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# LEGAL SYSTEM OF COMMUNITY PARTICIPATION IN ENVIRONMENTALLY FRIENDLY POWER PLANTS: A SOCIO-LEGAL STUDY OF MICRO-HYDRO PROJECTS IN CENTRAL JAVA

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**ABSTRACT**

Energy management is closely linked to environmental concerns and community involvement. However, in electrical energy regulations, community participation is frequently overlooked, with the community treated solely as a consumer. This study examines the legal system for community participation in environmentally friendly micro-hydro power plants. The research method used was qualitative, with a socio-legal approach. Data was collected through observation and in-depth interviews with purposefully chosen informants. The findings show that the legal system, in the form of legal substance, such as management rules and legal structures, is implemented in a participatory manner by the residents of Karangtengah and Lebakbarang villages. Community participation is critical to the success of the two villages' micro-hydro power projects, which earned them the provincial award for the best management of micro-hydro projects in Central Java. Community participation in this project is strong because the community has a legal culture characterized by cooperation, environmental friendliness, deliberation, and family values. Based on the level of participation, community involvement in the micro-hydro project is at the highest level, namely partnership, delegation of authority, and citizen control.

## 1. Introduction

Law Number 30 of 2009 concerning Electricity, and Presidential Regulation Number 112 of 2022 concerning the Acceleration of Renewable Energy Development for Electricity Provision, state that electrical energy requires a transition from fossil-based energy to renewable energy.[1] This transition is essential because fossil-based energy is currently recognized as a significant contributor to problems such as climate change and global warming of the earth's surface. Meanwhile, the application and use of renewable energy sources are generally derived from natural sources, such as water, solar power, waves, wind, geothermal energy, and biomass, which are considered more environmentally friendly.[2]

One of the renewable energy sources is the micro-hydro power plant, a type of hydroelectric power plant that utilizes environmentally friendly technology, typically located in rural areas. Local governments in Indonesia continue to explore the potential of Micro-hydro Power Plants at the rural level to achieve the target of energy independence from 2025 to 2050.[3] At this stage of independence in the field of electrical energy, the community is not only seen as a consumer or user, but also as an essential actor in an environmentally friendly and sustainable transition to electrical energy, so that the community can ensure the effective management of electrical energy in Indonesia, thereby achieving the greatest possible welfare for the community.

Community participation in the electricity sector has not been regulated in Law Number 30 of 2009 concerning Electricity. Currently, community participation is at the stage of drafting the Law on New and Renewable Energy, as well as the Law on Environmental Protection and Management (Number 32 of 2009). Likewise, at the empirical level, the space for community involvement in decision-making stages within the electricity sector, both at the national and regional levels, tends to be limited.[4] In general, the community is also only given a short time to play an active

[1] Rinaldi Kalman, Kusno Kusno, and Ahmad Ansyari Siregar, "Legal Study of Criminal Acts of Electricity Theft Reviewed Based on Law No. 30 Of 2009 Concerning Electricity," *International Journal of Science and Environment (IJSE),* Vol.5, no.3, 2025, page.84. See too, Natasya Artameivia Zulfi, Triana Dwi Seroja, and Lu Sudirman, "Evaluation of the Effectiveness of Legal Protection for Consumers for Unused Electricity Bills in Batam," *Legal Brief,* Vol.14, no.1, 2025, page.55.

[2] Alfian Faulia Numairi, and Amin Purnawan, "Law Enforcement of Crime Operation Power Installation Without Certificate of Operations Eligible Under the Constitutional Court Decision Number 58/Puu-Xii/2014 (Overview Against Article 54 Paragraph 1 of the Act Number 30/2009)," *Jurnal Daulat Hukum*, Vol.2, no.2, 2019, page.275.

[3] Yudiartono Yudiartono, Jaka Windarta, and Adiarso Adiarso., Analisis Prakiraan Kebutuhan Energi Nasional Jangka Panjang Untuk Mendukung Program Peta Jalan Transisi Energi Menuju Karbon Netral, *Jurnal Energi Baru Dan Terbarukan,* Vol.3, no.3, 2022, page.201.

[4] Muhamad Azhar, and Dendy Adam Satriawan, "Implementasi kebijakan energi baru dan energi terbarukan dalam rangka ketahanan energi nasional," *Administrative Law and Governance Journal,* Vol.1, no.4, 2018, page.405.

role, namely by providing ideas, data, and/or information in writing within a maximum of 30 (thirty) working days. At the implementation and monitoring stages, the community is also not involved, as these projects are typically private or involve cooperation between the private sector and the central government.[5]

Based on the background above, studying the legal system of community participation in environmentally friendly micro-hydro power plants project through a socio-legal approach is crucial. With this approach, it can be revealed how a comprehensive legal system works in relation to micro-hydro power plants, including aspects of regulation, rules, institutions, and legal culture.[6] With a socio-legal approach, the strength of community culture outside the law can also be revealed, encouraging strong community participation in micro-hydro projects.[7] This research was conducted in the villages of Karangtengah, Banyumas, and Lebakbarang, Pekalongan. Villages that have received micro-hydro awards in Central Java Province.

Several studies related to the importance of environmentally friendly and economical renewable energy were conducted by Pritesh[8] and Vickram.[9] The results of their research state the importance of considering the short-term economic feasibility of renewable energy resources for developing countries. Among all renewable energy sources, micro-hydro power plants are the most economical, environmentally friendly, and reliable sources. In the field of renewable energy research, essential studies on community participation and how management rules support the success of environmentally friendly renewable energy sources have not been explored.

Likewise, Suripto[10,11] Jawahar[12], Suryatna[13] and Arnaiz[14] focuses on the power of

[5] Steve Campbell, Melanie Greenwood, Sarah Prior, Toniele Shearer, Kerrie Walkem, Sarah Young, Danielle Bywaters, and Kim Walker., Purposive sampling: complex or simple? Research case examples, *Journal of research in Nursing,* Vol.25, no.8, 2020, page.653.

[6] Adriaan W. Bedner, Sulistyowati Irianto, Jan Michiel Otto, and Theresia Dyah Wirastri., *Kajian Sosio-Legal*, Denpasar, Pustaka Larasan, 2012, page.23.

[7] Victor Imanuel W. Nalle., The Relevance of Socio-Legal Studies in Legal Science, *Mimbar Hukum - Fakultas Hukum Universitas Gadjah Mada,* Vol.27, no.1, 2015, page.179.

[8] Pritesh Gokhale, Abhijit Date, Aliakbar Akbarzadeh, Putra Bismantolo, Ahmad Fauzan Suryono, Afdhal Kurniawan Mainil, and Agus Nuramal., A review on micro hydropower in Indonesia, *Energy Procedia,* Vol.110, no.13, 2017, page.318.

[9] S. S. K. Rangarajan Vickram, H. S. Dhamodharan, and M. Sivasubramaniyan., Micro-hydro systems: Empowering Rural communities with small-scale solutions, *Nanotechnol. Percept,* Vol.20, no.6, 2024, page.118.

[10] Heri Suripto and Saiful Anwar., Desain dan Pengembangan Prototipe Alat Uji Pembangkit Listrik Tenaga Mikro Hidro Dengan Back Flow Water System, *Jurnal Teknologi Rekayasa,* Vol.5, no.2, 2020, page.221.

[11] Heri Suripto, Saiful Anwar, and Purwo Subekti., Application of Micro Hydro Power to Improve Community Welfare by Utilizing Alternative Energy in Remote Areas, *International Conference on Sciences Development and Technology,* Vol.2, no.1, 2022, page.229.

[12] C. P. Jawahar and Prawin Angel Michael., A Review on Turbines for Micro Hydro Power Plant, *Renewable and Sustainable Energy Reviews,* Vol.72, no.28, 2017, page.882.

[13] Bambang Sugeng Suryatna., Design Micro Hydro Power Plant for Generate Electrical Energy About 3000-to-5000-Watt, *Journal of Vocational and Career Education,* Vol.5, no.1, 2020, page.9.

[14] M. Arnaiz, T. A. Cochrane, R. Hastie, and C. Bellen., Micro-hydropower impact on communities' livelihood analysed with the capability approach, *Energy for Sustainable Development,* Vol.45, no.12, 2018, page.208.

micro-hydro technology in rural areas, stating that small-scale micro-hydro systems, according to local demand and resources, can provide sustainable electricity for rural communities. Micro-hydro projects can be adapted to meet the energy demands of rural residents by utilizing locally accessible resources and technologies, whether they reside in mountainous areas with abundant water or flat regions with limited water flow. Although this research discusses technology in the village, it has not touched on the role of village communities in the technology, and how the rules for managing the technology in the community.

Research from Mbika[15] and Bhandari[16] states that this micro-hydro power generation system can eradicate poverty, increase economic growth, improve the quality of life, support small-scale agriculture, agricultural processing, and home businesses, and help fund education and health facilities. These studies discuss the significant benefits of micro-hydro power plants for rural communities, but have not explored the role of village communities in managing and supervising these plants. Thus, a gap exists in the literature regarding micro-hydro power plants. Many studies on micro-hydro power plants focus on electrical energy technology that is easily accessible to rural communities, as well as research on the benefits of micro-hydro for the socio-economic well-being of the community. However, few analyze micro-hydro power plant projects from the perspective of community participation within the legal system using a socio-legal approach. This gap highlights the need for a more comprehensive study on the legal system of community participation in regulations, institutional structures, and the legal culture of environmentally friendly micro-hydro power plants.

This study offers novelty in comparison to previous studies. Several critical questions raised are about how the legal system of community participation in environmentally friendly micro-hydro power plants in Karangtengah Village, Banyumas, and Lebakbarang - Pekalongan, both in terms of legal substance, legal structure, and legal culture, and how the strength of cultural factors that exist and live in the village encourages community participation to be strong. This research also examines the level of community participation in micro-hydro power plants.

## 2. Research Methods

This research employs field research with a socio-legal approach. Revealing the workings of law in society with a legal system.[17] It also uses a social science approach in its methodology, specifically highlighting external aspects beyond the law,

[15] Mbika C. Muteba, Shanelle N. Foster, Dele Raheem, and Agwu E. Agwu., Micro-hydropower systems for smallholder farmers in rural communities of Taraba state, Nigeria: Feasibility study, system analysis, design and performance evaluation (Part II), *Energy Nexus,* Vol.11, no.4, 2023, page.100228.

[16] Bhandari, Samir Raj., A Comprehensive Study of Micro Hydro Plant and its Potential: A Case Study: Studi Komprehensif Pembangkit Mikro Hidro dan Potensinya: Studi Kasus, *Indonesian Journal of Electrical Engineering and Renewable Energy,* Vol.3, no.1, 2023, page.22.

[17] Adriaan Bedner and Jacqueline Vel., Legal Education in Indonesia, *Indonesian Journal of Socio-Legal Studies,* Vol.1, no.1, 2021, page.21.

including socio-cultural and community institutions, that influence the law's workings.[18] The analysis method is qualitative, providing a structured approach to exploring the research problem.[19] The research locations are in Karangtengah Village, Banyumas Regency, and Lebakbarang Village, Pekalongan Regency, Central Java Province. This location was chosen because in the two areas, there is a micro-hydro power plant that is considered successful and has received an award at the provincial level in Central Java.

Data were collected through several techniques, including semi-structured interviews, observation, a literature review of articles from relevant journals and books, as well as archival records from villages. Informants were selected using purposive sampling. The criteria of informants are those who have knowledge, experience, and perspectives that are relevant to research problems.[20] Informants included the administrators of micro-hydro power plants, village officials, community leaders, religious leaders, and micro-hydro power users in Karangtengah and Lebakbarang villages.

Qualitative data analysis used the Miles and Huberman[21] model, which involves three main stages: data reduction (organizing and simplifying data), data display (presenting data in a readily accessible format), and drawing/verifying conclusions (interpreting findings). The analysis combined data triangulation (cross-checking data from multiple sources) and member checking (validating findings with participants) to increase rigor. This approach thoroughly examined the complex factors underlying community participation in the management of micro-hydro power plants.

## 3. Results and Discussion

### 3.1. Villages Profile and Basic Concept of Micro-hydro Power Plant

Karangtengah and Lebakbarang villages have successfully implemented a micro-hydro projects, which is managed independently by the community. These two villages have received the best micro-hydro management award at the provincial level in Central Java. Karangtengah is a village in Cilongok District, Banyumas Regency, Central Java, Indonesia, located approximately 15 kilometers west of the regency's capital. It has a mountainous topography with an average height of 500-700 meters above sea level. Village area: 11.6 $km^2$, with a population of 10,180 people and a population density of 877.6 people/$km^2$.[22] Meanwhile, Lebakbarang is a village that serves as the administrative center for Lebakbarang District, located

[18] Irianto Sulistyowati., Sejarah Dan Perkembangan Pemikiran Pluralisme Hukum, *Hukum Dan Pembangunan,* Vol.33, no.4, 2017, page.485.

[19] Josephine Oranga and Audrey Matere., Qualitative Research: Essence, Types and Advantages, *OALib,* Vol.10, no.12, 2023, page.3.

[20] Steve Campbell, Melanie Greenwood, Sarah Prior, Toniele Shearer, Kerrie Walkem, Sarah Young, Danielle Bywaters, and Kim Walker., Purposive sampling: complex or simple? Research case examples, *Journal of research in Nursing,* Vol.25, no.8, 2020, page.656.

[21] Matthew B. Miles, A. Michael Huberman, dan Johnny Saldaña., *Qualitative Data Analysis: A Methods Sourcebook*, California, SAGE Publications Ltd, 2014, page.22.

[22] Panggih Pawenang., *Kecamatan Cilongok Dalam Angka 2024*, Banyumas, Biro Pusat Statistik Kabupten Banyumas, 2024, page.1.

approximately 21 kilometers from the center of government of Pekalongan Regency, Central Java, Indonesia. Lebakbarang has a mountainous topography with an average height of 691-720 meters above sea level. The village area is 3.90 km² with a population of 2,234 people and a population density of 573.31 people/km².[23]

Micro-hydro power plants are a form of renewable energy that utilizes the potential of water resources to generate electricity in local areas.[24] Micro-hydro energy provides a more affordable and environmentally friendly alternative to large-scale power plants.[25] It is very suitable for remote or rural areas with limited access to the national electricity grid. Micro-hydro energy harnesses the kinetic energy of water flowing in rivers or other waterways to drive hydroelectric turbines. This process converts kinetic energy into mechanical energy, which is then converted into electrical energy through a generator.[26]

Some key elements of a micro-hydro energy system[27] are: a. Water Channel: Water is channeled through canals or pipes to a hydro turbine connected to a generator, which generates electricity. b. Hydro Turbine: Hydro turbines use the energy of flowing water to create rotation, which is then used to drive an electric generator. c. Electric Generator: The generator converts mechanical energy from the turbine into electrical energy, which can then be used to meet local electricity needs or distributed to the primary electricity grid. In Karangtengah Village, Banyumas Regency, hydro turbines produce electrical energy with a capacity of 15 kilowatts (kW). The community utilizes water energy from the flow of the Telaga Pucung River. In contrast, the community of Lebakbarang Village, Pekalongan Regency uses a hydro turbine from one engine unit that produces 20 kilowatts (kW). The community utilizes the flow of the Sengkarang River.

A micro-hydro power plant is a clean and environmentally friendly renewable energy source that does not produce greenhouse gas emissions or air pollution.[28] In Karangtengah and Lebakbarang Villages, the energy comes from water sourced from

[23] Andhika Misriysnto Ahmad Ghozien., *Kecamatan Lebakbarang Dalam Angka- 2024 Lebakbarang District In Figures*, Pekalongan, Biro Pusat Statistik Kabupaten Pekalongan, 2024, page.3.

[24] Muhamad Alhaqurahman Isa, Priana Sudjono, Tatsuro Sato, Nariaki Onda, Izuki Endo, Asari Takada, Barti Setiani Muntalif, and Jun'ichiro Ide, Assessing the sustainable development of micro-hydro power plants in an isolated traditional village west java, Indonesia, *Energies,* Vol.14, no.20, 2021, page.6458.

[25] Naufal Rospriandana, Paul J. Burke, Amalia Suryani, M. Husni Mubarok, and Miranda A. Pangestu, "Over a century of small hydropower projects in Indonesia: a historical review," *Energy, Sustainability and Society*, Vol.13, no.1, 2023, page.35.

[26] Irianto Sulistyowati., Sejarah Dan Perkembangan Pemikiran Pluralisme Hukum, *Hukum Dan Pembangunan,* Vol.33, no.4, 2017, page.487.

[27] Bambang Sugeng Suryatna., Design Micro Hydro Power Plant for Generate Electrical Energy About 3000 to 5000 Watt, *Journal of Vocational and Career Education,* Vol.5, no.1, 2020, page.10.

[28] Muhamad Alhaqurahman Isa, Priana Sudjono, Tatsuro Sato, Nariaki Onda, Izuki Endo, Asari Takada, Barti Setiani Muntalif, and Jun'ichiro Ide, Assessing the sustainable development of micro-hydro power plants in an isolated traditional village west java, Indonesia, *Energies,* Vol.14, no.20, 2021, page.6456.

the surrounding forests. This forest is overgrown with dense plants, especially pine, and underneath it, various useful plants for the community have also been planted, such as cardamom. Forest conservation is essential for the people of Karangtengah Village and Lebakbarang Village because maintaining the forest ensures the sustainability of water sources, which in turn supports the energy needed to drive the turbine and generate electricity.

A micro-hydro power plant is affordable.[29] The investment and operational costs of micro-hydro are generally lower compared to those of power plants using large-scale energy sources, making it more affordable for local communities. In Karangtengah and Lebakbarang Villages, one family that uses micro-hydro energy for electricity currently pays around IDR 50,000 monthly. This amount is for lighting, refrigerators, TVs, and other household needs. Much cheaper compared to families in different villages that use State Electricity Company (*Perusahaan Listrik Negara* or PLN) electricity. In practice, the community does not even want PLN to enter the village because PLN electricity is more expensive; the community prefers to maintain micro-hydro electricity, which is much cheaper. This aligns with what was conveyed by the chairman of Lebakbarang Village and the administration of Karangtengah Village.

### 3.2. Legal System for Community Participation in Environmentally Friendly Micro-hydro Power Plants

At the national legal level, the Regulations related to micro-hydro are Law Number 30 of 2009 concerning Electricity, Law Number 30 of 2007 concerning Energy, and Government Regulation Number 14 of 2012 concerning Electricity Supply Business Activities.[30] Of the various regulations, there are no clear rules regarding community participation in the electricity sector.[31] However, the Government is currently designing rules for community participation in the energy sector in the Draft Law on New and Renewable Energy.

The provisions regarding community participation are outlined in Article 59 of the Draft Law on New Energy and Renewable Energy, which stipulates that: (1) The community has the right to implement new and renewable energy projects. (2) Community participation as referred to in paragraph (1) in implementing new and renewable energy is in the form of: a. Providing input in determining the direction of new and renewable energy policies; b. Submitting objections to the implementation of new and renewable energy regulations or policies; c. Individual initiative or cooperation in the provision, research, business, and utilization of new and renewable energy; and/or d. Supervision and evaluation of the implementation

[29] Asad Ali, Jianping Yuan, Hamza Javed, Qiaorui Si, Ibra Fall, Israel Enema Ohiemi, Fareed Konadu Osman, dan Rice ul Islam., Small Hydropower Generation Using Pump as Turbine; a Smart Solution for the Development of Pakistan's Energy, *Heliyon,* Vol.9, no.4, 2023, page.1499.

[30] Rinaldi Kalman, Kusno Kusno, and Ahmad Ansyari Siregar, "Legal Study of Criminal Acts of Electricity Theft Reviewed Based on Law No. 30 Of 2009 Concerning Electricity," *International Journal of Science and Environment (IJSE),* Vol.5, no.3, 2025, page.82.

[31] Ian Kurniawan, Reisya Ichwani, Richa Fionasari, Aryansyah Batubara, and Adri Huda, "Indonesia's renewable energy outlook: what to expect in the future renewable energy of Indonesia. a brief review," *Elkawnie: Journal of Islamic Science and Technology,* Vol.8, no.2, 2022, page.310.

of new and renewable energy regulations or policies.

Community participation related to the environment is regulated in Law Number 32 of 2009 concerning Environmental Protection and Management Article 70 paragraph (1) which mandates that the community has the same rights and opportunities as widely as possible to play an active role in environmental protection and management, both in the planning, implementation, and supervision stages.[32] To determine the effectiveness of the law related to community participation in micro-hydro management related to environmental preservation in Karangtengah Village and Lebakbarang Village as a whole, it can be analyzed using the legal system theory. Friedman[33] in the legal system theory stated that the effectiveness or ineffectiveness of law in society depends on three elements of the legal system as a whole, namely legal substance, legal structure, and legal culture. Friedman stated that these three aspects of law must work in synergy with one another so that the legal regulations can function effectively.

The first legal system is the legal substance. Legal substance includes regulations and norms. Micro-hydro power plant regulations in Karangtengah and Lebakbarang Villages are participatory because they are made together and agreed upon by the community. These regulations encompass management regulations, including technical requirements for the use and maintenance of micro-hydro machines, environmental stewardship for water resources, guidelines for the economic utilization of electricity, provisions for payment and fines for users, and regulations governing administrators.

The regulation also regulates supervision and provides clear sanctions. Several management regulations govern sanctions for electricity users, including late payment fines and disconnection of electricity if payment is not made within three months. Sanctions are also given to the general public who damage water sources and cut down trees in the forest.[34] Meanwhile, the rules regarding sanctions for administrators who fail to fulfil their obligations will include a warning, as well as potential dismissal and replacement by other community members. The rules for sanctions made by administrators and also members of the community through deliberation are rules that the management admins must obey and also micro hydro users, but in Lebakbarang and Karngtengah villages, these sanctions are rarely implemented, because the micro hydro user community and the admins obey the rules, and even if there is a dispute related to micro hydro, it is resolved in the village through family deliberation and consensus.

[32] Yulinda Adharani, Ida Nurlinda, Gusman Siswandi, Maret Priyanta, and Rewita Salsabila, "Renewable Energy Development in Indonesia from New Normal to Better Normal: Environmental Law Perspectives," *Padjadjaran Jurnal Ilmu Hukum (Journal of Law),* Vol.10, no.3, 2023, page.5.

[33] Lawrence M. Friedman., *The Legal System: A Social Science Perspective*, New York, Russell, Sage Foundation, 1975, page.75.

[34] Seger Santoso, Eka Wahyu Kasih, and R. M. Saputra, "Analysis of implemented policy strategies and innovations in legal management of natural resources and renewable energy in Indonesia," *Jurnal Riset dan Inovasi Manajemen,* Vol.1, no.4, 2023, page.310.

The second legal system is the Legal Structure. A structure is a permanent legal framework, such as an institutional body or authorized body that holds power and is represented by an office holder. The community forms micro-hydro institutions in Karangtengah and Lebakbarang Villages, and the Administrators in these institutions are also the community. The duties of micro-hydro institutional administrators include planning and supervising micro-hydro power plants.[35]

The institutional structure of the micro-hydro power plant comprises a project leader, head of management, secretary, treasurer, turbine maintenance officer, environmental guard, and personnel responsible for water resources.[36] In this institution, there is a slight difference between Karangtengah and Lebakbarang Villages. The leader of the micro-hydro project in Karangtengah Village does not have to be a village official, because in several periods the project leader has been led by a religious figure. Meanwhile, the management of micro-hydro in Lebakbarang Village is handled directly by the village head, who acts as the Chairperson, the village secretary, and the treasurer, all of whom are village administrators. They are assisted by two people tasked with maintaining the turbine so that the transformer remains stable. These individuals are on duty in the morning and evening, reducing the water discharge after dawn and increasing it again in the afternoon.

The uniqueness of this institution lies in the field of micro-hydro power plant supervision, where officers and the entire community supervise both villages in Karangtengah and Lebakbarang. This is a form of social capital attachment has been proven to strengthen village community participation through collaboration, participation, technology adoption, joint maintenance, and resource mobilization competence.[37] Such institutions are participatory, meaning they actively involve the community in the decision-making process, planning, implementation, and supervision.

This participatory institutional theory emphasizes the critical role of social networks and trust in an institution's success.[38] Research on community participation indicates that higher participation can enhance social capital within a community, which in turn can strengthen institutions and increase their effectiveness.[39] This attachment is seen in the Karangtengah and Lebakbarang communities, where the importance of Micro-hydro binds the community as an affordable and accessible energy source in their area. Thus, the entire community, including administrators and micro-hydro

[35] Muhammad Rahjay Pelengkahu, Fatma Ulfatun Najicha, and Lego Karjoko, "The Urgency of New Renewable Energy Regulation as an Efficiency in The Utilization of Natural Resources in Indonesia," *Jurnal Analisis Hukum,* Vol.7, no.1, 2024, page.61.

[36] Rochmani, Wenny Megawati, Adi Suliantoro, and Muhammet Ebuzer Ersoy, "An Effective Environmental Dispute Resolution Model That Supports Environmental Sustainability," *Jurnal Hukum,* Vol.41, no.2, 2025, page.281.

[37] Annisa Qurani and Ricardi Adnan., The Role of Local Community and The Barriers to Participation in A Mini Hydro Energy Project in Indonesia, *Indonesian Journal of Social Research,* Vol.5, no.2, 2023, page.106.

[38] Indah Dwi Qurbani, and Ilham Dwi Rafiqi, "Prospective green constitution in new and renewable energy regulation," *Legality: Jurnal Ilmiah Hukum,* Vol.30, no.1, 2022, page.82.

[39] Tianlan Fu and Sanqin Mao., Individual Social Capital and Community Participation: An Empirical Analysis of Guangzhou, China, *Sustainability,* Vol.14, no.12, 2022, page.4.

users, oversees the resource.

### 3.3. Legal Culture that Encourages Strong Community Participation in Micro-Hydro Management

In the theory of the legal system, the third is legal culture. For Friedman[40] this is the most critical aspect of the legal system. Legal culture is a concept that encompasses the cultural values that influence the implementation of the legal system in a specific location or region. This concept involves all aspects of community life, including value systems, beliefs, ethics, and norms.[41] Legal culture influences how the law is understood, applied, and adhered to, thereby determining the effectiveness of the legal system.[42]

Legal culture encourages strong community participation in managing the micro-hydro projects in the villages of Karangtengah and Lebakbarang. However, community participation has not been explicitly regulated in various national regulations on electricity; nonetheless, community participation has been carried out. The village community possesses a culture of cooperation (*gotong royong*), deliberation, brotherhood, and an environmentally friendly culture. The village's ancestors have passed down this culture from one generation to the next.[43] It plays a vital role in strengthening community participation in managing the micro-hydro power plant.

Community participation in forest maintenance, including the careful cutting down of trees, and river maintenance to maintain a stable water level are carried out according to the intrinsic values that exist within the community and have become part of the culture. The existence of a micro-hydro power plant further increases awareness of forest conservation, as the community comes to realize that forests are a source of water for rivers and that rivers, in turn, are a source of electrical energy.[44] Without a local culture of togetherness, cooperation, deliberation, and environmental friendliness, community participation in maintaining water resources originating from forests will be challenging to implement. Traditional leaders, community leaders, and local religious leaders have a significant influence on the legal culture system. These figures have a substantial impact on the management of micro-hydro power plants.

In local customary law, traditional leaders are regarded as symbols of leadership that must be obeyed and are believed to have a positive impact on community

[40] Lawrence M. Friedman., *The Legal System: A Social Science Perspective*, New York, Russell, Sage Foundation, 1975, page.78.

[41] Satjipto Rahardjo., *Membedah Hukum Progresif*, Jakarta, Kompas Group, 2006, page.31.

[42] Satjipto Rahardjo., *Memahami Hukum: Dari Konstruksi Sampai Implementasi*, Jakarta, PT. Raja Grafindo Persada, 2009, page.32.

[43] Wolfgang Bilsky, Ingwer Borg, and Dieter Hermann., Utilizing Personal Values to Explain People's Attitudes towards Legal Norms, *European Journal of Criminology*, Vol.19, no.4, 2020, page.642.

[44] Pratama Yudha Pradheksa, Putri Cahya Arimbi, and Dian Tamitiadini, "Public engagement in micro-hydro technology in Central Java: a call to decentralize the energy system," *East Asian Science, Technology and Society: An International Journal,* Vol.18, no.1, 2024, page.82.

welfare.[45] Guidance from traditional leaders on committing to maintaining micro-hydro is crucial for its sustainability and the benefit it will provide to future generations. Community leaders are also considered a valuable source of information about micro-hydro power plants, which serve as an infrastructure for providing electricity to rural areas. They can even provide technical expertise if the micro-hydro project faces obstacles. This demonstrates that the active involvement of local community leaders is crucial in enhancing community awareness and participation in managing micro-hydro power plants. In Karangtengah Village, Banyumas Regency, community leaders are religious leaders, so their influence is increasingly strong among the majority muslim population. This highlights the significant role of religion and community beliefs in environmental preservation. Religious leaders convey information about micro-hydro and its relationship to forest and water conservation through community meetings known as *tahlilan* meetings.

*Tahlilan* is understood as a study session led by religious/community leaders.[46] *Tahlilan*, as a spiritual culture, also serves as a forum for discussing various village issues. The village community holds Routine *tahlilan* meetings every week (on Friday nights) or more often during celebrations and other events. Related to the management of micro-hydro power plants, this routine meeting is considered a strategic medium for conveying and reminding the importance of preserving forests and water resources for the sustainability of the village.[47] The *tahlilan* event also discussed the importance of honesty and the need for family members to pay their electricity bills, as well as for Micro-hydro administrators to manage their finances.

In Lebakbarang, the legal culture of community participation in protecting the forest environment and water resources, which serve as a source of micro-hydro energy, is strengthened by several supporting traditions. Among them is the *sedekah bumi* (doing good to the earth) ritual culture, which is held every year in the month of *dzulqo'idah* (a noble month in Islam) or known as the *legenonan* culture, a traditional Javanese ceremony, specifically practiced in Pekalongan, Central Java, to express gratitude for the harvest and strengthen community bonds.[48] This ritual includes a joint prayer that begins with a *tahlil* prayer, followed by *sedekah bumi* (doing good to the earth) as an expression of gratitude for the blessings bestowed by Allah.

In *sedekah bumi* events (doing good to the earth), there is usually a *wayang performance* (a traditional Indonesian performing art that uses *wayang* as the main character in the story. This *wayang* is generally made of leather, wood, or other materials and is accompanied by gamelan music. The *wayang* performance is not

[45] Akmal Achsan Sulwanta and Tahir Kasnawi., The Role of Traditional Leadership in Community Participation in the Development of Assolokobal Village, Assolokobal District, Jayawijaya Regency, *Hasanudin Journal of Sociology,* Vol.1, no.1, 2019, page.4.

[46] Sirait, Sangkot., Religious attitudes of theological tradisional in the modern Muslim community, *Journal of Indonesian Islam,* Vol.10, no.2, 2016, page.237.

[47] Masrur Alatas, Maria Ts Budiastuti, Totok Gunawan, and Prabang Setyono, "Spiral cycle micro-hydro community system model for sustainable development in Yogyakarta, Indonesia," *Journal of Sustainability Science and Management*, Vol.17, no.9, 2022, page.53.

[48] Nikmah Rachmawati, Mizano Liongga Alhassan, and Mukhammad Syafii., Sedekah Bumi : Model Kebersyukuran Dan Resiliensi Komunitas Pada Masyarakat Pesisir Utara Jawa Tengah, *Jurnal Penelitian,* Vol.15, no.1, 2021, page.1.

only for entertainment, but also a means to convey cultural values, morals, environmental values, and life philosophy. *Sedekah Bumi* (doing good to the earth) [49] is also celebrated by bringing food from home to be shared or exchanged. In addition, people bring agricultural tools and tree seedlings to the village hall. This culture fosters a high awareness of environmental preservation by avoiding actions that can harm the environment, such as cutting down trees or disregarding ecological cleanliness. Planting trees is mandatory. The celebration concludes with a prayer for safety in the coming year.

Based on the data and analysis of the legal system of community participation in the management of micro-hydro plants, as presented above, it can be seen that the legal system of micro-hydro plants in Karangtengah Village and Lebakbarang Village functions optimally in various subsystems, namely in the legal substance and institutional legal structure. The community actively participates in the management of micro-hydro plants. The strength of this participation is attributed to the encouragement of the community's legal culture, which fosters cooperation, brotherhood, deliberation, and environmentally friendly behavior.[50] Socio-legal studies can reveal the strength of the legal culture as a driver of the effectiveness of the legal system.[51]

### 3.4. Level of Community Participation in Karangtengah and Lebakbarang Villages Based on the Ladder of Participation

Community participation in micro-hydro projects in Karangtengah and Lebakbarang Villages, as described in the literature on participation models, mainly Arnstein's, can be assessed in terms of the ladder of participation. Arnstein classifies community participation into three main groups: non-participation (including manipulation and therapy), tokenism (including providing information, consultation, and calming), and citizen power (including partnership, delegation of power, and citizen control). Based on this ladder of participation, community involvement in the micro-hydro projects in Karangtengah and Lebakbarang Villages is at a higher level of citizen power, which is characterized by partnership with the government, delegation of power, and citizen control as shown in the following Figure 1:

[49] Merina Merina, Lelly Qodariah, and Cahya Adhitya Pratama., The Sedekah Bumi Tradition as an Effort to Improve Local Wisdom Education for Generations of the Nation, *Riwayat: Educational Journal of History and Humanities,* Vol.6, no.2, 2023, page.578.

[50] Budhi Wibhawa, "IBEKA's social service delivery model in Indonesia's micro-hydro power," *Human Systems Management,* Vol.37, no.4, 2019, page.392.

[51] Roger Cotterrell., A Socio-Legal Quest: From Jurisprudence to Sociology of Law and Back Again, *Journal of Law and Society,* Vol.50, no.1, 2023, page.6.

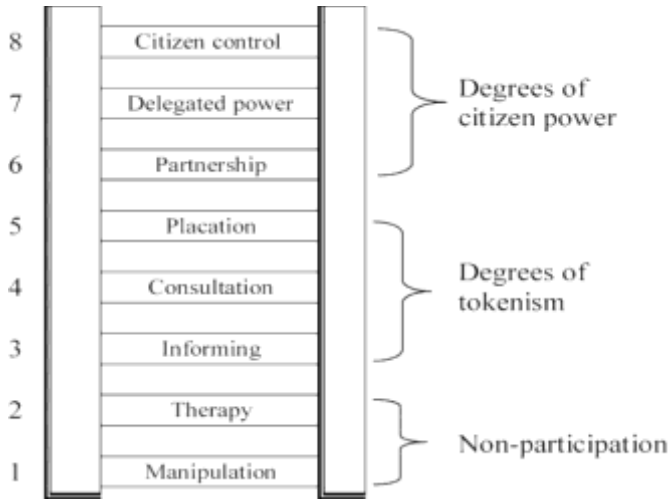


**Figure 1.** Community Participation Ladder from Arnstein[52]

The management of micro-hydro power plant in Karangtengah and Lebakbarang Villages, when viewed from Arnstein[53] participation ladder, is at the highest level, namely community participation related to the distribution of power from the government to the community: The higher level of community involvement, the greater the power the community has. Thus, the level of community involvement affects their perception of the Micro-hydro Power Plant, including their sense of ownership. As shown in the table of the legal system of community participation in the Micro-hydro Power Plant in Table 1 below:

**Table 1.** Legal System of Community Participation in Environmentally Friendly Micro-hydro Power Plants in Karangtengah and Lebakbarang

| No | Part of The Legal System | Arrangement | Information |
|---|---|---|---|
| 1 | The purpose of utilizing environmentally friendly micro-hydro power plants | Justice for all Indonesian people, to get electricity. And the use of environmentally friendly technology. | All Indonesians can access energy sources using environmentally friendly technology, even in remote villages, including Karangtengah village in Banyumas and Lebakbarang Village in Pekalongan, both of which are located in remote mountains. |
| 2 | Legal Substance of environmentally friendly micro-hydro power plants | The rules and legal provisions of micro-hydro are developed in a participatory manner, created by the community and | The community collaborates to establish rules for the planning, management, and supervision of micro-hydro. For example, rules for the Administrators consist of technical rules for micro-hydro |

[52] Sherry Arnstein, Building A Ladder of Citizen Participation, *Learning from Arnstein's Ladder: From Citizen Participation to Public Engagement,* Vol.2, no.3, 2020, page.34.

[53] Sherry R. Arnstein, "A ladder of citizen participation," *Journal of the American Institute of planners,* Vol.35, no.4, 1969, page.219.

| No | Part of The Legal System | Arrangement | Information |
|---|---|---|---|
| | | agreed upon collectively through deliberation. The rules contain the implementation and supervision of the micro-hydro power plant. | machines, turbine maintenance, manager responsibilities, and supervision of water resources. Rules for users include electricity prices, monthly fees, fines for late payments, and supervision guidelines. |
| 3 | Legal Structure of Environmentally Friendly micro-hydro power plants | Participatory institutions. These are institutions formed by the community, with office holders who are entirely from the community and work in collaboration with it. | The office holders in the micro-hydro institution are the community, selected based on community agreement, consisting of project administrators, field technical officers, turbine maintenance supervisors, water resource supervisors, and electricity payment officers |
| 4 | Legal Culture of environmentally friendly micro-hydro power plants | Participatory and environmentally friendly culture | The village community's culture of cooperation, brotherhood, and environmentally friendly behavior encourages community participation in environmentally friendly micro-hydro projects. |

Based on Table 1, it can be observed that the micro-hydro power plant's legal system is participatory. The strength of community participation cannot be separated from the legal culture of the local community. To understand the interrelation of law in society, it is necessary to portray the law in its interrelation with the society in which it plays a role, where the depiction of the interconnection cannot be separated from the theories of legal and social relations.

The Mirror Thesis by Tamanaha[54] states "Every legal system is closely related to society's ideas, aims, and purposes. Law reflects the intellectual, social, economic, and political climate of its time". Law, according to Tamanaha, is essentially a reflection of its society, and Law is a reflection of society's ideals, wills, and desires. The ideals, wills, and desires of society have often been institutionalized in the laws that govern society. Therefore, law must also be based on the values that live in society. Law is a comprehensive representation of all interests, values, situations,

[54] Brian Z. Tamanaha., *A General Jurisprudence of Law and Society*, Oxford, Oxford University Press, 2009, page.46.

community contexts, legal politics, and historical aspects reflected in the law.

This aligns with Savigny's opinion that law is a factual recognition of society and the attitudes, actions, or behavior of society that occurred a long time ago and became historical facts.[55] Positive law is a manifestation of the historicity of the rules of life of the existing society. Concerning the construction of an environmentally friendly micro-hydro power plant legal system, the participatory, environmentally friendly behavior and culture-based micro-hydro legal system in Karangtengah and Lebakbarang Villages is a meeting of Indonesian culture that lives in society and is expressed in the values of Pancasila, in the form of human ties with society and human relations with nature meeting with the view of modernity that currently carries a more democratic and sustainable development.

The modern view of good environmental governance consists of participation, supremacy of law, and transparency.[56] This view is oriented towards consensus, equity, inclusiveness, effectiveness, efficiency, and accountability. Good environmental governance requires democratic environmental decision-making, which entails broad openness to the dimensions of public participation and recognition of local cultures. Thus, an ecological decision that is taken will be readily accepted because it is taken democratically and can protect the affected parties (complementing legal protection).

The construction of the legal system for micro-hydro power plants in Karangtengah and Lebakbarang is a harmonization of good environmental governance and local community participation. However, the development of the legal system has not fully absorbed modern views on good environmental governance, such as the supremacy of law in villages that still use legal sanctions that are familial.[57] The application of law at the village level prioritizes family values and deliberation, although law remains the main foundation, dispute resolution in villages often involves a familial approach to reach consensus. Furthermore, the plan for micro-hydro power plants in Karangtengah and Lebakbarang Villages is a model that seeks to integrate micro-hydro management with local community participation and a modern management approach that emphasizes effective environmental governance.[58]

This aligns with Rahardjo's[59] view that the intersection between local (customary) law and modern law is complex and dynamic. He emphasized the importance of understanding the socio-cultural context in the application of law, as well as the

[55] M. Zulfa Aulia., Friedrich Carl von Savigny Tentang Hukum: Hukum Sebagai Manifestasi Jiwa Bangsa, *Undang: Jurnal Hukum,* Vol.3, no.1, 2020, page.205.

[56] Naufal Rospriandana, Paul J. Burke, Amalia Suryani, M. Husni Mubarok, and Miranda A. Pangestu, "Over a century of small hydropower projects in Indonesia: a historical review," *Energy, Sustainability and Society*, Vol.13, no.1, 2023, page.36.

[57] Suparnyo, Dwiyana Achmad Hartanto, Yusuf Istanto, Wahyu Edy Amrulloh, and Rizal Bagus Prabowo, "The Environmental Legal Responsibility of Cigarette Companies in Community Economic Empowerment," *Jurnal Hukum,* Vol.40, no.2, page.325.

[58] Purniawati, Nikmatul Kasana, and Rodiyah Rodiyah., Good Environmental Governance in Indonesia (Perspective of Environmental Protection and Management), *The Indonesian Journal of International Clinical Legal Education,* Vol.2, no.1, 2020, page.43.

[59] Satjipto Rahardjo., *Memahami Hukum: Dari Konstruksi Sampai Implementasi*, Jakarta, PT. Raja Grafindo Persada, 2009, page.35.

importance of progressive law oriented toward humanity, the environment, and justice. He believes that local (customary) law, which possesses local wisdom closely related to its environment, needs to be considered in the process of forming and implementing modern law.

Based on this harmonization model. The paradigm of new energy that is environmentally friendly and equitable will then bring the analysis of the investment policy of environmentally friendly power plants in Indonesia to the idea of an energy-independent village.[60] The explanation of the energy-independent village clearly demonstrates the importance of public participation, environmental protection, and recognition of local culture as essential elements in a democratic society. In line with this, theoretically, community participation is a crucial element that determines the effective implementation of sound environmental governance, which prioritizes environmental protection and management efforts.[61] The construction of the legal system for the micro-hydro power plant is in accordance with the state economic system outlined in the constitution, which is based on family, emphasizing shared prosperity and the sustainable use of earth, water, and natural resources for the greatest well-being of the people.[62]

## 4. Conclusion

The legal system of community participation plays a key role in the success of the environmentally friendly micro-hydro power plants in Karangtengah village, Banyumas district, and Lebakbarang village, Pekalongan district, Central Java Province. In terms of legal substance, micro-hydro regulations are participatory. Regulations are made and implemented by the community. In terms of legal structure, the institutions are participatory, formed by the community, and the administrators are community members who are elected through deliberation. The high level of community participation in the management of environmentally friendly micro-hydro in both villages is due to the legal culture, which includes a culture of cooperation, brotherhood, and environmental awareness. Community participation in the micro-hydro projects in Karangtengah village and Lebakbarang village, based on the participation ladder, is at the highest level, namely partnership, delegation of authority, and citizen control. The high level of participation is due to the legal culture and also because the community has a standard connection and goal towards the environment, economy, and energy. This model of community participation in electricity, rooted in local culture aligns with modern laws that currently prioritize

[60] Nyphadear Tiara Scoorpy Ananda Putra and Randhi Satria., Energy Independency and Sustainable Development in International Relations Context, *Journal of International Studies on Energy Affairs,* Vol.5, no.1, 2024, page.16.

[61] Purniawati, Nikmatul Kasana, and Rodiyah Rodiyah., Good Environmental Governance in Indonesia (Perspective of Environmental Protection and Management), *The Indonesian Journal of International Clinical Legal Education,* Vol.2, no.1, 2020, page.45.

[62] Arinto Nurcahyono, Fabian Fadhly Jambak, and Abdul Rohman., Shifting the Water Paradigm from Social Good to Economic Good and the State's Role in Fulfilling the Right to Water, *F1000Research,* Vol.11, no.6, 2022, page.490.

environmentally friendly and participatory energy management. Harmonizing local culture and modern laws in energy management enables villages to be independent in their use of electrical energy and has the potential to improve welfare through the application of environmentally friendly technology.

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