A policy review on the development of wood-based biomass energy: strengthening incentive for investment

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Abstract. Problem on national energy becomes important in relation to National Determined Contribution (NDC) particularly emission target from energy sector. One of renewable energies is wood based biomass energy (WBBE). The objectives of the research are: (i) to review policies on WBBE development, and (ii) to provide share estimation of WBBE in national energy supply. Method used is content of analysis for reviewing regulations on energy field and supply and demand for estimating share of WBBE. Research shows that WBBE is an alternative energy as substitution for now renewable energies such as oil and gases and coal. However, this still requires, such as, presidential instruction related to WBBE provision and utilization. Potential tree species for WBBE are Kaliandra (Calliandra calothyrsus), Akasia (Acacia auriculiformis), Gamal (Gliricidia sepium), dan Lamtoro (Leucaena leucocephala). In national energy mix, WBBE is allocated with other energies for 2%. This share can be increased more than 2% if it is supported by various policies at national and field levels, and provision of forest and land by Ministry of Environment and Forestry and National Land Agency.

1. Introduction

At present time, the Indonesian electricity provision is dominated by fossil energy and using renewable energy resources such as sun, water, sea waves, and others are still limited (Djanegara, 1992). Although national energy security problem rise is related to the high deficit of trade balance that is dominated by high imported fossil fuel, the subsidized energy level is also high with the amount of Rp. 225 trillion or 17.8% from the total State Revenue and Spending Budget (APBN) 2014[1].

Beside that, the energy security problem is not only related to economy aspect, but also to the increase of greenhouse gases (GHGs) level that finally affect the climate change. The happenings of climate change has been supported by scientific who proves that result in new ecology disaster is affected by human being. For example, dry season period occurs so long and rainy season becomes relatively short with high rain intensity. These influences to the various aspects of human life such as long drought, harvesting failures, food and clean water crisis, sea level increase, flood and landslide. Various studies mention that developing countries are suffering more because they are not able to build structure for adaptation, even though climate change effect is also faced by the developed countries[2][3].

This climate change happens due to GHGs concentration increase that is caused by (i) development process and industries using fossil fuels that are increasing, (ii) land use activity, and (iii) land use and fuction change of land and forestry. Results of study done by[3] for global level, the highest emission source comes from energy sectors (65%) that is used for electricity generation 24 %, industries 14 %, transportation 14 %, construction 8 % and other energy sources 5 %. Emission from non energy sector is 35% consisting of land use changes including forestry 18 %, agriculture 14 % and waste 3 %.

In relation to the high emission level from the existing electricity generation (24%), it requires breakthrough for finding alternative energy sources, namely new and renewable energy (NRE). Role of forests in mitigating climate change can be done through planting efforts of energy tree species at critical lands and the using of biofuels or WBBE from the results of growing for replacing fossil fuels.
Global climate change issue has been forced to shift from fossil fuel to NRE as energy alternative sources. Based on Presidential Regulation(Perpres) No 5 Year 2006 regarding National Energy Policy (NEP), Indonesia has planned to reduce fossil fuels significantly from national consumption of energy mix. Fossil fuels used for long time would be replaced by using natural gases and other renewable energy (RE) sources including biomass up to 17% from the total energy mix[4].

Up to now, national energy demand is dominated by fossil fuels and refuse potential and better energy, namely biofuel and WBBE. Actually, Indonesia has great potential for developing biofuel and WBBE. Beside that, the requirement of RE is highly increasing due to the shortage and price increasing of fossil fuels in the international market. As one of RE sources, biomass has a big potency with total provision of 60 million ton in equivalent to 50 gigawatt (GW)electricity. The successful biomass development in Indonesia depends mainly on the industrial scale of biomass product development and combination with innovation technology and the Indonesia National Standard (SNI)[4]. Although Indonesia WBBE potency is relatively high, the development of WBBE is slower. This slow development is due to lack of incentive and low price of subsidised fossil fuels (Subarudi, 2015). Therefore, the aim of the paper is to review the policy on wood based biomass energy (WBBE) for strengthening incentive in its investment. The objectives of the research are: (i) to review policies on WBBE development, and (ii) to provide share estimation of WBBE in national energy supply.

2. Methods
2.1. Logical Framework
Logical framework used in the research on policy on WBBE development at national level as shown in Figure 1. Figure 1 explains the steps for reviewing several tree species and their potency as WBBE sources, after the analysis of handicaps and challenges are conducted. The review result is used for calculating the potential use of alternative energy sources and for formulating recommendations towards steps for achievements.

2.2. Time and Location
Policy review on WBBE was conducted in 2 (two) months from November to December 2018. The location chosen are Deli Serdang District, North Sumatera Province and Bangkalan District, East Java Province. The reason for choosing Deli Serdang District is because it has biomass electricity power generation (PTLBm) projects at Tanjung Selamat Village, Percut Sei Tuan District managed by PT Cipta Multi Listrik Nasional (CMLN). When visiting the project sites, it has not been built yet and it has only MoU for electricity power transaction (PJBL) between PT CMLN and PT PLN held in Medan, September 26th, 2018 [5]. The choice of Bangkalan District is due to having a wood pellet industry. However, this industry has stopped its operation due to facing many problems and handicaps.

2.3. Data Collection
Data collected in this research are primary and secondary data. Primary data consist of stakeholders’ perception on WWBE development, license process, problems and handicaps in the operation of wood pellet industry, and recommendations for future WWBE development. Primary data are collected through direct interview and focus group discussion (FGD) to competent respondents or forestry and RE experts chosen. Respondent selection is done through purposive sampling. Secondary data are collected from information recorded at research institution, government institution, websites and universities related to WWBE development and other relevant publications.

2.4. Data Processing
Research on WWBE development policy uses qualitative method for explaining findings as it is in more depth way [6]. Content and substance analysis of regulations use content of analysis developed by [7]. This analysis is for exploring how the regulation involving actors and its substance relate to
WWBE development as Regulation of MoEMR No. 5899 K/20/MEM/2016 regarding the approval of business plan of electricity power provision PT PLN for year 2016 - 2025.

The next description uses descriptive qualitative analysis [8] for assessing the effectiveness of regulation of MoEMR No. 5899/2016 in supporting the electricity power provision with various generation and development of RE can be done fast, easily and economically (reducing transaction cost).

Figure 1. Logical framework used in the research on WBBE policy review

3. Result
3.1. Definition of Wood Biomass Based Energy (WBBE)
3.1.1. Definition of Biomass Energy
Before discussing biomass energy, it is important to understand the terms related to energy, energy source, and energy resources. Based on Law (UU) No. 30 Year 2007 regarding Energy, definition of (i) energy is ability to do work that can be heat, light, mechanic, chemist and electromagnetic; (ii) energy source is a basis that can produce energy either directly or indirectly through conversion or transformation process; (iii) energy resources is natural resources that can be utilized either as energy source or as energy; (iv) new energy source is energy source that can be produced by new technology either coming from renewable energy or non-renewable energy such as nuclear, hydrogen, coal bed methane, liquified coal, and gassified coal; (v) new energy is energy coming from new energy source;
and (v) renewable energy source is energy source that is produced from sustainable energy resources, such as geothermal, wind, bioenergy, sunrise, water flow and fall, and movement and different sea temperature level.

3.1.2. Biomass Energy Source

Biomass energy can be categorized as renewable energy (RE) because it is obtained from renewable resources. RE biomass source can be gained from agriculture wastes (straws, sugarcane wastes, livestock dung, and also poultry dung), biogasses (produced from broken organic matter such human feses, plant material, manure, etc) through fermentation process with the assistance of anaerobic microorganism for producing carbon dioxide and methane, energy source plants (cassava, corn, soyabean, wheat, etc that is proceeded for producing buthanol, ethanol, methanol, propanol, and biodiesel), forest trees (woody plant through combustion for producing heat) [9]. Wood is biomass that has already known by community as RE. During wood production and utilization, carbon that is produced is almost neutral. Although during the wood combustion produces CO$_2$, woody trees also absorb CO$_2$ during photosynthesis. The use of wood biomass as fuel material, in general, in form of fire wood, wood chips and charcoal [10].

3.2. The Policy of Wood Biomass Based Energy Development

Wood biomass-based energy policy (EBBK) in general has been regulated by regulations that do not only involve The Ministry of Energy and Mineral Resources (ESDM) but also other relevant stakeholders as listed in appendix 1. According to policies identification, there are 16 types of biomass energy utilization regulations (appendix 1) that involves 3 ministries (Ministry of Energy and Mineral Resources, Ministry of Finance and Ministry of Environment and Forestry), PT. State Electricity Company (PLN), Regional Governments (provinces and districts/cities), BUMN, BUMD, BUMS, BUMDes, cooperatives, and non-governmental organizations as providers of power plant. The policies include activities in regulating the licensing requirements, tax exemption, electricity trading and pricing of electricity from PLTBm plant. In this regard it should be understood that the electricity power system is a power supply system consisting of a set of plant and substation that are connected by a transmission line or distribution network.

According to the Government Regulation (PP) No. 97 year 2014 concerning about National Energy Policy (KEN), biomass is one of renewable energy sources. The utilization of these energy sources is directed to electricity and transportation (Appendix 1), however the strategic position of forest that has huge biomass potential remains untapped. This is due to The Ministry of Environment and Forestry (MoEF) that has limited role in the development of biofuel. The role of the Ministry of Environment and Forestry is limited to the provision of unproductive land for the development of biofuel as it is according to the Presidential Decree No. 1/2006 concerning Provision and Utilization of Biofuel as Other Fuels. Hence, there are recommendations that the role of the Ministry of Environment and Forestry would not only receive a mandate regarding the provision of forest land, but it is also encourage to accelerate its mandate through (i) Raw material supplies through the development of energy industry plantations (HTI-E) for biofuel; (ii) Preparation of processing technology, and (iii) Development of alternative energy based on forest plants[11].

The Government sets the purchasing price of biomass electricity (PLTBm) by PT. PLN as it is regulated in Minister of Energy and Mineral Resources regulations No. 27 year 2014 concerning on Electric Power Purchases from Biomass Power Plants (PLTBm) and Biogas Power Plants (PLTBg) by PT. PLN. These regulation is a revision of Regulation issued by the Minister of energy and Mineral Resources No. 2 of 2012, as a incentive to encourage interest of investors in the PLTBm development. According to the resource person in the Directorate General of New Renewable Energy and Energy Conservation, the price is set as substitution of the government’s seriousness in its efforts to provide electricity to the public, especially electricity from ET. Indonesia has a large potential of ET, especially biomass, on the other hand there are many people who have not yet received electricity. The
The development of energy from forest biomass at the present time is not supported by economic policies that is in favor to the small medium enterprises and cooperatives (MSMEs) as well as equal employment opportunities for community, even though forest has enormous potential and has strategic location to actively participate in the provision of EBBK[11]. Moreover, the legislations in the EBBK sector is still limited so the development needs to adopt a biofuel development strategy that includes (i) obligation of the central government to improve the supply and utilization of EBBK; (ii) the Research and Development Agency of The Ministry of Energy and Mineral Resources needs to support EBBK utilization energy; (iii) primary energy utilization is prioritized to use new renewable energy or EBBK sources; (iv) supports to the achievement of an new renewable energy mix to 23% in 2025 the central and regional government must provide fiscal and non-fiscal incentive; (v) PLTBm is established in accordance with the National Electricity General Plan (RUKN) as an effort to increase the national electrification ratio and accelerate the compliance of efficient electricity needs; (vi) the purchase of electricity depends on the type of generator, as example, ET plants are performed by direct appointment, and (vii) KEN can be used as a guide in national strategy management for supplying security and domestic energy security and supporting sustainable development[13].

Energy security has significant contribution to the national security[14]. National security consists of political security, economy security, social security and cultural security. The existence of the four areas of the resilience depends on the presence of the energy supply needed. This is supported by research findings that the aspect of the energy use per capita is an indication or reflection of the country welfare, the more prosperous a country it is, the higher energy consumption per capita will be.

According to the data of the Ministry of Energy and Mineral Resources, the national crude oil reserves reaches 3.6 billion barrels with a production rate of 288 million barrels per year and it is estimated that it will be exhausted for another 12 years. While 98 trillion cubic feet (tfc) of gas reserves will run out in the next 33 years if the average annual production is 3 tfc. This encourages new paradigms and concrete steps to develop energy road maps that are relevant and future-oriented energy roadmap. The role of EBT sources is vital amid high dependence on fossil energy. The urgency of EBT supply has become a necessity if we do not want to be trapped in a circle without solutions between world oil prices, energy needs, subsidized budgets and fiscal deficits [15]. PT PLN states that the supply of energy new policies has encouraged entrepreneurs to invest, especially for EBT plants. In 2019 the EBT plant contract increased significantly compared to the previous year, where it was nearly 71 units of companies who signed because previously there was still no final decision on price. In this case, it needs an understanding among the developers that this price is the price to the community. In addition, the policies of the Minister of Energy and Mineral Resources has supported a good business climate as well[16][12].

PT. PLN has signed 11 new renewable energy electricity purchase Agreements (PPAs) with Independent Power Producer (IPP) developers with total capacity of 291.4 megawatts (mW) and a total investment of Rp. 8 trillion on September 8, 2018. Those agreements is a continuation of the new renewable energy plant agreement that was conducted on August 2, 2017 with the capacity of 257.17 mW, so that at that time, the total PTL from new renewable energy was 548.57 mw (the capacity is beyond the capacity of the PLTB Geothermal Power Plant). By the end of 2017, the generating capacity of new renewable energy, including PLTB was estimated to have reached 1,300mW [17]. However, PT. PLN is ready to cancel the agreement of the private IPP if bank guarantee to achieve the financial closing at the set time limit is absent. Furthermore, of the 70 IPPs that signed the PPA, it is only 3 IPP that has reached commercial stage (Commercial on Date/COD), 17 IPP is implementing
construction and 4 IPP is preparing for construction, and the rest (46 IPP) have not been active since the issue of the funding so that they are not yet able to carry out financial closing [18].

In the midst of rupiah impairment against the US dollar (US), the government will postpone a number of electricity projects. However, PT. PLN ensures that the electricity project that uses new renewable energy continues to run as expected by the Minister of Energy and Mineral Resources. This is a good opportunity to utilize new renewable energy for PLTBm companies. In addition, PLN is reviewing and considering the demand for electricity before delaying the project because the demand for electricity in each region varies so that the treatment of the electricity project cannot be generalized[17].

Geographically, Indonesia which is located in the equator, has a tropical climate and receive sunlight throughout the year that provides abundant source of new renewable energy that can be used to improve national energy security. The new renewable energy sources include geothermal, bioenergy, biomass, wind power, hydropower and solar power. The government is committed to develop EBT as stated in government regulation No. 79/2014 with an energy consumption level of 0.8 tonne of oil equivalent (TOE) or suited to tons of oil per capita and electricity consumption of 776 kWh per capita. In 2013 only 5% of the total national energy mix came from new renewable energy, it is the smallest if it is compared to fossil fuel (46%), coal (31%) and natural gas (18%). The source of new renewable energy will increase to 23% in 2025, which is expected that energy consumption will mount to the level of 1.4 TOE per capita and 2500 kWh per capita for the electricity consumption[15].

4. The Estimation of WBBE’s Share in National Energy Supply

The government through the Presidential Regulation No. 5/2006 issues KEN which aims to realize the security of domestic energy supplies. The main policies include the provision of optimal energy, efficient energy utilization, pricing of energy towards economic prices and environmental preservation. The policy includes the target of achieving the energy mix as well until 2025 as shown in figure 2.

![Figure 2. Energy mix target 2025](image)

Presidential Regulation No. 5/2006 implies the importance of new renewable energy source that can meet national energy requirements and that are environmentally friendly such as new renewable energy and renewable energies. Renewable energy is a source of energy produced by energy resources that naturally will not be exhausted and will be sustainable if it is managed properly, including: geothermal, biofuel, river water flow, solar heat, wind, biomass, biogas, ocean waves, and the temperature of the ocean depths. The energy policy followed by the issuance of presidential instruction No. 1/2006 has established the main duties and function of the Ministry of Energy and
Mineral Resources and other ministries/agencies, governors and regents/mayors regarding the supply and utilization of biofuels under the coordination of the Coordinating Minister for Economic Affairs.

A real effort to realize energy security and diversification is the Energy Independent Village (EIV) program. The EIV program is one of the government program that was launched by the President SBY on February 20, 2007. The program is coordinated by the Coordinating Minister for Economic Affairs as an effort to develop energy in rural areas. The benefits of the program include villages that are being able to meet their own energy needs through energy diversification and at the same time also being able to create jobs and reduce unemployment and poverty. Through EIV program, the villages will be able to meet 60% of their energy needs (electricity and fuel) from renewable energy sources by utilizing local potentials. The Ministry of Forestry is aware of its role for the success of the national energy policy. Nyamplung biofuel technology research and development program and the transfer of technology have been carried out by conducting socialization and construction of the Nyamplung-based EIV demonstration plot[19].

The 11th National Energy Agency (NEA) meeting, at the office of the Ministry of Agriculture on November 8, 2013, it was stated that the government set a target of biofuel utilization in 2013 to the tune of 3.9 million kiloliters through the implementation of government regulation which required mixing 10% biodiesel in diesel fuel. This is expected to reduce the imports volume of fossil fuel in the amount of USD 3 billion. In addition, the development of biofuel is expected not to collide with the development of crops for food crops, such as cassava (ethanol) and palm oil (biofuel)[20]. Further, the realization of the biodiesel 20% (B20) policy implementation until February 2019 only reached 92%[21]. Due to the mixing point of B20 raw materials that is still as many as 29 points and it will be trimmed become 25 points from 112 points. Moreover, biofuel utilization is likely to have a positive and negative impacts on natural forests and communities whose lives depend on forests[22]. On the other hand, the need of biofuels can increase competition for land demands and threaten food production and also causes large inequality between rich and poor[23].

The existence of Presidential Regulation No. 5/2006 and Presidential Instruction No. 1/2006 and other Minister of Energy and Mineral Resources regulation have become a stimulant in the liberalization of energy diversification and absorption of emissions. The utilization of wood pellets can be one of solutions to overcome the accumulation of CO2 produced by burning fuel. In addition, the potency and area of state forest and community forest are immense to supply biomass feedstock for the benefit of renewable energy.

The High dependence of fossil fuel has a bad impact and plunge Indonesia to the considerable fiscal deficit. The increase in energy consumption being offset by the level of production and exacerbated by the decline in oil and gas reserves minimal exploration activities that have been proven to bring disaster to the energy crisis in the future. As the example, the Ministry of Finance data show that the energy subsidy budget in 2018 state budget was Rp. 187.1 trillion consists of fuel subsidies Rp. 126.8 trillion and Rp. 60.3 trillion for electricity subsidies. The energy subsidy in 2018 increased by 50.5% compared to the same subsidy in 2017, which is Rp. 109.7 trillion[15]. Therefore, the Chair of the Indonesian Ministry of Forestry’s Climate Change Working Group, Dr. Yetti Rusli, emphasizes the importance of using renewable energy in reducing the amount of energy subsidies and at the same time overcoming the ecological effects of weather changes. The utilization of wood pellets can be one of solutions to overcome the accumulation of CO2 produced by burning fuel. In addition, the potency and area of state forest and community forest are immense to supply biomass feedstock for the benefit of renewable energy.

Based on the results of silvicultural studies, cultivation of potential types of energy plants is easy so that to increase the role or WBBE share in the future can be done through the provision of land in forest areas (Through Industrial Plantation Forest and community forest) and in non forest areas (abandoned and unproductive state lands) for mass planting to energy wood species. In this case, The
Ministry of Environment and Forestry is the ministry that is responsible to provide sufficient forest area and The Ministry of Agrarian and Spatial Planning provides abandoned and unproductive land for WBBE development. Ministry of Environment and Forestry has special role. The role is not only as a land provider, but also a technical coach in the development of WBBE.

The barriers and obstacles of the development and utilization biomass fuel in general are: (i) lack of cultivation knowledge; (ii) uncertainty in post-harvest handling; (iii) lack of processing process socialization; and (iv) less competitive capabilities of plants for the biomass fuel with other food crops. Furthermore the specific obstacles in the development of wood pellets include: (i) the product processing requires adequate technology; (ii) the high need for raw material from waste; (iii) low priority on energy crop cultivation, and (iv) the far distance of the wood pellet industry development from the source of the raw material.

The BBB development strategy (biomass energy) and biofuel as fuel substitution can be done through: (i) reformulation of the DME concepts; (ii) revitalization of DEN in the management and development of BBB and biofuel; (iii) implementation of consistent biofuel development policy; (iv) Improvement of the forestry sector role; (v) proactive BBB implementation and biofuel purchases from the community; (vi) transfer of fuel subsidies for the development of BBB and biofuel; (vii) development integration BBB and biofuel with other fuels; (viii) immediate implementation of fossil fuel change program; (ix) joint policies formulation on upstream-downstream for the energy plantation forest between the Ministry of Environment and Forestry and The Ministry of Energy and Mineral Resources.

5. Conclusion And Recommendation
5.1. Conclusion
Biomassa energi is an alternative energy to be developed for replacing non-renewable energy such as oil, gas, and coal. The development of WBBE as renewable energy becomes urgent national demand for achieving energy security and diversification as substitution of fossil fuel. Up to now, the consumption of subsidized fossil fuel is very high so that government has to spend around Rp. 187.1 trillion or 8.5% from APBN P 2018.

There are 16 (sixteen) regulations related to the utilization of WBBE and involvement of three ministerial levels, PT PLN, local governments and private sectors as providers of electricity generation unit. This policy regulates starting from the license requirement, tax holiday, PPA process until the price setting from the PLTBm unit.

Based on silviculture review, a cultivation of potential energy tree species is relatively easy if the trees are planted in line with their suitable growing site condition and climate as well as integrated with the forest and land program at critical lands. Potential tree species for WBBE are Kaliandra (Calliandra cllothyrsus), Akasia (Acacia auriculiformis), Gamal (Gliricidia sepium), dan Lamtoro (Leucaena leucocephala). The best tree species for WBBE are kalindra (Callyandra callothyrsus) due to (i) highest emission absorption factor, (ii) high growth increment (32 m3/ha/year), and (iii) high energy content (683 GJ/ha/year).

In national energy mix, WWBE is allocated with other energies for 2%. This share can be increased significantly to be more than 2% if it is supported by various policies at national and field levels, and provision of forest and land by the Ministry of Environment and Forestry (through plantation forest and private forest) and National Land Agency (bare and unproductive state land). However, KLHK is not enough only acting as forest land provider, but also as technical adviser for WBBE development.

5.2. Recommendation
In order to guarantee the sustainable development of WBBE, it requires price policy, speed up mixture infrastructure, transportation, and obligation of WBBE high quality for consumer. DEN should be revitalized focusing on developing ET especially WBBE through providing conducive, proactive and incentive based policies related to the speed up of WBBE development program.
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APPENDIX

Policy and regulations in national energy field (WBBE)

| No. | Type of Regulation | Substances of Regulation | Actors involved | Related to WBBE |
|-----|--------------------|--------------------------|----------------|----------------|
| 1.  | Law No. 30/2007:   | Every person has right to | Community, central, provincial, district/city and village governments, and research institution | Central government has to increased provision and utilization of EBT. Research support EBT implementation |
|     | Energy             | enery with using environmental sound technology. Government would provide energy with prioritizing undeveloped and remote villages and using local enery sources | | |
| 2.  | Law No. 30/2009:   | Central and local government implement the provision effort of electricity power (EP) provided by private sector, cooperative and community. Utilization of primary energy source is conducted by prioritizing renewable energy (RE) | Central and local govern-ment, private sector, coope-rative and community | Utilization of primary energy source is conducted by prioritizing RE |
|     | Electricity Power  | Energy | | |
| 3.  | Government Regulation (PP) No. 79/2014: National Energy Policy | Provision of EP generation in 2025 is 115 GW and year 2050 is 430 GW. Achievement of optimal primary energy mix from new and RE (NRE) 23% in 2025 and 31% in 2050. Central and local government give fiscal and non fiscal incentives to push NRE development | Central and local govern-ment, EP generation business | Target of NRE is 23 % (2025) and 31% (2050). There is incentive for NRE development |
| 4.  | PP No. 23/2014: revision of PP No. 14/2012 regarding Business activity of Electricity Power Provision | Electricity power provision for public domain is conducted in line with General Planning of National Electricity (Rencana Umum Ketenagalistrikan Nasional-RUKN). Purchasing of electricity power can be done through direct appointment from the electricity power generation that used renewable energy | Ministry of Environment and Forestry (MoEF), Parlia-ment, PT PLN and business entity for EP provision | Biomass electricity generation would be built in according to RUKN. Development of RE is done by direct appointment |
5. PP No. 61/2012: 
Revision of PP No. 24/2010 regarding the use of forest area
The use of forest area has included the food and energy securities as a strategic national development in the outside of forest activity.

MoEF, Ministry of Agriculture, and Ministry of Energy and Mineral Resources (MoEMR)
Forest area can be planned by energy tree species for renewable energy

6. Presidential Regulation (Perpres) No. 5/2006: 
National Energy Policy (NEP)
Achievement of optimal (primer) energy mix in 2025 is around 5 % for RE such as biomassa, nuclear, small scale water power, sun energy and wind. This target would be met through main policies (energy provision and utilization, economy price, and sustainable environment) and supporting policies (energy infrastructure, partnership and community development, and R&D)

Central Government, MoEMR, business entity and R&D
NEP is guidance for national energy management for energy supply security and for supporting sustainable development

7. Perpres No. 22/2017; 
Planning of National Energy (GPNE)
GPNE is made as an obligation of UU No. 30/2007 by central government and determined by National Energy Council (NEC) for period of up to 2050.

Centra Government, MoEMR, and NEC
GPNE is important for formulating the plan of biomass energy utilization

8. Perpres No. 105/2016: 
revision of Perpres No. 68/2015 regarding the MoEMR
MoEMR has a task to carry out government affair in field of energy and mineral resource. The function of MoEMR is to formulate, set and implement the policy, technical guidance, supervision, HRD, and R&D.

Each echelon I and its subordinate
Biomass energy development is under Directorate General of New Energy, Renewable, and energy Conservation

9. MoEMR No. 49/2017: improvement of MoEMR No. 10/2017 regarding Main Point of EP Transcation Agreement
Giving legal certainty in the EP provision needs regulation for risk allocation and force majeure in EP transaction between PT PLN and business entity

PT PLN with EP transaction business entities (National, Local, and Private Business, Cooperation and Community group
Pembangunan Listrik Tenaga Biomasa (PLTB) harus mengacu kepada Permen ESDM No 49/2017.

10. Minister of Energy and Mineral Resources regulation No. 37/2008 concerning Rules of the
To create security, reliability, operation and development of a reliable and integrated electric power transmission system, it is necessary to regulate the electricity network that must be adhered to by business actors and consumers.

All the TL supply businesses and TL consumers
Applies only to business actors and consumers of electric power connected to the Sumatra Electric Power Network System
Sumatra Electric Power System Network

11. Minister of Energy and Mineral Resources Regulation No. 05/2014 concerning Procedures for Accreditation and Electricity Certification

The procedure for accreditation of TL support services businesses for Engineering Inspection Institutions, Low Voltage Engineering Inspection Institution, Competency Certification Institutions, and Business Entity Certification Institutions. Procedures for Electricity Installation Certification, Electricity Engineering Personnel Competency Certification, and Business Entity Certification.

All institutions related to electricity need accreditation and certification. Accreditation is applied to an institution and certification for individual skills/profession

12. Minister of Energy and Mineral Resources Regulation No. 50/2017 Concerning substitute of Minister of Energy and Mineral Resources No. 12/2017 regarding Utilization od Renewable Energy Sources for Electricity Supply

This regulation is guideline for PT. PLN in purchasing TL from power plants that utilize renewable energy sources, as sunlight, wind, hydropower, biomass, biogas, municipal waste, geothermal and temperature differences in the ocean layer. The purchase of TL from PLTBm by PT. PLN is done through a direct selection mechanism.

Echelon I ranks of the Ministry of Energy and Mineral Resources and business actors engaged in renewable energy sources

The purchase of TL from PLTBm by PT. PLN can only be done to PPL who have sufficient fuel supply sources for the continuity of PLTBm operations during the PPA

13. The Minister of Energy and Mineral Resources Regulation No. 10/2012 concerning implementation physical activity of utilizing ne renewable energy

Physical activity of new renewable energy utilization implemented in order to support national development in a sustainable manner to improve national energy security. These physical activities include the construction, procurement and/or installation of (i) TL supply installations, (ii) biofuel supply installations, (iii) productive tools to support community business activities resulting from the use of new renewable energy.

1. Central and regional government
2. TL business provider

The Physical implementation objectives: (i) encourage the development of the DME program, (ii) encourage the supply of energy from new renewable energy, (iii) promote growth and equity in development,
14. Minister of Finance Regulation No. 21/2010 concerning Provision of tax and tourism facilities for the use of renewable energy resources

Renewable Energy resources utilization activities can be given tax incentives in the form of: (a) Income Tax (VAT), (b) Facilities Value Added Tax (VAT), (c) Facility duties, (d) facility taxes paid by the government.

Central government, PT. PLN and business entities

There are tax and customs facilities if using renewable energy sources

15. Minister of Environment Regulation No. 11/2006 concerning the type of business plan and/or activities that must be equipped with EIA

One type of business plan and/or activity that must be equipped with MDAL is the construction of a power plant of another type (i.e: Ocean thermal energy conversion (OTEC), solar, wind, biomass, peat, etc) which reaches > 10 MW

Ministry of Environment and Forestry, PT PLN, and Business entities

The construction of biomass power is required by AMDAL if the capacity s > 10 MW

16. Minister of Energy and Mineral Resources regulation No. 27/2014 concerning purchases electricity from PLTBm and PLTBg by the PT. PLN

The TL selling price of the PLTBm with a capacity of 10 MW is determined by considering (i) the voltage of the PT. PLN electricity network, (ii) the location/area of the generator (factor f)

Central government, PT PLN and business entities

The calculation of the TL selling price on PLTBm is largely determined by the type of PT. PLN electricity network and the correction factor of the area where the PLTBm is located. As example F=1.15 for the Sumatera region, F=1.30 for Kalimantan

TL Selling price of PLTBm: (a) Rp. 1,150/kWh X F (1.15 for sumatera region), if connected to a medium voltage network, (b) Rp. 1,500 kWh X F, if connected to a low voltage network. PLN can purchase electricity from PLTBm with capacity above 10 MW