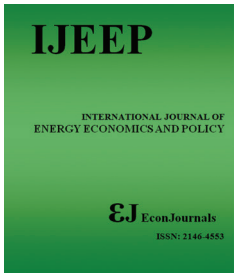


International Journal of Energy Economics and Policy

ISSN: 2146-4553

available at http: www.econjournals.com

International Journal of Energy Economics and Policy, 2020, 10(6), 376-382.

The Strategies of West Java's Regional Energy Management: To Support National Energy Security

Suyono Thamrin[1], Rita Ambarwati[2]*, Syaiful Hidayat[3]

[1,3]Faculty of Defense Management - Universitas Pertahanan, Bogor, Indonesia, [2]Faculty of Business Law and Social Science, Universitas Muhammadiyah Sidoarjo, Sidoarjo, Indonesia. *Email: ritaambarwati@umsida.ac.id

Received: 09 June 2020 **Accepted:** 20 September 2020 **DOI:** https://doi.org/10.32479/ijeep.10259

ABSTRACT

The focus of this research is to analyze energy potential in West Java Province, and its management. The purpose of this study is to first analyze the energy potential of his particular region in West Java Province; the second one is to analyzes the indicators that affect regional energy security in West Java. This study uses a qualitative method. Data obtained from observations, interviews and literature studies. The results show that West Java has strong potential in contributing to making Indonesia the largest geothermal user in the world. Utilization of geothermal energy for electricity generation in fields that are already in production, can already be said to be optimal. However, there are still several other geothermal resource locations that can still be developed and utilized. Other new renewable energy potentials are the Mini and Micro Hydro potential of 647 MW and a new exploitation of 18.3 MW, Solar Energy with a potential of 9,099 MW but which has only been used up to 0.3 MW, and Bioenergy from the potential of 2,551 MW has only been utilized at 109, 3 MW and several other new renewable energy potentials which are still in the development stage such as Wind Energy and Sea Energy. West Java Provincial energy security indicators are still based on Availability, Affordability, Accessibility, Acceptability, and Sustainability) coupled with: elasticity between economic and electricity growth, energy diversification, and energy conservation.

Keywords: Energy Management, Energy Security, Potential Energy
JEL Classifications: H56, O13, P48

1. INTRODUCTION

The condition of the Indonesian state which is still a developing country requires many sources of energy as a driving force to improve its economy in becoming a developed country. The potential energy must be utilized as much as possible for the prosperity of the Indonesian people. The main indicator of success in utilizing the energy potential is the achievement of security and independence in energy management (Li et al., 2018; Foo, 2015). Energy management is an integrated program designed and consistently carried out to effectively and efficiently use energy resources by always preparing, tracking, monitoring, and evaluating without reducing production/service quality (Matsumoto et al., 2018; Austvik, 2016). Energy conservation seeks to save water, protect the environment, and reduce costs. Energy management makes it easier for customers to gain access to electricity where and when they need it (Shadman et al., 2016; de Amorim et al., 2018).

The use of energy in Indonesia remains dominated by fossil-derived non-renewable energy, especially petroleum and coal. Still, the availability of fossil energy is low over time, and the best alternative is to predict renewable energy (Augutis et al., 2015; Oh et al., 2018). The Indonesian Government will concentrate primarily on using fresh and sustainable resources, reduce not only the use of fossil fuels but also generate clean and environmentally friendly resources. In the energy sector, the Indonesian government has committed to setting the primary energy mix to 25% petroleum, 22% natural gas, 30% coal and 23% for new and renewable energy (renewable energy) by 2025. For renewable energy the 23% target

This Journal is licensed under a Creative Commons Attribution 4.0 International License

for the energy mix means being able to provide an energy supply capacity of 400 million tonnes of oil equivalent (MTOE) in 2025 and for the long term phase of 31% in 2050 with a production capacity of 1,012 MTOE. In addition to primary energy, the energy mix target is also applied to the electricity sector where the share of renewable energy in the power generation sector which is only 10.5% of the total national power generation in 2015 is expected to be increased by 25% by 2025. For 2015, the power generation sector in Indonesia is still dominated by power generation from coal by 56.1% then followed by natural gas by 24.9%, then by renewable energy by 10.5% and finally by BBM by 8.6% (Djanggih, 2017).

Indonesia has abundant renewable energy resources for power generation with an estimated potential of 443 GW. West Java Province as the most populous province in Indonesia with 48.68 million people in 2018, certainly has a high energy demand . On the other hand, West Java has some fairly complete energy potential, both from fossil and renewable energy (Murjani, 2020). This is an attraction to study the energy potential of West Java Province, and its strategy in realizing Regional Energy Security to support National Energy Security. Several studies have examined the optimization of energy efficiency within the national context (Bridge, 2015; Aized et al., 2018; Murjani, 2020; Romadhoni and Akhmad, 2020; Dooyum et al., 2020). However, no research has been done to measure Indonesia's potential and level of energy security, especially at the regional level. This study aims to analyze and measure the regional energy security index and its position in the Regional energy plan, especially in West Java. The study's results contribute to regional energy security's role in supporting the national security of resources. Even before the Sustainable Development Goals were created, the government has had an energy commitment as defined in the National Energy Policy. Energy efficiency goals in the National Energy Policy include: hitting the renewable energy share by 23% by 2025; energy elasticity is less than one in 2025, consistent with economic growth targets (Guswandi, 2017). The goal to raise electricity would be accomplished by taking account of environmental aspects, using various sources, both fossil-based and renewable, and part of the efforts to achieve the energy sovereignty and electricity of Nawa Cita. Indonesia 's efforts in that new renewable sources of energy, as well as environmental protection initiatives, have been expressed in the publication of Regulation No 12 of the Minister of Power and Mineral Resources 2017 on the use of renewable energy sources for electricity supplies. The Federal electricity company should purchase energy from renewable energy plants. In general, the purpose of this research is to formulate concepts and design regional energy security models. Specifically the objectives of this study are as follows: analyzing regional energy potential in West Java Province and analyzing indicators that affect regional energy security in West Java.

2. LITERATURE REVIEW

Based on the constitution, the existence of mastery and exploitation of natural resources, which is fundamental to the nation's life and state, is carried out by the state. The people are collectively constructed by the 1945 Constitution, giving a mandate to the country to carry out policies and Actions, regulation, management, and supervision for the people's maximum prosperity. Then all energy sources must be controlled by the state and must be used and tried optimally for the greatest prosperity of the people of Indonesia in order to realize one of the ideals of the Indonesian people, namely to advance public welfare. Energy use is increasing rapidly in line with economic growth and population growth. The rapid development of technology triggers an increase in the need for energy, in this case an increase in the need for electricity in people's daily lives is increasing (Guswandi, 2017). As one of the outcomes of natural resources and technology, electric power plays a significant role for the State in attaining national development objectives. Electrical energy appears to be the community's primary needs. With technological advancements such as electric stoves production, electronic transport equipment, or other means of satisfying human needs, based on electricity as a motor, this shift in energy requirements in the livelihoods of people will become evident in the future (Blok and Nieuwlaar, 2016; Augutis et al., 2017). The need for power in the community continues to grow every year. Future demand for electricity will continue to rise as investment and technological advances, including education growth at all educational levels and population growth and development. To meet the increasing electricity requirements, the government continues to develop technologies and construct electricity plants in line with economic growth expectations and demand forecasts (Bompard et al., 2017)(Gökgöz and Güvercin, 2018). Essentially, the power plant development system is an electricity development project that should be able to apply the profit principle as much as possible in electricity production, according to law No 30 of the Year 2009. This system is meant by the "benefit principle" that results in electricity production that must improve people's well-being and welfare. As an organizer for the supply of electricity to meet the increasing needs of the population in all regions of Indonesia, in Law No 30 of 2009 on Electricity, the government specified that the electricity supply sector is conducted for the public by nationalized industries, regional industry, private businesses, cooperatives and none. The Electricity Law states that government-owned corporations have priority in the supply of electricity for public use. The priority for the electricity sector is the state-owned company, The Federal Electricity Company. It states the state-controlled production sectors, which are of importance to the State and which control the livelihoods of the people (Guswandi, 2017).

Different energy shortage conditions that we observed and still feel today, such as fuel station queues in different regions in Indonesia and regular blackouts, are signs of a severe energy supply crisis (Setyawan and Wardhana, 2020). Energy management also needs to be carried out, for example, by saving energy. The energy-saving systems and control systems assess the performance of other developed energy-saving countries in the energy infrastructure network (Matsumoto and Shiraki, 2018). Indonesia can demonstrate this achievement by immediately making the standard operational procedures for commercial, industrial and residential buildings energy-efficient. Indonesia does not take renewable energy seriously, and this is another aspect that triggers national energy security vulnerability. Renewable energy production so far is intermittent and relies for a moment on political interests.

Weak governance and corruption also lead to renewable energy growth in Indonesia. The dominance of fossil energy in meeting electricity and energy needs in general has so far caused renewable energy power generation as an alternative energy source and cannot be utilized optimally, but since the issuance of the National Energy Policy and the National Energy General Plan, the sector renewable energy has become a priority in developing national energy (Ramadani et al., 2019). The development and construction of renewable energy-based power plants in Indonesia is prioritized to meet the electricity needs in remote, remote and outermost areas that are still not reached by electricity access from The Federal Electricity Company.

3. METHOD

This research uses a qualitative approach. All the activities of this study concentrate on a partnership approach with researchers. Researchers must be aware of the techniques to collect, observe, process, formulate, and analyze data and concepts to obtain maximum research results. Interviews were the instrument used by researchers in this analysis. Meetings took place to receive information on the research object from a broader range of competent, credible sources. Therefore, primary data collected about the concept of regional energy conservation, taking into account production, facilities, and economic value aspects. Field reports are already required to give by direct energy security observations and interviews. Resource people were interviewed for the National Energy Council and the Department of Energy and Mineral Resources of West Java, in two places, as research subjects. A literature research/documentary review was undertaken, in addition to interviews, to collect additional data from government/private organizations/agencies, books, newspapers, and the Internet. Data reduction, data presentation, and eventually, results require quality analysis using concise analysis methods. Data reductions are forms of analysis that sharpen, classify, direct, and remove unnecessary collected data. Narrative texts and tablets have data reduction outcomes. The study and decision became performed based on data presentation, according to the question formula and research objectives.

4. RESULTS AND DISCUSSION

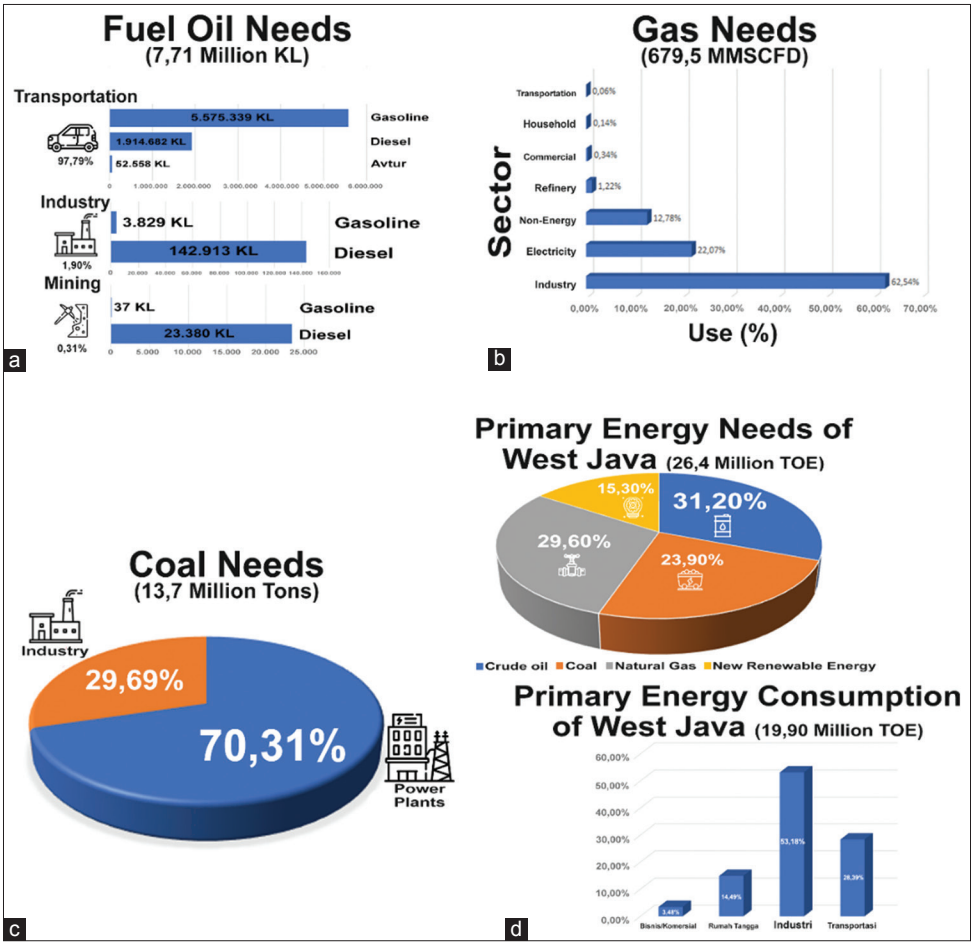
Fuel oil is a source of energy that directly affects people's lives, especially regarding transport. The forms of transport alluded to here are private and public transportation that also relies very heavily on the use of petrol as an energy source for driving a motor vehicle (de Amorim et al., 2018). In the manufacturing sector, fuel is used other than as a source of energy for transport in the production cycle. Fuel oil is used in power generators or maybe as a thermal energy source by using fuel oil as a fuel in stoves or boilers. In the mining industry, fuel is used as a source of electric power generators and for heavy machinery used for mining (Fajardy and Mac Dowell, 2018; Zhou et al., 2016).

Natural gas is a thermal energy source, and in Western Java, the use of natural gas is still limited to gas pipelines and natural gas supply for customers in areas not yet fitted with the Compressed Natural Gas (CNG) system. The industry is the largest consumer of natural gas products, even over half of the natural gas uses used by industry. Natural gas is a source of thermal energy, such as trains and boilers in the natural gas industry. Natural gas transforms the alternator as fuel for power plants using gas turbines (Islam and Khan, 2017). The use of the combustion exhaust gases in the plant can be used as a heater to produce water vapor and to generate fuel again (Tasik, 2020). Industrial and natural gas households typically serve as fuel for cooking or water heating (Vidadili et al., 2017). Transportation uses gas as a replacement for petrol or diesel in the form of natural gas used in the type of Compressed Natural Gas (CNG) and Liquefied Gas Vehicle (LGV).

It is a source of thermal energy in the coal industry. In the cement industry, coal is generally mixed into raw materials as fuel during the cement production; the temperature required in the cement production process is 1.450°C. In West Java, the bulk of coal is for power stations (steam power stations). Such as Sumat Adem PLTU generated 990 MW of electric power in Indramayu; Port Ratu power plant generates 1050 MW in Sukabumi; Cirebon Electric Power PLTU generates 660 MW in Cirebon. There is currently no advanced coal method, such as the heating process of coal or the coal gasification process. Electricity is a relatively easy source of energy to convert to other forms of energy. Electricity use is highly dependent on the type of industry in the industrial sector. The findings of West Java Large and Medium Industry Statistics Publications released by BPS in 2015 revealed a ranking of 10 industry groups with substantial electricity: electric power supplies, textile industry, oil and electronic goods, rubber manufacturing, rubber and plastics manufacturing, motorized vehicles, trailers and semiconductors, non-metal mining industry. The households use electricity mainly for lighting purposes. Still, the increasing use of electricity in terms of welfare and living standards starts from the use of electrical equipment to the use of electricity for the regulation of room temperature. In the industrial and economic industries, as well as in the social and public sectors, electricity also acts as a source of energy to sustain the trade and public services. Primary energy is the energy supplied by nature and has not been further processed. West Java needs 26.40 million TOE primary energy, with the West Java central blended energy mix containing four different energy sources. The most important uses are petroleum 31; 10% of all primary resources; natural gas (29.60%); coal (23.80%); and Renewable Energy (15.30%); and solar energy (15.3%). Final energy is energy that can be consumed directly by end-users. West Java requires 19, 90 million TOE of final energy. Final energy consumes 53.18% of the total ultimate power of the industrial sector, 28% of the transportation sector, 15.95% of the household, and 3.48% of the final allergy of the business/commercial sector (Figure 1).

Building on the concept of the national energy policy, energy development targets: increasing the use of renewable energy, taking economic considerations into account, the use of petroleum; enhancing the usage of natural gas, and new energy; using coal as a critical supply of national energy. Energy Development Priorities are implemented by (a) Consideration of the economic balance of energy, the security of the supply of energy and preservation of the environment; (b) Prioritization of energy supply for the benefit

Figure 1: (a-d) Primary energy needs and consumption of West Java



of persons without access to energy; (c) Energies development through prioritization of local energy resources; (d) Priorities in meeting domestic energy needs. The National Energy Council figures of 11 September 2019 indicate that only five of the 34 Provinces of Indonesia, namely Central Java, East Java, West Nusa Tenggara, North Kalimantan, and East Java, have passed Regional Regulations (Perda) concerning Regional Energy General Plan. One province has issued a registration number, namely Gorontalo, from the Ministry of Internal Affairs. Four provinces, namely East Kalimantan, South Kalimantan, Central Sulawesi, and Jambi, have received The House of Representatives in the Province authorization and are officially facilitating and enrolling in the Ministry of Internal Affairs. Fourteen provinces negotiated the Provincial Regulation Education System with The House Of Representatives in the Province. Three provinces, namely northern Sulawesi, western Sulawesi, and Riau Islands, were Budgeted in 2019 but have not yet been enrolled in the Regional Regulation Training Program. However, seven provinces have not budgeted for the implementation via the 2019 Local government budget, of RIAU, South Sumatra, North Sulawesi, South Sulawesi, Maluku, and Papua and West Papua, of the Regional Energy General Plan Regional Regulation. Roles and benefits of Regional Energy General Plan for the regions: (a) Ensuring energy supply in the regions by 2050; (b) Encouraging regional growth and development plans, including industrial estates; (c) Enabling regions to send budgets through the Local government budget for the development of regional energy infrastructure, in particular, New and Renewable Energy (renewable energy); (d) Open economic development potential. Regional Energy General Plan Preparedness Approach: (a) provides forecasts of energy requirements and plans for sustainably meeting long-term energy needs until 2050; (b) armed with an ambitious attitude to back Indonesia Gold's dream; (c) a document with local stakeholders so that all relevant stakeholders are interested in the planning; (d) prepared in line with energy technologies and market trends, emphasizing the growing role of renewable energy in the regions.

4.1. West Java Energy Potential

The potential of fossil energy in West Java sourced from Oil and Gas for petroleum with reserves reaching 378.9 million barrels, with production of 14.5 million barrels per year and is expected to be able to survive for the next 26 years if no new reserves are found. Then the Natural Gas reserves in West Java reached 2,976.7 BCF with annual production of 190.7 BCF and is estimated to be able to survive for the next 15 years. The potential of renewable energy in West Java has not been fully utilized, such as geothermal energy from its potential of 5,294 MW, which has only been utilized at 1,164 MW. West Java has strong potential in contributing to making Indonesia the largest geothermal user in the world. Utilization of geothermal energy for electricity generation in fields that are already producing, can be said to be optimal. However, there are still several other geothermal resource locations that

can still be developed and utilized. Other new renewable energy potentials are the Mini and Micro Hydro potential of 647 MW and a new exploitation of 18.3 MW, Solar Energy with a potential of 9,099 MW but which has only been used up to 0.3 MW, and Bioenergy from the potential of 2,551 MW has only been utilized at 109, 3 MW and several other new renewable energy potentials which are still in the development stage such as Wind Energy and Sea Energy (Figure 2).

4.2. The Future Energy Challenges of West Java

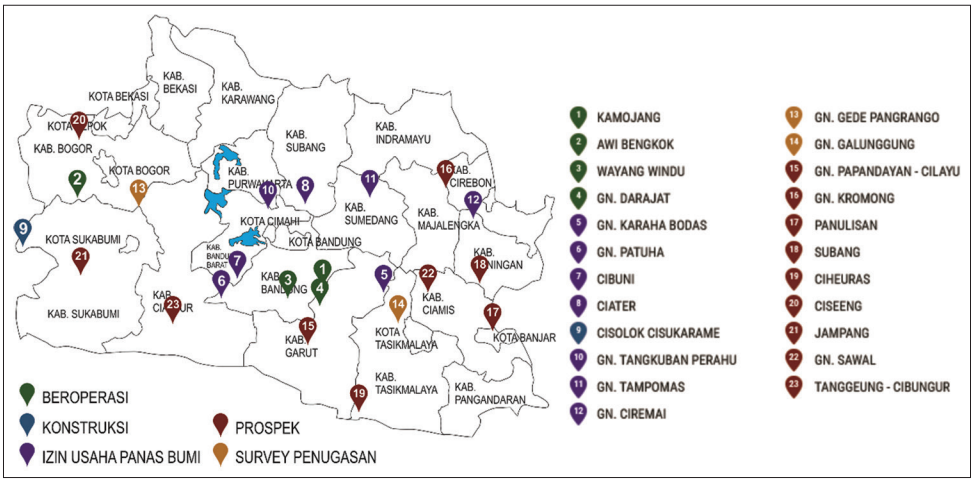
Population growth and increased need for energy are two things that seem unrelated, but in reality the population growth rate will affect the increasing energy needs. An increase in population will increase the number of households or the number of family members who need energy (Romadhoni and Akhmad, 2020). Increasing population also increases demand for industrial commodities, so the industry will enhance growth by improving production or expanding infrastructure (Cornell, 2009; Tasik, 2020). In addition, the increase in the number of residents encourages an increase in the number and means of transportation infrastructure. Economic growth marked by an increase in Gross Domestic Product and Gross Domestic Product per capita can affect the increase in energy needs (Pysar et al., 2020). The level of consumption of residents and homes dates in particular the increase in consumption, changes in consumption patterns and changes in lifestyle that have an impact on increasing energy needs. Economic growth and rising Gross Domestic Product can be used as a reference for an increase in production in the industrial sector. In addition, the increase in this aspect will increase the needs of the transportation sector, given that economic growth will increase ownership of motorized vehicles and the flow of transportation for both passengers and goods. An increase in Gross Domestic Product and an increase in the production sector have an effect on population consumption, one of which is the need for business and office areas as well as commercial areas (Araújo, 2014; (Oh et al., 2018).

4.3. Regional Energy Security

The West Java Regional Energy General Plan as an embodiment of energy management that takes into account the economic balance of energy, security of energy supply and preservation of environmental functions, prioritizes energy management in the province of West Java based on the principle of: Ensuring energy availability and access to energy equally and equitably. Optimizing the utilization of available energy resources for energy independence; Diversifying energy to increase energy security; Optimizing the utilization of energy resources that are environmentally friendly; Make efficiency in energy utilization; Energy problems in the province of West Java include dependence on fossil energy and low fossil energy resources, low renewable energy utilization, and low energy consumption, and inefficient energy use.

West Java Regional Energy General Plan in its composition uses the Long Range Energi Alternative Planning (LEAP) software with three indicators, namely socio-economic indicators, energy indicators, and environmental indicators. The results of projections in the LEAP modeling are as follows: Final energy needs in 2025 amounted to 34.29 MTOE with the sectors that absorb the most energy are industry at 35.81%, Households at 17.83%, commercial 3.36% and other sectors by 0.05%; Final energy requirement of 34.29% MTOE requires a primary energy supply of 51.98% MTOE. Comparison of final energy and primary energy in 2025 is 65.98%. The primary energy mix in 2025 showed an renewable energy of 20.1%, petroleum 27.66%, natural gas 27.71% and coal 24.53%; GHG emissions generated at 119.0 million tons of CO2-eq and in 2050 amounted to 269.9 million tons of CO2-eq. While the reduction in GHG emissions in 2025 was 33.3% and in 2050 by 46.0%; Energy conservation is carried out from the demand and supply side. The demand side is carried out by implementing energy management, fuel savings, increasing equipment efficiency, and replacing more efficient equipment in the transportation, industrial, commercial and household sectors. Meanwhile, from the supply side, it is done by using more efficient power plants and refineries, reducing losses during transmission and distribution, revitalizing power plants and refineries, and saving on own use. Energy elasticity in 2025 is projected to be 1,09 and will gradually go down with the target in 2050 to 0.10. The implementation of the West Java Regional Energy General Plan involves institutions/institutions that are cross-sectoral in

Figure 2: Active Oil and Gas Working Area in West Java



Source: Energy and Mineral Resources Offices

nature. Specifically, institutions/institutions acting as coordinators of each activity are responsible for coordinating and synchronizing joint activities between institutions/institutions and other relevant parties. Related to Regional Energy Security in West Java, based on observations and interviews it is known that, the indicator of Regional Energy Security in West Java remains based on Availability, Affordability, Accessibility, Acceptability, and Sustainability coupled with: Elasticity between economic growth and electricity; Energy Diversification; Energy Conservation. The complexity of these factors ultimately affects the energy security situation in Indonesia. This situation requires severe and systematic efforts. Reform steps should start immediately, for instance by: (1) Reorganize the national oilfield management system by reviewing the legislation and contracts governing our oil fields, if they are deemed unfavorable to Indonesia. Authorization to operate petroleum fields operated by foreign firms will not be extended until their contracts are over; (2) Increased knowledge of science and technology based on the availability of natural resources and human resources as science and technology are crucial to enhancing energy security. Value-added technology can improve each energy product, prioritize energy technologies as a matter of urgency, improve the climate of investment and improve technique, infrastructure, research, human resources, and capital capacities; (3) Increasing the commitment to environmentally friendly renewable energy as a replacement for fossil fuels, as fossil energy reserves will decrease in the future.

5. CONCLUSION

The potential of fossil energy in West Java sourced from Oil and Gas for petroleum with reserves reaching 378.9 million barrels, producing 14.5 million barrels per year and can survive for the next 26 years if it could not found new reserves. Then the Natural Gas reserves in West Java reached 2,976.7 BCF with an annual production of 190.7 BCF and is expected to last for the next 15 years. The potential for renewable energy in West Java has not been fully utilized, such as geothermal energy from the potential of 5,294 MW, and only 1,164 MW. West Java has strong potential in contributing to making Indonesia the largest geothermal user in the world. The utilization of geothermal energy for electricity generation in fields that are already producing can be said to be optimal. However, there are still several other geothermal resource locations that can yet be developed and utilized. Different new renewable energy potentials are the Mini and Micro-Hydro potential of 647 MW and further exploitation of 18.3 MW. Then solar energy with a potential of 9,099 MW but which has only been used up to 0.3 MW. Bioenergy from the potential of 2,551 MW has only been utilized at 109, 3 MW, and several other new renewable energy potentials. The new renewable energy is still in the development stage. It is such as Wind Energy and Marine Energy.

The indicator of Regional Energy Security remains based on Availability, Affordability, Accessibility, Acceptability, and Sustainability. It can support with Elasticity between economic and electricity growth, Energy Diversification, Energy Conservation. Further research related to regional energy security is needed to support national energy security. There is a need to re-examine the problem of energy in the region so that it can be a reference and material for policymaking. The need for a more in-depth study to better understand the energy problems in the area, because surely each region has its challenges. The need for involvement of level II regions for the formulation of policies related to energy in the regions, because the working area for exploration of energy sources is in level II regions. Thus, the second level regions must have an active role and role in policymaking.

REFERENCES

Aized, T., Shahid, M., Bhatti, A.A., Saleem, M., Anandarajah, G. (2018), Energy security and renewable energy policy analysis of Pakistan. Renewable and Sustainable Energy Reviews, 84(3), 155-169.

Araújo, K. (2014), The emerging field of energy transitions: Progress, challenges, and opportunities. Energy Research and Social Science, 1(3), 112-121.

Augutis, J., Krikštolaitis, R., Martišauskas, L., Pečiulytė, S., Žutautaitė, I. (2017), Integrated energy security assessment. Energy, 138(1), 890-901.

Augutis, J., Martišauskas, L., Krikštolaitis, R. (2015), Energy mix optimization from an energy security perspective. Energy Conversion and Management, 90(15), 300-314.

Austvik, O.G. (2016), The energy union and security-of-gas supply. Energy Policy, 96(9), 372-382.

Blok, K., Nieuwlaar, E. (2016), Introduction to Energy Analysis. London: Routledge.

Bompard, E., Carpignano, A., Erriquez, M., Grosso, D., Pession, M., Profumo, F. (2017), National energy security assessment in a geopolitical perspective. Energy, 130(1), 144-154.

Bridge, G. (2015), Energy (in) security: World-making in an age of scarcity. Geographical Journal, 181(4), 328-339.

Cornell, P.E. (2009), Energy and the three levels of national security: Differentiating energy concerns within a national security context. Connections: The Quarterly Journal, 8(4), 63-80.

de Amorim, W.S., Valduga, I.B., Ribeiro, J.M.P., Williamson, V.G., Krauser, G.E., Magtoto, M.K., de Andrade Guerra, J.B.S. (2018), The nexus between water, energy, and food in the context of the global risks: An analysis of the interactions between food, water, and energy security. Environmental Impact Assessment Review, 72(9), 1-11.

Djanggih, H. (2017), Kesiapan Pemda Menghadap Kontrak Participant Interest (10%) Migas, OSF Preprints.

Dooyum, U.D., Mikhaylov, A., Varyash, I. (2020), Energy security concept in Russia and South Korea. International Journal of Energy Economics and Policy, 10(4), 102-107.

Fajardy, M., Mac Dowell, N. (2018), The energy return on investment of BECCS: Is BECCS a threat to energy security? Energy and Environmental Science, 11(4), 1581-1594.

Foo, K.Y. (2015), A vision on the opportunities, policies and coping strategies for the energy security and green energy development in Malaysia. Renewable and Sustainable Energy Reviews, 51(11), 1477-1498.

Gökgöz, F., Güvercin, M.T. (2018), Energy security and renewable energy efficiency in EU. Renewable and Sustainable Energy Reviews, 96(11), 226-239.

Guswandi, A. (2017), Outlook infrastructure development in Indonesia. The International Journal of Social Sciences and Humanities Invention, 4(7), 1-10.

Islam, S., Khan, M.Z.R. (2017), A review of energy sector of Bangladesh. Energy Procedia, 110, 611-618.

Li, Z., Kang, J., Yu, R., Ye, D., Deng, Q., Zhang, Y. (2018), Consortium blockchain for secure energy trading in industrial internet of things.

IEEE Transactions on Industrial Informatics, 14(8), 3690-3700.
Matsumoto, K., Doumpos, M., Andriosopoulos, K. (2018), Historical energy security performance in EU countries. Renewable and Sustainable Energy Reviews, 82(2), 1737-1748.
Matsumoto, K., Shiraki, H. (2018), Energy security performance in Japan under different socioeconomic and energy conditions. Renewable and Sustainable Energy Reviews, 90(7), 391-401.
Murjani, A. (2020), Assessing the energy subsidy reform in Indonesia through different scenarios. International Journal of Energy Economics and Policy, 10(4), 122-134.
Oh, T.H., Hasanuzzaman, M., Selvaraj, J., Teo, S.C., Chua, S.C. (2018), Energy policy and alternative energy in Malaysia: Issues and challenges for sustainable growth-an update. Renewable and Sustainable Energy Reviews, 81(2), 3021-3031.
Pysar, N., Viktoria, D., Vynogradova, O., Guseva, O. (2020), Gross domestic product energy intensity level as a criterion for evaluating the energy security of national economy. International Journal of Energy Economics and Policy, 10(4), 424-429.
Ramadani, T., Pakpahan, F., Pradana, S.A., Supriyanto, M.A., Mardiyono, E. (2019), Implementasi kebijakan satu peta energi sumber daya mineral (esdm one map) di kementerian energi sumber daya mineral republik Indonesia. Matra Pembaruan, 3(2), 109-118.
Romadhoni, B., Akhmad, A. (2020), Household electricity demand in South Sulawesi, Indonesia. International Journal of Energy Economics and Policy, 10(4), 229-233.
Setyawan, D., Wardhana, I.W. (2020), Energy effciency development in Indonesia: An empirical analysis of energy intensity inequality. International Journal of Energy Economics and Policy, 10(4), 68-77.
Shadman, F., Sadeghipour, S., Moghavvemi, M., Saidur, R. (2016), Drought and energy security in key ASEAN countries. Renewable and Sustainable Energy Reviews, 53(1), 50-58.
Tasik, H.H.D. (2020), Can energy consumption and beneft programs explain one's living standards afterwards? Evidence from Northern Sulawesi, Indonesia. International Journal of Energy Economics and Policy, 10(4), 43-50.
Vidadili, N., Suleymanov, E., Bulut, C., Mahmudlu, C. (2017), Transition to renewable energy and sustainable energy development in Azerbaijan. Renewable and Sustainable Energy Reviews, 80(12), 1153-1161.
Zhou, K., Fu, C., Yang, S. (2016), Big data driven smart energy management: From big data to big insights. Renewable and Sustainable Energy Reviews, 56(4), 215-225.