Guidelines

A calculation of the geothermal electricity price, in general, is similar with the calculation of the other power generation projects that has a calculation model using the assumptions of economy, fiscal policy, tax, production rate and risk factors, etc.

The geothermal electricity price is normally sorted out according to capacity scale of the geothermal power plant, under 55 MWe and over 55 MWe. Today, the power plant size can be designed for 80 MW and 110 MW. The information presented herein shows standard parameters for the geothermal electricity price calculation.

3.2.1 Engineering Assumptions

For the upstream segment, the assumptions used include the degree of capital expenses in the project development and the operation cost factors and maintenance. The parameter is basically as the following:

1. Capital Projects Factors in the project.

   1) Exploration Activity

      a) Preliminary Survey (Geology, Geosciences, and Geophysics).

      b) Land exemption, road development, and wells location.

      c) Facility development and logistic support.

      d) Drilling equipment mobilization.

      e) Exploration well drilling.

         I. Number of Conventional exploration wells.

         II. Number of slim-hole exploration wells.

         III. Exploration wells depth.

         IV. Success ratio (%).

V. Production rate per well (MWe/ well).

VI. Drilling cost (IDR or US$).

VII. Well Study.

2) Feasibility study/ Environmental and licensing/permit.

3) Steam field development.

a) Production well drilling.

I. Number of conventional production well.

II. Number of Big-hole production well.

III. Production well depth.

IV. Success ratio (%).

V. Production rate per well (MWe/ well).

VI. Drilling cost (IDR or US$).

VII. Well Study.

b) Injection well drilling.

I. Number of big-hole injection well.

II. Injection well depth.

III. Success ratio (%).

IV. Injection rate per well (kg/s per well).

V. Injection index (kg/s-bar).

VI. Drilling cost (IDR or US$).

VII. Well Study.

4) Steam field production facility and pipelines.

5) Geothermal power generation plant facility.

a) Power plant capacity (MW).

b) Engineering cost, power plant facility procurement and development.

c) Project management

6) Unanticipated cost.

2. Operation cost factors and maintenance.

1) Geothermal electricity generation facility.

2) Capacity availability factor (%).

3) Make up wells per year.

A reservoir quality of the geothermal resources affects a major consideration to the project cost calculations. In the reservoir system with two phases of temperature above 240 degrees C, and enthalpy of higher than 1,100 kJ/kg figure is categorized as a medium to high quality. For the medium to low quality, the reservoir system with liquid phase temperature equal and below 240 degrees C and the enthalpy equal to below 1,100 kJ/kg is normally has higher development cost than the medium to high quality reservoir.

3.2.2 Economic Assumption Factors

In general, the model used is to calculate the rate of return investment (IRR/ ROR) as the electricity price with the certain assumptions is set in the range of fix value given by the Government. The calculation model includes the following:

A. Total project funding model to the full equity model.

B. Total project funding model (conventional bank project funding).

C. The period of pre-production.

D. Starting point of 30 years contract.

E. Inflation rate.

F. Long-term materials procurement.

G. Depreciation rate.

H. Levelized price.

I. Average escalation rate per year.

J. Starting point of 30 years commerciality.

K. Clean Development Mechanism or related environmental reward and benefit.

L. Investment rate of return (IRR).

3.2.3 Fiscal and Tax Assumption Factors

A geothermal energy as well as other renewable energy needs significant incentives by the Government. The Indonesian Renewable Energy Society (METI) in cooperation with the Indonesian Geothermal Association (API/INAGA) and the Indonesian Electrical Power Society (MKI) always stand up and give positive support to the Government to continue providing the fiscal and tax incentives such as the following:

A. Corporate income tax.

B. Royalty or government income non tax (PNBP).

C. Duty on the goods/materials imported.

D. Investment allowance.

E. Dividend on tax.

F. Delay on tax losses carried forward.

G. Signature bonus on geothermal authorization/purchase and sales electricity contract.

These assumptions are also influential in the economics analysis; as the incentive parameter, these assumptions shall positively be adjusted in the calculation. Thus far, the government shall take more incentives considerations to accelerate the development of geothermal power plant project. The present incentives are as the following:

1) Placing the geothermal development activities as a 'Total Project' model in Indonesia.

2) Preliminary survey assignment given as 'first right refusal' facility. A first priority in the possession of the geothermal area is given to the agency that has conducted preliminary survey in the geothermal area.

3) Financing the exploration programs for geothermal small-scale development (< 10 MW) project in the East Indonesia that is considered less attractive for investors.

4) Providing tax and fiscal incentives: PMK 177/PMK.001/2007 in relation to duty exemption on import of goods for upstream geothermal and oil/gas business activities; PMK 178/2007 in relation to value-added tax undertaken by the government on goods imported for the upstream oil, gas, and geothermal businesses; PP No. 62, 2008 in relation to amendment of PP No. 1, 2007 regarding tax revenue facilities for investment in the fields of business and / or in certain areas, which provide tax revenue for the facility investment that is one of them in the geothermal field.

3.3 Assumptions Used in the Geothermal Risks

Basically, the risk of geothermal business can be divided into two (2) types of risk, i.e.: 1). Risk of resources and development; and, 2). Risk of market price, politics, changing law and regulations as well as inflation, exchange rates, and others.

3.3.1 Resources risk is risk associated with.

Risk factors can only be reduced and cannot be eliminated. To have the same understanding of the risk factors definition, here below the risk factors is the following:

- Exploration risk, possibility of finding no production wells in the area that is being explored.
- Possibility to get potential size of the geothermal resources in the area is smaller than the estimated commercial value or no values.
- Possibility to get exploration success in the area is smaller than expected.
- Possibility to get the success well output, exploration and/or exploitation is smaller than estimated.
- Possibility to get success development wells is smaller than predicted.
- Possibility to get capacity rate of development wells is smaller than predicted.
- Possibility to get number of delineation wells is smaller than predicted.
- Possibility to have estimated exploration cost is higher than early estimated.
- Possibility to have the right geothermal plant is higher than early anticipated.
- Possibility to have the engineering problem and/ or environment is such as corrosion and scaling, etc.

3.3.2 Risk is associated with production rate decline or temperature degradation.

3.3.3 Risk is associated with market access and price risk.

3.3.4 Construction risk.

3.3.5 Corporate management risk.

3.3.6 Legal and regulatory risks.

3.3.7 Political country risk.

3.3.8 Bank interests and inflation risks.

3.3.9 Force majeure.

3.3.10 Etc.

Engineering and economy assumptions of the geothermal project are unsymmetrical from one to the other geothermal working areas considering the site specific regional conditions, geological, and volume of reserves.

3.4 Natonal Long-Term Benefit of Developing Geothermal Power Plant

The present geothermal electricity price does not meet with the least cost principle used by electricity companies, namely PLN, the State Owned Electricity Co of Indonesia. It is, therefore deemed necessary to include the full legal justification into long term quantitative benefit with regard to the agreed geothermal electricity price between investor as seller and PLN as buyer. For PLN, the tangible benefits to be included among others are avoided cost of not using high price non-renewable (gas and coal) and imported fuel (oil).

As the GR No. 59, 2007 Article 20 section 1 in relation to the geothermal tender offer, the main objective is to consider the intangible benefit of developing geothermal power plant(s) which include conserving domestic non-renewable energy resources, reducing depletion premium and energy supply security. The government therefore shall provide the electricity price benchmark for the geothermal project. This legal basis is important for PLN, the State Owned Electricity Co of Indonesia.

4. OTHER CONSIDERATIONS ORIENTATION OF GEOTHERMAL BID EVALUATION

There are many geothermal resources in Indonesia cannot be developed due to land overlapping with the forestry issues. In the GR No. 59/ 2007, the regional government is expected to be the vocal point and the government through the minister of energy and mineral resources is its partner. Regional governments are required to bridge other geothermal development regulations and policies linked to the other regulations as the clear up guidelines.

As the tender committee shall play important role in the geothermal bidding round; an equal perception among geothermal stakeholders before bidding round established is highly important. This is essential key to support the near future geothermal tender evaluation. The tender committee members shall be derived from multi department and function team including PLN. As the successful participant/applicant of geothermal bidding round requires one-door process due to the fact that the less bureaucracy is the best system for the execution of any bidding round outcome.

The coordination between central and regional governments for the geothermal license and permits, and among various ministries on land authorization, environmental worthiness decision and authorization for the Clean Development Mechanism, as well as fiscal and non-fiscal incentives shall

be agreed under regional government's vocal point as stated in the Geothermal Law.

Presently there are 6 (six) geothermal projects worldwide that have been registered at the International CDM Board, of which one is from Indonesia. All registered geothermal projects used ACM-consolidated methodologies ACM002 that is a "consolidated baseline methodology for grid-connected electricity generation from renewable resources". The geothermal projects are among the big earners of Certified Emission Reductions (CER) from thousands CDM projects worldwide. The geothermal project from Indonesia is able to generate a total of 4 million CER in the first crediting period.

5. CONCLUSION AND RECOMMENDATION

The guidelines as described in the assumptions of the future geothermal bidding round presented in this paper are important parameter for the future Ministerial Regulations.

- The Geothermal Law No. 27/2003 stipulates that it is expected to require at least five (5) government regulations. One of which is the regulation to implement the Geothermal Business Activities which was issued in 2007, namely the GR 59/2007, that subsequently requires at leas fourteen (14) ministerial regulations/decrees. Today, three (3) of which those ministerial regulations have been released addressing preliminary survey, assignment of geothermal working areas, and determination of geothermal electricity prices. Future regulations derived from, tax law, environmental law, forestry law, and regional autonomy law released will have to be synchronized with the Geothermal Law no. 27/2003 to obtain a certainty of laws as well as to protect investment guiding principle in accelerating the Indonesia geothermal power development.

- In the ministerial regulations, the clause of multi department and cross function members shall be explained detail; thus, both, i.e. the successful applicant and the government/regional government shall work closely for the success of the program, as the objective of this stage is to prove the reserve and be in agreement with the direction set forth in the feasibility study, especially the electricity price and the cost recovery mechanism. The cost recovery mechanism is only applicable while the project does commercially perform. If not, the successful applicant absorbs the preliminary geologic survey and the explorations costs as the developer's risk.

- Three (3) development scenarios (high, medium, and low case) and sensitivity cases applied in the tender evaluation and the feasibility study report is to assure that the geothermal project development as agreed by the tender committee and is economically sustainable to operate throughout the life of the project. In order to determine the winner, the tender evaluation is not solely determined from the lowest electricity rates being offered, but prices should be justifiable, reasonable and meet the economics value throughout the life of the project.

- The Government and PLN have to establish the electricity price benchmark for the geothermal project and legal basis of the avoided cost application. This is important for PLN as a state enterprise. The long term benefit analysis, which is based on the avoided cost for not using high price non-renewable fuel (gas and coal) and imported fuel (oil), with the agreed electricity price of geothermal project have to be in the government regulations. The geothermal projects will clearly reflect the cost of developing geothermal and the long term benefit enjoyed by the nation. This information is used as assurance that the geothermal project is beneficial, even when the agreed price is higher than the least cost principle. Thus, this will protect the agreed price from any future possible legal accusation and would facilitate the future geothermal development without any significant hindrance.

ACKNOWLEDGEMENT

The authors wish express their appreciation to Mr. Pontjo H. Soedjanto for his excellent advice and review.

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