

IMPLEMENTATION OF MICRO HYDRO POWER PLANT POLICY ON MOUNT HALU

DONNY YOESGIANTORO

Energy Security Program, Republic of Indonesia Defense University.
Corresponding Author E-Mail: energyprogram@gmail.com

Abstract

The use of Micro-Hydro Power Plants is the right choice to realize the utilization of new, renewable energy that is environmentally friendly in supporting energy security and developing the economy of rural communities. This Power Plant utilization policy has been supported by the Minister of Energy and Mineral Resources Decree No. 12 of 2017 and Regulation of the Minister of Villages, Development of Disadvantaged Regions and Transmigration No. 2 of 2016. This research takes a case study in Tangsi Jaya Village, Mount Halu which uses a generator micro hydro power. This research used qualitative research supported by a field survey of Mount Halu. The results showed that the type of water source for a micro-hydro power plant is less than 5 m (small river category) with a discharge of 380-400 l/s, a fall height of 8 m, a channel length of 248.5 m, and a distance from the water source to the village the closest that will get electricity is 2 km. The total number of heads of households that need electricity is 80 families. The Micro Hydro Power Plant has been established since 2007. The existence of this power plant has a positive impact on village communities, namely meeting the energy needs of villagers and supplying electricity to the coffee factory where coffee is one of the main commodities in Mount Halu, even the quality of Mount Halu's coffee beans gets awards from Europe so that the people's economy is also helped. Apart from that, the electricity generated by the micro-hydro power plant also fulfills the needs of the military training routinely held by the Indonesian National Armed Forces around the village.

Keywords: Micro Hydro Power Plant, Policy, Renewable Energy

1. INTRODUCTION

To realize energy security and use of clean energy as well as equal distribution of energy throughout Indonesia, the use of new and renewable energy sources in electricity must be a priority. One of Indonesia's new renewable energy sources with great potential is hydropower with the micro-hydro type providing great opportunities and challenges to develop small-scale power plants for rural communities in remote parts of Indonesia.

In Indonesia, the potential for developing Micro Hydro Power Plants can reach 7,500 MW. Meanwhile, mini and micro hydro development is expected to reach 3 GW in 2025 and 7 GW in 2050, or around 37 percent of the mini and micro hydro potential of 19 GW. This potential makes Micro-Hydro Power Plants an alternative source of electricity for rural areas, especially villages that have or are close to rivers. This is due to several advantages that can be generated from the construction of a Micro Hydro Power Plant, both technically and financially.

The first advantage, Micro Hydro Power Plant can work day and night. Another advantage is the simple structure of the Micro Hydro Power Plant so the Micro Hydro Power Plant can also be used in remote areas. Third, the process of maintaining a Micro Hydro Power Plant is usually simple, requiring only basic training for Local residents (Oktaviani, 2012). Not only technically, but also from an environmental perspective, a Micro Hydro Power Plant can reduce

greenhouse gases that cause global warming. The Ministry of Public Works (2011) states that a Micro Hydro Power Plant with a capacity of 100 kW can reduce carbon dioxide emissions by 560 tons per year. Finally, the cost of building a Micro Hydro Power Plant is relatively lower than other renewable energy power plants, which is around IDR 50,000,000.00/kW (Taufik, 2017).

In addition, with a river flow that is not too large and a small discharge that is commonly found in rural areas through Micro Hydro Power Plants, it can be a source of energy for rural communities in building economic independence. In advancing villages and the use of Renewable Energy, the government has issued a policy supported by a Decree on the utilization of renewable energy sources for the provision of electricity No. 12 of 2017 and Regulation of the Minister of Villages, Development of Disadvantaged Regions, and Transmigration Number 2 of 2016 concerning the Developing Village Index.

For the development and optimization of Renewable Energy, the portion of New Renewable Energy in the national energy supply must be 23% in 2025 and in 2050 at least 31% in Regulation of the Government of the Republic of Indonesia Number 79 of 2014 concerning National Energy Policy. In the Law of the Republic of Indonesia Number 30 of 2009 concerning Electricity, 2009 it is stated that one of the government's efforts in developing and optimizing the hydropower potential is to utilize river flows as Micro Hydro Power Plants.

Tangsi Jaya Village is a village with a hilly topography and an area around the forest. This village is located in Mount Halu District, West Bandung Regency, and West Java Province. This village is one of the villages that has utilized electrical energy from the Micro Hydro Power Plant since 2007. Based on height measurements carried out by the West Java Province Water Resources Service, the condition of the Mount Halu Micro Hydro Power Plant water discharge is very stable. In addition, the economy of the people of Mount Halu Village is still based on the agricultural sector.

2. RESEARCH METHOD

This research used qualitative research supported by a field survey of Mount Halu. This study is also supported by literature review. The implementation methods in this activity also include potential surveys, measuring water velocity, falling height, and discharge analysis (Methods for measuring river flow and open channel discharge using flow meters and buoys, 2015).

3. RESULT AND DISCUSSION

Micro Hydro Power Plant is an alternative in reducing greenhouse gas emissions in the energy sector and focuses on renewable energy. Greenhouse gases are one of the causes of increasing global temperatures which cause global warming and climate change.

The development of micro-hydro power plants has a positive impact on the environment and is in line with low-carbon development policies.

Micro Hyro Policy

To meet the demand for electrical energy and increase national energy security through the utilization of renewable energy, the Government provides opportunities for Business Entities (BU) in the field of electricity supply to utilize hydropower potentials for Hydro Power Plants including Micro Hydro Power Plants, regulated in Ministerial Regulation Number 19 of 2015 concerning the Purchase of Electricity from a Hydroelectric Power Plant with a capacity of 10 MW by a Power Electricity Company. Business entities that have been designated as managers of hydropower for power plants are required to report on the implementation of the construction of Hydro Power Plants every 6 months starting from the date of determination to the Director General of New and Renewable Energy up to the Commercial Operation Date (COD) with a copy to the Director General of Electricity and Directors of PT Electricity Company Country.

Another effort made by the government to increase the mix of New Renewable Energy generation is by utilizing hydropower reservoirs on ex-mining land. To increase the flexibility of the electric power system in accommodating variable renewable energy (VRE) penetration, the government has also revised the grid code through the Regulation of the Minister of Energy and Mineral Resources Number 20 of 2020. Apart from that, the construction of Micro Hydro Power Plants is part of the program to provide renewable energy power plants run by the Government as a form of utilization of the State Budget that is right on target. To support the implementation of the use of Micro Hydro Power Plants, the regulations used as the basis are Law Number 30 of 2007 concerning Energy, Law Number 30 of 2009 concerning Electricity, Law Number 32 of 2009 concerning Environmental Protection and Management, Government Regulation Number 70 of 2009 concerning Energy Conservation.

Currently the development of hydroelectric power plants, including micro-hydro power plants, still faces major obstacles related to the environment, in general, water resources are located in forest areas, especially conservation forests and protected forests, which have led to a lot of resistance from non-governmental organizations and other organizations working in the field of environment. Unfortunately, there is no specific policy to regulate micro hydro power plants, the government has just made a hydro power plant policy. However, now, the government and parliament are making a New Renewable Energy law. It is hoped that with the issuance of this law, there will be a micro-hydro power plant policy.

Tangsi Jaya Village and Micro Hydro Power Plant

Tangsi Jaya Village is located in Mount Halu Village, Mount Halu District, and West Bandung Region. This small village of only 100 families with scattered houses is located at the foot of the Kendeng Mountains, mountains that still have dense and natural green forests. The main river Cidadap flows in all seasons. Before 2000, when it was pitch dark at night, he became a loyal friend of the residents of Tangsi Jaya Village, Mount Halu Village, and West Bandung Regency. When night fell, they used oil lamps to illuminate the houses. One or two residential buildings have been lit up with light bulbs, but the owner has to stretch the cable up to tens of kilometers. Residents have repeatedly proposed to the State Electricity Company to install electricity networks and poles, but the state-owned company refused for various reasons.

Starting from the number of residents as prospective customers is still minimal, to the distance and boarding houses that are not comparable to income.

After the field survey, the distance from the location of the micro-hydro power plant to the road that can be reached by vehicles throughout the year is 1 km while the distance from the load center (village) from the micro-hydro power plant is 15 m and through the float method it is known that the river water discharge is 360- 400 l/s and the design discharge used is 400 l/s with a fall height of 8 m and a channel length of 248.5 m. In the Intake Channel, water hits the ground which can cause soil abrasion and turbulent water flow.

Meanwhile headrace, Pt. 1 is in good condition but Headrace, Pt. 2 in an avalanche. And the forebay is in good condition and there has been an avalanche but it has been repaired. Unfortunately, access to the powerhouse is dangerous, it does not meet Occupational Health and Safety standards. What needs to be considered in the Tangsi Jaya village micro-hydro power plant is the condition of landslides along the power plant structure and there is a possibility that the construction of a micro-hydro power plant will trigger landslides.

Meanwhile, the people who benefit from the micro-hydro power plant are 80 heads of families, of whom there are 20 heads of families who are poor. And sources of income in general are coffee farmers, rice fields, chilies. The electricity tariff system used is a lump-sum tariff (usually based on load limiting or MCB). The electricity generated by the micro-hydro power plant has successfully supplied electricity for primary schools and early childhood education. The huller machine, coffee peeler and coffee grinder are also supplied with electricity by the micro-hydro power plant. And the potential conflict due to water comes from irrigation with 24 hours water usage hours.

Residents' efforts to produce energy self-sufficiency have finally received attention from the government. In 2007, the West Java Provincial Government provided assistance in building a Micro Hydro Power Plant. At the beginning of construction, the hydro power plant supplied electricity to 50 families. Now with a capacity of 30,000 Watt, as many as 80 households can now enjoy electricity with only a contribution of Rp. 25,000 per month. Meanwhile, public facilities such as mosques, road applications, places of recitation, and schools are completely free. The hydrological power plant was built by the West Java provincial government and managed by the local community.

The water flow of the Cidadap River which flows throughout the season really supports the operation of the micro-hydro power plant. In 2022, the electricity network and poles belonging to the State Electricity Company have entered the village. However, the majority of residents chose to continue using energy from the Rimba Lestari Micro Hydro Power Plant on the grounds that it is cheaper and more stable. The electricity produced by the Micro Hydro Power Plant is 2A 450 watts at a cost of Rp. 25,000 per month, whereas if people use electricity from the State Electricity Company the cost can reach Rp. 80,000 per month.

The micro-hydro power plant also supplies electricity to a coffee factory with the name "Gunung Halu Coffee" to support the economy of the Tangsi Jaya village community. Even Gunung Halu coffee won the AVPA Gourmet Product award at the SIAL Paris exhibition,

France, in 2018. Gunung Halu coffee is also exported to the United States such as Boston, Florida and Chicago, then for Europe to the Netherlands and Turkey, while for the Middle East, namely to Bahrain, and Saudi Arabia. In addition, the electricity generated by the micro hydro power plant also supplies electricity for the needs of the Indonesian National Armed Forces. The Indonesian National Army often conducts military exercises around Mount Halu. When the soldiers were training, the electricity generated by the micro hydro power plant was prioritized for military needs while the civilians gave in.

Even though the abundant agricultural commodities that are blessed around Mount Halu range from chilies, rice fields to coffee, the middlemen are the ones who feel the greatest economic benefit. Farmers around Mount Halu only feel a little of the economic benefits of their farming products. For example, the price of immature chilies at farmers is Rp. 1,800/kg and when ripe the price is Rp. 3,000/kg while the price received by the community is Rp. 40,000/kg. This price disparity is very high, the middlemen who get the biggest profit are the middlemen so that they are prosperous while the farmers are not prosperous. Breaking the chain of middlemen by utilizing technology is a solution for farmers to be prosperous.

The constraints of a micro-hydro power plant are frequent blackouts because the drain tank is clogged with dirt so that the discharge does not enter and sometimes overcapacity (electricity consumption is greater than the electricity generated). Overcapacity is caused by the increasing electricity needs of the communities, this indicates that the community's economy has increased. Another factor that causes micro-hydro power plants to frequently go out is the frequent flooding that occurs every March.

In reviewing the Implementation of the Hydro Power Plant in Tangsi Jaya Village, researcher used Edwards III's theory.

a) Communication

The importance of coordination and communication for synchronizing programs and activities related to micro-hydro power plants. Although constrained by budget constraints, the local government is still trying to implement a micro-hydro power plant that can run well, starting with financial assistance in the construction of a micro-hydro power plant.

b) Resource

To achieve the target of implementing the Micro Hydro Power Plant program, the government implemented a strategy for implementing energy conservation (maintenance and protection). This strategy is carried out by developing public awareness of energy conservation, optimizing community capabilities and mastery of technology, carrying out monitoring and evaluation, as well as conducting supervision in the field of energy conservation. Without good human resources, a program may not necessarily be implemented properly, so the Tangsi Jaya village community was given training on the use of micro-hydro power plants. Even the people of Tangsi Jaya village become employees in a micro-hydro power plant company. Being an employee does not have to have a high educational background. This also provides positive

economic benefits for the Tangsi Jaya village community. The existence of investor support is also needed so that it can provide benefits to the region, especially the community.

c) The attitude of the Bureaucracy or National Energy Policy Executor becomes a reference in determining energy conservation targets

The target is to reduce the intensity of energy use by 1% per year until 2025 and achieve final energy savings of up to 17% in 2025. Implement energy management mandates for energy consumers $\geq 6,000$ TOE per year, implement energy efficiency standards and labels for equipment and implementing energy conservation within Ministries/Agencies, such as encouraging private involvement to invest in the energy conservation sector. The West Java Provincial Government continues to pursue the development of new renewable energy such as the Micro Hydro Power Plant through the Department of Energy and Mineral Resources.

d) Organizational structure

Policies are made, established and implemented aimed at solving problems and achieving certain goals. In 2004 with the National Program for Community Empowerment, the district government returned to building micro-hydro power plants in coordination with the central government where the structure was seen from the top leader down to the government below. The implementation of a program cannot be separated from the assistance of the provincial government.

By taking into account the available resources, development and construction of micro-hydro power plant facilities continues to be pursued by local governments. If it is related to Edward III's theory, a program includes governance of bureaucratic workflow that regulates work flow and implementation of policies where the central government where the structure is seen from the top leader to the government below with the implementation of a program cannot be separated from assistance from the provincial government.

4. CONCLUSION

Seeing the micro-hydro power plant in Mount Halu and the impact of using the power plant on the economy of rural communities and the increasing community demand for electricity, energy optimization efforts in the construction of the Mount Halu micro-hydro power plant are very important.

Therefore, the study of energy optimization for the Mount Halu micro-hydro power plant is urgently needed considering that there are many factors that must be considered in the development of micro-hydro power plants for the provision of rural electricity so that this development can provide optimal and sustainable benefits and can provide benefits to the parties involved. Investors.

And support by making special regulations and policies governing micro-hydro power plants must exist so that micro-hydro power plants can be implemented in all rural areas of Indonesia to improve the economy and welfare of rural communities.

References

- ❖ Daud, A., Zein, H., Saodah, S., & Yusuf, E. (2020). Issn 2615-2363. 3(1).
- ❖ (Daud et al., 2020; Kayu & Kabupaten, 2021; Parahyangan et al., 2018; Pusat et al., 2008; Rahayu & Windarta, n.d.; Selatan, 2020; Siagian & Gunawan, 2020; Tenaga et al., 2021
- ❖ Kayu, K., & Kabupaten, B. (2021). : Journal of Government Studies Vol. 1 No. 1 April 2021 Available Online at <https://journal.unismuh.ac.id/index.php/kybernology> ISSN (Online) : 2807-758X. 1(1), 34–45.
- ❖ Parahyangan, U. K., Ekonomi, F., Sarjana, P., & Pembangunan, E. (2018). PEMBANGKIT LISTRIK TENAGA MIKROHIDRO DI FEASIBILITY STUDY OF MICRO HYDRO POWER CAPACITY ENHANCEMENT IN TANGSI JAYA VILLAGE , BANDUNG BARAT REGENCY. 211.
- ❖ Pusat, S., Dan, P., Eergi, P., & Terbarukan, B. (2008). JARINGAN IRIGASI DENGAN PEMBANGKIT LISTRIK TENAGA MIKRO HIDRO (PLTMH). 87–95.
- ❖ Rahayu, L. N., & Windarta, J. (n.d.). Tinjauan Potensi dan Kebijakan Pengembangan PLTA ,. 3(2), 88–98. <https://doi.org/10.14710/jebt.2022.13327>
- ❖ Selatan, S. (2020). Jurnal Mahasiwa Ilmu Administrasi Publik (JMIAP). 2(4), 28–35.
- ❖ Siagian, T., & Gunawan, I. (2020). DESA SIMBANG JAYA KECAMATAN BAHOROK. 11(2). <https://doi.org/10.33772/djitm.v11i2.11678>
- ❖ Tenaga, L., Hidro, M., Terjun, A. I. R., Manduriang, D., & District, S. O. K. U. (2021). DESIGN OF ELECTRICAL-MECHANICAL COMPONENTS OF MICRO HYDRO. 4(2).