

Feed-In Tariff for Indonesia's Geothermal Energy Development, Current Status and Challenges

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Abstract

Given an acute electricity shortage and global warming and climate change, electricity market in Indonesia is expected to move from a monopoly fossil-fuel generation base to a more competitive structure with an increasing share of renewable energy by the private sector. In addition to hydro power, the abundant and commercially viable RE resource in Indonesia is the geothermal.

In order to boost the development of geothermal resources and other renewable resources, the Government of Indonesia (GOI) has introduced the use of Feed-in Tariff (FIT). A feed-in tariff is a guarantee that renewable energy producers will be able to sell the electricity they generate at a price set in advance by the government under the long-term contract (15 – 20 years). Under the FIT scheme, providers of energy from renewable sources will receive a price for what they produce based on the generation costs. This purchase guarantee is offered generally on a long-term basis, ranging from 5 to 20 years. This report discusses the implementation of (FIT) for geothermal energy in Indonesia, its current status and challenges.

The report concludes that the GOI has made a breakthrough in the development of renewable energy such as with the FIT regulation to develop geothermal and other renewable resources. However, inconsistencies in the law and regulation and heavy subsidies for energy consumption, has forestalled the development of a cleaner energy infrastructure. Indonesia needs to review the structure of renewable transactions, while the GOI also needs to provide assistance in securing the land and streamlining permit applications, in particular the project that has been included in the Accelerated Power Plant Project.

1. INTRODUCTION

Motivated by the depleted oil reserves and increasing awareness of global warming and climate change, electricity market in Indonesia is expected to move from a monopoly fossil-fuel generation base to a more competitive structure with an increasing share of renewable energy. In addition to hydro power, the abundant and commercially viable Renewable Energy (RE) resource in Indonesia is the geothermal. Despite having 40 percent of the world's geothermal reserves, Indonesia is producing only 1,341 MW or 4.6 percent of its potential.

Prices have been another important policy issue in the sector. In an effort to encourage private sector investment, the Indonesian government has been establishing a Feed-in Tariff (FIT) scheme. A feed-in tariff is a guarantee that renewable energy producers will be able to sell the electricity they generate at a price set in advance by the government under the long-term contract (15 – 20 years). The FIT scheme providers of energy from renewable sources will receive a price for what they produce based on the generation costs. This purchase guarantee is offered generally on a long-term basis, ranging from 5 to 20 years. This report discusses the implementation of (FIT) for geothermal energy in Indonesia, its current status and challenges.

2. ENERGY DIVERSIFICATION POLICY

In order to reduce the dependency to oil-based fuels for electricity generation, the Government of Indonesia (GOI) has issued a number of Presidential Regulation (PR) addressing the energy diversification. The first was PR Nr. 5/2006, which set the RE targets to reach 17% of the energy mix by year 2025; GOI raised these target to 25% in 2010, under the so called Vision 25-25 as shown in Table 1

Table 1: Projected Renewable Energy Contribution in Energy Mix through 2025

Fuel Type	Unit	2007	2010	2025	Potential
Biodiesel	Kilo Liter	133	482,000	16,371,559	
Bio-ethanol	Kilo Liter	-	296,000	6,876,005	
Other Biomass	MW	445	500	870	49,810
Geothermal	MW	1,052	1,260	12,332	28,500
Wind	MW	2	4	256	9,290
Solar	MW	-	12	250	4.8 kWh/m ³ /d
Small Hydro	MW	210	245	2,486	770
Large Hydro	MW	4,200	4,380	14,516	76,170

Source: DJEBTKE Vision 25-25

3. ELECTRICITY PRICING POLICY

In order to attract the participation of private sector in accelerating the development of renewable energy, such as geothermal energy, some countries implement mandatory (compulsory) policies as follows:

- 1) To set the electricity generated from geothermal energy at a fixed price, also known as Feed-in Tariff (FIT). Under the FIT, the buyers/sellers of electricity are required to purchase/sell the electricity from renewable energy at a price set by Government. If necessary, the Government will provide subsidies or incentives to the provider/buyer. FIT is applied in Germany, Denmark and several countries in Europe.
- 2) Policies with renewable energy quota system or Renewable Portfolio Standard (RPS), where the project developer or power producers are required to provide the majority of electricity generated from renewable energy or carbon credits that have to be gained through carbon trading or tradable Green Certificate. RPS is implemented in the United States, Japan, Britain and other developed countries.

The advantages and disadvantages for each system are shown in Table 2 below.

Table 2: Feed-In Tariff versus Renewable Portfolio Standard

Advantages	Disadvantages
Feed-In Tariff (FIT)	
<ul style="list-style-type: none"> • Will attract the renewable resources, if the price is set right in order to meet the objective. • Energy developer will have incentives for investment. 	<ul style="list-style-type: none"> • Price for electricity buyer/seller can be high. • Does not support efforts to reduce development cost of renewable resources. • Require accurate determination of electricity tariff. If it is set low, then will not attract the investor for development of renewable energy.
Renewable Portfolio Standard (RPS)	
<ul style="list-style-type: none"> • Will create price competition, which support efforts to reduce electricity prices from renewable resources. • The relationship between desire and target of renewable development target is clear. 	<ul style="list-style-type: none"> • As the price of carbon trading is determined by the market and uncertain, the investment risks for renewable resources development will be high. • Will require long-time for development carbon trading market. It is not attractive for developing countries.

4. FEED IN TARIFF SCHEME

FIT policies typically include three key provisions, namely guaranteed access to the grid, stable, long-term purchase agreements, and payment levels based on the costs of RE generation.¹ The main goal of a FIT program is to clarify and minimize risk factors, which will ultimately increase investment security and assist the project with securing lowest cost capital. There are four main approaches used to set the overall FIT payment to RE developers, and these are based on:

- 1) The actual levelized cost of RE generation plus a targeted return (set by the regulators or policymakers);
- 2) The estimated value of the renewable energy generation either to society or to the utility;
- 3) The fixed-price incentive that offers a purchase price for renewable electricity that is based neither on generation costs, nor on the notion of value; and
- 4) The results of auction or bidding process, which can be applied and differentiated based on different technologies, project sizes, etc. and is a variant on the cost-based approach.

FIT payments can also be differentiated by technology type, project size, resource type and quality. Also, many FIT implementation options center on the utility's role, i.e. utilities is required to purchase the entire output from eligible projects. This will guarantee eligible project owners that they will be able to interconnect their projects to the grid. Caps may be imposed either on the total capacity of RE allowed (usually differentiated by technology type), on the maximum individual project size (also often differentiated by technology type), or according to the total program cost (either total dollars per year, or for the multiyear program).

Also, guarantees can also be given to transmission system operators (TSOs) to offer guaranteed grid connection. This will ensure that RE projects can be connected to the grid in a timely way that minimizes bureaucratic overhead and fosters more efficient project siting.

¹Mendonça (2007), *Feed-in Tariffs: Accelerating the Deployment of Renewable Energy*. Earth Scan, London.

5. FIT POLICIES IN INDONESIA

The FIT program in Indonesia dates back in 2002, when the MEMR issued a regulation for small scale renewable power plant below or equal to 1 MW. The FIT was used in the 12 Power Purchase Agreements (PPA) with total installed capacity around 5.5 MW, all from hydro power plants. The tariff was set up as a base on the electricity basic production cost (Harga Pokok Produksi or HPP) of PLN and therefore every region of PLN has different HPP. The tariff was set at 60% of the HPP in the low voltage interconnection and 80% of the HPP in the middle voltage interconnection.

In 2006, the capacity parameter was increased to include the medium scale renewable power plants up to 10 MW under the same tariff system with all technologies being eligible for the tariff that has a long-year maturity. But the problem with this financial incentive is not the level of support provided but the regulated end user energy prices, with a growing concern that unless the government increases these prices the FIT system will become economically unsustainable.

In March 2009 MEMR issued a new regulation that the tariff will be set up based on the PLN's own price on the principle of economic value fairness price, and on the negotiation of business. Although the tariff has been set up more attractive and fair, but the issues remained with respect to how the tariff must be developed, how long it will survive and whether or not PLN will accept it.

For example, the costs of the coal-fired generation are just over half that of renewable resources and for PLN, coal is a far more economically attractive generation source. Also, while PLN is obligated to off-take renewable generation from independent power producers (IPPs) the disparity between renewable generation costs and end user prices could well force the utility to switch its own production to coal in order to reduce losses, which would ultimately undermine the government's renewable and emission objectives.

In Indonesia the design of tariff is differentiated by the technology and resource based on generation cost. This will provide sufficiently high tariffs on the one hand and avoiding wind fall profits on the other hand. In geothermal power development, the FIT policies has been designed to provide the guarantee of a stable revenue stream over the life of the generation plant, thereby lowers the investment. 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.

The following lists the various regulations and issues dealing with the FIT system for geothermal resource.

- 1) Minister of Energy and Mineral Resources Regulation Nr. 2/2011, authorizing PLN to purchase geothermal electricity at the tendered price and obligating PLN to develop geothermal Power Purchase Agreement (PPA) model.
- 2) Minister of Finance Regulation Nr. 3/2011 on guideline for the management and accountability of Geothermal Fund Facility (GFF). For this purpose, GOI allocated in 2011 and 2013 State Budget a fund of USD 380 million to help mitigating risk by enhancing data of geothermal prospects (including drilling up to three pre-exploratory wells to reservoir depth).
- 3) Minister of Energy and Mineral Resources Regulation No. 22/2012, which amends previous regulation on Feed-In Tariff (FIT) for geothermal electricity from a nation-wide cap at USD 0.97/kWh to fixed tariff as shown in Table 3 below.

Table 3: Feed-in Tariff for Geothermal

Location	Tariff (USD cents per kWh)	
	High Voltage	Medium Voltage
Sumatra	10.0	11.5
Java, Madura, Bali	11.0	12.5
South,, West and South East Sulawesi	12.0	13.5
North and Central Sulawesi and Gorontalo	13.0	14.5
West and East Nusa Tenggara	15.0	16.5
Maluku and Papua	17.0	18.5

- 4) The new tariff regime will be applicable to new developers that are issued their geothermal business licenses after 23 August 2012 and present developers which hold other forms of geothermal authorizations, permits or contracts issued before the 2003 Geothermal Law who wish to pursue expansion projects, extension of the PPA or who have already signed PPAs with PLN (and whether or not the plant has started producing electricity or steam), provided that the terms of the PPA provide that the parties may agree to changes in the price of electricity or steam. The new tariff is also applicable to developers that hold IUPs that will "implement" PPAs, provided that the price amendment is agreed between the parties and the PPA makes possible the use of the new tariffs.
- 5) The new FIT would only apply to new projects or extension contracts between IPPs and PLN. Note Article 4 of the new Regulation allows 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, suggesting the possibility of revising the existing pricing through negotiations.

- 6) In response to the industry’s demand, the GOI planned to amend the MEMR Regulation No. 22/2012, which involves differentiation of FIT payments to account for the differences in size and types or the choice of technology used. In addition to distinction between high temperature (higher than 225° C) and medium/low temperatures (lower than 225° C), the prices will also be structured in accordance with the size as shown in Table 4 below.

Table 4: Proposed New Feed-in Tariff for Geothermal

Capacity	Feed-in Tariff –c\$/kWh	
	High Temperature	Low/Medium Temperature
Greater than 55 MW	10.5	13.5
Between 20 MW – 55 MW	11.5	15.0
Between 10 MW – 20 MW	13.5	16.0
Smaller than 10 MW	17.0	19.0

6. FIT IMPLEMENTATION

One of the issues or problems in the implementation of FIT is Electricity Price Escalation, since the MEMR Regulation Nr.22/2012 is silent with respect to electricity price escalation. This stems from the fact that although the regulations on FIT were prompted by the industry’s demand and at the outset of process MEMR office generally convenes a series of discussion with the industry through the Industry Association, but the recommendations by the industry are not binding. Such approach to tariff setting has indeed some advantage as it can move forward more quickly because there is less opportunity for stakeholder intervention. On the other hand, the disadvantage is that the stakeholder process is not iterative and do not have a chance to comment on the cost model used.

The opponent to price escalation argues that 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 contrary, the supporters to price escalation may argue that the Indonesia’s system of FIT as outlined in the Minister of Energy and Mineral Resources 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, this can be seen from the GOI’s plan to differentiate FIT payments by also accounting for the differences in size and types or the choice of technology to help the acceleration of small capacity geothermal field and low enthalpy resources may indicate that the FIT as introduced by GOI, is not a true FIT, although the FITs have been developed based on actual cost.

Moreover, 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.

The legal basis of price escalation is accommodated in the Article 39 of the Government Regulation No. 14 Year 2012 on Electricity Supply Business Activities, which 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. 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 exceeding $\pm 20\%$.

Another issue that is inhibited the FIT implementation, is the Government Regulation regarding procurement for goods, services or works from external sources involving the bidding process known as “tendering”. Under the regulation, the goods, services or works are procured at the best possible cost to meet the needs of the purchaser in terms of quality and quantity, time, and location. Corporations and public bodies often define processes intended to promote fair and open competition for their business while minimizing exposure to fraud and collusion.

Like other countries, in Indonesia, strict rules on procurement must be followed by public bodies, with contract value thresholds determining the processes required (relating to advertising the contract, the actual process etc.). Given the new FIT regime it appears that in the geothermal activity 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 2 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, new bidding criteria will include the work program and expenditures commitment and bonus payment. 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.

Furthermore, confronted with the Government Regulation No. 59/2007 that stipulates that the bid winner is determined by the lowest bid price (Government Regulations has higher hierarchy than Minister Regulations), the new FIT schemes will in its application be in the form of a cap price instead of a fix price. The new regulation of electricity tariff for solar photovoltaic reflects this condition. The draft new Geothermal FIT as shown in Table 3 will also be considered as a capped price.

BARRIERS TO DEVELOPMENT

Although Indonesia has committed to increasing the deployment of renewable energy by including among others the introduction of FIT scheme for renewable electricity, several barriers must still be over-come for the country to reach its full potential. Unlike fossil fuel projects, geothermal projects require integrated efforts and risk management between upstream and downstream activities. Some may involve basic development issues as will be explained below. The installation of power plants will involve various stages of work and clearances, including project identification, project allotment, pre-feasibility report, detailed project report, techno-economic clearance, environmental and other clearances, financial closure, finalizing contracts for civil and mechanical work, and commencement of construction.

Out of many steps and clearances required to set up a power project, making land available is a major challenge since there is many a stakeholder with varied forms in interest in the making this possible. Land is of basic importance and necessity when it comes to pre-requisites of power generation. Most of the projects get delayed or cancelled due to the effect of non availability of land at market prices. Since about 80% of geothermal reserves are located in designated conserved forest areas, a Presidential Decree would be required to allow geothermal activities in conserved forest areas.

Also, like in many places, the Indonesia's geothermal project has often been challenged by local community or affected by the so-called NIMBY (not in my backyard) syndrome, which reflects the propensity of local citizens and officials to insist on sitting unwanted but necessary facilities anywhere but in their own community. A recent example included the two geothermal projects in West Java and South Sumatra that were suspended following the protests by the community, which claimed that development of the project would damage the social structure of the community.

In addition, the governmental system is sometimes a barrier to renewable energy deployment. For instance, following the promulgation of autonomy laws in late 1990's, local governments have been given a larger authority, including administering tenders for projects, but they often lack the capacity to do so transparently. Several companies have complained that tenders are worded poorly and amended after the tender is announced. The GOI is now assisting the local governments to promote better tendering practices for the government's related projects.

Other factors relate to the facts that developments of various energy sources are found in various laws and regulations, thereby they have potential for conflict in the execution. Also, land rights and ownership have been a vexing matter since Indonesia's independence, attributable to among others by the rich diversity of the local population adhering to different sets of customary rules and high-handed bureaucratic intervention. Other crucial issues include overlapping of rights on mining operating areas on one side with the rights of forestry, people's land and others. The overlapping lands and permits and conflicting interest have ultimately delays the activities for development of oil and gas resources, mineral, coal and geothermal.

CONCLUSION

The GOI has made a breakthrough in the development of renewable energy such as with the FIT regulation to develop geothermal and other renewable resources. However, inconsistencies in the law and regulation and heavy subsidies for energy consumption, has forestalled the development of a cleaner energy infrastructure. Designing a policy structure with short-term availability and uncertainty adds to the overall risk of a project and will create a barrier entry for many developers and potential capital providers. Indonesia needs to review the structure of renewable transactions, while the GOI also needs to provide assistance in securing the land, in particular the project that has been included in the Accelerated Power Plant Project.

REFERENCES

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