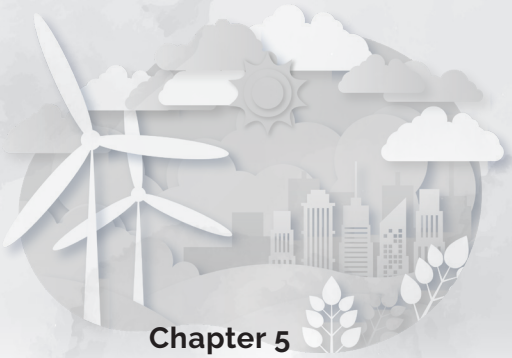


Chapter 5

Regulatory Frameworks for Renewable Energy

Rachmat Trijono

A. Introduction

The use of green energy has become a demand on this planet Earth. Likewise, Indonesia has also stated its commitment to continue the use of new and renewable energy as part of the Paris Agreement (United Nations, n.d.). This is a manifestation of Indonesia's seriousness as part of achieving the Sustainable Development Goals (SDGs), particularly SDG No.7, namely ensuring access to affordable, reliable, sustainable, and modern energy for all (Department of Economic and Social Affairs, n.d.). This commitment is in line with Indonesia's commitment to reduce emissions.

R. Trijono
National Research and Innovation Agency, e-mail: lkpi.179@gmail.com

Trijono, R. (2023). Regulatory frameworks for renewable energy. In S. Ariyanto & S. I. Heriyanti (Eds.), *Renewable energy: Policy and strategy* (89–113). BRIN Publishing. DOI: 10.55981/brin.900.c785
E-ISBN: 978-623-8372-25-6

The Government of the Republic of Indonesia has issued several regulations to support the development and utilization of renewable energy. Indonesia set a goal to achieve net-zero emissions by 2060 and pledged alongside other countries to help limit global warming to less than 1.5 degrees Celsius above pre-industrial levels. Some of these regulations include: Vendu Reglement, Ordonantie 28 February 1908 Staatsblad 1908: 189 (Vendu Reglement Stb 1908/189), Presidential Regulation No. 5 of 2006 concerning National Energy Policy, Presidential Regulation No. 5 of 2006 concerning National Energy Policy, Presidential Regulation (*Perpres*) No. 5 of 2006 concerning National Energy Policy, Presidential Instruction No. 1 of 2006, Law No. 30 of 2007 concerning Energy which states that the government must promote the development of renewable energy and regulate its use effectively, Minister of Energy and Mineral Resources (ESDM) Regulation Number 17 of 2014 concerning the Purchase of Electric Power from PLTP and Geothermal Steam for PLTP by PT Companies State Electricity, Minister of Energy and Mineral Resources (ESDM) Regulation Number 50 of 2017 concerning Utilization of Renewable Energy Sources for The Provision of Electricity, Regulation of the Minister of Energy and Mineral Resources of the Republic of Indonesia Number 9 of 2020, Minister of Energy and Mineral Resources (ESDM) Regulation Number 15 of 2022 concerning Procedures for Determining Certain Natural Gas Users and Certain Natural Gas Prices in the Industrial Sector, Regulation 0733.K/DIR/2013, which requires PLN to credit energy produced by solar power to customers' accounts, and Presidential Regulation of the Republic of Indonesia Number 112 of 2022. If you pay close attention, these regulations were issued from various periods or years, some were even issued during the Dutch colonial period. This chapter provides an overview of renewable energy regulations in Indonesia.

The data used is secondary data (Vartanian, 2011), both in the form of laws and regulations, literature, and journals. All data describes the regulation of renewable energy, namely solar, wind, hydroelectric, geothermal, marine, hydrogen, biomass (Martens,

2010). This is important considering that the regulations applied by Indonesia must be able to achieve the criteria targeted, namely achieving net-zero emissions by 2060.

B. Indonesia's Regulatory Framework for Renewable Energy

Indonesia's abundant natural wealth for renewable energy must be supported by laws and regulations. This is important considering that Indonesia is a state of law (Constitution of the Republic of Indonesia, 1945).

Indonesia has a regulatory framework for renewable energy, which aims to achieve domestic energy supply security (*Perpres* No. 5, 2006). The following are some key regulations and policies related to renewable energy in Indonesia.

1. The Indonesian Government's Commitment

Formally, the development of renewable energy in Indonesia began in 2006. This was stated in Presidential Regulation (*Perpres*) No. 5 of 2006 concerning National Energy Policy. The targets of the National Energy Policy are as follows:

a. achievement of energy elasticity of less than one in 2025.
b. realization of an optimal (primary) energy mix in 2025, namely the role of each type of energy to national energy consumption:
    1) petroleum becomes less than 20%;
    2) natural gas becomes more than 30%;
    3) coal becomes more than 33%;
    4) biofuel becomes more than 5%;
    5) geothermal energy becomes more than 5%;
    6) other new and renewable energy, in particular, biomass, nuclear, small-scale hydropower, electricity solar, and wind up to more than 5%;
    7) other fuels originating from liquefaction coal to more than 2% (*Perpres* No. 5, 2006).

The steps taken to achieve this target are through the main policy and supporting policies. Main policy includes:

a. Provision of energy through:
    1) guarantee the availability of internal energy supply country;
    2) optimization of energy production;
    3) implementation of energy conservation.
b. Utilization of energy through:
    1) energy utilization efficiency;
    2) energy diversification.
c. Determination of energy price policy in the direction of price economy, taking into account assistance for poor households, in the long run, a certain time.
d. Preservation of the environment by applying the principles of sustainable development.

Supporting policies include:

a. energy infrastructure development in increasing consumer access to energy;
b. government and business partnerships;
c. community empowerment;
d. research and development as well as education and training (*Perpres* No. 5, 2006).

Indonesia is very serious about dealing with renewable energy, so the Government issued the Presidential Instruction (*Instruksi Presiden, Inpress*) No. 1 of 2006 to accelerate the supply and utilization of bio-fuels as other fuels (*Inpres* No. 1, 2006). This instruction is addressed to the Coordinating Minister for the Economy, Minister of Energy and Mineral Resources, Minister of Agriculture, Minister of Forestry, Minister of Industry, Minister of Trade, Minister of Transportation, Minister of State for Research and Technology, State Minister for Cooperatives and Small and Medium Enterprises, Minister of State for State Owned Enterprises, Minister of Internal Affairs, Minister

of Finance, Minister of State for the Environment, Governors, and regents/mayors, to accelerate the supply and utilization of biofuels as other fuels.

As stated in the Presidential Instruction, each minister is instructed to take some measures according to their ministerial function. The Presidential Instruction No. 1 of 2006 instructions are as follows. The Coordinating Minister for Economic Affairs coordinates is instructed to prepare for the implementation of the supply and utilization of biofuels as other fuels. The Minister of Energy and Mineral Resources is instructed to:

a. establish and implement policies on the provision and utilization of biofuels as materials and other fuels, which among other things contain a guarantee of the availability of biofuels as well as guarantees of smooth operation and even distribution;
b. set incentive policy packages and tariffs for the development of supply and utilization of fuel vegetable (biofuel) as other fuel with coordination with related agencies;
c. establish standards and quality of biofuels as other fuel;
d. establish simple systems and procedures for testing the quality of biofuels as other fuel;
e. establish a simple trading system of biofuels as other fuel into the governance system trading in fuel oil;
f. socialize the use of biofuels as other fuel;
g. encourage companies engaged in energy and mineral resources to utilize fuel biofuels as other fuel.

The Minister of Agriculture is instructed to:

a. encourage the provision of fuel raw material plants vegetable (biofuel) including seeds and seedlings;
b. carry out counseling on the development of biofuel raw material plants;
c. facilitate the supply of seeds and plant seedling materials biofuel raw materials (biofuels);

d. integrate development activities and activities post-harvest plant raw materials for biofuels.

The Minister of Forestry was ordered to grant permits for the use of unproductive forest land for the development of biofuel raw materials by statutory provisions. The Minister of Industry was instructed to increase the production development of domestic biofuel raw material processing equipment and encourage business actors to develop the biofuel industry.

The Minister of Trade was instructed to:

a. encourage the smooth supply and distribution of raw materials biofuels;
b. ensure the smooth supply and distribution of components for the processing and utilization of bio-fuel equipment.

The Minister of Transportation was instructed to encourage increased use of biofuels as other fuels in the transportation sector. The State Minister for Research and Technology was instructed to develop technology and submit proposals for applications for the use of supply and processing technology, distribution of raw materials, and utilization of biofuels as other fuels. The State Minister for Cooperatives and Small and Medium Enterprises gave instructions to assist and encourage cooperatives and small and medium enterprises to participate in developing biofuel raw material factories as well as processing and trading of biofuel as other fuels. The Minister of State for State-Owned Enterprises (BUMN) was instructed to:

a. encourage state-owned enterprises in the fields of agriculture, plantations, and forestry to develop raw materials and biofuel crops;
b. encourage the state-owned industrial sector to develop the biofuel processing industry (biofuel);
c. encourage engineering BUMN to develop biofuel processing technology;
d. encourage BUMN in the energy sector to take advantage of it.

The Minister of Internal Affairs was instructed to coordinate and facilitate local governments and their staff as well as prepare the community for the provision of land in their respective areas, especially critical land for cultivating biofuel raw materials. The Minister of Finance was instructed to review laws and regulations in the financial sector in the framework of providing incentives and fiscal relief for the supply of raw materials and the use of biofuels as other fuels. The State Minister for the Environment was instructed to carry out outreach and communication to the public regarding the use of biofuels as other environmentally friendly fuels.

Governors and regents/mayors are instructed to:

a. implement policies to increase the utilization of biofuels as other fuel in their area according to their authority;
b. carry out socialization on the use of biofuels as other fuel in their area;
c. facilitate the provision of land in their respective areas by their authority, especially critical land for cultivation of biofuel raw materials;
d. report the implementation of this instruction to the Minister of the Interior Country (governor) and the Governor (regents/mayor) (*Inpres* No. 6, 2006).

Presidential Regulation (*Perpres*) No. 5 of 2006 and Presidential Instruction (*Inpres*) No. 1 of 2006 confirm the Indonesian government's commitment to changing the use of fossil energy with renewable energy by supplying and using biofuels as other fuel.

2. Renewable Energy Law

Various laws and regulations relating to renewable energy have been issued by the Indonesian nation as a foundation for the government in realizing the provision of renewable energy. Law No. 30 of 2007 concerning Energy was passed because: first, energy resources are natural resources as mandated in Article 33 of the 1945 Constitution of the Republic of Indonesia which are controlled by the state and

used for the greatest prosperity of the people. Second, the role of energy is very important for increasing economic activity and national resilience, so energy management which includes supply, utilization, and exploitation must be carried out in a fair, sustainable, rational, optimal, and integrated manner. Third, reserves of nonrenewable energy resources are limited so it is necessary to diversify energy resources so that energy availability is guaranteed by state (UU No. 30, 2007).

The main substances regulated in this law include (General Explanation of UU No. 30, 2007):

a. energy regulation which includes control and regulation of energy resources;
b. energy buffer reserves to guarantee national energy security;
c. energy crisis and emergencies and energy prices;
d. the authority of the government and regional governments in regulating the energy sector;
e. national energy policy, national energy general plan, and establishment of the national energy council;
f. community rights and roles in energy management;
g. fostering and supervising management activities in the energy sector;
h. research and development.

Minister of Energy and Mineral Resources Regulation No. 12 of 2017 (*Permen ESDM* No. 12, 2017) concerning the Development of New and Renewable Energy was passed to realize national energy security and reduce carbon dioxide (CO_2) emission levels, the use of renewable energy sources for the benefit of national electricity must be prioritized. Apart from that, the use of renewable energy sources for the benefit of national electricity is developed by considering the price of electricity based on sound business principles, so it is necessary to re-regulate the use of renewable energy sources for the supply of electricity, especially regarding the purchase of electricity from power

plants that utilize renewable energy sources from State Electricity Company (PT PLN).

This Ministerial Regulation is a guideline for PT PLN in purchasing electricity from a power plant that utilizes renewable energy sources (*Permen ESDM* No. 12, 2017).

Renewable energy sources include:

a. sunlight that generates electricity from PLTS Photovoltaic;
b. the wind that generates electricity from PLTB;
c. water power that generates electricity from Water Power;
d. biomass that produces electricity from PLTBm;
e. biogas that generates electricity from PLTBg;
f. municipal waste which generates electricity from PLTSa; and
g. geothermal which produces electricity from PLTP.

3. Feed-in Tariff (FiT) Scheme

The feed-in tariff (FiT) scheme or benchmark price for electricity from renewable energy sources based on production cost components is the key to the success of renewable energy development. In addition, policy consistency is also needed to maintain business certainty for investors.

In Indonesia, the FiT scheme is a government policy program that aims to encourage the development of renewable energy by providing incentives in the form of guaranteed electricity rates for every kWh of electricity generated from renewable energy sources such as solar, wind, and biomass power (Dewan Energi Nasional, 2012).

Subsidies for Power Generation Business Units from renewable energy are distributed in two systems, namely the FiT system and the tradable green certificate (TGC) system. The FiT system is given to build new renewable energy (NRE) generating units to attract investors, while the TGC system is given more to existing renewable energy generating units to reduce operational costs. Aside from the unclear continuation of the Kyoto Protocol for the TGC system, so

far, the more popular FiT system has been implemented. In developed countries (European Union), the classification of FiT is based on the following criteria (Dewan Energi Nasional, 2012):

a. the location of the power plant,
b. the type of fuel used in the power plant,
c. power generation capacity,
d. generator efficiency of the power plant.

In Indonesia, the implementation is in the form of tariff subsidies to consumers grouped into voltages of 450 kVa, 900 kVa, and so on. This subsidy was further elaborated by PT PLN based on the following criteria (Dewan Energi Nasional, 2012).

a. How many of these consumers whose electricity comes from the Power Generation Business Unit from renewable energy?
b. And how many of these consumers whose electricity comes from the Power Generation Business Unit from fossil energy?

The basic laws for FiT Schemes vary from country to country. However, generally, the basic law for the FiT Scheme is legislation in the field of energy or electricity that authorizes the regulator or electricity supply agency to set a guaranteed electricity rate for renewable energy (Dewan Energi Nasional, 2012).

Examples of the legal basis for the FiT Scheme in Indonesia include:

a. Minister of Energy and Mineral Resources (ESDM) Regulation No. 15 of 2022 concerning Procedures for Determining Certain Natural Gas Users and Certain Natural Gas Prices in the Industrial Sector (*Permen ESDM* No. 15, 2022). In the context of implementing the utilization of natural gas, the Minister of Energy and Mineral Resources determines the price of natural gas by considering: field economy, natural gas prices domestically and internationally, the purchasing power of natural gas consumers in the country, added value from the use of natural gas in the country *(Permen ESDM* No. 15, 2022). The Minister sets the Price

of Certain Natural Gas at the point of delivery of natural gas users (plant gate) with a maximum price of US$6 per MMBTU. Certain Natural Gas Prices (HGBT) apply to natural gas users who purchase natural gas at the point of delivery of natural gas users (plant gate) at a price higher than US$6 per MMBTU.

Determination of HGBT is carried out based on adjustments to the calculation of Natural Gas Prices and/or natural gas distribution rates. Calculation adjustments are made to: price of natural gas purchased from contractors and/or tariff for natural gas distribution which includes the imposition of costs arising from liquefaction, compression, transportation through transmission and distribution pipelines, transportation of liquefied natural gas and transportation of compressed natural gas, storage, regasification, and/or trade, as well as reasonable margins (*Permen ESDM* No. 15, 2022). The determination of HGBT is intended for users of natural gas engaged in the industrial sector, consisting of the fertilizer industry, petrochemical industry, oleochemical industry, steel industry, ceramic industry, glass industry, and rubber glove industry (*Permen ESDM* No. 15, 2022).

b. Minister of Energy and Mineral Resources Regulation Number 10 of 2020 concerning Amendments to Minister of Energy and Mineral Resources Regulation Number 45 of 2017 concerning the Utilization of Natural Gas for Power Generation (*Permen* ESDM No. 10, 2020). This regulation was passed to increase the use of natural gas in the energy mix for electricity generation and to guarantee the availability of natural gas supply at a fair and competitive price, it is necessary to adjust the regulation of natural gas prices for power plants and adjust the arrangements for the mechanism for purchasing electricity.
c. Regulation of the Minister of Energy and Mineral Resources of the Republic of Indonesia Number 9 of 2020 concerning the Efficiency of Electricity PT PLN (Persero) (*Permen ESDM* No. 9, 2020). This regulation was made to improve efficiency in the electricity supply business of PT PLN (Persero). It is necessary to

regulate a target-setting mechanism and realize electricity supply efficiency in the form of electricity generation efficiency and electricity network efficiency. The mechanism for determining the efficiency target for power generation is carried out by (1) paying attention to the pattern of loading operations, the reliability of the electric power system, the quality of electricity service, NPHR, and generation technology. (2) PT PLN (Persero) implements supply efficiency electric power at power plants based on the set SFC target amount for power plants. (3) The amount of SFC for a power plant is the weighted average of the volume of fuel used for electricity production for each type of power plant with the following classification: (a) steam power plant (PLTU) made from coal fuel, calculated based on the ratio between the total volume of coal (in kilograms) and total electricity production (in kilowatt-hour units); (b) gas-fired power plant (PLTG) or gas-fired steam power plant (PLTU), is calculated based on the ratio between gas volume (in metric units millions of British thermal units) and total electricity production (in kilowatt-hour units); (c) gas-fired steam power plant (PLTGU), is calculated based on the ratio between the total gas volume (in million metric British thermal units) and total electricity production (in kilowatt-hour units); (d) gas engine power plant (PLTMG) is fueled by gas, calculated based on the ratio between the total gas volume (in million metric British thermal units) and total electricity production (in kilowatt-hour units); (e) oil-fired diesel power plants (PLTD), are calculated based on the ratio between the total volume of fuel oil (in liters) and the amount of electricity production (in kilowatt-hour units); (f) Oil-fired steam power plant (PLTU), calculated based on the ratio between the total volume of fuel oil (in units of liters) and total electricity production (in kilowatt-hours units); and (g) oil-fired gas power plant (PLTG), steam gas power plant (PLTGU), or gas engine power plant (PLTMG), calculated based on the ratio between the total volume of fuel oil (in liters) and total electricity production (in kilowatt-hours units) (*Permen ESDM* No. 9, 2020).

d. Minister of Energy and Mineral Resources (ESDM) Regulation Number 17 of 2014 concerning Purchase of Electric Power from PLTP and Geothermal Steam for PLTP by PT Perusahaan Listrik Negara (Persero) (*Permen ESDM* No. 17, 2014). This regulation was passed with various considerations, namely (1) to accelerate the development of geothermal energy, it is necessary to rearrange the arrangements regarding the purchase of electricity from geothermal power plants; (2) that to provide certainty on the buying and selling price of geothermal steam for geothermal power plants, it is necessary to regulate the purchase of geothermal steam for geothermal power plants.

e. Minister of Energy and Mineral Resources (ESDM) Regulation Number 50 of 2017 concerning Utilization of Renewable Energy Sources for The Provision of Electricity (*Permen ESDM* No. 50, 2017). Considerations for ratification of Minister of Energy and Mineral Resources Regulation Number 50 of 2017 is to accelerate the development of renewable energy for the benefit of national electricity, it is necessary to rearrange the provisions regarding the mechanism and purchase price of electricity by PT PLN (Persero) which utilizes renewable energy sources as stipulated in the Minister of Energy Regulation and Mineral Resources Number 12 of 2017 concerning Utilization of Renewable Energy Sources for the Provision of Electricity as amended by Regulation of the Minister of Energy and Mineral Resources Number 43 of 2017 concerning Amendment to Regulation of the Minister of Energy and Mineral Resources Number 12 of 2017 concerning Utilization of Energy Sources Renewable for the Provision of Electric Power (*Permen ESDM* No. 50, 2017). To supply electricity sustainably, PT PLN (Persero) is required to purchase power from power plants that utilize renewable energy sources (*Permen ESDM* No. 50, 2017). In general, it is determined that the purchase of electricity from power plants that utilize renewable energy sources is carried out by PT PLN (Persero) through a direct selection mechanism (*Permen ESDM* No. 50, 2017). Purchase of electricity from a power

plant utilizing renewable energy sources based on high technology, varying efficiency, and highly dependent on local radiation or weather levels such as solar and wind energy, carried out by PT PLN (Persero) through a direct selection mechanism based on Quota Capacity (*Permen ESDM* No. 50, 2017). PLN (Persero) is required to operate a power plant that utilizes renewable energy sources with a capacity of up to 10 MW (ten megawatts) continuously (must-run) (*Permen ESDM* No. 50, 2017).

f. Regulation of the Minister of Energy and Mineral Resources of the Republic of Indonesia Number 13 of 2017 concerning Amendments to the Regulation of the Minister of Energy and Mineral Resources Number 15 of 2016 concerning Provision of 3 (Three) Hour Fast Licensing Services Regarding infrastructure in the Energy and Mineral Resources Sector (*Permen ESDM* No. 13, 2017). One of the considerations for the issuance of this regulation is that a Geothermal Permit is a permit to conduct geothermal exploitation granted based on the results of the offer of geothermal working areas through tender with administrative, technical, and requirements financial statements that have been fulfilled by applicants for Hot Permits Earth at the time of bidding for the geothermal working area. Fast Investment License Service 3 (three) hours, which one hereinafter referred to as Fast Service I23J is the service provided to the Permit Applicant concerned with infrastructure in the Energy and Mineral Resources Sector

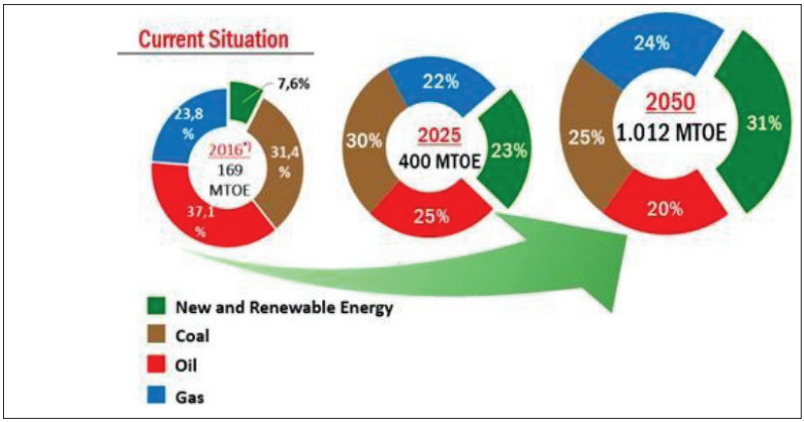
4. Net Energy Metering (NEM)

Net Metering is a service system where the electricity generated by a solar power system that meets the requirements of a household can be connected (sent) to the PLN distribution network and can be reused for consumption by the household. In Indonesia, Net Metering has been mandated by PLN in Regulation No. 0733.K/DIR/2013, which requires PLN to credit energy produced by solar power to customer

accounts. So that customers can send (export) their daily electricity production and at the same time consume (import) electricity from PLN for reuse. To implement the Net Metering, household customers will be equipped with a 2-way electric meter reader (kWh Meter EXIM—Export-Import) (MerketingSurendo777, 2020).

Solar panels on rooftop PLTS that use an on-grid system must be installed in areas that are included in the coverage of the PLN network. Electricity in the area also has to work 24 hours a day with infrequent power outages. This is because in installing a rooftop PLTS system, electricity is still needed as a trigger for the system to work. When the solar panels have been installed, the electricity generated will be used for household needs. But when the weather is hot, there is usually an excess of kWh from these solar panels. So, you can 'sell' or export this excess current to the PLN distribution network. Later, you can reuse the electricity for household needs through the Net Metering system using kWH EXIM. Net Metering-kWh EXIM is a service system where electricity generated by a solar power system that meets the requirements in households can be connected (sent) to the PLN distribution network. Furthermore, the electricity that has been sent can be reused for consumption by the household (DTEC Solutions, 2022).

The projected model for future energy growth is presented graphically in Figure 5.1. In 2016, the use of renewable energy, especially solar power plants (PLTS), was still relatively low. In 2016, the use of solar energy was 107.8 MW. Meanwhile, the potential for solar energy in Indonesia is very large, reaching 112 GWp. The government continues to refine regulations so that investors and developers in the new and renewable energy sector can still carry out requests and enthusiasm for the development of NRE generators. Licensing streamlining, tariff improvement, and incentives are still being studied to obtain an ideal pattern in supporting the NRE utilization program as a capital for national energy independence and security.



Source: WowShack Team (2018)

Figure 5.1 The Projection Model for Future Energy Growth

From Figure 5.1, in 2025 and 2050 there will be an increase in the utilization of NRE. Specifically for solar energy, in 2025 the Government is targeting solar energy utilization of 6500 MW and 45000 MW in 2050. The serious development of NRE is reflected in the targets set by the Government. This must be balanced with the current and future use of fossil energy. Government subsidies for fossil energy must be reduced or converted to NRE development.

5. Renewable Energy Development Acceleration Program (REDAP)

Formally, the acceleration of renewable energy development for the provision of electricity is regulated in the Presidential Regulation (*Perpres*) of the Republic of Indonesia Number 112 of 2022. This regulation was passed with the consideration of increasing investment and accelerating the achievement of renewable energy mix targets in the appropriate national energy mix with the national energy policy and reduction of greenhouse gas emissions; it is necessary to regulate the accelerated development of power plants from renewable energy sources (*Perpres* No. 112, 2022).

The Business Plan for the Provision of Electricity (*Rencana Usaha Penyediaan Tenaga Listrik)*, hereinafter abbreviated as RUPTL, is a plan for procurement of electricity, includes the generation, transmission, distribution, and/or sale of power electricity to consumers in a business area.

PT PLN (Persero) is preparing RUPTL by taking into account:

a. development of renewable energy by the renewable energy mix target based on the national electricity general plan;
b. balance between supply and demand; and
c. renewable energy generation economics.

The RUPTL is determined by the Minister after coordinating with the minister administering government affairs in the field of state-owned enterprises and the minister administering government affairs in the state finance sector by taking into account:

a. the aspect of the balance between supply and demand;
b. electricity system readiness; and
c. state financial capacity.

6. Renewable Energy Targets

The Indonesian government has set targets to develop NRE technologies in the next few years, referring to Presidential Regulation (*Perpres*) No. 5 of 2006 concerning National Energy Policy. In the Presidential Decree, it is stated that the contribution of NRE to the national primary energy mix in 2025 is 17% with a composition of 5% biofuels, 5% geothermal, 5% of other NRE (especially biomass, nuclear, water, solar, wind), and liquefied coal of 2%. This Presidential Regulation forms the basis for the development of renewable energy that has been carried out so far (*Perpres* No. 5, 2006).

The Indonesian government will continue to strive to achieve the new renewable energy mix target of 23% in 2025 even though until 2020 the achievement is only 11.5%. The government will pursue the NRE target of 23% by 2025 through three channels: electricity, the

use of nonfossil fuels or biofuels, and the direct use of new, renewable energy. In terms of biofuels, the utilization of biofuels in Indonesia has become the highest in the world because the utilization of biodiesel in Indonesia has reached 30% or B30. Indonesia is the only country that utilizes biofuels in a large scale. In terms of electricity based on new and renewable energy, in the next five years the power generation capacity must increase by 2,000–3,000 megawatts (MW) per year to achieve the 23% EBT mix target in 2025 (Umah, 2021).

Another strategy to achieve the 2025 energy mix target is through investment. This investment value can help increase the energy market share in 2025. The investment consists of Geothermal PLT worth USD 17.45 billion, PLT Water or Microhydro worth USD 14.58 billion, PLT Solar and PLT Wind Turbine worth USD 1.69 billion, PLT Waste worth USD 1.6 billion, PLT Bioenergy worth USD 1.37 billion, and PLT Hybrid worth USD 0.26 billion. This investment figure indirectly has an impact on increasing the capacity of mixed NRE generators in Indonesia to 24,074 megawatt (MW) in 2025 from 10,335 MW in 2019. If translated into the next five years, the installed capacity of new and renewable energy generators will be 11,256 MW in 2020, 12,887 MW in 2021, 14,064 MW in 2022, 15,184 MW in 2023, and 17,421 MW in 2024 (Asian Development Bank, 2020).

7. Renewable Energy Auctions

The Indonesian government has also introduced renewable energy auctions to promote the development of renewable energy projects. The auctions provide a competitive and transparent process for awarding renewable energy projects to developers. The government sets a ceiling price for the auctions, and developers bid for the right regenerate response.

The current auction rules still refer to colonial heritage products, namely *Vendu Reglement, Ordonantie 28 February 1908 Staatsblad 1908: 189*. These rules are obsolete and lagging in keeping up with the needs and developments that exist in society. One by one, the regulations from the colonial era began to be revised and replaced.

Currently, the government is preparing to revise the rules regarding auctions.

In its implementation, the Ministry of Energy and Mineral Resources (ESDM) plans to reopen auctions for three to four geothermal working areas (WKP) in 2023. This commitment follows high investor interest in acquiring several potential fields within the country. Previously, the Ministry of ESDM had officially auctioned off two blocks, namely the Way Ratai WKP which is located in South Lampung Regency and the Nage WKP which is in Ngada Regency (Wahyudi, 2023).

C. Successes and Challenges Associated with Implementing Renewable Energy

The implementation of renewable energy regulations in Indonesia has significant potential for success but is also faced with various problems. Following are some examples of successes and problems associated with implementing renewable energy regulations in Indonesia.

1. Success

a. Potential natural resources: Indonesia has huge potential for renewable energy resources such as solar, wind, water, and biomass. This potential can be utilized efficiently to produce clean energy.
b. Energy diversification: Increased use of renewable energy can help reduce dependence on fossil fuels, such as oil and coal, which negatively impact the environment and supply availability.
c. Reduction of greenhouse gas emissions: Adoption of renewable energy can help Indonesia achieve its target of reducing greenhouse gas emissions according to commitments in international agreements, such as the Paris Agreement.
d. Job creation: The renewable energy industry can create new jobs in installation, maintenance, and research.

2. Problems

a. Limited infrastructure and technology: The infrastructure and technology needed to generate, distribute, and integrate renewable energy is still limited in Indonesia. This can slow down the growth of this sector.

b. Inconsistent regulation: Lack of consistency in renewable energy regulations and policies can hinder long-term investment due to uncertainty.

c. Dependence on fossil energy subsidies: Remaining fossil energy subsidies in Indonesia can reduce incentives for renewable energy development and discourage fair competition.

d. Financial capacity and investment: Developing a renewable energy project requires a large investment. The limited financial capacity of the government and the private sector to invest in these projects can be a constraint.

e. Land and local issues: Renewable energy projects often require quite large areas of land. Land issues, conflicts with local communities, and land rights can be serious problems.

f. Lack of awareness and education: Public awareness of the importance of renewable energy and its benefits is still lacking. Wider education and campaigning are needed to increase public understanding.

g. Uncertain economic advantages: Some renewable energies are still considered to have a higher initial cost compared to fossil energy. Even though these costs can pay off in the long run, many are still hesitant to invest.

h. Technical and technological challenges: Integration of renewable energy into conventional power grids can face technical challenges such as grid stability and energy storage.

The implementation of renewable energy regulations in Indonesia is a complex challenge involving various aspects, including political, economic, social, and technical. The government, private sector, and

civil society need to work together to overcome this problem and maximize the potential of renewable energy to achieve sustainable development goals.

D. Closing

All the previously mentioned rules are still in place, meaning they still apply. Indonesia's regulatory framework for renewable energy is still developing and faces some challenges, such as limited infrastructure and financing. However, the government's commitment to promoting renewable energy and the implementation of various policies and programs are positive steps toward achieving a more sustainable energy system.

The Indonesian government has to work harder again in creating new regulations or revising regulations that are lagging behind the development of society and technology to encourage renewable energy. Furthermore, Indonesia has set a goal of achieving net-zero emissions by 2060 and promised with other countries to help limit warming globally to less than 1.5 degrees Celsius above pre-industrial levels.

Addressing the legal backlog of renewable energy technologies is an important step in facilitating the growth and development of the clean energy sector. Here are some steps we can take to solve this problem.

1. Regulatory update: Identify regulatory barriers that hinder the adoption of renewable energy technologies and seek to update existing regulations. Ensure that existing laws and regulations support the use of renewable energy by providing the necessary incentives, concessions and legal certainty.
2. New policy formation: Create new policies that encourage investment and development of renewable energy technologies. This can include fiscal incentives such as tax breaks, subsidies, and other financial support programs.

3. Awareness raising: Raise awareness among citizens, businesses, and governments about the benefits of renewable energy and the urgency to shift away from conventional energy sources which are more damaging to the environment.
4. Public and private collaboration: Facilitate collaboration between government, energy companies, research institutions, and civil society. This can assist in sharing knowledge, resources, and the latest technology to address legal and technical issues that may arise.
5. Research and development funding: Support research and development efforts in the field of renewable energy. Increased understanding of these technologies can help overcome legal barriers that may arise from a lack of knowledge.
6. Infrastructure development: Ensure that the necessary infrastructure for renewable energy, such as integrated power grids and energy storage systems, is also given adequate attention in laws and regulations.
7. Law enforcement: Ensure that existing laws are properly and fairly enforced. This includes protecting the rights of owners of renewable energy technology, enforcement of contracts, and respect for intellectual property rights.
8. Training and education: Support training and education for legal professionals and regulators involved in addressing legal issues related to renewable energy. Understanding technology and technical aspects will help them make better decisions.
9. Pilot projects and demonstrations: Support pilot projects and demonstrations of renewable energy technologies to prove the feasibility and reliability of these technologies. The results of these projects can be used to strengthen arguments for necessary legal and regulatory changes.

10. Development of standards and certifications: Assist in developing standards and certifications for renewable energy technologies. This can help in building trust in this technology in the eyes of governments, businesses, and society.

Addressing the legal backlog of renewable energy technologies is a complex task and requires collaboration across sectors. These steps can help create a legal environment that supports the sustainable growth and development of renewable energy.

References

Asian Development Bank. (2020). *Indonesia energy sector assessment, strategy, and road map.* https://www.adb.org/sites/default/files/institutional-document/666741/indonesia-energy-asr-update.pdf

Department of Economic and Social Affairs. (n.d.). *Goal 7: Ensure access to affordable, reliable, sustainable, and modern energy for all.* United Nation. Accessed on 26 June, 2023, https://sdgs.un.org/goals/goal7.

Dewan Energi Nasional. (2012, February 6). *Penerapan kebijakan Feed-in Tariff (FiT) di Indonesia.* https://www.den.go.id/index.php/dinamispage/index/268-.html

DTEC Solutions. (2022, January 14). *Ingin pasang PLTS Atap? Begini cara ajukan kWh Exim ke PLN!* https://blog.dtecs.co.id/2022/01/14/apa-itu-exim-meter/.

Instruksi Presiden Republik Indonesia Nomor 1 Tahun 2006 tentang Penyediaan dan Pemanfaatan Bahan Bakar Nabati (Biofuel) sebagai Bahan Bakar. (2006). https://jdih.esdm.go.id/storage/document/inpres_01_2006.pdf

MarketingSurrendo777. (2020, January 30). *Tahu lebih banyak mengenai Net Metering.* Surya Energi Indonesia. https://pjusolarpv.wordpress.com/2020/01/30/tahu-lebih-banyak-mengenai-net-metering-2/

Martens, D. M. (2010). *Research and evaluation in education and psychology: Integrating diversity with quantitative, and mix method.* SAGE.

Peraturan Menteri Energi dan Sumber Daya Mineral Nomor 17 Tahun 2014 tentang Pembelian Tenaga Listrik Dari PLTP Dan Uap Panas Bumi Untuk PLTP Oleh PT Perusahaan Listrik Negara (Persero). (2014). https://jdih.esdm.go.id/peraturan/Permen%20ESDM%2017%20Tahun%202014.pdf.

Peraturan Menteri Energi dan Sumber Daya Mineral Nomor 50 Tahun 2017 tentang Pemanfaatan Sumber Energi Terbarukan Untuk Penyediaan Tenaga Listrik. (2017). https://jdih.esdm.go.id/peraturan/PerMen%20ESDM%20NO.%2050%20TAHUN%202017.pdf.

Peraturan Menteri Energi dan Sumber Daya Mineral Nomor 13 Tahun 2017 Tentang Perubahan Atas Peraturan Menteri Energi dan Sumber Daya Mineral Nomor 15 Tahun 2016 Tentang Pemberian Layanan Cepat Perizinan 3 (tiga) Jam Terkait Infrastruktur di Sektor Energi dan Sumber Daya Mineral. (2017). https://peraturan.go.id/id/permen-esdm-no-13-tahun-2017#:~:text=Peraturan%20Menteri%20Energi%20dan%20Sumber%20Daya%20Mineral%20Nomor%2013%20Tahun,Energi%20dan%20Sumber%20Daya%20Mineral

Peraturan Menteri Energi dan Sumber Daya Mineral Nomor 9 Tahun 2020 tentang Efisiensi Penyediaan Tenaga Listrik PT Perusahaan Listrik Negara (Persero). (2020). https://peraturan.bpk.go.id/Details/142178/permen-esdm-no-9-tahun-2020.

Peraturan Menteri Energi dan Sumber Daya Mineral [Permen ESDM] Nomor 10 Tahun 2020 tentang Perubahan Atas Peraturan Menteri Energi Dan Sumber Daya Mineral Nomor 45 Tahun 2017 tentang Pemanfaatan Gas Bumi Untuk Pembangkit Tenaga Listrik. (2020). https://jdih.esdm.go.id/storage/document/Permen%20ESDM%20No%2010%20Tahun%202020_SALINAN.pdf

Peraturan Menteri Energi dan Sumber Daya Mineral [Permen ESDM] Nomor 15 Tahun 2022 tentang Tata Cara Penetapan Pengguna Gas Bumi Tertentu dan Harga Gas Bumi Tertentu di Bidang Industri. (2022). https://jdih.esdm.go.id/index.php/web/result/2355/detail

Peraturan Presiden Republik Indonesia Nomor 5 Tahun 2006 tentang Kebijakan Energi Nasional. (2006). https://jdih.kemenkeu.go.id/fulltext/2006/5TAHUN2006PERPRES.HTM#:~:text=PERATURAN%20PRESIDEN%20REPUBLIK%20INDONESIA%20NOMOR%205%20TAHUN%202006&text=a.,b.

Umah, A. (2021, February 22). *Target EBT 23% di 2025, pemerintah kejar lewat 3 jalur ini.* CNBC Indonesia. https://www.cnbcindonesia.com/news/20210222113317-4-225113/target-ebt-23-di-2025-pemerintah-kejar-lewat-3-jalur-ini

United Nations. (n.d.). *The Paris agreement*. Accessed on 26 June, 2023, https://www.un.org/en/climatechange/paris-agreement.

Vartanian, T. P. (2011). *Secondary data analysis: Pocket guides to social work research methods.* Oxford University Press.

Wahyudi, N. A. (2023, January 8). *Kementerian ESDM akan lelang 4 blok panas bumi tahun ini.* Bisnis.com. https://ekonomi.bisnis.com/read/20230108/44/1616049/kementerian-esdm-akan-lelang-4-blok-panas-bumi-tahun-ini

WowShack Team. (2018). *6 reasons why Indonesia is ideal for renewable energy.* WowShack. https://www.wowshack.com/6-reasons-why-indonesia-is-ideal-for-renewable-energy/