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FEED-IN TARIFF FOR INDONESIA'S GEOTHERMAL DEVELOPMENT

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ABSTRACT

On 23 August 2012, the Minister of Energy and Mineral Resource (MEMR) issued Regulation Nr. 22/2012, which introduced feed-in tariff (FIT) schemesfor Indonesian geothermal electricity. The new regulation introduced a geographical based tariff system and increased the geothermal-generated electricity from $ 0.97 to $ 0.10 - 0.17 cents per kilowatt-hour (kWh), depending on the region where a plant is located. The FIT policy is not new for Indonesia, as the Government has already offered FITs for biogas, hydro, municipal waste, and landfill gas, and plans to soon add FITs to incentivize investments in solar and wind projects.

The goal of FIT is to offer cost-based compensation to geothermal energy producers, providing the price certainty and long-term contracts that help finance geothermal energy investments. First introduced in Germany in 2000 for renewable energy development, FIT is a policy mechanism designed to accelerate investment in renewable energy technologies. It achieves this by offering long-term contracts to renewable energy producers, typically based on the cost of generation of each technology.

The key principles behind Regulation Nr. 22/2012 are positives step forward in the development of Indonesian geothermal projects. Fixing the price for geothermal projects should assist in the roll-out of future geothermal projects in Indonesia. There are 51 geothermal projects in the second "10,000 MW Fast Track Power Generation Projects". At a capped price of US 9.7 ¢/kWh, only geothermal projects with capacity above 110 MW or 2x55 MW are progressing. Hopefully with the new FIT the remainder of geothermal projects will move forward at accelerated pace.

However, the industry appears to have still some concern on the new FIT policy that it might not be able to meet the intended target, especially for small to medium capacity geothermal projects in certain geographical areas. This paper will discuss the the new FIT regulations by providing analytical assessment of the concept and benchmark with prevailing FIT concepts that has been successfully applied in other countries. The discussion also outlines recommendations to enhance the policy, in order to make it work and attract investment.

INTRODUCTION

In Indonesia, investment in geothermal development faces substantial uncertainties and continuing challenges. The pricing of steam and electricity has been the main obstacle to the development of geothermal energy in Indonesia. Over years, the pricing regime for Indonesia's geothermal projects has suffered from somewhat of a see-saw development. For example, when Indonesia began its geothermal development activities in the 1990's, there were two pricing schemes that commonly used in the Power Purchase Agreement (PPA) or Energy Sales Contract (ESC) between PLN and Independent Power Producer (IPP).

The first scheme is that the price consists of only one component, which is based on the kWh dispatched. The price also include escalation indices and "take-or-pay" capacity provision (TOP), in which the buyer have obligation to pay for minimum capacity made available irrespective of the actual amount of dispatched, ranging from 80% to 90%. The TOP will ensure the recovery of operation and maintenance costs, debt servicing obligations in a timely manner and to provide the shareholders with a return on their investment.

The other pricing scheme consists two or more components namely the capacity charge and energy charge, which are expressed as Dollars per

kVA per month and Dollars per kWh, respectively. The capacity charge is capital recovery charge comprising return for equity capital, debt repayment, tax and depreciation, contract capacity and availability factor. The second component is usually pass-through cost components as determined by the quantity and type of fuel, specific het rate and fuel price, and fixed and variable operating and maintenance charge. Under the scheme, only the energy charge that will be escalated, while the capacity charges will decline after the project is paid out.

As the result of renegotiation following the Asian monetary crisis in late 1997, PLN requested a change from a two components to a single pricing concept with limited escalation rather than cascading prices. PLN also capped the base electricity price up to USD 0.05 per kWh between 1999 and 2003. This resulted that the utilization of geothermal potential has proceeded slowly.

In addressing the issue, in 2008 the Ministry of Energy and Mineral Resources introduced a geothermal pricing regime which set a maximum geothermal tariff at different levels, depending on electricity supply production costs in the location of the project within Indonesia, which also are depending on voltage and capacity of the power plant. However, this was soon replaced in 2009 with an Indonesia-wide cap on geothermal tariffs of USD 0.097/kWh. On 23 August 2012, the Minister of Energy and Mineral Resource (MEMR) issued Regulation Nr. 22/2012, which again reverts back to a geographical based tariff system and the use of feed-in tariff (FIT) arrangements for Indonesian geothermal tariffs. The new prices would be 10, 11 and 17 USD cents for Sumatera, Java and Papua, respectively.

The new feed-in-tariff would only apply to new projects or extension contracts between IPPs and PLN. There is the possibility to revise existing pricing through negotiations. Given the background, this paper will discuss the new FIT regulations by providing analytical assessment of the concept and benchmark with prevailing FIT concepts that has been successfully applied in many countries.

FEED-IN TARIFF POLICY

A feed-in tariff is an energy policy that provides for a guaranteed of payment to renewable energy developers for the energy that is produced. This type of policy can be thought of as an advanced form of a production-based incentive because payments are made for the actual electricity produced and not for how much capacity is installed. The most common feed-in tariff payment is based on the actual levelized cost of renewable energy generation. This method of payment provides a price adequate to ensure a reasonable rate of return on for investors.

The use of FIT is to add risk premium on the purchase price of geothermal energy, which is aimed at compensating risks with rewards in order to assist the project in maintaining some economical viability, even if the project becomes worse than planned. Accordingly, feed-in tariff policies typically include:

1) Guaranteed electric grid access for electricity generated from renewable sources.
2) Long-term contracts designed to provide a reasonable profit for companies that generate electricity from renewable sources.
3) An obligation on electric utilities to buy electricity generated from renewable sources.

Also, FIT is generally structured according to a standard power purchase contract. The FIT contract provides a guarantee of payments in dollars per kilowatt hour for the full output of the system for a guaranteed period of time. The first is to base the FIT payments on the levelized cost of Renewable Energy (RE) generation; the second is to base the FIT payments on the value of that generation to the utility and/or society. This payment guarantee is often coupled with the assurance of access to the grid and the actual payment amount is usually differentiated based on renewable resource type (e.g. solar, wind, biomass, geothermal, etc), technology type, project size, quality of the resource and/or other project-specific variables.

FIT policy can be thought of as an advanced form of a production-based incentive because payments are made for the actual electricity produced and not for how much capacity is installed. The policy has been enacted in more than 60 nations in the world, in which the Government oblige the power companies to purchase power from renewable energy sources at fixed prices. The fixed purchase price can be determined as certain ratio (e.g. 90%) of retail tariff or as a definite price for each renewable energy source.

Countries worldwide are increasingly turning to feed-in tariffs as a mechanism to develop geothermal energy. FITs are currently the most common national renewable energy policy in the world and are in place in over 60 countries,

including FIT policies that are specifically tailored for geothermal technologies. In Germany, the Electricity Feed-in Law (1991) places power companies under an obligation to buy renewable energy power at a price of 90% of general power tariff to the end-user with the upper limit of 5% of sales. For geothermal, the purchase prices per kWh as of 2006 for power plant higher and lower than 10 MW were set at, respectively, 7.2 € cents and 15.0 € cents/kWh. In 2008 the prices were increased to respectively, 10.5 and 20.0 € cents per kWh.

In the US, under the "1978 Public Utility Regulatory Policies Act (PURPA)", the regulation places power companies under an obligation to buy power from the Qualifying Facilities (QFs) at the Avoided Price. The definition of QFs is a non-power company with the equipment capacity less than 80 MW which makes cogeneration or renewable energy power generation. The judgment of "Avoided Price" was left to respective state. However, thereafter in 1995 the Federal Government unified the definition of the Avoided Price as "the cost at which the power company itself generates power, or the cost at which it buys the power from other power company".

FEED-IN TARIFF DESIGN

FIT policies can be designed to address some risks specific to geothermal power plant development. The guarantee of a stable revenue stream over the life of the generation plant lowers the risk that large investments in exploration and development will not yield an off-take agreement. The combination of a guaranteed purchase, a pre-determined payment price, and a standardized off-take agreement can relieve some of the cost, risk, and pressure associated with overall project development since the project does not need to compete for or negotiate a contract before final project costs are known.

There are essentially two approaches of payments that can be made in setting up the FIT policy. The most common FIT payment is based on the actual levelized cost of renewable energy generation, plus a stipulated return (set by the policy makers, regulators, or program administrators). The advantage of this approach is that the FIT payments can be specifically designed to ensure that project investors obtain a reasonable rate of return, while creating conditions more conducive to market growth. Most European countries have successfully applied to have FIT payments have been structured to cover the RE project cost, plus an estimated profit. This resulted in quick and substantial RE capacity expansion at both distributed and utility-scale levels.[1]

The alternate method of setting FIT payments is by estimating the value of the renewable energy.[2] This value can be defined in a number of ways, either according to the utility's avoided costs, or by attempting to internalize the "externality" costs of conventional generation. Externality costs can include things such as the value of climate mitigation, health and air quality impacts, and/or effects on the energy security. The value-based approaches may not match the actual RE generation costs, and may provide insufficient payments to stimulate rapid market growth. Alternatively, they may provide payments that are higher than generation costs, leading to cost-inefficiency. Many U.S. states currently use value-based cost methodologies to support renewable projects. However, value-based FIT policies, whether tied to avoided costs or to external social and environmental costs, have so far been unsuccessful at driving rapid growth in renewable energy.[3]

Another important distinction in FIT design is how the payment levels will be differentiated, based on project-specific factors. These factors can include the technology type (whether solar, wind, geothermal, etc.; or the fuel type, in the case of biomass and biogas), the size of the project (to account for economies of scale), the quality of the resource at that particular site (to encourage broad deployment of wind and solar power, and limit windfall profits at high-quality sites), and/or the specific location of the project (e.g., building integrated, offshore wind). Because each renewable energy generation

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[3] [3] Jacobson S, Lauber V (2005): Germany: From a Modest Feed-in-Law to a Framework for Transition, Switching to Renewable Power: A framework for the 21th century; Volkman Lauber, editor, Earthscan London, pp 122 – 158.

project is unique, differentiation of FIT payments to account for these differences can ensure that a variety of technologies and project sizes come online.

As with most policies, the FIT policy has some notable challenges. These include requirements for detailed analysis in determining the payment level at the outset so ensuring that revenues will be adequate to cover project costs and right balance across a wide range of technologies and project sizes and fiscal policy. Finally, frequent updates to the FIT program structure can lead to policy uncertainty.

INDONESIA'S NEW FIT

In order to accelerate the development of geothermal energy resources, on 23 August 2012 the Minister of Energy and Mineral Resource (MEMR) issued Regulation No. 22 of 2012 on the new tariff for geothermal development. The FIT policy is not new for Indonesia, as the Government has already offered FITs for biogas, hydro, municipal waste, and landfill gas, and plans to soon add FITs to incentivize investments in solar and wind projects.

Replacing the MEMR's Regulation Number 02 of 2011, the new regulation increases the tariff for geothermal, which reverts back to a geographical based tariff system, as shown in Table 1 below.

Table 1
Reference Price for Geothermal Electricty

Location	Tariffs (cents/kWh)	
	HV	MV
Sumatra	10	11.5
Java, Madura, Bali	11	12.5
Sulawesi, S, W, SE	12	13.5
Sulawesi, N, C, Gorontalo	13	14.5
W and E Nusa Tenggara	15	16.5
Maluku, Papua	17	18.5

As stated in the Article 1.3 of the said MEMR's Regulation, the parties who are entitled for the new pricing regime include:

a) New IUP holder (to be issued after 23 Augustus 2012).

b) Existing developers (before Promulgation of Geothermal Law Nr. 27/2003) who are planning for plant expansion.

c) Existing developers (before Promulgation of Geothermal Law Nr. 27/2003) who are nearing contract expiration and to be extended.

d) Existing developers (before Promulgation of Geothermal Law Nr. 27/2003) who have the PPA in place but have not produced steam or electricity provided there is a clause in the agreement that allows the price negotiation.

e) Existing IUP holders who are in the process of negotiation for Power Purchase Government (PPA), subject to the Parties' agreement and the price adjustment is allowed under the said PPA.

Of the all above requirements, the item e) is probably worth to note along with the Article 4 of the new Regulation, which is allowing PLN to buy the power at the higher price or in excess of the amounts specified in the regulation, subject to the agreement by the parties and based on PLN's own estimates and approved by the Minister. From the transparency perspective, these two Articles which allow PLN to negotiate may not be effective. Given increasing campaign for corruption eradication such clause would be meaningless for the potential developer, as there is a great probability that no one in PLN has a courage to entertain such request from the developer or potential developer for price higher than FIT as stated in the MEMR's Regulation Nr. 22/20012.

Furthermore, under the new tariff regime, it appears that the potential developers will no longer be required to bid the tariff that they are willing to accept, since the applicable tariff has been set up based on location and connecting transmission as set out in the Table 1 above. This would raise a question as to what the criteria to be used in determining the winner of a tender? Under such circumstances, new bid evaluation criteria must be established, which may include work program and expenditures commitment and signature bonus, and technical and financial capability. Given experiences in oil and gas, the work program and expenditures commitment and bonus payment may be used as new bidding criteria. For effectiveness and from a transparency perspective, such commitment shall be supported by appropriate bank security in the form of bank guarantees or escrow accounts.

Another issue related to MEMR's Regulation Nr.22/2012 is with respect to electricity price escalation. The opponent to price escalation may argue that although the operational expenses and subsequent capital costs may increase, but the computation for FIT has been made based on levelized costs of energy, which is defined as the

constant price per unit of energy that causes the investment to just break-even: earn a present discounted value equal to zero. In other words, present discounted value of energy produced times the levelized cost equals the present discounted value of the fixed and variable costs over the life of the investment.

In contrary, the supporters to price escalation may argue that a large portion of the costs involved in developing a geothermal project are capital costs invested up front, thereby there may be no strong basis for these costs being the subject of indexation over time. However, all geothermal projects do involve varying degrees of operational expenses and drilling make-up wells to maintain the geothermal resource, which tend to increase. Accordingly, a flat tariff structure without indexation (over 30 year PPA terms) may expose developers to a mismatch between flat revenue and increasing operating costs.

Article 39 of the Government Regulation No. 14 Year 2012 on Electricity Supply Business Activities stipulates that the price of electricity as approved by the Minister, governor or regent/city mayor, in accordance with their respective authority, can be adjusted due to certain changes of cost elements on the basis of mutual agreement which should be stated in the PPA. Such price adjustment can be carried out upon receiving approval from Minister, governor, or regent/mayor in accordance with their respective authority. The foregoing clause provides the legal basis for price escalation in a PPA. In order that the price escalation would not cause instability, such price escalation can only be made effective if there is significant changes of certain economic parameter, such as changes of Consumer Price Indices (CPI) for certain commodities and Exchange Rate exceed ± 20%.

The latter is also true as, the Indonesia's system of FIT as outlined in the MEMR's Regulation Nr. 22/2012 has been developed on the basis of avoided costs and not based on the actual levelized cost of renewable energy generation, plus a stipulated return (set by the policy makers, regulators, or program administrators). Also, since the of development costs for geothermal resources will be dependent on size and enthalpy of the resources, differentiation of FIT payments to account for the differences in size and types or the choice of technology used can help the acceleration of small capacity geothermal field and low enthalpy resources. For example, the geothermal FIT in Japan: Capacity < 15 MW – JPY 42p/kWh; Capacity > 15MW – 27.3 JPY/kWh. In Germany: Capacity < 10 MW USD – 0.226/kWh; Capacity > 10 MW – USD 0.148.kWh, plus incentives for using certain technology.

CONCLUSIONS

In conclusion, the MER's Regulation Nr. 22/2012 is a positive step to accelerate the development of Indonesia's geothermal resources. The introduction of feed-in tariffs is intended to increase the adoption of geothermal technologies and provide significant economic development benefits for Indonesia. The price guarantee and long-term policy certainty offered by FITs is expected to propel Indonesia to the forefront of the global geothermal industry.

There are 51 geothermal projects in the second "10,000 MW Fast Track Power Generation Projects". At a capped price of US 9.7 ¢/kWh, only geothermal projects with capacity above 110 MW or 2x55 MW are progressing. Hopefully with the new FIT the remainder of geothermal projects will move forward at accelerated pace.

Finally, overall a FIT policy can be developed to work in concert with other energy policy, which sets a goal for less dependency on oil-based fuel. A properly structured FIT policy attempts to provide investor certainty to help support new supply development. This may include to redesigning FIT based on the combination of levelized costs and value of that geothermal to replace the fossil based fuel (avoidance) and based on plant capacity and geographical location or type of technology employed.

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