Promotion of Least Cost Renewables in Indonesia (LCORE-Indo)

Grid-connected Biomass & Biogas Power Investment in Indonesia:

Barriers and Policy Options

Compiled by:
Lisa Conrads

April 2014

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List of Abbreviations

FIT – Feed-in tariff

ASEAN – Association of South-East Asian Countries

RE – Renewable energy

ASEAN RESP – ASEAN Renewable Energy Support Project

PLN – PT Perusahaan Listrik Negara (Persero)

DGNREEC – Directorate General for New and Renewable Energies and Energy Conservation

DGE – Directorate General for Electricity

kWh – Kilowatt hour

IPP – Independent Power Producer

IDR – Indonesian Rupiah

MEMR – Ministry of Energy and Mineral Resources

MSOE – Ministry of State-Owned Enterprises

MOF – Ministry of Finance

PPA – Power Purchase Agreement

ROE – Return on equity

IUPTL – Ijin Usaha Penunjang Tenaga Listrik (Business Permit for the Supply of Electricity)

RUKN – Rencana Umum Ketenagalistrikan Nasional (General National Power Plan)

RUKD – Rencana Umum Ketenagalistrikan Daerah (General Regional Power Plan)

RUPTL – Rencana Usaha Penunjang Tenaga Listrik (Power Supply Business Plan)

CFPP – Coal-fired power plant

EPC – Engineering, Procurement, Construction

O&M – Operation and maintenance

PPU – Private Power Utility

USD – US Dollar

US FED – US Federal Reserve Bank

GDP – Gross domestic product

POM – Palm oil mill

KKO-KKF - Kajian kelayakan operasi – kajian kelayakan finansial (Operational and financial feasibility study)

PD – Project developer

IRR – Internal rate of return

MSW – Municipal solid waste

CDM – Clean Development Mechanism

1. Introduction

Being a former OPEC member state, Indonesia used to be a net oil exporter until 2004. Due to the strong increase in domestic energy demand, Indonesia became a net oil importer. Even though the country has huge renewable energy (RE) potential, and even has installed renewable capacity, these potentials remain unused and the energy demand of this population of 230 million is satisfied by domestic and imported fossil fuels. Contrasting to these energy consumption habits, the Indonesian government made promising emission reduction pledges at the 2009 Copenhagen U.N. climate summit, which however have not been followed consistently. Apart from the environmental effects of the fossil-fuel consumption of the 4th most populous country in the world, the budgetary effects are pressing. The country shows an increase of energy demand of 7-9% p.a. which, in combination with a rising oil price, is a costly issue for the government of this fast developing country. To guarantee a minimum degree of energy security – today only 66% of the population has access to electricity - energy is strongly subsidized.

To address the above named issues – the cost of fossil fuel import, the promised emission reductions, and the low electrification rate – the Indonesian government supports the diffusion of RE and aims at reaching a share of 25% by 2025. For this purpose Feed-in-Tariffs for biomass, hydro, municipal waste and landfill gas have already been implemented; and a benchmarked FIT for geothermal has just been added to the RE support systems.

In the case of bioenergy, currently mostly smaller plants for own consumption are installed in palm oil mills. This circumstance brings up the question whether the current support systems are working effectively in increasing the amount of RE installed.

The central question that will be approached in this report is: *Can the present barriers and risks be settled by the current support system, and which aspects require revision?*

Even though the Indonesian government introduced a new and more favourable regulation for IPPs using biomass in January 2012, progress in project development is very slow. The new ministerial regulation was supposed to improve the conditions for IPPs compared to the old regulation 31/2009, however the lack of grid-connected plants with a signed PPA (under reg. 4/2012) brings up the question if the further uptake of bioenergy power technologies is still hindered by unfavourable regulations or by other factors surrounding these.

2. Approach and methodology

The objective of this report is to provide valuable inputs for the revision of the support system for grid-connected biomass and biogas power plants that are currently subject to regulation 4/2012. A detailed evaluation of the current situation is of significant importance and must comprise various aspects.

First and foremost, in Chapter 3 an overview will be given on the surrounding factors for bioenergy investment[1]. This section will focus on the political aspects, describing and evaluating the development of renewable and bioenergy policy in Indonesia, the structural aspects, describing the stakeholders of the renewable energy sector and their relationship, and the macro-economic factors, primarily currency exchange rates, inflation and access to credit, that influence the investment climate in general. These insights are important to understand the complexity of the Indonesian renewable energy sector.

The analysis of this report then will also consider three main aspects. The central research object of this report are the barriers perceived by the different stakeholders of the Indonesian renewable energy sector. Apart from this, the requirements and characteristics of different investor groups and policy design considerations will be evaluated.

The barriers will highlight the main obstacles that should be aimed at by policy revision. However, these should not be addressed blindly. Due to the different requirements and characteristics of different investor types and groups, policymakers should be aware of who is targeted by the policy (Dinica, 2006) (Wüstenhagen & Menichetti, 2012). If this consideration is not included in policymaking, the efforts are likely to become fruitless (Enzensberger, Wietschel, & Rentz, 2002). Furthermore, different policy design issues have diverse impacts on an array of policy considerations that should not be neglected for successful policy design, especially in the case of developing countries (Rickerson, Laurent, Jacobs, Dietrich, & Hanley, 2012). If a feed-in tariff (FIT) for example only focuses on increasing investor security, important considerations like grid stability, energy access, economic development, to only name a few, might be affected in an unintended and adverse way. In other words, the barrier analysis will focus on what is perceived problematic, the investor characterization focuses on

[1] The term "bioenergy investment" will be used in this report to account for investment in and development of grid-connected electricity plants based on solid, liquid and gaseous biomass feedstock that occurs as residue in the agroindustry.

what investors require and the policy design section elaborates the current (regulative) situation and the implications for different policy considerations.

In the following, these three analysis aspects will be explained in more detail.

2.1. Data collection

For the data collection by stakeholder interviews, the usual project development steps will be applied to assess the underlying barriers as proposed by UNEP/GEF (2006) and de Jager & Rathmann (2008). The ASEAN RE Guidelines, shown in Figure 1, developed by the ASEAN-RESP project are used as a framework for the interviews. As underlined by de Jager & Rathmann (2008), "*each phase [of project development] has its own risks, risk management opportunities and sensitivity for policy changes.*"

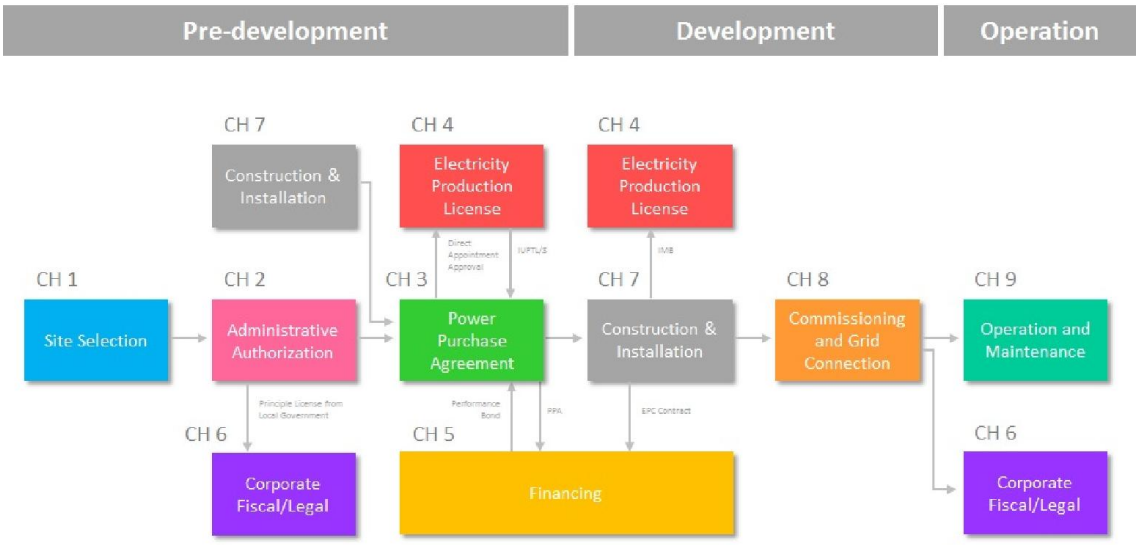

Figure 1: Usual Project Development Steps for Grid-connected Biomass and Biogas Power Plants up to 10 MW (ASEAN-RESP, 2014)

The interview partners were selected with the goal to cover all stakeholders that are usually involved in renewable energy project development in Indonesia.

PT. PLN as the state-owned electricity supplier is the main partner for project developers and owners when aiming at grid-connection.

DGNREEC is the Directorate General of New and Renewable Energies and Energy Conservation in charge of setting the regulations for renewable energy and DGE, the Directorate General of Electricity is doing the same for the electricity sector.

Banks/financing institutions are the key stakeholders for project financing.

Project developers/owners are the ones who have to pass all the steps shown in the guideline and can also give feedback on the operation and maintenance of the plants.

Development organisations have experience in advising the government in policy design and regulative issues and furthermore they have experience in project development.

With this first general list of stakeholders in mind, the contacts for the interviews were chosen by their expertise and experience in bioenergy grid-connected plants. The aim was not to have a long list of interviewees but to conduct interviews with qualified and experienced people.

The chosen research method is a guided interview with the different stakeholders of the Indonesian renewable energy sector. The guided interview is chosen to account for new input from the interviewees. Nevertheless, the interviews are carefully structured to make sure that all steps of the project development will be covered. The guidelines are kept rather simple and straight forward to make sure that all relevant steps and issues can be addressed during the interviews, with a planned duration of 1-2 hours each. Every interview is held by two interviewers, of which at least one speaks Bahasa Indonesia, to be able to further enquire in case of misunderstandings.

The guideline for the interviews is structured according to the RE Guidelines. Every step of the RE Guidelines is discussed separately, but all steps are covered by the same set of questions. The first issue always is to find out if the processes described in the RE Guidelines are correct. Following this, the stakeholders are asked for input concerning the costs and duration of each step. These questions are also needed to verify the information that is available in official laws and regulations. Following this, key questions that came up during compilation of the guidelines will be asked. This step is supposed to resolve issues of misunderstandings. All four questions are included to verify the "translation" of the official documents into readable guidelines, and to make sure that all important steps have been described correctly and in the right order.

Following this "verification", the issue of barriers is addressed. For this purpose, several pre-identified barriers are listed in the interview guideline. These are evaluated with the interviewee during the meeting. However as underlined by Painuly (2001), some precautions are to be required when designing the interview guideline. One important aspect is to keep provision for additional barriers and remarks to be mentioned by the interviewee. Furthermore, a stakeholder's opinion on these issues that have not been covered in the questions can be a very useful source of information. Therefore, the questionnaire is not worked through in detail but

in a very open manner. First, the stakeholders' opinion and input will be asked for and only in case the interviewee needs further guidance to answer, the pre-identified barriers will be addressed. The adherence to a certain structure and the coverage of all relevant steps is guaranteed by following the steps of project development throughout the RE Guidelines. Also the aspect of designing a different questionnaire for each group of stakeholder will be taken care of by only including those project development steps in the interviews that are relevant for the stakeholder.

2.2. Data analysis

2.2.1. Barriers

The answers from the interviews will be grouped based on the RE Guideline steps of project development, following this, the single barriers will be allocated to different risk categories, as depicted in Figure 2. This step is proposed by Waissbein, Glemarec, Bayaraktar & Schmidt (2013), to allocate one stakeholder group to each risk category. The advantage of this classification of risks and barriers is that it groups the single barriers according to the stakeholder group that is mainly concerned with these barriers and therefore is also the group in charge of improving the situation. The authors proclaim that this categorisation will prevent the overlapping of barrier classes that is inherent to most other frameworks. While complete mutual exclusiveness is questionable, the fact that each category is linked to one stakeholder group will increase the ability to link a certain barrier to particular one class. Like this, the final table will not only include an array of instruments but the stakeholder who would be in charge to initiate the instrument is included as well.

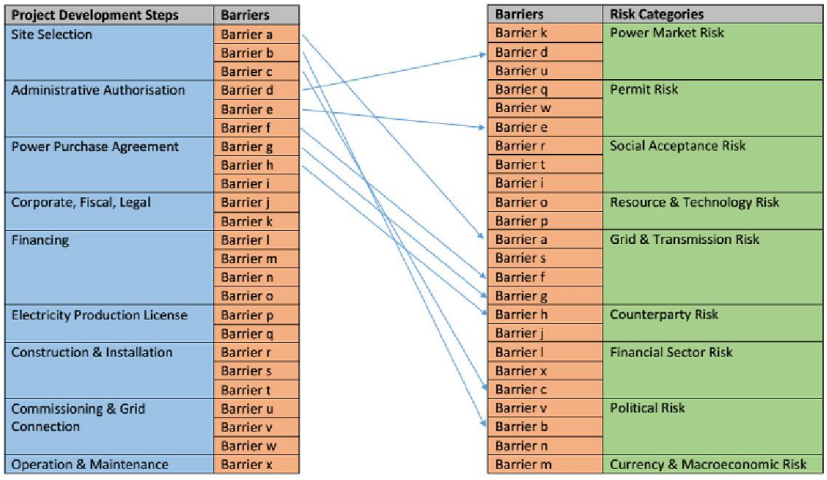

Figure 2: Framework for Categorisation of Barriers

2.2.2. Investor groups

As FIT and other RE support systems are implemented with the aim to increase investment into RE, it seems logical to take an investor-perspective when evaluating policies for RE diffusion. However, until today mostly a policy perspective is applied to find out whether a policy design is working properly and successfully or not. There are plenty of frameworks analysing factors like efficiency, efficacy, equity and institutional feasibility (Verbruggen and Lauber, 2012) or efficacy, cost effectiveness, dynamic efficiency, equity and fiscal responsibility (Sovacool, 2010) of support instruments. These approaches might as well evaluate the amount of investment into RET, however the investor as an important factor in the policy diffusion equation is only considered to a small extent, if at all, in the analysis. A new approach of policy evaluation takes a different way by focussing on the investor and its decision-making behaviour. This new stream of the literature analyses the effect of an instrument's risk and profitability aspects on the willingness to invest and also the different types of investors that are attracted by a certain investment context.

Apart from assessing the current barriers, Enzensberger et al. (2002) underline the importance to take into account different stakeholders' needs and put special emphasis on the requirements of investors, bankers and project developers.

	Financial strength		Project risk acceptance	Profitability expectations	Inherent motivation
	Individual	Cumulated			
Utilities	High	Depends on strategy	Depends on strategy	Depends on strategy	Low
Specialised green IPPs	Intermediate	Intermediate	Intermediate	High	High
Non-specialised commercial	Intermediate	Low	Low	Low/intermediate	Low/intermediate
Private investors with own projects	Low/intermediate	Intermediate	Low	Low/intermediate	Very high
Private investors acquiring project shares	Low	Very high	Very low	Low	Very high

Figure 3: Specific Characteristics of Different Investor Groups (Enzensberger, Wietschel, & Rentz, 2002)

Enzensberger et al. (2002) provide a framework taking into account the financial strength, project risk acceptance, profitability expectations and inherent motivation of different investor groups. The stakeholder groups in Indonesia will be evaluated according to this scheme, which is depicted in Figure 3.

2.2.3. Policy design considerations

According to Rickerson et al. (2012) FITs cannot be easily defined because they are rather a "package" of different policies. This distinguishes them from stand-alone policies like tax credit or rebate. Figure 4 outlines the various design issues that can have an impact on other policy considerations. All FITs will include administratively determined performance-based

cash payments (amount of money/kWh) which are available on a standard offer basis. Apart from this however there are wide variations of FITs depending on which policy elements they encompass. FITs can include elements regulating interconnection, the entity purchasing the electricity, priority given or not to RE on transmission and distribution systems, contracting details and pricing.

	Policy Considerations							
FIT Design Issue	**Investor security**	**Energy access**	**Grid stability**	**Policy costs**	**Price stabilization**	**Electricity portfolio diversity**	**Administrative complexity**	**Economic development**
Integration with Policy Targets	✓						✓	
Eligibility		✓	✓	✓		✓		✓
Tariff Differentiation		✓		✓		✓	✓	✓
Payment Based On	✓			✓	✓	✓	✓	
Payment Duration	✓			✓	✓			
Payment Structure	✓			✓	✓		✓	
Inflation	✓				✓			
Cost Recovery	✓			✓				
Interconnection Guarantee	✓		✓					
Interconnection Costs	✓		✓	✓				
Purchase and Dispatch Requirements	✓			✓				
Amount Purchased	✓						✓	
Purchasing Entity	✓						✓	
Commodities Purchased	✓			✓			✓	
Triggers & Adjustments	✓		✓	✓	✓		✓	
Contract Issues	✓							
Payment Currency	✓			✓				
Interaction with Other Incentives	✓			✓				

Figure 4: FIT Design Issues and the Impact on different Policy Considerations (Rickerson, Laurent, Jacobs, Dietrich, & Hanley, 2012)

Rickerson et al. (2012) name investor security, energy access, grid stability, policy cost, electricity portfolio diversity, administrative complexity and economic development and job creation as important policy considerations for policy makers in developing countries. When evaluating or designing a certain policy framework, these aspects must be included. Even though the lack of certain aspects, for example interconnection guarantee, can be perceived as a barrier by investors, it might be important for the grid stability to not provide this security. It is therefore crucial for optimal policy design to include the full amount of policy considerations and not only the investor's perspective. In other words: "Seeking to maximize one objective category typically reduces success at meeting the other." (Grace, Donovan, & Melnick, 2011).

The regulation 4/2012 will be evaluated according to this scheme in Chapter 4.

3. Surrounding conditions for renewable energy investment

3.1. Political

The purpose of this section is to give an overview of the evolution of (renewable) energy policies and laws in Indonesia. Policies and regulations in Indonesia are issued at different levels as depicted in Figure 5. In general, laws in Indonesia present rather brief guidelines (Mujiyanto & Tiess, 2013, p. 37).

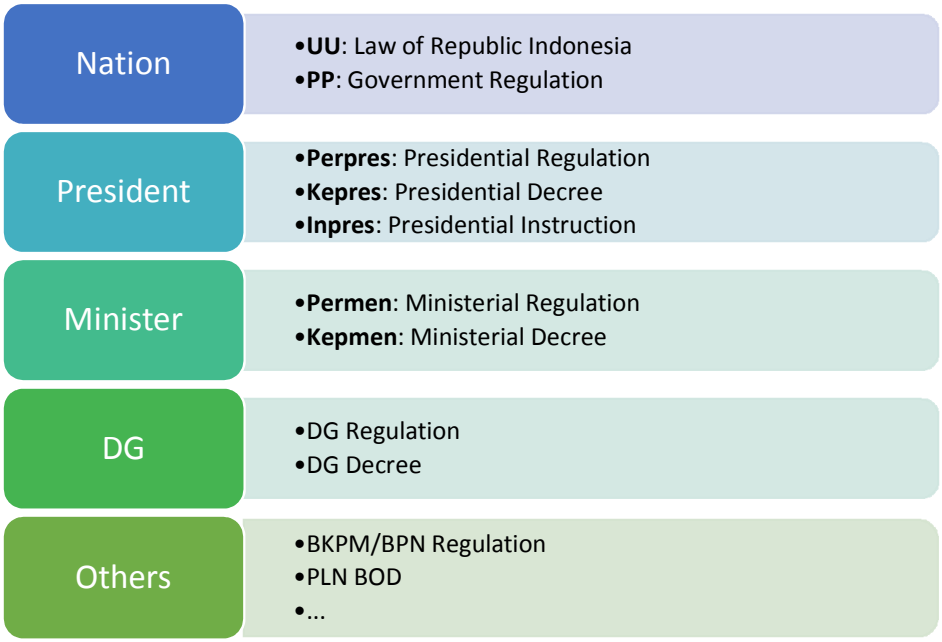

Figure 5: Structure of Laws and Regulations in Indonesia (ASEAN-RESP, 2014)

The first attempts to address the challenges of current and future energy supply in Indonesia were introduced after the first oil shocks with the Presidential Instruction No. 9/1982, which focused on energy conservation in all government ministries and agencies and state owned enterprises. Further important first steps in pushing the policy evolution was the establishment of the Ministerial Energy Coordination Board (Bakoren), which was assigned to issue general policy guidelines concerning energy as well as the introduction of the National Committee on Energy Conservation (NCEC), which supported the government in formulating laws, regulations and guidelines related to energy policy, as well as implementation campaigns at micro level (Singh & Setiawan, 2013). The introduction of the 1985 Electricity Law was the dawn of opening up the electricity market for independent power producers (IPPs), but it still took until 1991 until the first major IPP, PT Paiton Energy, began its operations in Indonesia (PWC, 2013). Presidential Decree No. 43/1991 about Energy Conservation put greater

attention on energy efficiency and environmental sustainability, which also included greater efforts and emphases to give attention to renewable energy sources like biomass. In general the policy scope was broadening during the 1980s and 1990s and evolved from micro to macro level orientation (Singh & Setiawan, 2013). The Asian financial crisis during the late 1990s put a large financial burden on PLN due to the depreciation of the Indonesian rupiah (IDR), which led to abandonment of many IPPs or at least a renegotiation of the selling price. This led to a loss of investor confidence (PWC, 2013).

The reformation of the Ministry of Mines and Energy into the Ministry of Energy and Mineral Resource (MEMR) in 2000 put emphasis on four policy objectives, namely energy diversification, rational energy pricing, energy sector reform and rural electrification. These emphases also increased attention given to renewable energy sources by government. (Singh & Setiawan, 2013)

Parallel with the establishment of the MEMR, the consultations for a new Electricity Law began between the government, PLN and a small group of other stakeholders in 1999. After three years of negotiations, the 2002 Electricity Law included a new outline of the power sector into competitive and non-competitive areas, where the competitive areas should allow for private participation in generation and retailing. Furthermore, the electricity tariffs were to be market-based and regulation was to be covered by the Electricity Market Supervisory Agency which was supposed to increase independence (PWC, 2013). This design of the new electricity law looked very promising and it might have been the foundation for a more dynamic electricity sector with growing generation capacity and a natural setting of the electricity tariff through supply and demand (Purra, 2011). However, the Law was found to be not in line with Article 33 of the Indonesian Constitution which states that the government is in charge of managing the sectors of production and the land, water and natural resources that are important for the country and the people (Indonesia, 2002). Electricity falls into this categorization and therefore the state must provide for electricity by law. This incompatibility with the Constitution stopped the 2002 Electricity Law from being put into practice and the government had to reinstall the 1985 Electricity Law.

According to Purra (2011), the incompatibility of the Law with the Constitution even though it had been in preparation for three years in total, is a perfect example of the unpredictability of the Indonesian institutional environment. The author brings up the question why the government would even invest the time into preparing a comprehensive legislation which is

not being put in practice afterwards. Frankly most legal experts should have been able to recognise the misalignment with the Constitution, and according to Purra (2011), this can only be explained by the relative weakness of legislators in the newly democratised Indonesian parliament and furthermore by a lack of coordination between the responsible government agencies, most of them also lacking the proper capacity.

Article 33 also today makes it difficult to open up the electricity sector to a free market structure. Private producers may enter the market but the government had to maintain authority for policy- and decision-making (Purra, 2011).

Only in 2009, the current Electricity Law was set into practice which is strengthening the regulatory framework and the position of the regional governments (especially with regards to licensing and determination of the electricity tariff) and it promotes the role of private investors by allowing them to participate in the power supply business. However, PLN still has the "right of first refusal" and therewith, the law is prioritising the utility in serving electricity (PWC, 2013). Even though transmission and distribution of power in Indonesia have been opened up to IPPs with the 2009 Electricity Law and the GR 14/2012, currently private sector participation is still focusing on power generation (PWC, 2013, p. 15).

In between however, the MEMR took up work and implemented the Ministerial Decree No. 1122k/30/MEM/2002 and its update of 2006 which order PLN to purchase electricity from renewable energy plants up to 10 MW. This regulation set the purchasing price at 80% of PLNs electricity base price[2]. Furthermore the Decree foresaw a minimum contract period of 10 years for plants between 1 and 10 MW (PWC, 2013).

Presidential Regulation No 5/2006 on National Energy Policy is the basis for biomass and other renewable energy development in Indonesia. Apart from reaching energy elasticity of below 1 by 2025, this regulation set the target for the energy mix in 2025 to which RES should contribute 15%, consisting of 5% biofuels, 5% other renewables (also including biomass and biogas) and 5% geothermal energy. Another 2% shall be generated by new energy in the form of liquefied coal. (Mujiyanto & Tiess, 2013, p. 35f)

Law No 30/2007 aims at reaching the goals set in Law 5/2006 to increase energy security and the reliance on renewable energy. Based on this Law the National Energy Council was founded

[2] 80% was the value for medium voltage connection, while the price for low voltage connection was set at 60%

which furthers the exploitation of renewable energies until 2025 (Mujiyanto & Tiess, 2013, p. 37).

Vision 25/25 was developed by DG NREEC and foresees the utilisation of 25% of new and renewable energies by 2025. As depicted in Figure 6 this is considerably higher than the share of 17% of new and renewable energies foreseen in Presidential Regulation No. 5/2006 (Statement on Notable Energy Developments since EWG40 - Republic of Indonesia).

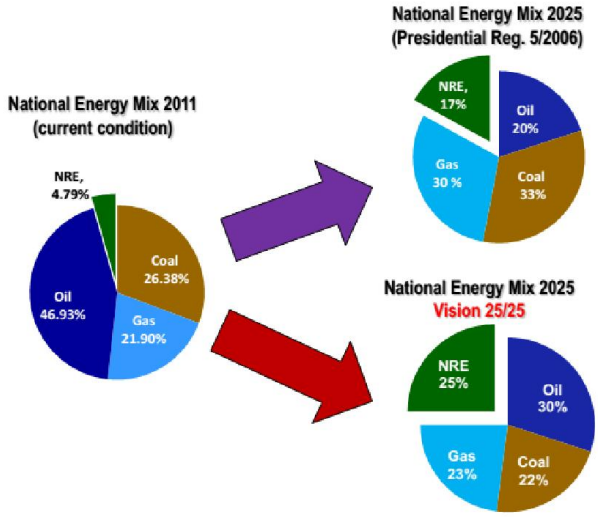

Figure 6: Indonesian Energy Policy Goals (Azahari, 2012)

Bioenergy policy in Indonesia has been more strongly oriented to the macro level for using bioenergy for power generation and transportation than for the small scale sector, e.g. for households (Singh & Setiawan, 2013, p. 336) like this has been the case for e.g. India.

The current flagship of bioenergy policy and regulation in Indonesia is the MEMR Regulation 4/2012 which introduced a distinct FiT for biomass and biogas power plants and municipal solid waste power plants.

The impact of policy making on investors can be evaluated by analysing the institutional processes in different jurisdictions (Holburn, 2012). According to the author the regulatory risks investors will face are determined to a large extend by two factors: the autonomy of regulative agencies from politicians and the policy-making processes being either rigid or flexible.

Purra (2011) outlines the organisational change of the administrative agencies from independence to 2000 and underlines that there have been frequent changes in the institutional

basis of the finally established MEMR. Even though the 1985 Electricity Law was a first attempt to restructure and decentralise the energy sector, the first IPPs only were established in 1992 (ibid.). This circumstance might, at least in part, be attributed to the missing administrative agency back then. As the author states, the administrative governance structures under Suharto were hindering the Law from being more effective.

Even though the MEMR established in 2000 is "generally regarded as the epicenter of administrative power in the energy sector" (Purra, 2011), it still faces operational problems due to, first, the hierarchical administrative positions of the different MEMR departments, and second, the influence of administrative decisions by the Ministry of State-Owned Enterprises (MSOE), the Ministry of Finance (MOF) and the State Ministry of National Development Planning (Bappenas). Based on this structure political manipulation and inter-agency disputes are widespread. (Purra, 2011)

Another factor underlining the lack of autonomy of regulative agencies are the massive subsidies for fossil fuels. Numerous attempts to reduce subsidies have failed due to the high politization of the energy prices in Indonesia. Due to the turmoil these attempts caused (at least for the private power prices) politicians have constantly been avoiding decisions to increase the price or reversing them later. PLN as the actor suffering from these low prices not covering the production costs, proposed plans to increase the prices gradually but mostly failed (Purra, 2011).

As PWC (2011) outlines, PLN is directly affected by the political process as the electricity price and therewith PLNs return is set by Parliament.

The IPPs that were established under the 1985 Electricity Law were able to negotiate power purchase agreements (PPAs) with very high return on equity (ROEs) for three main reasons. First, the contracts had often been negotiated and prepared directly by Suharto and only been handed over to PLN for signing. Second, PLNs negotiators were poorly trained for this activity predominantly being engineers. Third, the IPPs had a strong bargaining power due to the fact that the Indonesian electricity sector was considered a high-risk environment (Purra, 2011). Having in mind the huge financial burden PLN had to carry as a result of the Asian financial crisis, this experience might be one reason for the utility's reluctance to negotiate attractive PPAs for investors today.

3.2. Structural

The Indonesian electricity sector is strongly dominated by the state-owned electricity supplier PLN and, as stipulated in the Constitution, controlled by the Indonesian state. These structures were already set after Independence in 1949 during the period of President Sukarno's rule. His Guided Democracy was marked by a socialist industrial policy. The aim was to rebuild the country after the Dutch colonisation and for this purpose the government relied on state-owned entities to provide for energy. After the fall of Sukarno and during the period of President Suharto's New Order, bureaucratization and corporatization of political and social organizations was undertaken but did not include the energy sector. It stayed in hands of the government and a functional nation-wide energy policy did not exist (Purra, 2011). As described in the previous sub-chapter, an opening of the energy sector started in the 1980s when stakeholders other than PLN where first allowed to generate and sell electricity. Today the electricity sector in Indonesia is mainly influenced by the actors described in Figure 7.

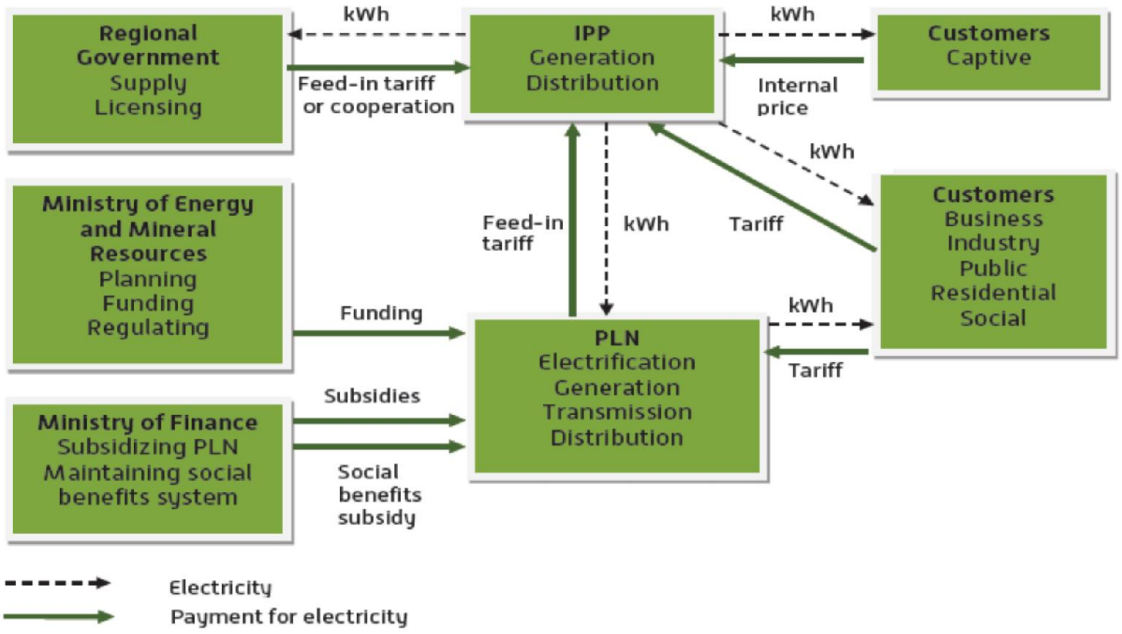

Figure 7: Structure of the Indonesian Electricity Sector (Differ Group, 2012)

The MEMR is responsible for the National Electricity Master Plan (RUKN) and for creating and implementing Indonesia's energy policy. This means MEMR is responsible for preparing laws and regulations concerning energy as well as tariff and subsidy policies (PWC, 2013). Furthermore, it stipulates the electricity price PLN has to pay when buying electricity from IPPs (Irnawati, Martinez, Pradekso, & Gampper, 2013). MEMR has various sub-agencies, two

of them are the Directorate General for Electricity (DG E) and the Directorate General for New and Renewable Energy and Energy Conservation (DG NREEC), the latter only being established in 2011 (PWC, 2013). The other two sub-agencies, the Directorate General for Oil and Gas and the Directorate General for Mineral, Coal and Geothermal are however better positioned according to their market size (Purra, 2011). DG NREEC is in charge of formulating and implementing policies and technical standardisation for the field of renewable energy (SERN, 2013), and DGE is in charge of doing the same in the field of electricity (Ministry of Energy and Mineral Resources , 2014) and of issuing the electricity production licence (IUKU/IUPTL) to IPPs. The purpose of the establishment of DG NREEC was to have more institutional and policy support for renewable energy, and to bring up faster changes in the policy evolution process (Singh & Setiawan, 2013, p. 336ff). One key activity of DG NREEC is the stipulation of the tariff that is paid by PLN to IPPs generating electricity from renewable sources. DG NREEC is again subdivided into four Directorates, namely one for geothermal energy, one for bioenergy, one for miscellaneous new and renewable energy and one for energy conservation (Statement on Notable Energy Developments since EWG40 - Republic of Indonesia).

Considering DGE and DG NREECs working fields a lack of clarity can be noticed. The longer existing DGE is in charge of all issues concerning IPPs. With the emergence of DG NREEC the responsibilities are no longer clear, as renewable energy fuelled power plants fit into both definitions, IPP and renewable energy.

The RUKN is the national 10 year estimate of electricity demand and supply developed by the Indonesian government in consultation with Parliament. It includes implications for investment and funding policy, as well as approaches to the utilisation of new and renewable energy resources. The RUKN provides guidance to central and regional governments and to potential investors on energy contribution levels for renewable sources. It is reviewed annually and is the basis for the RUKDs which should be prepared by the regional governments (PWC, 2013).

The regional authorities gained a larger degree of autonomy for electricity issues in 2009. As set in Law 30/2009, they have to prepare the Regional Electricity Plan (RUKD) and they can provide licenses to power projects if this does not interfere with the central government (PWC, 2013).

PLN is the state-owned electricity provider holding exclusive powers in transmission, distribution and supply of electricity to the public. Until the Electricity Law 2009 came into

practice PLN was the single or Authorized Holder of an Electricity Business Licence, whereas now PLN, just as the licensed IPPs, holds a simple IUPTL. Even though PLN holds exclusive rights in the electricity sector, the utility is supervised and regulated by several ministries and is subject to the parliament's decision on the electricity price. Especially the latter has immense impact on PLN's financial situation (PWC, 2013).

PLN develops the Electricity Development Programme 2010-2019 (RUPTL), which is based on the RUKN, and reviews it annually. MEMR must approve the RUPTL (PWC, 2011). The RUPTL outlines PLN's ten year IPP programme. The plan contains information on which projects will be tendered out by PLN during the next years (Baker & McKenzie). In general all planned plants bigger than 10 MW must be included in the RUPTL – whether to be developed by PLN or by IPPs. Plants below 10 MW might be mentioned but are not necessarily.

The electricity tariffs and therewith PLN's income is set by parliament approval. In case this set tariff is below the cost of electricity production, which has been the case for the past decades (iisd, 2012), the Ministry of Finance must subsidize PLN (PWC, 2011).

IPPs have already been allowed to sell electricity to PLN since the establishment of the 1985 Electricity Law, but accounted for only 14% of the generating capacity until 2011 (PWC, 2011). Every IPP in Indonesia has to sign a PPA with PLN, which sets the price and duration of the contract. IPP must not be confused with companies selling excess power to PLN. Companies producing captive power for their production can sell the amount they do not use to PLN. This concept is however based on different regulations and processes. Excess power contracts are limited to a period of one year and must be renegotiated in case extension is requested.

In general, IPPs in Indonesia have three different possibilities to start their business. One option is the tender process, during which PLN or DGE (in the case of Solar PV) announces their plans for new power plans. This process is generally available for all types of power plants and is a must for all projects that are not eligible for the two other options. The lowest price proposed by the bidders will be the tariff to be paid by PLN to the IPP. The "Direct Appointment" process is available for all renewable energies and coal fired power plants which match the following conditions, they are mine-mouth CFPP, local energy, excess power, expansion projects or are announced during a period of energy crisis condition. The tariff is based on negotiation and/or the applicable regulation issued by MEMR. During the "Direct Appointment" mechanism the IPP will propose a project to PLN, who can approve this after

having checked the proposal internally. The "Direct Selection" process is applicable for projects that are not fuel oil generators and when there is more than one direct appointment proposal in a grid-system, or if the proposed capacity is above the need of additional capacity. (PLN, 2013)

The basic structure of the PPA according to PLN is as depicted in Figure 8. The central part, the PPA is signed by the IPP, or the seller of electricity and PLN, the buyer of the electricity. Apart from this central agreement, the IPP will enter contracts and agreements with a number of other stakeholders. The capital cost of developing a plant are usually born by 30% equity, which is supplied by a consortium of 2 to 4 companies and by 70% debt provided by foreign or local lenders. The development and construction of the plant will be taken care of by an external EPC contractor, and the feedstock supply of the plant must be secured by entering a fuel supply agreement with a biomass producer. The task of O&M can also be outsourced to a third contractor.

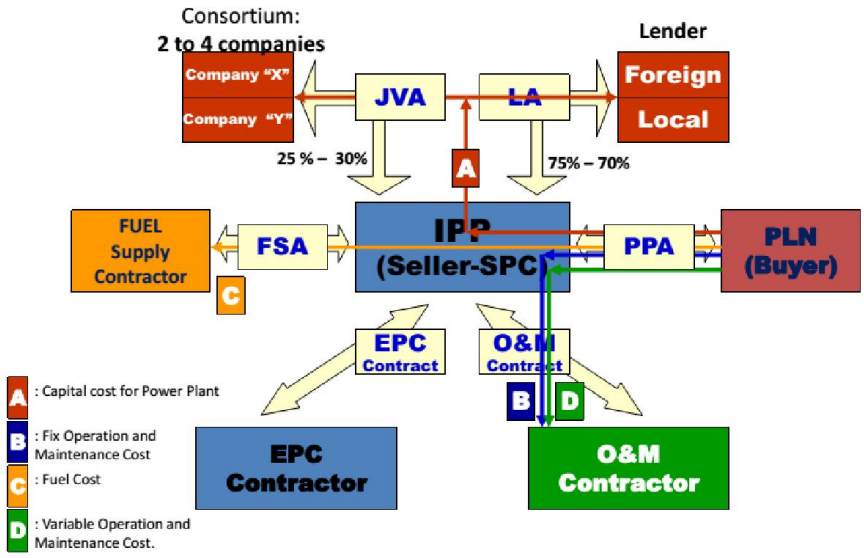

Figure 8: IPP Agreement Structure (PT PLN, 2013)

Another option to participate in the Indonesian electricity sector is by establishing a Private Power Utility (PPU). The PPU must hold an operating licence (Izin Operasi) which allows them to generate, transmit and distribute electricity for their own use or their customer base. The electricity can be bought by holders of an IUPTL (which is most likely PLN) or also to end-customers. In the latter case, approval of the relevant Minister, Governor or Mayor is required. The highest probability for end-customer sales from PPUs is given in remote areas that are not yet served by PLNs grid (PWC, 2013). In fact, this means that the Indonesian

regulation allows for rural electrification by other suppliers than PLN. However, as mentioned before, PLN has the "right of first refusal" in case they plan to serve the region in the future.

PLN's cost of electricity production varies strongly across the different regions in Indonesia. These variations are mainly caused by the availability of an inter-regional electricity grid as well by the main feedstock used for electricity generation.

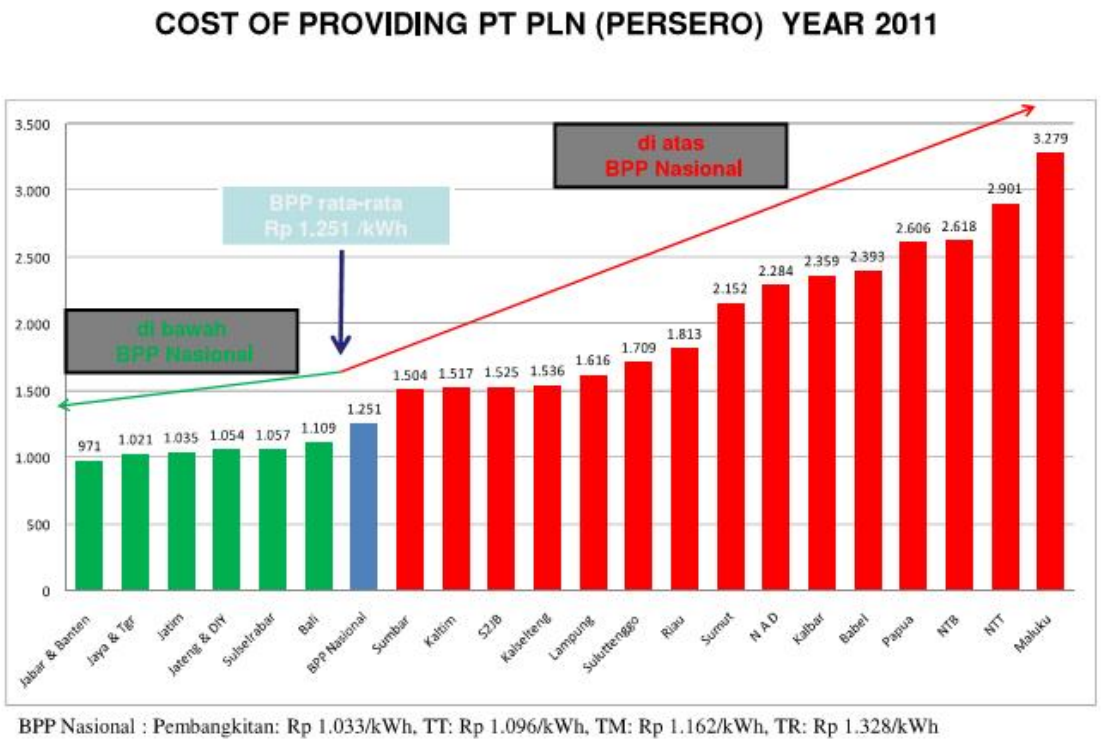

Figure 9: Cost of Electricity Production PT PLN (Winarno, 2013) [3]

Figure 9 displays the cost of providing electricity by PLN by region. Production costs below the national average are only possible in Java and Bali and in the south of Sulawesi. Production costs between 1000 and 2000 IDR/ kWh are feasible in the southern parts of Sumatra and Kalimantan and in the northern parts of Kalimantan and Sulawesi. All other regions face electricity production costs of more than 2000 IDR/kWh and in the islands of Maluku costs even exceed 3000 IDR/kWh.

[3] Explanatory note – regions from left to right: West Java & Banten; Jakarta and Tangeran; East Java; Central Java & Yogyakarta; South, Southeast and West Sulawesi; Bali; National; West Sumatra; East Kalimantan; South Sumatra, Jambi, and Bengkulu; South and Central Kalimantan; Lampung; North, Central Sulawesi & Gorontalo; Riau; North Sumatra; Aceh; West Kalimantan; Bangka Belitung; Papua; West Nusa Tenggara; East Nusa Tenggara; Maluku

The price of electricity in Indonesia is categorised by sector and by voltage of the distribution grid. In general the price is the higher the higher the voltage is. The latest price increases by 15% in 2013 did not affect the low-income population connecting to the low voltage grid up to 900 VA. The prices for this customer group ranged between 150 and 500 IDR/kWh in 2013. Furthermore the electricity price for social services is considerably lower than for other sectors. For households, businesses and industry, prices for medium and high voltage range broadly between 800 and 1100 IDR/kWh and 700 and 1400 IDR/kWh.

Table 1: Ranges of Electricity Prices in Indonesia in 2013 in IDR/kWh (PT. PLN)

	Social Services	Households	Businesses	Industry
< 900 VA	123-360	170-495	254-465	160-405
900 - 5500 VA (14 kVA)	629-900	833-1145	835-1100	830-1112
> 6600 VA (> 14 kVA)	635-925	980-1352	880-1380	723-1057

3.3. Macro-economic

This section will give a brief overview of the current macro-economic indicators in Indonesia. These indicators influence the required rate of return by investors and therefore are important factors in investment decisions (Kissel, 2008).

While the Indonesian Rupiah (IDR) was assumed to be rather stable to US Dollar (USD) lately, and even strengthen slightly in 2013 (KPMG), current exchange rate show the opposite. Starting in the second half of 2013 the value of the IDR has been decreasing more sharply. Values have been around 9,000 IDR/USD for the last years and have been skyrocketing up to over 12,000 IDR/USD by the end of 2013/beginning of 2014 as shown in Figure 10.

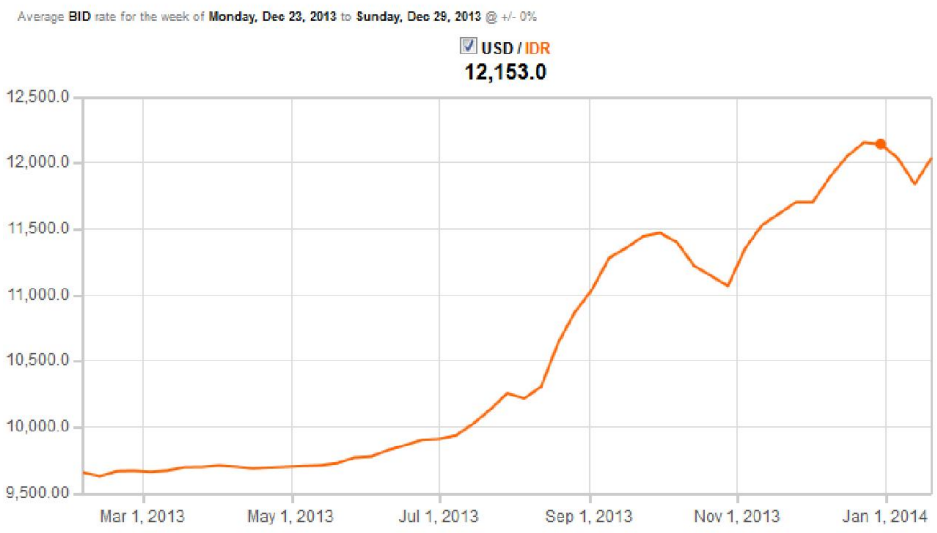

Figure 10: Development of Exchange Rate USD/IDR January 2013 to January 2014 (Oanda, 2014)

While the current loss of value can be reported for numerous Asian currencies, the IDR experienced the sharpest plunge, reaching 12,000 IDR/USD in late November, which is the worst value since March 2009 (Li & Ho, 2013). According to local economists, this current decline is not based on large outflows like in the past, but caused by lack of investor confidence, which will prevent them from returning to the markets as long as views remain gloomy (Li & Ho, 2013). While other emerging markets' currencies recovered after the US FED stepped back from increasing interest rates, the value of the IDR plunged further (Husna & Ismar, 2013).

While Figure 11 shows that the inflation rate has been under control during the past years (KPMG), it soared to 8.61 in July 2013 (Figure 12) which is the highest value in four years (Manurung, 2013). Since then the increase in consumer prices stabilised at this high level (Trading Economics, 2013).

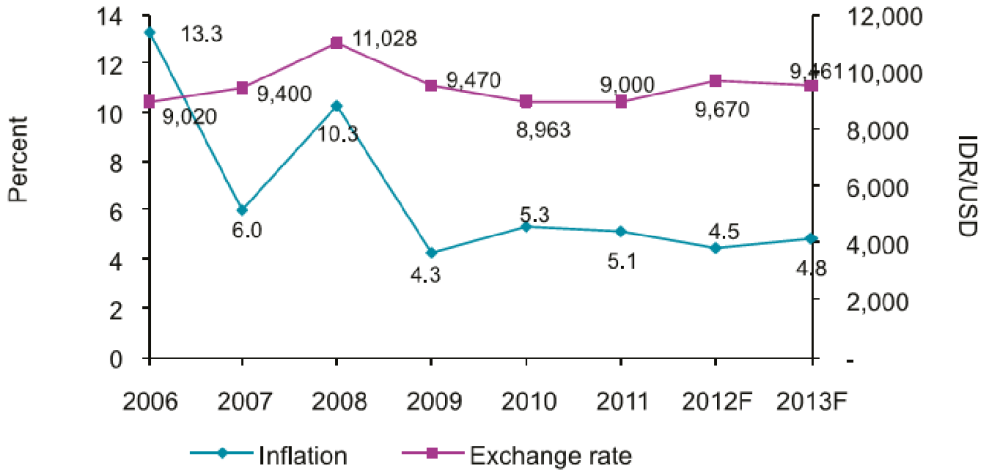

Figure 11: Inflation and Exchange Rate (2006-2013F) (KPMG)

Figure 12: Indonesia Inflation Rate (2012-2013) (Trading Economics, 2013)

This sudden increase was unexpected by the business world, and might decrease domestic consumption which has been a strong factor for growth since external demand of commodities decreased. GDP growth values have been dropping below 6 percent in May 2013 and have been falling since then (Bloomberg, 2013). Slowing down to 5.6 percent in the third quarter of 2013, this resembles the lowest values in almost four years (Husna & Ismar, 2013).

Lending rates in Indonesia are with around 11 to 13 % the highest in Southeast Asia, and can even reach more than 20% for microbusinesses (Husna & Ismar, 2013).

The domestic credit to private sector indicates the availability of financial resources to the private sector. As shown Figure 13, the availability of credit in Indonesia plunged after the Asian financial crisis and has only been slowly increasing ever since. The values for Indonesia are in line with those of the Philippines, Brunei Darussalam, Cambodia and Laos and this group

of countries, ranging between 33 and 39% lies far behind the second group of ASEAN countries consisting of Thailand, Singapore, Malaysia and Vietnam, ranging between 104 and 147 % of domestic credit issued to the private sector.

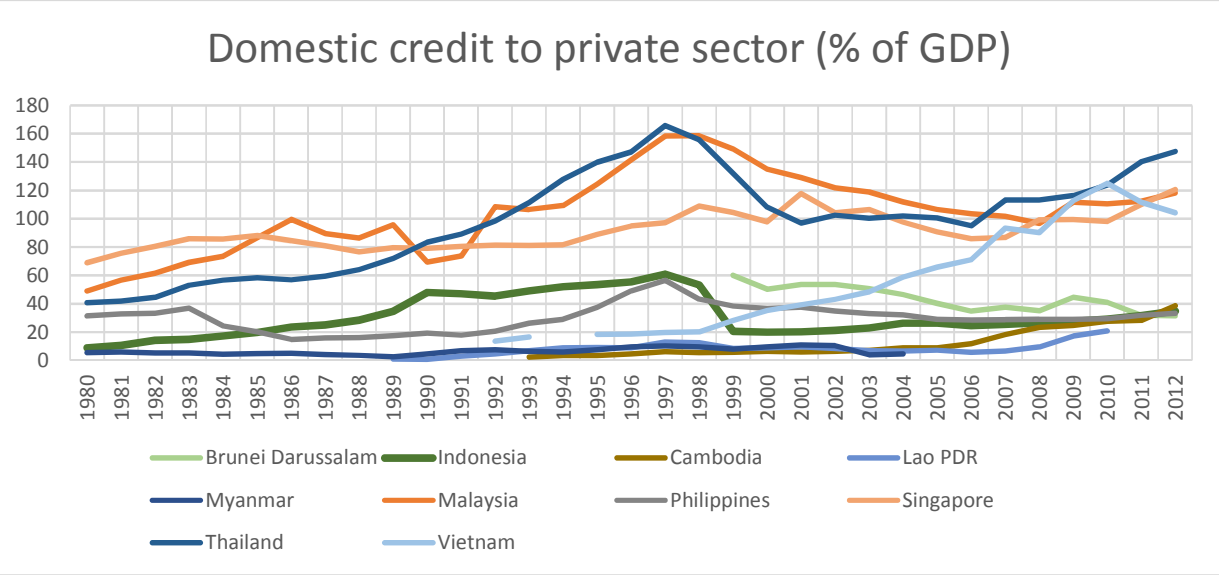

Figure 13: Domestic Credit to Private Sector (1980-2012) in the ASEAN Es ist eine ungültige Quelle angegeben.

Aiming at fighting inflation, Bank Indonesia increased the benchmark interest rate to 7.5 % in 2013 (Ho, 2013). This value has been the highest in the last four years, and the latest increase has been unexpected by most economists. After two increases in August and September, the motivation behind the latest November increase is regarded to be the aim to bring the current-account deficit – with 4.4 % the widest since the Asian financial crisis in the late 1990s – down and keep foreign investors' money in the country. This current increase reduces competitiveness according to local businesses considerably (Husna & Ismar, 2013).

In conclusion it can be observed that, until mid-2013, interest rates in Indonesia have been relatively high. Even though the Indonesian Rupiah is rather weak against hard currencies, the exchange rate as well as the inflation rate have been relatively stable. The conditions for renewable energy investment therefore could not be considered perfect but still ok. Since mid-2013, interest rates have been rising even higher and the Rupiah experienced a strong depreciation. On top of that, inflation was soaring. These factors make investments rather difficult especially for small and newly founded renewable energy project developers.

4. Analysis

4.1. Barriers

The results from the stakeholder interviews will be analysed according to the classification by Waissbein et al. (2013). The advantage of this classification of risks and barriers, is that they group the single barriers according to the stakeholder group that is mainly concerned with these barriers and therefore is also the group in charge of improving the situation. The authors proclaim that this categorisation will prevent the overlapping of barrier classes that is inherent to most other frameworks. While complete mutual exclusiveness is questionable, the fact that each category is linked to one stakeholder group will increase the ability to link a certain barrier to particular one class.

The results presented in this section were obtained during the interviews listed below.

Stakeholder group	Number of interviews	Details
Project Developer	3	ANJ, ibris, Pak Abinanto
Development Agency	3	EEP, Winrock, USAID
Consultant	1	Southpole Carbon
Financing Institution	2	PIP, KfW
Utility	1	PLN
Policymakers	2	DG E, DG NREEC
Sum	12	

4.1.1. Policy Market Risks

According to Waissbein et al. (2013) all limitations and uncertainties in the power market that are subject to the legislators and policymakers are included in this group. The following issues have been revealed by the stakeholders.

The current FIT rate is too low for projects to be economically attractive. One main issue connected to this is that the FIT is lacking inflation adjustment which leads to uncertainty on price development of RE. Inflation adjustment was requested by project developers and banks.

One issue that was mentioned especially by the policymakers themselves is the limited area of influence of DG NREEC. They are in charge of the regulations but have no insight into current developments. Information on how many plants are installed or currently in the PPA process is only available to PLN, who do not share this information with DG NREEC. Other stakeholders expressed the idea that DG NREEC should be in charge of coordinating the different actors and the development of the market. However they focus on the FIT and state budget for small projects. This underlines the problem of defining DG NREEC's role which was already mentioned in the previous chapter.

The interviews revealed vagueness about the rate paid by PLN to the IPPs. According to some interviewees the FIT as set in the regulation is always paid, while others considered it a ceiling price, and the third opinion was that it can be higher than the FIT mentioned in the regulation if negotiated. It seems that PLN has such a strong position in the market that they can negotiate with IPPs on a price lower than the FIT set in the regulation, and the policymaker, DG NREEC, does not have any influence on this.

There is still no standard PPA. While most stakeholders were aware that there should be a standard PPA none had ever seen it. The lack of the standard PPA is problematic as many details like payment duration, payment structure, interconnection responsibility and interconnection costs are not yet stipulated in the regulation but are subject to the PPA. This means that DG NREEC gives away their influence and responsibility for policy design to PLN.

Another issue is the lack of uniform implementation of national regulations at regional level. The RUED that is mentioned in Law 30/2007 is still not available in many regions.

4.1.2. Permit Risks

This group of barriers is related to the public sectors or administration's inability to efficiently and transparently administer licences and permits (Waissbein, Glemarec, Bayraktar, & Schmidt, 2013).

One aspect mentioned by different stakeholders is the lack of coordination and communication of different authorities and the unclear responsibilities, for example between PLN, the Bupati[4] and the Ministries. The different authorities do not know about each other's responsibilities and decisions and everybody just ticks their own lists of requirements. One project in North Sumatra failed because PLN had own plans to build a hydropower plant in that location. This

[4] Head of regency; Regent.

one was mentioned in the RUPTL but nobody checked and the Bupati still issued the required permits.

In general transparency is a major problem of the public sector – internally as well as externally. External transparency is an issue as it is not clear which permits are needed and in which order. Meetings with numerous administrative offices are needed to obtain all permits and licenses. Internal transparency is needed as the lack thereof can result in too many permits being issued for the same location by the same administrative office. Also PLN mentioned that the regional authorities should apply a more thorough check of the proposed project location.

There is a problem with unskilled and unexperienced administration staff. A one-stop-authorisation has been established at regional level but this means that officers now have to deal with numerous different topics they have no experience with. There has not been proper training of the officers on how to administer these new tasks, which leads to insecurity and hesitation. On top of this the regional authorities have limited staff capacity in general.

Another issue is the regional variation of procedures. Experience with the proceedings in one region therefore does not mean that it will be the same in another one.

The administrative procedures are so complicated that foreign project developers need an established local partner. According to one stakeholder interviewed, due diligence for finding the right local partner is more important than the due diligence in the following administrative processes.

Negotiation costs are very high as information is only made available in personal meetings and when chemistry is good. Furthermore, hidden and unclear fees have been mentioned by different stakeholders. There is for example no clear indication of the fee for establishment of the special purpose vehicle (SPV). Furthermore it was mentioned that under-the-table payments can speed procedures up.

4.1.3. Social Acceptance Risks

Social acceptance risks are caused by a lack of awareness and resistance in communities and end-users (Waissbein, Glemarec, Bayraktar, & Schmidt, 2013). These risks were not mentioned by many stakeholders. In some cases a public hearing of the local community might be required in order to receive a permit, and prices for land are likely to be risen when the owner finds out it will be a project location. These issues are however no major barriers.

4.1.4. Resource & Technology Risks

Resource and technology risks include the assessment of the renewable energy resources and its future supply, as well as plant design and construction and operation and maintenance (Waissbein, Glemarec, Bayraktar, & Schmidt, 2013).

The low quality of the pre-feasibility study and the feasibility study is a problem in some cases. Project developers apparently are unaware of the importance of the pre-feasibility study/ feasibility study which consequently often is only based on desktop study. This leads to cost overrun during construction due to revision of plans. Apparently, project developers are more concerned about the permits and land acquisition issues. Most project developers are very new players lacking experience. They would rely on technology provider's input instead of having it done by a qualified consultant. Grid considerations are a very important part of the feasibility study and should not be neglected. Capacity and demand must be sufficient for approval by PLN.

Another issue is the unreliability of project developers. There have been cases of project developers who only apply for PPAs to sell it afterwards. Furthermore, unfinished projects have been problematic. According to the interview results, this is the reason PLN is more demanding and cautious and banks hesitate to grant credits.

Secure feedstock supply is an issue because of the opportunity costs of selling the feedstock for other purposes. Simple contracts can easily be broken when feedstock prices rise. Closer cooperation with suppliers (e.g. POM) increase security but are more difficult to establish. These cooperation require very careful due diligence and currently the agroindustry is aware of possibilities but not strongly motivated to invest or cooperate.

The above named problem might also be, at least partly, caused by the lack of pilot projects and best-practice-examples. Banks and POM hesitate to get involved.

There is a lack of skilled local professionals. Organizational incompetence was named a typical problem with contractors. Unrealistic scheduling and interface issues call for constant supervision to make sure the plans are executed correctly. During the interviews examples were mentioned of construction workers who built the plant different than planned because they thought it was “more pretty like this”.

Furthermore there is a lack of high quality local machinery which is problematic because of the local content rule.

4.1.5. Grid & Transmission Risks

Infrastructure barriers focus on the availability of a grid to feed-in electricity (IEA, 2011) (Waissbein, Glemarec, Bayraktar, & Schmidt, 2013).

The general lack of grid infrastructure in Indonesia is a problem as it limits the availability of possible sites. The existing grid, especially in smaller and more remote grids, is partly of low quality and requires upgrade as well.

Grid capacity and local demand determine whether PLN will sign a PPA. The location of the plant is only approved if there is sufficient demand. PLN's benchmark is however not publicly available. If a project developer's proposal is in line with PLN's plans for electrification they are more likely to succeed. The RUPTL could be considered by the project developer, however, it does not necessarily contain plants up to 10 MW. Therefore it is difficult for project developers to find available locations. According to PLN, the project developer (PD) should wait for PLN to build new plants and therewith sub-stations to which the IPPs can then connect. This approach rather slows down private sector initiative instead of encouraging it.

There is no clear rule on how connection to the transmission grid is handled. Usually project developers enter into negotiations with PLN. Figures vary, some say the project developer has to pay for up to 8 km of grid connection (further than 8km could be shared with PLN) others say PLN could pay up to 2.5 km depending on the demand for electricity in the region.

The transmission grid extension is lengthy and uncertain. Project developers can request building of new grid infrastructure. However this request for grid extension will be assessed by PLN internally which is a long process and the outcome is very unclear.

There is a huge lack of transparency of grid information. Grid details are only available directly from PLN local and not published. This means project developers have to set up a personal meeting for every possible project location and a good "chemistry" is advantageous to receive the required information.

4.1.6. Counterparty Risks

The counterparty risk described by Waissbein et al. (2013) includes the utility's poor management and corporate governance qualities.

A major problem is the lack of transparency. The procedures within PLN, as well as the requirements for project proposals and the criteria for evaluation of proposals, the KKO-KKF

(kajian kelayakan operasi – kajian kelayakan finansial, technical and financial assessment) are unknown. This means that PLN's decisions about issuing PPAs are not reproducible.

In general, PLN staff is lacking capacity and expertise to assess RE and especially biomass/biogas project proposals. One practical example by PLN was that they do not know how to properly read GPS coordinates which leads to wrong assumptions about the location of projects (too many plants in same location). In some cases PLN regional also directly forwarded project proposals to PLN headquarter without evaluating them first, because of lack of staff.

Especially in light of the last point, PLN's requirements are over the top. They ask for too much information, like business plans. Capacity and technical specifications should be sufficient for their internal assessment of proposals.

Establishing contact with PLN, which is needed to obtain the crucial grid information, is difficult. It is problematic to find the right contact person in PLN. The general manager is mentioned as contact who however does not have the capacity to deal with all the daily issues.

The PPA itself is not bankable, but requires further guarantees. PLN as contract partner is relatively safe for Indonesian banks. This however might be different for international commercial banks.

It is difficult to predict how long the PPA-process takes. Apparently this depends on the region and the amount of applications. In some regions, PLN local might not even be aware of regulation 4/2012.

PLN is very likely to support projects that can positively impact the key performance indicators of PLN local (e.g. diesel-fired island grids) and oppose to those that do not.

4.1.7. Financial Sector Risks

Financial barriers describe the lack of funding and financing products for RET (IEA, 2011). This can be caused by the immaturity of the local financial sector and its lack of experience with renewable energy projects as well as a general lack of availability of finance (domestic and foreign) (Waissbein, Glemarec, Bayraktar, & Schmidt, 2013).

The main problem concerning financing is the unavailability of project financing. Banks only offer corporate financing and demand around 120% collateral. Newcomers, like project developers usually have no strong financial background and therefore need a strong partner.

Even when this security is provided, the cost of capital range around 13%, which is very high.

Banks have no experience in the RE sector. Based on this, they do not properly evaluate the feasibility study. One interviewee mentioned that for rice husk plants, a lot of suppliers should be mentioned irrespective of their exact location. However, due to the low bulk density, rice husk cannot be transported economically over long distances. Banks do not consider this important circumstance but only pay attention to the number of suppliers.

Renewable energy is marked as high risk sector. Banks are skeptical if IPPs will keep the contract with PLN. The trust into project developers' compliance is low and banks tend to follow a wait-and-see-approach.

The payback period proposed by banks (8 years) is too long for IPPs. They would accept maximum 3 to 5 years.

The internal rate of return (IRR) of bioenergy plant is too low. This is especially the case in light of the high costs of capital in Indonesia. Max 12% IRR might be possible (but single digits are more realistic). Project developers however would aim at 20-25%.

Furthermore, the small size of projects might make it difficult to find a bank willing to provide financing. The small project volume does not provide a valuable business opportunity for large commercial banks. Sharia banks are more likely to get involved with small and medium sized RE projects.

4.1.8. Political Risks

Political risk includes barriers arising from country-specific governance and legal characteristics. Uncertainty is the key problem which can be caused by war, terrorism and civil unrest on the one hand and by high political instability and poor governance and adverse government policy on the other hand (Waissbein, Glemarec, Bayraktar, & Schmidt, 2013).

One problem is the general political inconsistency. The parliament requires PLN to reduce their spending while at the same time the government issues new regulations for FIT. PLN consequently is torn between these provisions and will only issue PPAs that allow high cost savings for PLN.

Currently the political situation is unfavourable. Local authorities as well as the government are reluctant to issue permits / new regulations before the elections in 2014.

4.1.9. Currency & Macroeconomic Risks

Macro-economic risk include aspects like volatile currency (Waissbein, Glemarec, Bayraktar, & Schmidt, 2013), high inflation rate and the interest rate outlook (Waissbein, Glemarec, Bayraktar, & Schmidt, 2013) (Painuly, 2001).

In case of international financing the instable currency is a major problem (as income stream is in IDR). In the case of domestic financing currency risk does still concern the imported parts. Also, domestic banks imply much higher interest rates than foreign banks, but the currency risks make the latter option impossible.

In any case inflation is a problem as it reduces the real value of the future revenue stream.

4.1.10. Summary

The most important issues revealed during the interviews were the lack of grid infrastructure, the (too) low economic attractiveness of bioenergy projects, the lack of transparency and reliability of information disclosure, the lack of capacity and experience of all stakeholders, the difficulty of access to financing, and the lack of trust. Grid access, access to financing and economic attractiveness of projects are especially problematic as these factors can inhibit project development.

While the interviews revealed the most problematic barriers that require a revision of the current regulations, important implications for policy considerations have been found as well. PLN's focus on projects that will allow highest cost savings is worthwhile and underlines the importance of considering policy costs when revising the regulation.

Furthermore, electrification seems to not be a policy goal, at least from PLN's side. The utility underlined that they would prefer to take care of grid extension themselves and have the IPPs following to increase the share of renewable energy.

4.2. Investor groups

As feed-in tariffs (FIT) and other renewable energy (RE) support systems are implemented with the aim to increase investment into RET, it seems logical to take an investor-perspective when evaluating policies for RE diffusion. There are plenty of frameworks analysing factors like efficiency, efficacy, equity and institutional feasibility (Verbruggen and Lauber, 2012) or efficacy, cost effectiveness, dynamic efficiency, equity and fiscal responsibility (Sovacool, 2010) of support instruments. These approaches might evaluate the amount of investment into RET as well, however the investor as an important factor in the policy diffusion equation is

only considered to a small extent, if at all, in the analysis. A new approach of policy evaluation takes a different way by focussing on the investor and its decision-making behaviour. This new stream of the literature analyses the effect of an instrument's risk and profitability aspects on the willingness to invest and also the different types of investors that are attracted by a certain investment context.

Apart from assessing the current barriers, Enzensberger et al. (2002) underline the importance to take into account different stakeholders' needs and put special emphasis on the requirements of investors, bankers and project developers.

The group of investors, at least with a view to Western Europe, can be separated into:

- Utilities [PLN]
- *Individual, private investors with own project*
- *Individual, private investors with shares in professional project*[5]
- IPPs (professional, market-focused, profit-driven) [Project developers]
- Companies with a main business field in another sector (e.g. agriculture) [Palm oil mills]

These different investors generally have different financial strength, profitability expectations, attitudes towards acceptable project risk levels and varying inherent motivation. These characteristics can give important hints on how a policy mix should be designed to account for the main or different investor groups' requirements. The inherent motivation of an IPP for example is very high while that of a non-specialised commercial investor is rather low. In line with this, the risk acceptance of an IPP would be higher than that of a non-specialised commercial investor. Enzensberger et al. (2002) therefore strongly advise to first undertake an analysis of the techno-economic characteristics of the energy supply system, and to study the characteristics of the different stakeholder groups. When not doing so, a failing of the support system is very likely as it does not meet the requirements of the addressee.

Utility – PLN

In general PLN shows only little interest in investing in grid-connected small scale renewable energy plants, but is rather interested in off-grid plants. As PLN is in charge of securing the energy supply in Indonesia, their risk acceptance is rather low. Furthermore, PLN will only

[5]The groups of individual, private investors might not be relevant in the Indonesian context. I assume that private investment in RE is more a phenomenon of developed countries in a later stage of technology diffusion.

consider renewable energy projects when the profitability is higher than that of fossil fuel plants. The financial strength of PLN is very low. PLN is subsidised by the government.

Specialised green IPPs – Domestic and foreign project developers

As renewable energy project development is their core business, green IPPs show a very high motivation to invest in renewable energy plants. The risk acceptance of project developers is intermediate and their profitability expectation high (IRR 15-20%). The financial strength of IPPs is low as they are usually very small newcomers.

Non-specialised commercial – Palm oil mills

The motivation of palm oil mills to invest in bioenergy technology is low. They are however aware of the possibilities and relatively open to cooperate with project developers in case their risk share is kept low. This shows that their risk acceptance when it comes to renewable energy is low. Furthermore, their profitability expectations are high. The financial strength of palm oil mills is high which makes it easy for them to obtain finance.

Currently, the main group of investors in Indonesia are IPPs. These newcomers have a high motivation and a relatively high risk acceptance (compared to other investor groups). Their profitability expectations range at a medium level. The main problem is their lack of financial strength which requires a strong partner. Here, the non-specialised commercial investor comes into play. Palm oil mills are optimal partners in bioenergy project development from residues. They are needed to secure feedstock supply and their strong financial background – the majority of Indonesian POM are held by large private corporations – opens door to equity and debt funds. However, their risk acceptance is extremely low and their profitability assumptions are geared to the profitability of their core business, which is higher than that of bioenergy projects.

4.3. Policy design considerations

Based on prior UNEP research, Rickerson et al. (2012) give an overview of the main policy instruments that are used to promote renewable energy including rebates and grants, tax credits, Renewable Portfolio Standards and quota systems, competitive tenders and auctions, tradable renewable energy credits and net metering, before elaborating on feed-in tariffs in more detail. As the FIT is the instrument in place in Indonesia, this section will focus on the FIT as cornerstone instrument and on secondary instruments that can support the FIT.

According to Rickerson et al. (2012) FITs cannot be easily defined because they are rather a "package" of different policies. This distinguishes them from stand-alone policies like tax credit or rebate. The table below outlines the various design issues that can have an impact on other policy considerations. All FITs will include administratively determined performance-based cash payments (amount of money/kWh) which are available on a standard offer basis. Apart from this however there are wide variations of FITs depending on which policy elements they encompass. FITs can include elements regulating interconnection, the entity purchasing the electricity, priority given or not to RE on transmission and distribution systems, contracting details and pricing.

Couture and Gagnon (2010) present an overview of different FIT design options focusing on the remuneration for project developers. In general, a distinction can be made between market-dependent and –independent models. Market-independent FIT offer a fixed or minimum price, while market-dependent FITs are also known as premium price policies as they consist of an adder that is paid additionally to the market price. Fixed-price are the most popular option and are generally also accompanied by a purchase guarantee.

Apart from the FIT as a cornerstone instrument, secondary instruments can be implemented to support the FIT. de Jager & Rathmann (2008) give a general overview and distinguish between fiscal incentives and policies to reduce administrative and grid barriers. A brief description of the different instruments is given below.

- Fiscal incentives
    - Investment subsidies / capital grants. These reduce risk and capital cost and can be determined depending on site, technology, economics of project, or other factors.
    - Low-interest loans through state-owned banks or through subsidies to commercial banks. These lower interest rates and allow longer payback periods. Another option are loan guarantees, which reduce risk and therewith also the interest rate.
    - Tax measures like investment or production tax deductions can help to reduce the tax burden. Another option are flexible depreciation schemes, that allow a faster writing off of the project which will result in tax benefits and lead to a higher overall net present value. Production tax deduction and flexible depreciation schemes however only benefit the equity provider.

- Policies to reduce administrative and grid barriers
    - One-stop authorization provides streamlined administrative procedures by reducing the number of actors involved.
    - Obligatory response periods and approval rates for authorities to speed up administrative process.
    - Pre-planning. The pre-allocation of suitable areas for RE project development by municipalities can help reduce the permit requirements in these areas.
    - Increase grid capacity
    - Transparent grid connection procedures and non-discriminatory rules for bearing and sharing of grid investment costs.

As has been explained in this subchapter, different cases and policy considerations require different support system design. It is therefore necessary to analyse to which extend the attributes of the current support system in Indonesia meet these policy consideration properly. This is necessary to eventually name the issues that require revision to not only support investor security but also other relevant consideration like grid availability, energy access, policy costs, economic development and others.

The first step of the synthesis is to check how the current FIT handles different design issues summarised by Rickerson et al. (2012). This step is necessary as the design of a FIT has certain implications for policy considerations. If all barriers mentioned would blindly be considered aspects that need to be changed, important policy considerations might be neglected. Most design aspects of a FIT do not only impact one policy consideration like investor security but a variety of considerations like energy access, policy cost, etc. Keeping in mind the research question: Can the present barriers and risks be settled by the current support system, and which aspects require revision to fit to the case of Indonesia?, the aim is not to find the support system that will attract most investment but that is possible within the current surrounding aspects.

Integration with Policy Targets

Renewable Energy Targets are formulated in Presidential Regulation 5/2006 and Law 30/2007 aiming at 15% of RE and additional 2% of new energy sources by 2025. 5% of these 15% are supposed to be biofuels, 5% geothermal and 5% other renewable energies. The update, the Vision 25/25 even accounts for 25% of new and renewable energy by 2025. From a supply side point of view, energy diversification is the main goal (DG NREEC, 2011).

Permen 4/2012 does not name vision 25/25 in the considerations. Instead, the regulation is issued in view of Law 30/2007 on Energy aiming at securing domestic energy supply and increasing energy exploitation efficiency and energy diversification and Law 30/2009 on Electricity mainly aiming at increasing electricity supply and a number of other regulations.

There is integration with the policy targets. Presidential Regulation 5/2006 names definite goals. The share of other new and renewable energy sources of the national energy consumption should amount to 5% by 2025. The target named in Law 30/2007 is energy diversification in the light of limited non-renewable energy resources (Presiden Republik Indonesia, 2007).

This integration can increase investor security. However as underlined by financing institutions during the interviews (KfW), banks do not care about general government goals but only about binding regulations.

Administrative complexity is increased by integrating policy with targets as tracking of the development is required by some kind of monitoring and verification system. A system like this is currently not in place in Indonesia but is planned in cooperation with GIZ LCORE.

Policy objectives in law

Regulation 4/2012 does not name another goal that to support the purchase of electricity form power plants using biomass, biogas and municipal waste-based RE and to improve the preceding regulation.

Eligibility (technology, new vs. old, ownership, size, grid connection)

Eligible are power plants using small scale and medium scale renewable energy with a capacity of up to 10 MW (the tariff for MSW was revised and the technology is now regulated in MEMR regulation 19/2013), or excess power from state owned enterprises, regionally owned enterprises, private enterprises, cooperatives and community enterprises.

The regulation consequently is eligible for any technology except for MSW (which is covered in a new regulation), either new or old plants, which are up to 10 MW in size. Plants are eligible to be connected to the medium- or low-voltage grid.

Ownership is only differentiated for excess power.

Technology eligibility has an impact on portfolio diversity. In Indonesia basically all kinds of renewable energy are eligible; however there is technology differentiation via price as

described in the next point. Policymakers could impact grid stability, by only including technologies that can easily be integrated into the grid; policy costs, by only including the most cost-competitive technologies; and economic development, by only including those with the highest job potential. Experience shows that policy costs and grid stability are important considerations in Indonesia. These aspects seem to be the main reasons for the slow progress. In fact PLN only approves those plants that can easily be integrated into the grid and that are the least-cost option. The problem is that this approach is neither backed by the regulation nor transparently communicated by PLN.

As currently old and new plants are basically eligible, market growth and increasing portfolio diversity is not targeted specifically. With view to economic development, new plants can offer investment and job opportunities while including older facilities encourages maintenance of plants that would otherwise fail.

The narrowing of the eligible size down to 10 MW can support grid stability as these smaller plants are better "manageable". Considering economic development, larger plants might be more cost-effective but smaller plants are more likely to be domestically owned and thus support economic development. However this often comes at higher policy costs. This point again underlines the importance of policy cost considerations. Stakeholder feedback has shown that PLN is more likely to approve larger plants.

Energy access could be impacted by the FIT if mini-grid or off-grid applications where eligible as well. This is not the case in Indonesia. Plants must be connected to the transmission grid. While according to the regulation, connection to both medium- and low-voltage is possible in practice PLN only allows connection to medium voltage due to cost reasons.

Tariff Differentiation

Regulation 4/2012 foresees a separate tariff for biomass and biogas based electricity (and MSW, however this technology is now regulated in a new regulation). This tariff again is differentiated by voltage to be connected to (higher tariff for lower voltage) and by location (the more remote, the higher the tariff).

By differentiating the tariff by region, the more remote islands are supported with a higher price than the central islands that already have a high degree of grid-access.

By focussing on relatively mature and therewith cheaper (than e.g. pv) bioenergy technology, policy costs are kept low.

Considering electricity portfolio diversity, clearly bioenergy technologies are selected.

The administrative complexity is kept relatively low as apart from the location factor and the voltage factor, the same tariff is grated for all forms of biomass and biogas electricity. Apart from keeping administrative complexity low, it is more likely that the least-cost bioenergy options are applied.

While theoretically the above-named impacts could be achieved, in practice the tariffs are generally too low, considering the adverse factors that come into play when going for the higher tariff regions. Due to the lack of grid access in the more remote regions and the problem that there is no agroindustry which could supply low-cost feedstock, tariffs are still too low to account for feedstock supply and grid development. Consequently, project development is concentrated to Sumatra, Java and Kalimantan, which means that the target of increasing energy access is not reached.

Setting the FIT rate

Regulation 4/2012 does not outline the basis of the price mentioned. Only in case of negotiating for a price exceeding the tariff, the self-estimated price by PT PLN will be the basis. This price however is not explained in more detail.

In general there are two main options for setting the FIT rate, cost-based approaches and value-based approaches. Cost-based approaches are focusing on the cost of renewable energy generation and a targeted return. Value-based approaches focus on the value of the electricity that is fed into the grid. This can be based on avoided cost, retail prices or other considerations. Even though there is no clear indication of which approach is used in Indonesia, the reference to PLNs cost of electricity generation in case of negotiation, it can be hypothesised that the value-based approach focusing on avoided cost is applied. On the other hand, it is clear that the FIT rate is lower than the generation costs of PLN in most regions.

Considering investor security, the cost-based approach is more likely to provide the required return. Value-based approaches can happen to coincide with the rate required by investors, and if this is the case also support market growth.

The impact on policy cost of both options strongly depends on the cost of electricity generation. If the generation cost rates are higher than the avoided costs they clearly cause higher policy costs. If however the value-based approach is chosen in countries with very high generation costs based on e.g. the dependence on oil-fired island grids, these rates can create massive

profits for renewable energy generators, and a reduction of overall cost of electricity generation is not achieved.

Cost-based rates can have a stronger impact on price stabilisation than value-based rates, at least when the latter would be based on the electricity price.

The differentiation of tariffs by technology and location is an indicator for a cost-based approach being applied. Electricity portfolio diversity considerations can be reached more easily with this model.

When it comes to administrative complexity value-based rates are much easier to be stipulated and require less expertise and time to be calculated than cost-based rates.

Payment duration

The payment duration is not mentioned in the regulation. The duration of the payment is based on the duration of the contract (the PPA) between the IPP and PLN. This term is subject to negotiations. Based on feedback from the interviews it can vary between 10 and 20 years. Due to the uncertainty of feedstock price development and revision of policies, project developers rather opt for shorter contract periods.

In case of value-based FIT rates, investor security is provided by long-term payments that guarantee that investment costs are finally recovered. In case of generation-cost based rates there is greater confidence in receiving the targeted return also in shorter contract periods.

In general a shorter payment length will result in lower policy costs. In contrast to that longer-term payments have a stronger influence on price stabilisation as the amount / kWh can be lower.

Payment structure

As the contract period is not mentioned in the regulation also the payment structure is not. However, currently the same rate will be paid over the full contract period without any adjustments.

The main design options are fixed price, premium price and spot market gap approach. As premium payments vary over time they entail lower investor security than fixed prices and spot market gap designs. This risk can be decreased by including a minimum floor payment. Premium prices also can lead to higher policy costs when they do not come with a ceiling.

Price stabilisation can best be achieved with fixed prices and spot market gap approaches and the first one also shows the lowest administrative complexity.

Planning in general is strongly facilitated by the fixed price model.

Inflation

Currently the regulation does not include inflation adjustment (which is however being discussed in the course of tariff revision right now). Inflation adjustment can be built into the rate setting model upfront. This can be challenging due to the difficulty to predict the development of the inflation rate especially in developing countries. Another option is to adjust the rate periodically, e.g. annually. This form requires decisions on the definition of inflation and which percentage of the rate should be adjusted.

Inflation adjustment can strongly increase investor security by accounting for future value reductions by inflation to make sure that investors are provided with the targeted rate of return. It does not affect the large share of costs that occurs at the beginning of a project's life but only those that occur over time.

Considering price stabilisation, inflation adjustment has adverse effects.

Cost recovery

Cost recovery is not mentioned in the regulation. In general there are two main options to fund the policy. Costs can be recovered from ratepayers or from national budget (taxpayers).

In practice, the FIT is paid by PLN. Electricity prices in Indonesia are highly subsidised. Therefore the gap between PLNs cost of electricity generation (or purchase) and the electricity price paid by the customers is financed by the MOF through subsidies. This mechanism is regulated in law 19/2003 on state-owned enterprises (PT PLN, 2011). In fact this means that cost recovery is based on taxpayers. In general, ratepayer recovery might be preferred by investors to taxpayer recovery as the latter is dependent on state budget and therefore subject to budget appropriations. According to KfW, Indonesian banks consider PLN as electricity buyer (and therewith the fact that the costs are borne by taxpayers) safe. This might be different for international financing institutes.

Ratepayer recovery is currently not an option in Indonesia due to the high subsidies and the difficulty of introducing higher electricity prices.

Interconnection guarantee

The lack of clear interconnection rules enables utilities to block or otherwise delay RE projects. This situation is very present in Indonesia and it is even supported by the fact that PLN has the right of first refusal. This is based on the Indonesian Constitution which considers electricity supply as a duty of the State.

While interconnection guarantee like it is offered in different countries (e.g. Germany, China) provides a large extent of investor security, it might be problematic for grid stability. This is especially the case in many developing countries with small and not well developed grid systems. Guaranteed interconnection could lead to a situation in which the number of applicants simply exceeds the grids ability to absorb them. Furthermore, the required grid improvements that come with guaranteed connection can easily surpass the funds available in developing countries. While it might still be possible in some developing countries, Indonesia shows two-folded problems – the pure size of the country and the remoteness which is even increased by the fact that the country consists of thousands of islands.

Project developers in Indonesia have to submit a feasibility study to PLN. This FS is then evaluated by PLN within their KKO-KKF. PLN does however neither outline the requirements of the feasibility study (not standardised) nor the criteria of their KKO-KKF.

Even though complete guaranteed connection is no option for Indonesia, increased transparency of PLN's requirements and standardised rules for grid connection are a must. Thailand for example applies a standardised application form for IPPs which is evaluated on a case-by-case basis.

Interconnection costs

There is no clear indication of who bears the cost of grid connection in regulation 4/2012. While this is usually the IPP, there were different opinions on PLNs willingness to bear at least parts of the cost. However, again there is no clear rule.

The question who covers the expenses for grid interconnection and grid upgrade has important implications for investor security which is clearly higher if expenses are borne by utility. Grid stability is affected as the grid upgrade required for renewable energies can provide benefits beyond the project in question. However, the weak grids in many developing countries can make it impossible to allocate these costs to ratepayers or project developers on an open-ended basis. Policy costs are affected as shifting interconnection to ratepayers clearly increases policy costs.

Aiming at also allowing connection of more remote locations will lead to higher interconnection costs in the rate than if the aim is to support those locations in which interconnection is the easiest and cheapest.

Purchase and dispatch requirements

PLN has to purchase electricity from the plants eligible for regulation 4/2012. There is no clause on priority dispatch, which would require PLN to feed the renewable power into the grid ahead of other generation. As this entails technical challenges due to base-load generation needs, priority dispatch is compensated for foregone revenues in some countries.

Guaranteed purchase increases investor security. Dispatch and technical limitations of the grid must be transparent to improve investor security.

Amount purchased

The FIT covers both excess power (net FIT) and full feed-in (gross FIT). Excess power however is subject to different conditions. The contract with PLN is only valid for one year and can be extended afterwards.

This underlines the higher administrative complexity that is entailed with net FITs.

Considering investor security, gross FITs are usually preferable.

Purchasing entity

The purchaser of power is PT PLN, the state owned electricity provider.

The impact on investor security strongly depends on the creditworthiness of the electricity purchaser. In Indonesia, PLN is considered safe as it is backed by the Ministry of State-owned Enterprises. Foreign investors might question PLNs creditworthiness.

Commodities purchased

Apart from selling electricity the generation of renewable electricity can also entail additional commodities such as renewable energy credits, or certified emission reductions under the CDM. If these commodities are associated with renewable energy, policy makers can specify whether these are transferred to the purchaser with the electricity or if they remain with the seller. This aspect is not specified in Indonesia.

In general having only one contract counterpart is favourable from an investor security point of view. In case of rates too low for economic viability, investors would prefer the option to sell commodities separately.

From a policy cost point of view a single contract for all commodities is more favourable as the possibility to sell additional commodities would provide additional profits for IPPs. In line with this is the lower administrative complexity that comes with one overall contract.

Triggers & adjustments

Triggers and adjustments are important to account for changes of market conditions and to prevent excessive funding of market mature technologies. Triggers are the thresholds at which an adjustment will be done. This can be a period of time, capacity installed or generated or total policy cost. The adjustment will be initiated when the trigger is reached and it can be automatic adjustment (e.g. of tariff rate) or a policy review. Reviews are the analyses of the current policy aiming at finding out which adjustment is needed. Triggers and adjustments are not present in Indonesia. Currently the FIT rate is being reviewed but there is no clear rule on when and why it is reviewed.

From an investor security point of view triggers and adjustments must be transparent and known in advance as sudden policy changes undermine investor confidence. The most transparent triggers are time-based or publicly available capacity-monitoring triggers. Generation and cost-based triggers are less transparent. As with triggers the main problem of adjustments from an investor security point of view is a lack of transparency. Automatic adjustments are the most transparent and hard caps can be improved in their transparency by installing transparent tracking systems. The investor security impacts of reviews depend on which issues are under consideration and whether this is known in advance.

Triggers and adjustments can be important aspects helping to ensure grid stability as in countries with a lack of grid capacity uncapped FITs are not possible.

Adjustments are a key tool to keep policy cost at a reasonable level. Furthermore they have a positive impact on price stabilisation.

Administrative complexity is clearly increased by introducing triggers and adjustments due to the need of monitoring and by reviews due to the need of staff to undertake these.

Contract issues

In general there is the possibility to include the need for a contract, namely a PPA, in the regulation or not. If a contract is required, this can be standardised or on a case-by-case negotiation basis.

Investor security can be increased by utilising contracts and this is specifically the case for standardised contracts as these reduce transaction costs and development risks.

Payment currency

The currency is important if foreign transactions are necessary as in this case foreign exchange risk will have an impact on financing.

According to regulation 4/2012 payment currency is IDR.

While paying the FIT in hard currency can increase investor security, it causes higher policy costs as the currency risk is shifted towards the ratepayer.

Interaction with other incentives

Apart from the FIT, tax incentives are granted. These mainly include accelerated depreciation and amortization rules and net income reduction by 30% of investment amount (Permen (Finance) No.21/PMK.011/2010), and an income tax exemption between 5 and 10 years and a consecutive income tax reduction of 50 % for 2 years (Permen (Finance) No.130/PMK.011/2011). Furthermore, the import duty can be exempted if the equipment cannot be produced domestically or does not meet the required quality or quantity.

In case of cost-based rates investors theoretically do not require additional support instruments. This is different if additional instruments are already considered for the rate setting. In this case all uncertainties from these additional instruments also translate into the investor security of the FIT. In the case of value-based rates, additional instruments can have an important impact on project profitability.

For developing countries other instruments can have a positive impact on policy costs as they can shift the cost burden to external sources such as development financing. In the case of tax exemptions like named above this is however not the case.

Conclusion

The analysis has shown that policy cost and grid stability are very important considerations in Indonesia. Energy access and economic development are not the primary goals of the regulation and therefore are not strongly taken into consideration by policymakers and PLN.

The following issues are not yet (properly) included in the FIT design in Indonesia. Currently the FIT is too low and does not yet account for value decrease by inflation. The FIT rate setting should be reviewed. The second big aspect that still needs revision is the PPA and the details that are subject to it. These are especially payment duration, interconnection guarantees and cost. A transparent standard PPA must be developed. Finally, the current support system does not account for triggers, adjustments and reviews. These aspects are urgently needed to keep policy costs as low as possible. A monitoring system is required to keep track of current market developments.

5. Discussion of policy options

The analysis has shown that the most imminent barriers perceived by different stakeholders are the lack of grid infrastructure, the (too) low economic attractiveness of bioenergy projects, the lack of transparency and reliability of information disclosure, the lack of capacity and experience of all stakeholders, the difficult access to financing, and the lack of trust. Furthermore, specialized project developers have been identified as the most committed investors at this time, and therefore the support instruments should be designed in order to meet their requirements. The evaluation of the current regulation has also shown that different aspects still need more detailed elaboration or revision to be in line with the important policy considerations. Based on the results from the analysis, policy options to address the main problems will be discussed in this section.

5.1. Pre-selection of areas

Grid extension is a necessary long-term endeavor, but just as the reduction of fossil fuel subsidies, it is a very challenging task which requires separate consideration. An immediate action which could reduce the risk arising from the barrier “lack of grid availability” is increased transparency by pre-planning. This measure is proposed by de Jager & Rathmann (2008), to reduce the administrative hurdles of obtaining spatial planning permits. In Indonesia, this instrument could first ease the site selection process by outlining which locations are suitable for renewable electricity plants. Currently, PLNs lack of transparency, by not publishing grid information, requires project developers to contact and meet PLN officials for any location they consider. If one is not feasible due to a lack of grid access, another meeting

with PLN must be scheduled to elaborate on another proposal. By publishing their grid information and indicating areas suitable for feeding in from plants up to 10 MW, the process of site selection will be streamlined considerably and both, the project developers and PLN, can reduce their negotiation costs. Another important barrier that can be at least reduced is the lack of grid availability. This is the case because the proposed locations will provide sufficient grid access and project developers do not need to worry about this factor. By outlining appropriate sites for RE project development, PLN also remain their power in planning the electricity supply in the country.

5.2. FIT revision

Currently the FIT rate is too low to ensure enough profitability and investor security. The high risk in Indonesia, caused by various factors like high inflation rate, exchange rate fluctuations, and high costs of capital, requires a more attractive FIT-model than the current one. Without accounting for inflation, like it is the case right now, the FIT which might be just acceptable today, will become unattractive with changing conditions in the future.

What needs to be underlined is that future more cost-effective installations require a provision of more attractive conditions for pilot projects today. This is especially true for developing countries where the persisting barriers and risks demand a much higher return on equity. According to DB Climate Change Advisors (2011) a project similar to one with ROE expectation of 8% in a developed country, would require more than 20% in developing countries. Therefore it is important to not only increase the current FIT to a more attractive level but to also make sure that mechanisms are in place that will reduce it once market growth has been initiated and costs and risks lowered by market development.

Two FIT models that would fit to the project developers and investors requirements would be an inflation-adjustment of the FIT or the front-loaded FIT model.

Inflation adjustment of the tariff is demanded by project developers and banks. The fixed price model with full or partial inflation adjustment, shown in Figure 14, prevents the decline of the real value of project revenues.

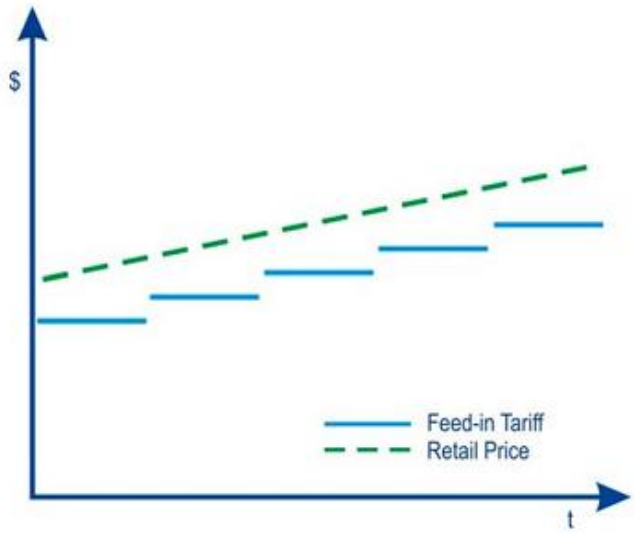

Figure 14: Fixed Price Model with Full or Partial Inflation Adjustment (Couture & Gagnon, 2010)

There are methodological differences on how to adjust the tariff to inflation. It can be based on the whole tariff or only a portion, and it could be done annually or quarterly. Inflation adjustment of a FIT will ensure a higher level of remuneration to the end of the project's life when capital costs are usually already settled and most revenues are actually profits for the project developer. This will translate into a higher electricity ratepayer (or taxpayer) burden and these effects are the higher in countries with high inflation rates. It is however an effective tool to encourage more risk-adverse investors to engage with renewable energies as it provides a high degree of security. Furthermore the lower initial prices might make it easier to be implemented from a policymaker point of view. Finally, the practice is common practice in conventional PPAs to account for rising fuel prices and it could be argued that RE deserve the same treatment (Couture & Gagnon, 2010). The latter point is especially the case for biomass-fuelled power plants as the feedstock (in contrast to pv and wind power plants) entails opportunity costs due to the possibility to sell it.

As several stakeholders mentioned that the payback period of credits is too long for IPPs, the front-loaded FIT model is another option to be considered. The front-loaded model provides higher steady payments during first (10) years and lower payments during the later (10) years.

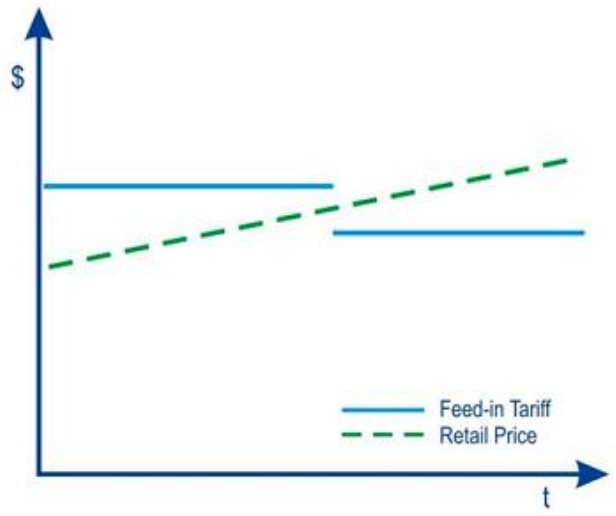

Figure 15: Front-end Loaded Tariff Model (Couture & Gagnon, 2010)

The IPP will receive the same total revenue as under the current fixed model without inflation adjustment, however a larger share is shifted to the initial phase in which capital costs are highest. This will enable PD to pay back their loans sooner (de Jager & Rathmann, 2008) (Couture & Gagnon, 2010). Another advantage of this model is that it reduces the pressure for policy makers to get the price right from the beginning, as the tariff paid in the later years can be based on actual site-specific data which can be collected during the initial years. (Couture & Gagnon, 2010)

5.3. Standard PPA

The standard PPA is urgently needed to streamline the PPA procedures and to define the issues that are not yet clarified in the regulation 4/2012. These issues are especially the lack of clear rules for grid connection and cost of grid connection. Currently negotiation costs of the PPA signing process are very high and the process can take around two years. Ferry & Cabraal (2006) name certain attributes that are needed for successful PPAs. A PPA must be binding and not subject to unpredictable revisions, and furthermore neutral and objective. The standardized PPA is the most efficient and cost-effective mechanism to attract private sector financing. Based on the stakeholder feedback, it seems like most aspects are negotiated with PLN, even the tariff rate. While such bilaterally-negotiated PPAs are possible, they usually are applied when there are no rates set by regulators Bjork et al. (2011). If the current practice is continued, the FIT regulation will remain useless.

5.4. Triggers, Adjustments and Monitoring

The purpose of periodic revision of the FIT is not only to provide investor security (e.g. by accounting for inflation) but also to adapt the regulation to changing market developments. Keeping in mind the purpose of FIT to initiate private investment into not-yet cost-competitive technologies, FITs must account for cost reductions that come with ascending the learning curve. It is important to review FIT rates not only from an investor security point of view but also considering policy costs, especially if the goal is to support least cost renewable energy. Triggers and adjustments must be set in place to manage the aspect of policy cost. Triggers can be based on a period of time or on capacity installed or electricity generated. A time-based trigger is most transparent. The adjustment can be in form of a reduction of the tariff, a hard cap, which means that no more capacity can be installed under the FIT or the initiation of policy revisions.

To be most effective, triggers and adjustments require a transparent monitoring system to keep track of the developments of the market. Review and evaluation of the support system is only possible if policymaker know about the developments in the market. Currently DG NREEC does not have any insights into PPAs signed or under negotiation. Without these insights, policy revisions will be based on bare assumptions.

5.5. Government loan guarantees

The problem of not having access to finance can be addressed by introducing government loan guarantees or government loans. The latter offer lower interest rates that can increase the commercial viability of projects significantly. Loan guarantees will ensure debt repayment to the lending bank, which improves interest rate, debt term and debt service conditions (de Jager & Rathmann, 2008).

Loan guarantees can be a useful instrument to address the lack of trust of banks into project developers and the weak financial background of most project developers that currently impede access to financing.

5.6. Training and Capacity Building

Training and capacity building is required to increase the quality of feasibility studies and the ability to evaluate these. As it has been revealed in the stakeholder interviews there is a wide lack of capacity and knowledge on how to deal with the new RE sector. Banks have underlined that they do not know how to properly evaluate project proposals and this causes insecurity and hesitation to engage with the sector. PLN has admitted capacity lacks for assessing project

proposals as well. One problem is the overall lack of staff in PLN and furthermore PLN engineers are mostly electrical engineers and there is a lack of civil engineers. The public sector requires training on new renewable energy related permits and licenses. The establishment of one-stop authorization is a very positive development in light of streamlining of procedures and the reduction of negotiation costs. However, when officers are not informed and trained on their new responsibilities and tasks the one-stop authorization will remain ineffective. Finally, project developers require guidance on how to conduct a proper feasibility study and site selection to reduce the risk of unsuccessful projects and cost overrun. General raising of awareness and knowledge about the possibilities and business opportunities of biomass and biogas based electricity generation can help to convince the Indonesian agro-industry to engage in the RE sector.

5.7. Central Helpdesk / Contact

Currently a variety of different stakeholders is involved with the plant development process. What is lacking is a central actor to coordinate the proceedings and act as a competent contact for stakeholders requiring support. During the interviews DG NREEC was considered to be in charge of coordinating the different actors and the developments of the market. Currently this is not the case, but by providing this contact service project development could be accelerated and at the same time DG NREEC can increase their influence and improve their standing in the market. This central helpdesk could be a valuable approach to address the problem of lacking transparency of the permits and licenses required and can help to streamline the lengthy procedures.

6. Conclusion

The study of barriers to and policy options for grid-connected biomass and biogas based electricity plants has revealed some key issues that need to be addressed to increase private sector investment. Even though a FIT for biopower plants is in place, the rate is too low in light of the high risks in the Indonesian renewable energy sector. An adjustment of the FIT also accounting for inflation is required. Apart from these basic economic considerations, the lack of transparency and reliability of information disclosure on the one hand and the lack of capacity and experience on the other hand are problematic. A clear outline of the requirements for PPA signing and grid-connection can streamline the lengthy procedures, and capacity building and training are needed to improve the quality of project proposals and their assessment and evaluation. Furthermore a standardized PPA is needed to provide investor

security especially regarding the difficult grid connection issues. The problematic financing situation requires closer consideration. Government loan guarantees can be a first step to improve the availability of finance to small newcomers without a strong financial background like IPPs. Overall the developments in the market must be carefully monitored to provide the most appropriate support system that does not only consider investor security but also other important factors such as policy cost and grid stability. Finally, grid availability is a major problem in Indonesia which is not easy to overcome. A more transparent planning and outline of available locations for RE projects can however reduce this persisting barrier without entailing massive policy cost.

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