

THE FORM OF STATE DEFENSE AWARENESS THROUGH COMMUNITY PARTICIPATION CULTURE IN RENEWABLE ENERGY MANAGEMENT

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Abstract – Each country has a unique personality that becomes the country's identity. Indonesia is known as a country that has community participation culture. However, that identity has been fading amid globalization today. As a matter of fact, community participation culture has the potential to be the unique culture of Indonesia in conquering the world through the conscious choice to defend the country for the unity of the nation. Research method employed in this study is literature review and observation based on author's previous research. The result is analysis for the application of community participation culture in the management of renewable energy towards energy independence reinforcing state defense through the implementation of the basic principles of community participation which includes: (1) community develops, provides and utilizes renewable energy sources together; (2) community becomes the pioneer and innovator that can facilitate other community in independently providing and propelling the growth of people's economy to reinforce state defense. Renewable energy management through state participation should not only be a normative advice, but should be clearly regulated to ensure people's active participation in achieving the 23% target for renewable energy mix in 2025. There is a need to optimize the sustainable coordination, evaluation and supervision between Ministry of Energy and Mineral Resources, Ministry of Village, Development of Disadvantaged Regions and Transmigration as well as Ministry of Defense in order to ensure people's participation in creating sustainable renewable energy management and as a form of defending the state.

Keywords: defending the state, renewable energy, community participation culture

Introduction

Energy is top priority to meet the needs of every country in the current era of globalization. Indonesia's energy needs are still dominated by fossil energy, especially petroleum in energy mix in Indonesia. This situation causes the low utilization of Renewable Energy (RE) such as geothermal

energy, sea, sun, wind, hydro (water) and other sources of energy crops.

Renewable energy has the potential to replace fossil energy and it can be implemented in an integrated and sustainable manner in regard to its management and production for domestic needs. This will definitely support the energy mix target (figure 1) in 2030 where

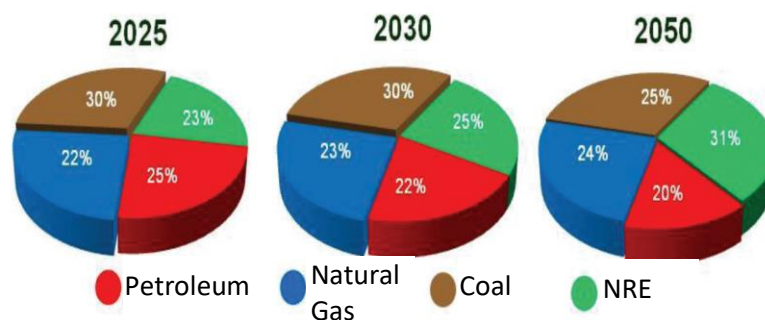


Figure 1. Energy Mix in National Energy Policy
 Source: National Energy Council, Indonesian Energy Security, (Jakarta: Sekjen DEN, 2015), p. 9.

RE usage is targeted to reach 25% and 31% in 2015¹.

Indonesia has a total geothermal potential of approximately 28,910 MW at 300 locations. As for hydro power, its installed capacity is only 7,573 MW of the 75,000 MW total potential. Biomass potential is around 32,654 MW, while the installed capacity is only 1,700 MW². Not to mention the potential energy of solar, wind, ocean, and so forth. Those potentials should be generated in many ways. On a small scale, there is Micro Hydro Power Plant (MHPP), solar power plant (SPP), or wind power plant (WPP). Wastes from people, livestock, and feed/plants can be processed into biogas or biofuel. As for larger scale,

there is hydropower plant (HPP) or geothermal power plant (GPP).

The Government has developed several RE development program projects, including: (a) the development of geothermal, solar, wind and hydro power plants; (b) Development of RE-based small-scale power plant for remote and outer islands; (c) program to develop and utilize biofuels as a substitute for petroleum; (d) development of renewable energy iconic island; (e) program to develop and utilize waste into energy sources; and (f) energy independent village program³. However, those programs need to be optimized in order to achieve tangible result in its implementation. The number of stalled and unsustainable renewable energy Power

¹ National Energy Council (DEN), *Indonesian Energy Security*, (Jakarta: Sekjen DEN, 2015), p. 9.

² R & D ESDM, *Moving with Renewable Energy*, (Jakarta: R & D ESDM, 2014), p. vi.

³ IESR, *Reaching the Target Access of Renewable Energy*, (Jakarta: ESDM, 2013), p. 12.

Plants causes the government to incur substantial losses on such development investments.

In 2017, there were 142 stalled RE projects with total loss of 1.17T investment⁴. This is due to the lack of community engagement in renewable energy management. The government is still focused on development projects that only involve community as passive actor. The community has not understood the technicality and maintenance matters should there be damage or technical constraints to the renewable energy equipment. People should be actively involved from the planning, development, management to maintenance stage of renewable energy development facilities. In that way, the community can support the government in providing and strengthening the energy security for themselves and contribute to state defense.

At the same time, Indonesia's noble values such as community participation, has now been eroded by globalization, especially in terms of lifestyle. Today, people of Indonesia tend to be individualist.

The rapid development of technology has affected the real bond between people. In before this situation becomes worse, awareness on the importance of unity must be nurtured once again.

These problems can be overcome through state defense programs. State defense can be implemented not only through military means but also non-military one in accordance with each person's profession. State defense is part of character building education, which serves as an effort towards a dignified and modern civil society. Awareness of state defense will encourage every individual within the community to fight with attitude and concrete actions by improving their competence to maintain the defense of the country⁵.

One of the forms of state defense can be implemented in renewable energy management through community participation. Community's potential to be an inspirer, empower, evoker and revitalizer of local wisdom in order to transform the fossil-based energy management paradigm into non-fossil can be realized through

⁴ Dias Prasongko, *Abandoned EBT Power Plant*, (Jakarta: Tempo, 2017), p. 4.

⁵ Nasruddin Anshoriy, dkk, *Education with National Perspective*, (Yogyakarta: LKiS, 2008), p. 197.

community participation culture as a form of state defense.

Community participation can support a sustainable use of energy, encourage the creation of energy independence, and the achieve the renewable energy mix target in accordance with Government Regulation No. 79/2014 on national energy policy.

Discussion

Energy Management

Minister of Energy and Mineral Resources' Regulation No. 14/2012 on Energy Management stipulates that energy utilization by energy sources and energy users must be done efficiently and energy/energy sources users consuming energy greater than or equal to 6,000 ton of oil per year shall implement energy conservation through energy management⁶. The goal of energy management is to control the development of energy project so it can be sustainable⁷. Stages of energy management are as follows:⁸

1. Energy Planning (Plan), including:
 - a. Determining the goal of energy plan.
 - b. Determining the strategy to achieve goals:
 - 1) Identifying energy use situation;
 - 2) Energy planning commitment and consistency;
 - 3) Required fund;
 - 4) Required equipment;
 - 5) Required organization.
2. Implementation (Do), including:
 - a. Program creation which consists of:
 - 1) Program goal;
 - 2) Strategy to be employed;
 - 3) Required staff and organizational structure.
 - b. Program implementation which consists of:
 - 1) Increasing the use of renewable energy in accordance with local wisdom;
 - 2) Conducting training and management through the participation of community as executive staff who will be directly

⁶ Ministry of Energy and Mineral Resources, *Minister of Energy and Mineral Resource' Regulation No. 14/2012 on Energy Management*, (Jakarta: State Secretary, 2012), p. 3.

⁷ Bayuaji Kencana, *Energy Management System (SME)*, (Jakarta: USAID-Indonesia Clean Energy Development Project, 2013), p. 20.

⁸ Parlindungan Marpaung, *Preparation of Energy Audit*, (Jakarta: Association of Energy Conservation Experts, 2014), p. 12.

- involved in program implementation;
- 3) Conducting pilot program activities;
- 4) Directing, supervising and monitoring the pilot program in collaboration with related institution (Ministry of Village, Disadvantaged Regions and Transmigration, Ministry of Energy and Mineral Resources, Ministry of Defense;
- 5) Preparing and modifying the equipment that will sustain RE infrastructure.
3. Monitoring and Evaluation (Check), including:
- Effective and efficient energy management;
 - Nurturing community participation culture in maintaining and managing renewable energy to every part of the community.
4. Improvement and Adjustment (Action), including:
- Priority grade based on the result of monitoring and treatment
 - Focus energy monitoring and analysis

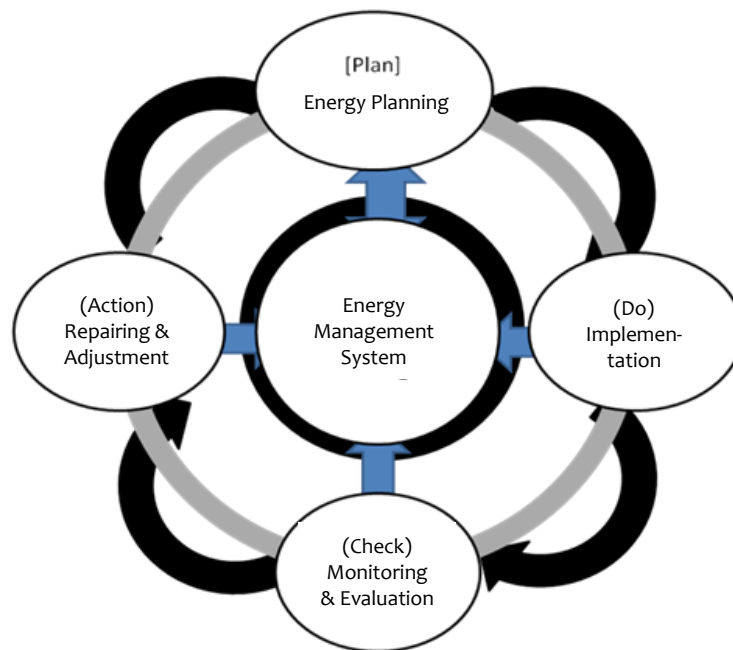


Figure 2. Energy Management System
 Source: PT. Energy Management Indonesia (Persero),
Introduction to Energy Management, (Jakarta:
 Ministry of Industry, 2011), p. 11.

to the potential for energy efficiency starting from the biggest one

Energy management activity can be started by nurturing state defense awareness by involving the society and government in an organized manner and employing energy management principles (Figure 2).

Community Participation as a Form of State Defense

State defense is an attitude, will and act of a well-ordered, thorough, integrated and sustainable citizen which results from their love to the country, consciousness to their identity and faith to the sacredness of Pancasila as national philosophy⁹.

Effort of state defense in Indonesia is strictly regulated in article 27 paragraph 3 of 1945 Constitution that reads “Each citizen shall have the right and duty to participate in the effort of defending the state.” Therefore, every citizen is expected to actively participate in defending the state. Law No. 3/2002 on State Defense stipulates the procedure of state defense by Indonesian National Armed Forces (TNI) and

every part of this nation. The attempt to involve every part of this nation in state defense can be made through, among others, Preliminary Education of State Defense¹⁰.

Raising people’s awareness to defend the state is necessary to reinforce state defense. This will be necessary since state defense awareness is not innate but needs to be developed from earliest age. This is meant to develop an Indonesian person that will love their country, willing to sacrifice for their nation, believing in Pancasila as national philosophy, knowing their role and place as a citizen as well as possessing the capability to defend their state, both physically and psychologically¹¹.

Raising state defense awareness through community participation values can be effectively done in community environment. This awareness-raising activity can be done in a simultaneous, integrated, thorough and sustainable manner to achieve the expected goal, which can be intangible (smart, critical, creative, proactive, discipline, perseverant and

⁹ Tim Abdi Guru, *Civic Education*, (Jakarta: Erlangga, 2006), p. 78.

¹⁰ Ryamizard Ryacudu, *The Indonesian White Book of Defense*, (Jakarta: Ministry of Defense RI, 2015), p. 48.

¹¹ Timbul Siahaan, *Fundamentals of State Defense*. (Jakarta: Ministry of Defense RI, 2014), pg 1.

prideful to their identity) and tangible (strong, agile and skilled)¹². Every individual that has state defense awareness will support the systematic, planned and integrated effort to preserve domestic energy sources¹³.

Community participation is a collective activity to solve any problems by including values of Pancasila in it.¹⁴ Collective community participation is the unique characteristic of Indonesia. This attitude is also one of the indicators of state defense

awareness, as it is the manifestation of Pancasila values. Community participation is a constructive concept that supports village development and should be sustained as a way to habituate collectiveness¹⁵. Community participation as the unique characteristic of rural communities is an integral part of their existence whether as an individual or a social being. In accordance with their quality, the one that can develop themselves are people who understand their needs¹⁶, so they have an awareness to

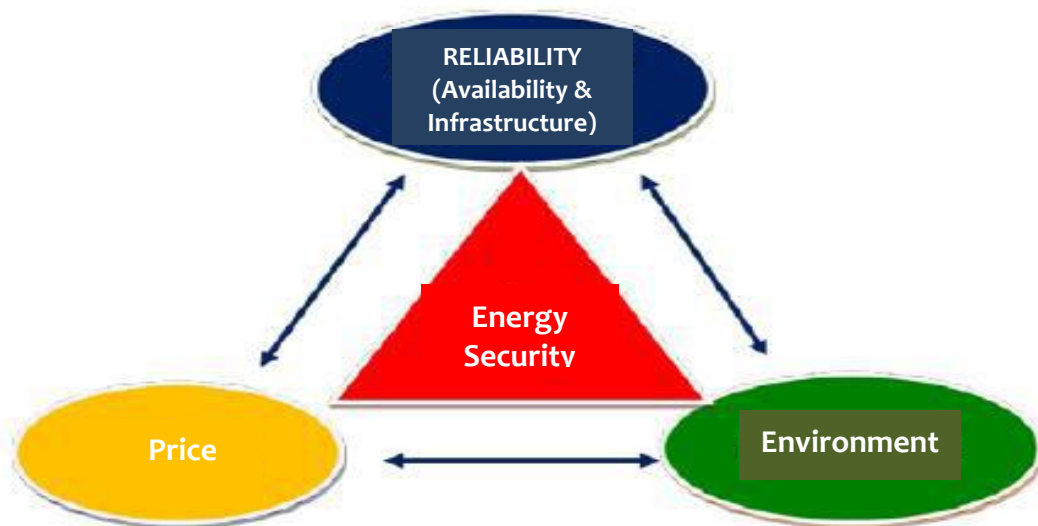


Figure 3. Concept of Energy Independence and Resilience
 Source: National Energy Council (DEN), *Indonesian Energy Security*, (Jakarta: Secretary-General of DEN, 2015), p. 5.

¹² Ibid, p. 2.

¹³ Reno Dinda Gita Perdana, "Implementation of Nationalism-Patriotism Value in Introductory Session of State Defense for the University Student Regiment of 805", *Wira Cendekia*, in <http://jurnal-online.um.ac.id/data/artikel>, accessed on 27 October 2017.

¹⁴ LEMHANNAS RI, *Pancasila in Globalization Era* (Jakarta: LEMHANNAS RI, 2017), p. 18.

¹⁵ Kusnadi, *Philosophy of Coastal Community Empowerment*, (Bandung: Humaniora, 2006), p. 16.

¹⁶ Widjaja, *Implementing the Value of Pancasila in Indonesia*, (Jakarta: Rineka Cipta, 2004), p. 20.

help each other.

In general, community participation is working together or helping each other. Community participation can be interpreted as lifting something together or working on something together. The concept of community participation itself exists within community due to individual's limitation in doing some things. This can be caused by individual's lack of ability, resources or time which results in an awareness for these individuals to work together and help each other. Community participation can be

differentiated into two, namely community participation in helping each other and community participation in social work¹⁷. In this study, the community participation concept that will be discussed is community participation in helping each other.

Synergizing Energy Management through Community Participation Culture

The form of state defense through synergizing community participation in energy management is aimed to achieve energy independence. This is important,

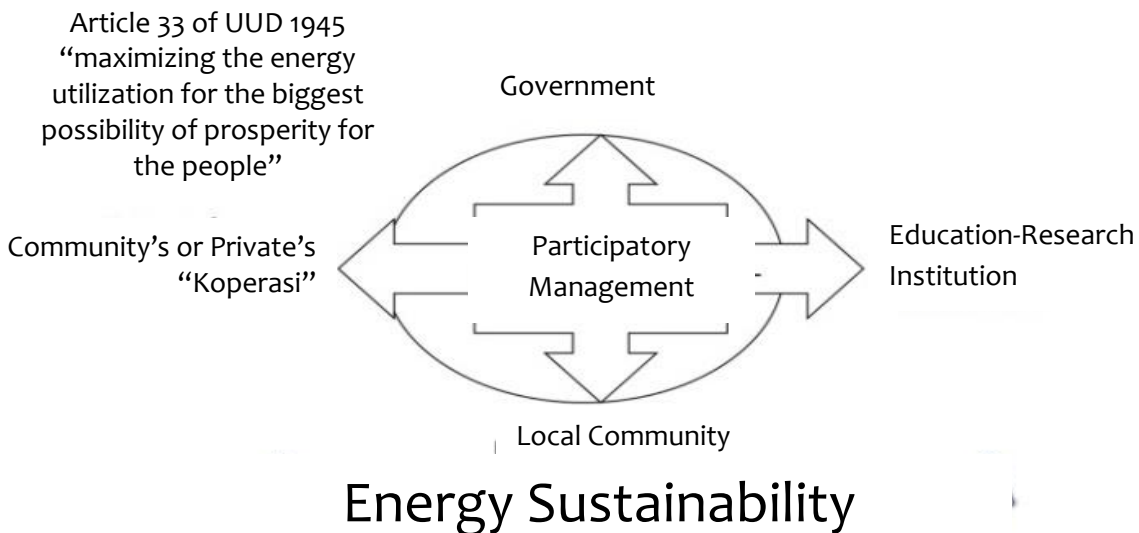


Figure 4. Synergy between Government, Private Sector & Community in Energy Management through Community Participation Concept

Source: PT. Energy Management Indonesia (Limited), *Introduction to Energy Management*, (Jakarta: Ministry of Industry, 2011), p. 18.

¹⁷ Koentjaraningrat, *History of Anthropology Theory*, (Jakarta: UI Press, 1987), p. 76.

given the importance of energy sources in this era of globalization.

National Energy Council (DEN) in Energy National Policy (KEN) defines energy independence and resilience (figure 3) as a condition where there is a guarantee for energy availability and people's longterm access to affordable energy while maintaining environmental protection¹⁸.

The Government through Government Regulation No. 79/2014 on National Energy Policy (KEN) is based on the principles of justice, sustainability and environmental awareness and strives to create national energy independence and resilience. KEN is the guidelines and direction for national energy management to support sustainable national development. It is the duty of citizens to resolve any problems faced by their country, including sustainable management of renewable energy.

The concept of participative management will be implemented by close cooperation between the government, private sector and community. Each of the three parties has their own capability which,

if combined, will result in a solution to resolve the energy independence and resiliency problem as illustrated in the following picture (Figure 4).

Figure 4 illustrates synergy in energy management where the government will be the authority figure in policy making, guarantor of program implementation through RE policy and provider of facilities to support the program. Meanwhile, private sector will be the implementer of program to build infrastructure and provide capacity building for the community. As for the community themselves, they will participate in the transfer of knowledge, as a consumer in earlier stage and an implementer or producer (of energy processing program) in later stage.

The community participation concept can be implemented in order to resolve the current energy independence and resilience problem, even at grass root level. Problem of energy independence and resilience itself is a condition where the increasing demand for energy use is expected to increase exponentially. At the same time, there is no guarantee that energy sources supply can

¹⁸ Government Regulation RI, PP No 79 on National Energy Policy, (Jakarta: State Secretary, 2015), p. 3.

always be relied on to fulfill the demand¹⁹. Such condition can be observed today where petroleum, coal and gas reserves as non-renewable energy sources are running low. According to economic principle, scarcity will inflate price.

As for Indonesia's energy scenario, Chairman of House of Representatives Commission VII on May 24th 2015 stated, "If there is no breakthrough in energy management by 2019, there will be a deficit that results in crisis." For the people, energy scarcity is a problem that will have huge impact to everyday life. People who lived in the outermost area of Indonesia is no exception, as their remote location makes energy supply even scarcer. At the very least, 63% of villages in Indonesia are disadvantaged and very disadvantaged²⁰.

The government through Ministry of Energy and Mineral Resources has provided a renewable energy management facility to Homeland Energy Patriot (*Patriot Energi Tanah Air*/PETA) in these following activities:

- 1) Socializing energy management program for rural communities who have no access to electricity;
- 2) Identifying the most used energy needs;
- 3) Effective supervision in project implementation
- 4) Providing training to the community to maintain power plant and repair it if there is a damage;
- 5) Internal evaluation on the result of the program and the sustainability of energy management²¹.

PETA's membership is selected based on four competences that each member must possess, understand and implement. The four competences are endurance, technicalities, community-based development and, most importantly, sincerity.

The first competence, endurance, is developed through physical training. In this training, Energy and Mineral Resources Ministry invited Environmental Organization Wanadri as a trainer that

¹⁹ Alan Collins, *Contemporary Security Studies*, (New York: Oxford University Press Inc, 2010), p. 45.

²⁰ Clean Power Indonesia, "Development of Renewable Energy", in [http://cleanpowerindonesia.com/unhan-gelar-](http://cleanpowerindonesia.com/unhan-gelar)

[seminar-umum-tentang-pengembangan-infrastruktur-sumber-energi-baru-terbarukan-untuk-peningkatan-ketahanan-energi-nasional-provinsi-maluku/](#), accessed on May 17th 2018.

²¹ Ditjen EBTKE, "Energy Patriot", *Energy Patriot Journal*, 2nd Edition of May 2016, p. 3.

taught the patriot to survive for 6 days in a forest. Despite all of their limitations, patriots were forced to survive and move. This physical training is very useful for field placement, due the remote nature of placement location which requires strong physical endurance. The second competence, technicalities, is developed through provision of detailed knowledge on solar cell or Solar Power Plant (SPP). In addition, they were also provided with knowledge on various renewable energy sources as well as the technology to utilize it. The patriots were expected to be able to identify sources of renewable energy in placement location which can be further developed to generate energy.

The third competence, community-based development, is the capability to drive community to identify the cause of certain problem and resolving it together. The fourth competence, and the most important one, sincerity, is the capability to build empathy by synergizing heart and mind. This competence is the core of this program because anything the patriots find and fell will be determined by their sincerity.

This opportunity has the potential to develop state defense awareness in maintaining the sustainability of future energy through energy management by human resources - both community and government – and through the collective implementation, development, provision and utilization of renewable energy sources.

Community can be turned into the pioneer and innovator that can facilitate other community in independently providing and propelling the growth of people's economy to reinforce state defense.

In Indonesia, community-initiated renewable energy management has been conducted in several places, such as the development of Micro Hydro Power Plant in Tana Toraja District, the development of Biogas Digester Plant by the people of Bangli, Bali Province, and the development of cocoa garden light wheel in III Kawerewere Village, Palolo Sub-district, Sigi District, Central Sulawesi Province. Ideas for those projects were initiated by involving local community.



Figure 5. Initiator of Independent MHPP Development through Community Participation

Source: R & D ESDM, *Moving with Renewable Energy*. (Jakarta: R & D ESDM, 2014), p. 2.

Ferdinandus Bongga was the person who initiated the development of MHPP in Tana Toraja District (Figure 5) which resulted in 124 units of PMHH with 1,565 kW capacity that can provide power for 10,686 households simultaneously. He has been taking care of a turbine workshop sustainably for 18 years in Sulawesi. “My village independent, my forest sustainable” was the community participation concept that he developed based on the hilly and mountainous condition of Tana Toraja. People in that area lives sporadically in small settlements while electricity provision from State Electricity Company (PLN) is very limited

and unable to reach the whole area²².

Ever since 1995, Ferdinandus has been actively promoting, introducing, and developing nature-friendly MHPP using renewable energy sources. Then, from 1996 to 1999, Ferdinandus applied as technical staff of Sulselra Village Turbine Foundation. This Foundation works to provide technical service and MHPP development in villages.

The year of 1999 was a new chapter in his life as he began to build MHPP with community participation, especially in Sulawesi Island. Through the Saluputti Sub-district of Tana Toraja District Development Program (PPK), he attempted to build three

²² R & D ESDM, *op.cit*, p. 2.

units of MHPP along with local people of Bettuang and Malimbong Village (Figure 6).

The increased utilization of MHPP in these villages has advanced people's economy. Community activities during the night become longer and village area becomes brighter. Not to mention, people can now access various informational technologies such as television or internet and they can access information on agriculture, stock-raising and fisheries.

During the day, energy is utilized to power end-use productive equipment such as rice huller, paddy thresher, flour/coffee milling, woodworking and sewing machine. As a result, small and household industries were flourishing, such as tailor, baker, carpenter, blacksmith and workshop²³.

The availability of hydro-based renewable energy is automatically preserving water sources, nature in general, and reducing the reliance to petroleum that has been subsidized by the government. The budget used to build MHPP came from Energy and Mineral Resources Ministry, Local Government Community Empowerment Program (PNPM), and

grants from PLN, Lutheran World Relief America, and EED Germany²⁴.

The main problem of building MHPP is not only equipment, technology and budget. One of the most important problems was engaging the community, especially their figures. In fact, the construction and maintenance of MHPP was participated by village's women.

The process to build and maintain MHPP requires active participation of the community, especially their figures. Therefore, the community was truly involved in planning, deciding and managing their local resources through collective action and networking to the point they can become an energy independent village.

There is a unique quality resulted from the involvement of village's women in building and maintaining MHPP. The women were directly involved from the consultation stage to the project implementation. They were participating in gathering local materials for, cleaning the location and construction work of MHPP.

Villagers contributed their money to the MHPP based on the tariff that has been agreed on. Meanwhile, electricity tariff for

²³ Ibid, p. 6.

²⁴ Ibid, p. 11

about IDR 30,000 – IDR 40,000/month/HH was stored in Village Cooperative. In addition to paying for the operator's wage and MHPP maintenance, their contributions are also utilized to purchase fertilizers and seeds of agricultural crops. Those funds were also used for villagers' saving and loan needs.

Through that concept, the constructed MHPP was not only an energy sources for the community. However, the most important thing is raising community's awareness to participate in preserving their environmental condition so that sustainable water sources can be available throughout each season.

Another community-based development has been done by people of Bangli, Bali Province, with the construction of Biogas Digester Plant. I Wayan Nyarke from Delod Umah, Pengotan Village of Bangli Sub-district, Bangli District, Bali Province, was the initiator of Biogas development. His work as farmer and cattleman has always resulted in livestock waste problems that pollute the environment²⁵.

Through a technical training provided by the government, he found a method to process livestock waste and he received local government fund to develop fiberglass digester with 4 meter cubic capacity²⁶ (figure 9).

The employed technology was quite simple, i.e. excavating hole in the soil according to the volume requirements and connecting biogas installation pipes. If the soil texture is good then it can be directly plastered. However, if the soil texture is loose, then it will be walled with unused building materials. The making of the dome also employs used feed bags and sawdust with special blend²⁷.

Materials to construct digester is sand, cement, waste rock, brick waste, sawdust, used feed bags, pipes, bamboo, planks and wooden rafters. A farm with 200 livestock will require 10 x 30m² land area, while a farm with 4 cows will require 9 x 6m² land area.

Ever since being proposed in 2008, the making of cheap digester with huge volume has experienced sharp growth and spread to nearby villages. Mr. Nyarke has built 15 digesters in Delod Umah Village, Ujung Desa

²⁵ *Ibid*, p. 18

²⁶ *Ibid*, p. 120

²⁷ *Ibid*, p. 21



Figure 6. Independent Development of MHPP with Community Participation

Source: R & D ESDM, *Moving with Renewable Energy*, (Jakarta: R & D ESDM, 2014), p. 3.



Figure 7. Development of MHPP Project with Community Participation

Source: R & D ESDM, *Moving with Renewable Energy*, (Jakarta: R & D ESDM, 2014), p. 8.



Figure 8. Turbine Manufacture Workshop owned by Multipurpose Community Group

Source: R & D ESDM, Moving with Renewable Energy, (Jakarta: R & D ESDM, 2014), p. 6.



Figure 9. Biogas Construction with Community Participation

Source: R & D ESDM, Moving with Renewable Energy, (Jakarta: R & D ESDM, 2014), p. 17.



Figure 10. Livestock Waste being Channeled into Tub Shelter
Source: R & D ESDM, Moving with Renewable Energy, (Jakarta: R & D ESDM, 2014), p. 18.



Figure 11. Utilization of Livestock Waste for Organic Fertilizer
Source: R & D ESDM, Moving with Renewable Energy, (Jakarta: R & D ESDM, 2014), p. 20.

(1 digester), Jebeh (2) and Dangin Desa (20), all of which is located in Bangli District. As for Tabanan and Gianyar District, each has 3 units of digester²⁸ (Figure 10).

Furthermore, Mr. Nyarke has been invited to provide training and make three units of digester in Manado, North Sulawesi. He also built one unit of digester for farmers in Palangkaraya, Lampung, Sorong and Bontang. For those who want to build digester themselves, Mr. Nyarke will train and teach them without charge, except for transportation and accommodation cost during the training and construction of digester.

The most important thing that makes Mr. Nyarke happy and proud is the fact that up to 2013 there has been no complaint or information on failed digester from users in Bali and outside of Bali. His other innovation is processing livestock manure solid waste combined with deciduous leaves into organic fertilizer (dry compost). The solid organic fertilizer produced from 10-12 m³ volume digester is amounted to one truck per week and sold for IDR 100,000 per truck.

Within a month, he can earn an extra IDR 400000²⁹.

Meanwhile, liquid waste or bio slurry generated by 10-12 m³ volume digester is about 1,500 liter per week valued at IDR 150,000/tank. This liquid waste can be turned into liquid fertilizer to be directly splashed or injected around the base area. The added value of bio slurry is about IDR 600,000/month³⁰. In addition to improving land fertility, crops yields grown with organic or liquid fertilizer from livestock waste tend to be valued higher than one grown with inorganic fertilizer³¹.

The next is renewable energy management with community participation through cocoa farm lighting wheel by Mr. Sudirman in III Kawerewere village, Palolo Sub-district, Sigi District, Central Sulawesi Province. III Kawerewere Village has 17 households and is located inside Rejeki Village. This village is 25km away from the capital of Palolo Sub-district of Sigi District, Central Sulawesi Province. When Sudirman first settled in the village, the area was a jungle engulfed with darkness at night – no electricity at all. For night lighting, villagers

²⁸ *Ibid*, p. 22

²⁹ *Ibid*, p. 24

³⁰ *Ibid*, p. 25

³¹ *Ibid*, p. 20

used kerosene-fueled lamps. In one month each family can spend 15 liters of kerosene worth IDR 7,000/l to light a lamp. For kerosene needs alone, the villagers will need IDR 105,000 each month. The amount was very burdensome for most residents of Kawerewere village³².

Such condition drove Sudirman to develop a water wheel by measuring, designing and excavating a tub shelter. He measured and designed the water wheel then he cut iron plate and welded it part by part. He then prepared a wood for the runway or holder of the mill and the dynamo and he channeled the water into the tub shelter. Finally, he managed to build a power plant which has only 3 kilowatt capacity in the beginning³³.

The MHPP designed by Sudirman has now developed into 5 units with 56 kWh capacity (Figure 13). Each unit has a capacity of 15 kWh and can provide power for 350 households. Power users who even reach neighboring villages were charged with IDR 65,000 per month for power plant maintenance and other technical needs³⁴.

If previously villagers can only stay at

their house during the night, now they can visit each other and improve their social relations. The same is also true in economic aspect. Thanks to power availability, people are not afraid to open up new businesses, such as workshop, furnishing or coconut grater³⁵. Another region that develops MHPP is Krueng Village of Aceh (Figure 14). In order to rise from the tragedy of Tsunami catastrophe that devastated their entire infrastructure, people and figures of Krueng took no time to rebuild their village, including village lighting.

During a meeting between figures of three villages, namely Baro, Teunong and Meunasah Village, it was agreed to raise fund for building Micro Hydro Power Plant (MHPP) by utilizing a waterfall of Suhom River located nearby the three villages. In no time at all, construction of MHPP with 25-35 KW capacity and 50 KVA total installed capacity was realized in 2006 thanks to a grant from Coca Cola and Nurani Dunia Foundation. About 300 houses populated by more than 1,500 persons in the three villages became bright as day thanks to the power provided by Suhom waterfall. During

³² *Ibid*, p. 28

³³ *Ibid*, p. 27

³⁴ *Ibid*, p. 28

³⁵ *Ibid*, p. 29

its earlier stage, MHPP management was still social-based with simple management. In mid-2008, the MHPP experienced technical and financial problem and was unable to operate³⁶.

Villages returned to being engulfed in darkness due to no electricity and people began to feel depressed because several positive community activities, such as night Quran recital, children's studying time, electronic media information and entertainment was not available. Local figures from the three villages gathered once more to seek solution. The resulting solution was very brilliant – they decided to build a cooperative to raise fund for repairing MHPP and managing it professionally³⁷.

Tuah Sabeena Sejahtera Cooperative was founded in 2009 (Figure 15), with Legal Entity Number: 59/BH/1.2/XII/2009 consisting of 45 people from Baroh and Tunong village. The main task of the cooperative is to revive the MHPP and be responsible for its operational continuity. The cooperative effort paid off by obtaining a loan from IBEKA Bandung Foundation

amounting to IDR 400,000,000 which was used for repair cost. However, many people are not disciplined in paying dues, causing a disruption the operational costs of MHPP. Village and cooperative meeting were held to find ways to ensure people pay for their electricity³⁸.

Finally, it was agreed that electricity generated from MHPP (Figure 16) will be sold to State Electricity Company (PLN) and people will buy electricity from PLN. This agreement yielded a very impressive result, because the sale of electricity to PLN of Rp. 1,204.08 per KWh can cover the operational cost of MHPP, repay their debt every month, and paying the salary of cooperative manager.

In addition to distributing the rest of annual profit to members, the cooperative also pays the electricity cost of Tunong Village Office, Meunasah (Pesantren) and a smart house for approximately Rp 350,000 per month. Cooperative also provides incidental contributions to social and religious activities of the community, such as religious festivals, Quran recitals, and celebrations of Independence Day. In

³⁶ *Ibid*, p. 31

³⁷ *Ibid*, p. 52

³⁸ *Ibid*, p. 54



Figure 12. Construction of MHPP in III Kawerewere Village
Source: R & D ESDM, *Moving with Renewable Energy*, (Jakarta: R & D ESDM, 2014), p. 27.



Figure 13. MHPP in III Kawerewere Village
Source: R & D ESDM, *Moving with Renewable Energy*, (Jakarta: R & D ESDM, 2014), p. 29.



Figure 14. Potential of Waterfall as MHPP in Krueng Village, Aceh
Source: R & D ESDM, Moving with Renewable Energy, (Jakarta: R & D ESDM, 2014), p. 31. Jakarta: R & D ESDM, 2014), p. 29.



Figure 15. Tuah Sabeena Sejahtera Cooperative
Source: R & D ESDM, Moving with Renewable Energy, (Jakarta: R & D ESDM, 2014), p. 50.



Figure 16. MHPP Turbine of Kreung Kala Village with Community Participation

Source: R & D ESDM, *Moving with Renewable Energy*, (Jakarta: R & D ESDM,

addition to managing MHPP, cooperative also has businesses in the field of organic fertilizer to serve the needs of farmers in the village nearby the cooperative³⁹.

The existence of MHPP increased the integrity of community nearby MHPP to be more concerned about environmental sustainability and preservation. It also increased the solidarity within local communities to help each other in overcoming various obstacles related to the operation of MHPP. A wise forest management tradition has been practiced for generations in the Acehese society. It is

organized through uteun customary institution led by Penglima Uteun⁴⁰.

Conclusion

State defense awareness through the implementation of community participation culture includes: (a) collective development, provision and utilization of renewable energy by community; (b) making community the pioneer and innovator that can facilitate other community in independently providing and propelling the growth of people's economy to reinforce state defense; (c) the

³⁹ *Ibid*, p. 52

⁴⁰ *Ibid*, p. 53

government through Ministry of Energy and Mineral Resources has provided a renewable energy management facility to Homeland Energy Patriot (*Patriot Energi Tanah Air/PETA*).

Recommendations

The following things should be considered:

(a) There needs to be periodic training to improve community's soft skill capacity in collectively developing, providing and utilizing public renewable energy sources; (b) A sustainable renewable energy management programs need to be optimized with community participation in support of the government. This program should not only be a normative advice, but should be clearly regulated through law on renewable energy management with community participation that actively involves community, government and private sector governed by Ministry of Energy and Mineral Resources; Ministry of Research, Technology and Higher Education; and Ministry of Defense to ensure that sustainable community participation culture can be created with commitment of all people as a form of state defense.

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