

# Energy Security: Energy Planning of West Java

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# Energy Security: Energy Planning of West Java

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**Abstract.** This study aims to examine the picture of the condition of energy management in West Java in the future, which is the result of projections of energy supply needs that will be carried out by the Regional Government concerning current conditions, indicators, and parameters that influence and the vision and mission of regional development. This research method is qualitative with a normative approach. The studies carried out in this research are mainly on Presidential Regulation Number 22 of 2017 concerning the National Energy General Plan and West Java Province Regional Regulation Number 2 of 2019 concerning the West Java Province Regional Energy General Plan. The West Java Regional General Energy Plan elaborates on the results of modeling energy demand and supply for 2015-2050. Which also includes policies, strategies, energy development programs, and activities that refer to the National Energy Policy's targets, with sustainable and environmentally sound principles for creating energy independence and resilience in West Java Province.

**Keywords:** Energy Planning; West Java; Regional Energy General Plan.

## 1 Introduction

The energy sector has an important role in increasing the economy and national resilience, so energy management which includes supply, utilization, and control, must be carried out sustainably. Indonesia's energy security condition is still not very healthy and tends to decline in a few years, as seen from the 4-A indicator (availability, accessibility, affordability, acceptability). The wide gap between Indonesia's Energy Security and the ideal condition needs to be overcome by developing an energy strategy to address this problem. [1,2]

West Java Province is one of the most advanced provinces in Indonesia, with a population of approximately 46 (forty-six) million people. Realizing energy independence and security requires the support of an adequate energy supply and infrastructure for its supply. In implementing energy management to achieve adequate infrastructure availability, energy planning is required at the National, Provincial, and District/City levels. This planning is contained in a document, as also mandated by Law Number 30 of 2007 concerning energy [3], called the Regional General Energy Plan (RUED), stipulated through Regional Regulations.

RUED is prepared comprehensively and integrated with planning in other fields and refers to national-level energy planning documents. Thus, the preparation of the West Java Province RUED was not carried out separately but took into account the planning documents of other fields that had been prepared. Such as the Regional Long-Term Development Plan (RPJPD) [4,5] and the Regional Medium-Term Development Plan (RPJMD) [6].

It prepared the West Java Provincial General Energy Plan (RUED-P) based on the provisions of Article 18 of Law Number 30 of 2007 concerning Energy [3]. The guidelines for

its preparation refer to "Presidential Regulation Nornor 1 of 2014 concerning Guidelines for Compiling the General National Energy Plan[7] and materially refer to the Presidential Regulation of the Republic of Indonesia Number 22 of 2017 concerning the National Energy General Plan"[8]. RUED for West Java Province applies for 2018-2050, synergistic with the period of the National Energy General Plan stipulated based on Presidential Regulation Number 22 of 2017[8].

This RUED will become a guideline in energy management in the West Java Province, both in supply and utilization, as well as an effort to develop energy potential in Regency/City Regions and energy utilization in other sectors. This study examines the projected need for energy supply to be carried out by the Regional Government concerning current conditions, indicators, and parameters that affect the vision of regional development.

## 2 Literature Review

The main issue in fulfilling energy is new and renewable energy and climate change [10]. "In response to increasing concerns about climate change and the need to meet the social and economic needs of energy demand, new energy production and consumption paradigms, the techno market approach dominate [11,12,13, 14]. The price signal approach is used to drive changes in the energy system. It is not only in changing the energy mix and shifting supply from fossil fuels to renewables but also in creating consumers who are more responsive to demand. For example, in many European countries, wind and solar photovoltaic power plants, their average production costs that are already competitive compared to fossil fuels[15]."

Much work is now looking forward to experimenting with decarbonizing energy systems by 'smart grid' methods (Battaglini et al., 2009; EU Commission, 2011; US DOE, 2009) [16,11,13]. "Smart grid can be understood as incorporating technology and software (including artificial intelligence and blockchain) into the electric grid to facilitate demand-responsive consumer-enabled electricity systems and effectively integrate renewable generation with the latest consumer technologies such as electric vehicles. Fulfillment of current energy can no longer be individual but must form a smart network that can cover the shortage of energy needs" [17,13,18,14].

There are two methods to achieve climate change goals: "The economic approach (incentives) and the regulatory approach. Europe uses regulation as a tool for energy transition with its various [21]. Europe applies both in environmental policies, not only providing general economic incentives to reduce emissions [22]. For example, the target is to increase the use of renewable energy to 20% of total energy, reduce greenhouse gas emissions by 20%, and increase energy efficiency by 20%. To reduce emissions, Europe passed laws requiring that buildings be billed for heating, air conditioning, and hot water based on actual consumption. So householders are expected to manage their consumption and are incentivized by economic savings on fuel bills. Various energy efficiency laws are expected to represent a change in total end-user demand for energy in Europe to fall by 10% to 20% [23]."

## 3 Method

The method used in this research is qualitative with descriptive type. This research was not carried out by fieldwork but by normative research through secondary data collection from

various related literature through documents, journals, regulations, and other applicable provisions. The studies carried out in this research are mainly on "Presidential Regulation Number 22 of 2017 concerning the National Energy General Plan (RUEN) and West Java Province Regional Regulation Number 2 of 2019 concerning the West Java Province Regional Energy General Plan" (RUED-P Jabar).

#### 4 Discussion

National Energy General Plan (RUEN) is implemented concerning Government Regulation 79 of 2014 concerning the National Energy Policy (KEN) [24]. "While RUED-P is implemented concerning Presidential Regulation of the Republic of Indonesia Number 22 of 2017 concerning the National Energy General Plan [7], which contains two directions policies, namely main policies and supporting policies as follows:

- a) The main policies include the availability of energy for the needs of West Java Province; Energy development priority; Utilization of energy resources in West Java Province; and West Java Province energy reserves.
- b) The supportive policies, including Energy conservation, conservation of energy resources, and energy diversification; Environment and safety; Infrastructure and access for the community to energy and the energy industry; Research, development, and application of energy technology; and Institutions and funding."

West Java Province's energy independence and security are achieved by realizing the following objectives: "Energy resources are used as the basic capital of development; Energy management independence; Availability of energy and meeting the needs of energy sources in West Java Province; Management of energy resources in an optimal, integrated and sustainable manner; Efficient use of energy in all sectors; Access for the community to energy fairly and equitably; Developing the capability of domestic technology, the energy industry, and energy services so that they are self-sufficient and increase the capacity of human resources, and Maintaining the preservation of environmental functions including controlling the impact of climate change." [9]

In realizing energy independence and security in West Java Province, energy development adheres to the following principles:

- a) First, "Optimizing the utilization of energy resources owned." So far, several types of primary energy supplies, especially natural gas, fuel oil, and Coal, have been imported from other regions or imported.
- b) Second, "Increasing adequate energy supply infrastructure. Some fuel is imported from other regions (imported) because the capacity of the oil refineries owned is insufficient. Increasing refinery capacity is expected to provide added value and absorb labor."
- c) Third, "Developing the utilization of new and renewable energy. Fulfilling energy needs from new renewable energy in the future will be prioritized on energy generation from solar energy."

RUED-P West Java is based on aspects of regulation and legislation related to energy and planning at the center as well as regional regulations, including: "Law Number 22 of 2001 concerning Oil and Gas; Law Number 26 of 2007 concerning Spatial Planning; Law Number 30 of 2007 concerning Energy; Law Number 30 of 2009 concerning Electricity; Law Number 21 of 2014 concerning Geothermal; Law Number 23 of 2014 concerning Regional Government and, as amended by Law Number 9 of 2015 concerning the Second Amendment

to Law Number 23 of 2014 concerning Regional Government; Government Regulation Number 70 of 2009 concerning Energy Conservation; Presidential Regulation Number 61 of 2011 concerning the National Action Plan for Reducing Greenhouse Gas Emissions (RAN GRK); Presidential Regulation Number 79 of 2014 concerning National Energy Policy; and Presidential Regulation Number 22 of 2017 concerning the National Energy General Plan."

The targets of the Regional Energy General Plan, "West Java RUED-P, are as follows:

- a. The realization of a new paradigm that energy is the capital for the development of West Java Province.
- b. The optimal primary energy mix is achieved: Renewable Energy of at least 17% in 2025 and at least 20% in 2050; Burning oil will be less than 30% in 2025 and less than 17% in 2050; Coal will be about 20% in 2025 and about 30% in 2050, and Natural Gas at least 25% in 2025 and at least 25% in 2050;
- c. Fulfillment of primary energy supply in 2025 approx 51.98 MTOE (Million Tonnes of Oil Equivalent ) and in 2050 around 137.55 MTOE;
- d. The achievement of per capita primary energy utilization in 2025 is around 0.97 TOE (Tonnes of Oil Equivalent ) and in 2050, around 2.15 TOE;
- e. Fulfillment of provision of power generation capacity in 2025 around 22.59 GW (Gigawatts) and 2050 around 78,031 GW•,
- f. The achievement of electricity utilization per capita in 2025 is around 1,692.5 kWh (Kilowatt-hours), and in 2050, it will be around 4,767.9 kWh;
- g. Achieving an energy elasticity of less than 1 (one) in 2025 aligned with the economic growth target."

West Java Province is still entangled in energy problems, namely:

- a) Dependence on Fossil Energy and Low Fossil Energy Resources. In 2015, final energy consumption in the Province of West Java reached 19.19 MTOE (Million Ton Oil Equivalent). This condition shows that the composition of final energy consumption derived from fossil energy reaches 94% of all final energy consumption.
- b) The use of New Renewable Energy (EBT) is Still Low. EBT potentials such as geothermal, water, bioenergy, sunlight, and wind are abundant in Indonesia. However, in 2015 the portion of fossil energy in the West Java province's energy mix was 90%, while EBT was 10%.
- c) Low Energy Consumption. In 2016 Indonesia's energy consumption reached 0.87 MWh/per capita. This figure is considered far from the average energy consumption of each country which is 3.1 MWh/capita. With the advantage of having a constant temperature, plans to increase energy consumption in West Java can be directed to its use to support economic growth compared to areas located in temperate climates where the largest energy use is for temperature regulation activities.
- d) Inefficient Use of Energy. Inefficient energy use can be seen from energy use efficiency indicators; namely, energy elasticity is still more than 1 in 2015. It shows that West Java province needs to be more efficient in energy utilization.

It will implement the West Java province energy development program during 2015-2050. The target of final energy use are:

- a) Transportation Sector. The contribution of the transportation sector's final energy needs to the final energy mix in 2025 is 31, and in 2050 it will be 24.5%.
- b) Industrial Sector. The final energy mix in 2025 is 14.7 MTOE (42.9%) for the industrial sector. In 2050, the final energy demand in the final energy mix will reach 39.4 MTOE.
- c) Household Sector. In the household sector, the final energy mix in 2025 will reach 6.1 MTOE (15.7%), and in 2050 it will reach 19 MTOE (10.1%).

- d) Commercial Sector. The projected final energy demand for the commercial sector in the final energy mix in 2025 is 1.15 MTOE (3.4%); in 2050, it will be 3.59 MTOE (4.2%).
- e) Other Sectors. The final energy demand of other sectors in the final energy mix in 2025 will be 0.02 MTOE (0.05%) and 0.02 MTOE (0.03%) in 2050.

The projected primary energy supply of new and renewable energy in the primary energy mix in 2025 will reach 22.94%, and in 2050 it will reach 20.13%. All projections of final energy demand and primary energy supply have included conservation and efficiency programs. The implementation of achieving the RUED-West Java Province targets involves institutions that are cross-sectoral in supporting the achievement of the National Energy Policy targets

## 5 Conclusion

The Regional Energy General Plan (RUED) is an elaboration and implementation plan for the National Energy General Plan that is cross-sectoral. The elaboration in RUED contains the results of modeling energy demand and supply for 2015-2050. Which also includes policies, strategies, energy development programs, and activities that refer to the National Energy Policy (KEN) targets, with sustainable and environmentally sound principles to create energy independence and resilience in West Java Province. As an embodiment of energy management that pays attention to the balance of energy, economy, energy supply security, and preservation of environmental functions, it needs to be supported by comprehensive studies. For this reason, it is necessary to make study topics that can serve as guidelines in understanding problems related to national and regional energy and policy alternatives that can be selected as solutions to achieve the stated National Energy Policy objectives. Especially after the COVID-19 Pandemic, which resulted in changes to the planned targets.

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