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Conflict of Interest in the Utilization of the Micro-Hydro Power Plant in Karangtengah Village, Banyumas Regency

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Abstract
This study aims to analyze the conflict of interest in the utilization of Micro Hydro Power Plants (MHP) in Karangtengah Village, Banyumas Regency. The background of this research is based on the success of the local community in establishing energy independence through MHP, which later triggered a conflict with Perusahaan Listrik Negara (PLN) as the national electricity provider. This study employs a qualitative approach using literature review and document analysis methods. Data were collected from academic journals, official reports, and relevant media sources, and analyzed using content analysis techniques and the conflict theory perspective of Karl Marx. The results show that the MHP is capable of generating electricity with a capacity of approximately 15 kW and supplying power to dozens to over a hundred households at an affordable tariff. However, this success has led to a conflict of interest between the community and PLN, particularly regarding the control of energy resources, distribution of economic benefits, and authority over the energy system. From a conflict theory perspective, this condition reflects the dynamics of domination and resistance between local actors and state actors. This study concludes that the conflict surrounding MHP is not merely technical but represents a structural conflict in community-based energy management.

Keywords: Conflict of Interest, Renewable Energy, Energy Self-Sufficient Village, Energy Independence, Marxist Conflict Theory.

1. Introduction
Climate change and the global energy crisis have encouraged countries around the world to transition toward sustainable energy systems. This global commitment was reinforced through the Paris Agreement, which emphasizes the importance of reducing carbon emissions and developing clean energy. The agreement serves as a foundation for countries to integrate energy policies with the principles of environmental sustainability (UNFCCC, 2015). Furthermore, the agreement promotes the use of renewable energy as a primary alternative within the global energy system. Consequently, energy issues are no longer viewed merely as technical matters, but have evolved into a strategic part of the global political agenda.

In line with this global commitment, Indonesia has also adopted the principles of sustainable development through the Sustainable Development Goals (SDGs). Within the SDGs, Goal 7 emphasizes the importance of ensuring access to affordable, reliable, and sustainable energy for all communities (UNDP, 2021). The Indonesian government has translated this objective into various national policies focusing on the development of renewable energy. This demonstrates that energy has become a strategic sector in achieving sustainable development at the national level. Therefore, the development of renewable energy is not solely oriented toward environmental concerns, but also encompasses social and economic dimensions of society.

In its implementation, the Indonesian government has developed various community-based programs, one of which is the energy self-sufficient village program (*desa mandiri energi*). This program aims to enhance village energy independence through the utilization of local resources. In addition, the direction of national energy policy has been formulated by the National Energy Council through the National Energy Policy, which targets an increase in the renewable

energy mix and a reduction in dependence on fossil fuels (DEN, 2019). This policy emphasizes the importance of energy diversification and strengthening national energy security. Thus, there is a strong state-driven initiative to develop locally based energy systems as part of a sustainable national development strategy.

One form of locally based energy implementation is the Micro-Hydro Power Plant (*Pembangkit Listrik Tenaga Mikro Hidro* / PLTMH), which utilizes water flow as a source of electrical energy. PLTMH is considered advantageous because it is environmentally friendly, sustainable, and allows for participatory management by local communities. In Karangtengah Village, PLTMH has developed into the primary source of electricity for the community. The existence of PLTMH has not only improved energy access, but has also stimulated local economic activities such as culinary businesses, services, and various other productive sectors. In fact, a significant portion of the community's economic activities depends on the electricity generated by PLTMH (Hartatik & Nurmaya, 2022). This indicates that PLTMH plays a strategic role in improving the welfare of rural communities.

However, the success of PLTMH cannot be separated from the dynamics of political interests surrounding its management. According to a report by Climate Tracker, the people of Karangtengah Village rejected the introduction of electricity from PLN despite several attempts at engagement by the company (Hartatik & Nurmaya, 2022). This rejection was based on the success of PLTMH in fulfilling the community's energy needs as well as concerns over the potential loss of local energy independence. This situation reflects a conflict between two energy systems: community-based energy and state-centered energy. The conflict is not merely related to the technical provision of electricity, but also involves issues of control, power, and the distribution of economic benefits. Thus, energy becomes a political arena where the interests of the state and local communities intersect in the management of resources.

From the perspective of Karl Marx's conflict theory, this condition can be understood as a struggle between groups that control the means of production and groups attempting to maintain their autonomy. In this context, PLN represents a centralized energy system controlled by the state, while PLTMH symbolizes community energy independence. Inequality in the control of energy resources becomes the primary factor triggering conflicts of interest. Furthermore, disparities in the distribution of economic benefits also intensify the potential conflict between these two actors. Therefore, analyzing conflicts in PLTMH management is essential for understanding the dynamics of energy politics at the local level.

Although numerous studies on Micro-Hydro Power Plants (*Pembangkit Listrik Tenaga Mikro Hidro* / PLTMH) have been conducted, most of them primarily focus on technical aspects, such as energy potential, system efficiency, and technological development. Several studies have also examined PLTMH within the context of community empowerment and the improvement of economic welfare. However, these studies tend to be normative in nature and have not thoroughly explored conflicts of interest among actors involved in the management of community-based energy systems. Furthermore, studies on national energy policy generally emphasize the role of the state within centralized energy systems without examining its interaction with local energy systems. Therefore, there remains a gap in the literature specifically addressing the conflict between community-based energy and state-centered energy systems.

On the other hand, the use of conflict theory approaches, particularly those referring to the ideas of Karl Marx, remains relatively limited in energy studies. Most existing research tends to adopt technocratic or participatory approaches without examining the dimensions of power relations underlying energy conflicts. In fact, conflict theory offers a more critical analytical framework for understanding how inequalities in resource control can trigger disputes among actors. Therefore, a theoretical approach capable of explaining energy conflict as part of broader social and political dynamics is necessary.

Based on the explanation above, the primary problem addressed in this study concerns how conflicts of interest occur in the utilization of PLTMH in Karangtengah Village, who the involved actors are along with their respective interests, and how these conflicts can be analyzed through the perspective of Karl Marx's conflict theory. This research is important because conflicts of interest in community-based energy management, particularly between PLTMH and

PLN, have rarely been examined in depth from the perspective of politics and power relations. Moreover, the utilization of PLTMH at the village level plays a strategic role in supporting energy independence and sustainable development, making it essential to understand its governance dynamics comprehensively. Therefore, this study is expected to provide academic contributions and policy recommendations for integrating community-based energy systems with the national energy system.

Based on this research gap, the study offers novelty by examining conflicts of interest in the utilization of PLTMH in Karangtengah Village through the lens of Marxian conflict theory. This research not only focuses on technical aspects or community empowerment, but also positions energy as a political arena involving power relations between the state and society. In addition, this study highlights the empirical conflict between PLTMH managers and PLN as a representation of the struggle between community-based energy systems and centralized energy systems. Thus, this study is expected to contribute new insights to the field of energy politics, particularly in understanding conflicts of interest in renewable energy management at the local level.

Conflict theory proposed by Karl Marx is based on the assumption that society is always in a state of conflict due to inequalities in the control of resources (Marx, 1867). According to Marx, social structures are divided into two main groups: the class that controls the means of production (the bourgeoisie) and the class that lacks access to the means of production (the proletariat) (Ritzer & Goodman, 2014). This inequality produces imbalanced power relations, making conflict an inherent aspect of social life. Thus, conflict is not an anomaly, but rather a logical consequence of unequal systems of resource distribution.

Furthermore, Marx emphasized that conflict emerges from struggles over control of the means of production, which constitute the source of economic power (Marx, 1867). Groups that control the means of production tend to maintain their dominance, while other groups attempt to gain access to or defend the resources they possess (Dahrendorf, 1959). In this context, conflict is not solely economic in nature, but also encompasses political and ideological dimensions. These power relations create structures of domination that influence how resources are distributed within society. Therefore, Marx's conflict theory provides a critical analytical framework for understanding conflicts of interest among actors.

In the context of this study, the concept of the "means of production" can be interpreted as energy infrastructure and electricity distribution systems. PLN, as a representation of the state, controls the centralized energy system and the national electricity distribution network. Meanwhile, the people of Karangtengah Village, through PLTMH, maintain control over locally managed energy resources. This difference in position creates the potential for conflict because both actors possess different interests regarding the control and management of energy resources. Thus, the conflict between PLTMH and PLN can be understood as a struggle over the control of energy resources.

Moreover, the conflict also reflects a broader contestation between community-based energy systems and state-centered energy systems. The community seeks to preserve the energy independence they have developed through PLTMH, while PLN aims to expand its electricity service coverage. From a Marxian perspective, this condition demonstrates a relationship of domination and resistance between actors possessing greater power and those striving to maintain their autonomy (Ritzer & Goodman, 2014). The conflict is therefore not merely related to the technical provision of electricity, but also concerns the distribution of economic benefits and control over resources.

Thus, Marx's conflict theory is highly relevant to this study because it helps explain the dynamics of conflicts of interest in the management of PLTMH in Karangtengah Village. This approach reveals that the conflict between society and the state is not simply a matter of energy policy, but rather part of a broader struggle over resource control. Therefore, the use of Marxian conflict theory enables a deeper analysis of the power relations underlying the conflict between PLTMH and PLN.

2. Method

This study employs a literature review method with a qualitative approach to analyze conflicts of interest in the utilization of Micro-Hydro Power Plants (*Pembangkit Listrik Tenaga Mikro Hidro* / PLTMH) in Karangtengah Village. The primary focus of this research is textual analysis, relying on an in-depth examination of various secondary sources, including academic literature such as scientific journals, reference books, and scholarly works relevant to renewable energy, PLTMH, and conflicts of interest within the energy sector. In addition, this study utilizes national energy policy documents, research reports, and articles from credible media outlets such as Climate Tracker to strengthen the empirical analysis (Hartatik & Nurmaya, 2022).

To collect data, the researcher conducted a systematic literature search using keywords such as "PLTMH," "community-based renewable energy," "energy conflict," and "PLN vs local energy." The selection of sources was carried out selectively by considering the credibility of the authors, the relevance to the research topic, and the recency of publications to ensure that the data used remained current and reliable (Zed, 2014). After the data were collected, content analysis was conducted to identify patterns in the utilization of PLTMH, including its establishment, management, and current operational conditions.

Furthermore, this study also applies critical discourse analysis to understand how conflicts between PLTMH managers and PLN are constructed across various sources and how power relations are reflected within these dynamics. To strengthen the analysis, this research adopts a theoretical analytical approach using Karl Marx's conflict theory to explain the contestation of interests in the control of energy resources. In addition, the analysis follows the interactive model developed by Matthew B. Miles and A. Michael Huberman, which consists of data reduction, data display, and conclusion drawing. The conclusions present new findings generated from this research (Miles & Huberman, 2014).

To ensure data validity, this study employs source triangulation by comparing different types of documents, including scientific journals, policy documents, and media reports, in order to obtain consistent and trustworthy information (Sugiyono, 2018). Thus, the research method is expected to provide a comprehensive understanding of the dynamics of conflicts of interest in the utilization of PLTMH in Karangtengah Village and its relationship with the centralized energy system represented by PLN

3. Results and Discussion

Conflicts of Interest in the Utilization of Micro-Hydro Power Plant in Karangtengah Village, Banyumas

The utilization of Micro-Hydro Power Plants (*Pembangkit Listrik Tenaga Mikro Hidro* / PLTMH) in Karangtengah Village originated from the limited access to electricity experienced by the local community, particularly in the foothills of Mount Slamet. The relatively remote geographical conditions and limited infrastructure caused the area to receive low priority in the expansion of the national electricity network. For many years, the community remained beyond the reach of electricity services provided by PLN and relied instead on simple lighting sources such as oil lamps and other alternative energy sources to meet their daily basic needs. This situation not only restricted household activities but also hindered local economic development and educational opportunities.

These conditions eventually generated collective disappointment among residents regarding the state's slow provision of electricity. This dissatisfaction gradually developed into a shared awareness of the importance of energy independence. In this context, the community no longer waited for state intervention, but instead began seeking alternative solutions by utilizing the natural resources available in their environment. One of the potentials later developed was the relatively stable water flow in the area, which was converted into electrical energy through PLTMH. Thus, the construction of PLTMH was not solely driven by the technical need for electricity, but also represented a social response to unequal energy access and reflected the community's collective initiative in overcoming structural limitations.

Historically, the development of PLTMH in Karangtengah Village began in 2012 with assistance from Kodim 0701 Banyumas and Indonesia Power. This program marked the starting

point of a community-based independent energy initiative, symbolizing a transformation from dependency to energy self-sufficiency. In its initial stages, the development of PLTMH still faced various limitations, both technically and managerially. Nevertheless, support from these external actors provided the initial foundation for the community to begin managing its own energy system independently.

Subsequently, in 2015, the Provincial Government of Central Java through the Regional Office of Energy and Mineral Resources took over and improved the operation of the power plant, which had a generating capacity of approximately 15 kW. This intervention became an important turning point in improving the quality and sustainability of PLTMH, particularly in terms of electricity supply stability. The Head of Karangtengah Village, Karyoto, explained that the development process of PLTMH experienced various challenges before reaching its optimal condition, stating: "For approximately five years, the system was not functioning optimally. Eventually, assistance from the Central Java Energy and Mineral Resources Office emerged. Currently, electricity is available 24 hours a day with stable operation. Two hamlets have now achieved electricity self-sufficiency" (Katadata, 2023). This statement demonstrates that the success of PLTMH did not occur instantly, but rather through a long process involving collaboration between the community and supporting actors.

Over time, the PLTMH in Karangtengah Village has been able to supply electricity to dozens of households. More broadly, in rural areas, PLTMH systems generally have the capacity to serve approximately 60 to 150 households depending on generating capacity and water resource conditions. Data from the Central Java Regional Office of Energy and Mineral Resources indicate that PLTMH has significant potential to independently provide electricity access for rural communities. This strengthens the position of PLTMH as an effective alternative solution amid the limitations of state electricity access, while also demonstrating that locally based renewable energy can address issues of energy inequality.

From an economic perspective, the community applies an electricity contribution system of approximately IDR 500 per kWh, determined collectively through mutual agreement. This mechanism reflects a participatory and community-based management system in which each resident plays a role in maintaining the sustainability of PLTMH operations. The contribution system not only ensures affordable electricity costs but also serves as a source of funding for maintenance and infrastructure repairs. In addition, the use of electricity meters in each household indicates that energy management has been carried out in an orderly, transparent, and organized manner, despite being community-based. This further demonstrates that the community is capable of independently managing its energy system without relying entirely on state institutions.

However, the success of PLTMH generated new dynamics when PLN began expanding into the area. According to a report by Climate Tracker, PLN approached the community on three separate occasions to acquire or take over the management of PLTMH, but these efforts were rejected by residents (Hartatik & Nurmaya, 2022). The rejection stemmed from concerns that if PLTMH were managed by PLN, the community-built power plant would eventually be neglected or no longer prioritized. In addition, residents were worried that electricity tariffs would become more expensive compared to the contribution system they had independently maintained.

This rejection demonstrates that PLTMH is not merely viewed as energy infrastructure, but also as a symbol of independence and the product of the community's collective struggle. The existence of PLTMH has shaped a new social identity for the community as a self-reliant energy-producing society. Therefore, the utilization of PLTMH in Karangtengah Village not only reflects the successful application of appropriate technology, but also reveals the socio-political dynamics involved in local energy governance, including the relationship between society and the state in competing for control over energy resources.

Actors and Their Interests in the Utilization of the Micro-Hydro Power Plant in Karangtengah Village, Banyumas

The utilization of the Micro-Hydro Power Plant (*MHPP*) in Karangtengah Village involves not only technical aspects, but also various actors with differing interests. The existence of MHPP as an alternative community-based energy source has created a space of interaction among local actors, the state, and external institutions, each of which possesses particular objectives in energy governance. Therefore, in order to understand the dynamics of the conflict, it is important to identify the actors involved along with their respective interests.

The utilization of MHPP in Karangtengah Village cannot be separated from the involvement of various actors who possess different backgrounds, roles, and interests. The presence of MHPP as a community-based alternative energy system has not only transformed the technical aspects of electricity provision, but has also created a new social configuration involving interactions between local communities, the state, and external actors. Consequently, analyzing the actors and their interests becomes essential in understanding the dynamics of conflict emerging within local energy governance.

The primary actor in the management of MHPP is the community of Karangtengah Village itself, which functions both as the manager and the consumer of energy. The community's interests are multidimensional, encompassing economic, social, and political dimensions. Economically, the community seeks to maintain affordable electricity tariffs through a collective contribution system so that energy costs remain accessible to residents. Socially, MHPP represents a symbol of collective achievement resulting from the community's struggle against limited access to electricity. Politically, the management of MHPP reflects the community's control over its own local resources. This finding is consistent with the study of Suwignyo (2024), which argues that community-based energy systems strengthen society's position in independently managing local resources. Therefore, the community's interests extend beyond merely fulfilling energy needs and also involve efforts to preserve autonomy and self-reliance.

In addition to the community, the village government plays a strategic role as an actor positioned between local interests and external pressures. The village government not only functions as a facilitator in the management of MHPP, but also acts as a mediator in reducing potential conflicts. In this context, the village government has an interest in maintaining social stability while ensuring the sustainability of MHPP operations as part of rural development. Its intermediary position requires the village government to balance the interests of local residents with pressures originating from external actors, particularly the state through national energy policies.

On the other hand, PLN acts as a state actor possessing structural interests within the energy sector. As a state-owned electricity company, PLN holds the mandate to provide electricity equitably while simultaneously expanding the national electricity distribution network. These interests are not limited to public service obligations, but also include institutional and economic dimensions such as increasing the number of consumers and integrating energy systems at the national level. PLN's repeated attempts to acquire the MHPP system in Karangtengah Village demonstrate its intention to integrate local energy systems into the centralized national electricity system. This situation indicates that energy is not merely viewed as a public utility service, but also as a strategic sector under state control.

Furthermore, several supporting actors contributed to the initial development of the MHPP, including Kodim 0701 Banyumas, Indonesia Power, and the Regional Office of Energy and Mineral Resources of Central Java. These actors shared interests in promoting renewable energy development and improving community welfare through empowerment programs. Their roles were primarily facilitative and technical, especially during the early stages of MHPP construction and capacity development. Although they were not directly involved in the conflict, their presence contributed significantly to establishing the initial foundation for community energy independence.

Table 1. Analysis of Actors and Their Interests

No	Actors	Primary Interest	Position in Conflict
1.	Karangtengah Village Community	- Maintaining energy independence - Maintaining low electricity rates (approximately Rp. 500/kWh) - Collectively managing and enjoying economic benefits - Safeguarding the results of social struggles (PLTMH as a symbol of independence)	Resistance actors (rejecting PLN's entry and maintaining PLTMH)
2.	Karangtengah Village Government	- Maintaining social stability in the community - Supporting the sustainability of the Micro Hydro Power Plant - Acting as a mediator between the community and external parties	Mediator actor (balancing the interests of the community and PLN)
3.	State Electricity Company (PLN)	- Expanding the national electricity grid - Increasing the number of customers - Integrating local energy systems into the national system	Dominant actor (attempting to acquire/enter the PLTMH area)
4.	Kodim 0701 Banyumas	- Strengthening energy distribution control - Supporting community development	Early supporting actors (not directly involved in the conflict)
5.	PT Indonesia Power	- Assisting in the provision of basic infrastructure (energy) - Supporting the development of renewable energy - Contributing to locally based energy development	Technical support actors (play a role in the early stages of development)
6.	Central Java Energy and Mineral Resources Agency	- Promoting renewable energy programs - Increasing access to electricity for rural communities - Supporting energy-independent villages	Policy facilitator actor (supports PLTMH, relatively neutral in conflict)

Source: Primary and secondary data processing

Further analysis of the interactions among these actors demonstrates the existence of differing interests that potentially generate conflict. The local community and village government tend to defend the community-based energy system because it provides direct control over resources and economic benefits. In contrast, PLN seeks to integrate the system into the centralized national electricity network. These differing interests create tensions between local energy independence and the dominance of the state-centered energy system.

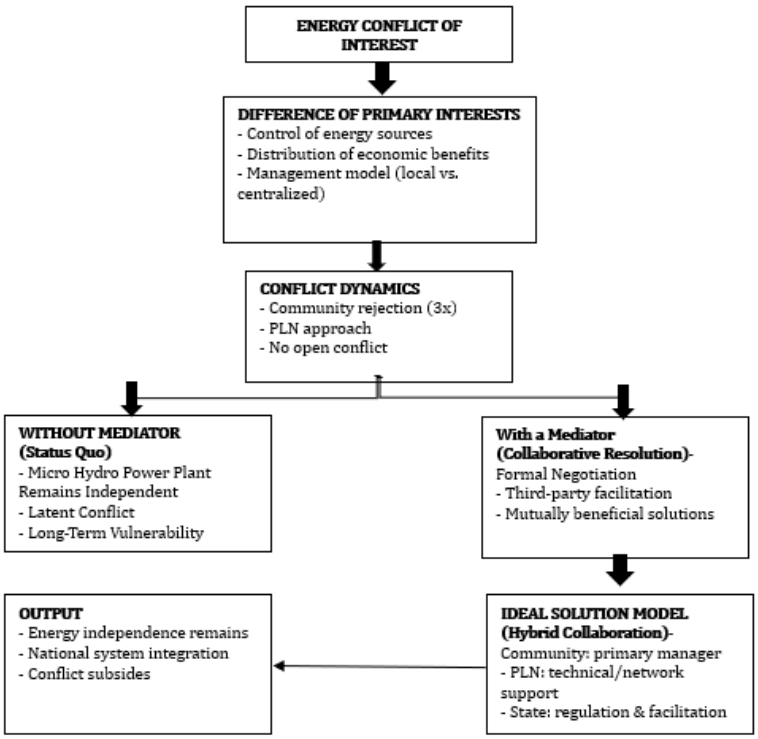
Moreover, this conflict can also be understood as a struggle over bargaining positions among the actors involved. The community possesses strength in the form of social legitimacy

and the proven operational success of the MHPP, which provides a strong basis for rejecting external intervention. On the other hand, PLN holds structural power through legal legitimacy and state support, enabling the company to continuously approach the community regarding integration into the national grid. This condition creates a form of conflict that is not openly confrontational, but instead unfolds through negotiation processes and continuous competition of interests.

Beyond the issue of power relations, the differences in interests among actors are also closely related to the distribution of economic benefits. Within the MHPP system, the community functions not only as consumers but also as beneficiaries of the economic value generated through energy management. In contrast, within the PLN system, the community is positioned merely as consumers without direct access to management authority or economic benefits derived from energy production. This distinction further strengthens the community's motivation to preserve MHPP as an alternative energy source. This finding is consistent with the argument of Hadi et al. (2025), which states that conflicts in energy governance are often triggered by unequal distributions of benefits between local actors and more dominant institutional actors.

At present, conflict resolution between the MHPP community and PLN in Karangtengah Village occurs informally through collective community resistance without the involvement of a formal mediator. However, in order to ensure long-term sustainability and prevent potential escalation of conflict, a more structured resolution mechanism is required through a collaborative approach involving a third party as mediator. Such an approach is important to bridge the differing interests between the community and the state, while simultaneously ensuring that community-based energy independence can be maintained without neglecting integration within the broader national energy system.

Figure 1. Model of the Conflict Resolution Scheme between PLTMH Managers and PLN



Source: Primary and secondary data processing

This model demonstrates that the conflict between the MHPP community and PLN can be resolved through two main approaches: a non-mediated approach (status quo) and a mediated collaborative approach. The collaborative approach represents the most ideal option because it is capable of accommodating the interests of local communities as managers of community-based

energy systems while also recognizing the role of the state within the national energy framework. In this sense, conflict resolution is not conceived as a zero-sum process in which one actor's gain results in another actor's loss, but rather as an effort to integrate competing interests into a more balanced and sustainable arrangement.

Therefore, the analysis of actors and interests in the management of the MHPP in Karangtengah Village demonstrates that the conflict is not merely caused by technical differences in energy provision, but is also shaped by power relations, bargaining positions, and the unequal distribution of economic benefits among actors. This complexity indicates that local energy governance cannot be separated from broader political dynamics of interests operating at both the local and national levels.

Analysis of Conflicts of Interest in the Utilization of the Micro-Hydro Power Plant in Karangtengah Village Through the Perspective of Karl Marx's Conflict Theory and Its Potential Failures and Solutions

The discussion regarding the utilization of the Micro-Hydro Power Plant (*MHPP*) in Karangtengah Village cannot be separated from the dynamics of conflicts of interest that accompany it, particularly between the local community and PLN. The success of the community in establishing a community-based energy self-sufficiency system has, paradoxically, generated complex interactions demonstrating that energy governance is not merely a technical issue, but also an arena of competing interests involving power relations, control over resources, and the distribution of economic benefits. To analyze this condition, the present study employs the perspective of Karl Marx's conflict theory as a framework for understanding the relationship between the community as the manager of the MHPP and the state as the holder of energy authority. This approach allows the conflict to be understood as a consequence of inequalities in the control of the means of energy production and differences in the distribution of economic benefits among actors. Furthermore, this discussion also identifies potential failures and formulates solutions aimed at maintaining the sustainability of community-based energy systems at the local level.

Analysis of Conflicts of Interest in the Utilization of the Micro-Hydro Power Plant in Karangtengah Village Through the Perspective of Karl Marx's Conflict Theory

Conflicts of interest in the utilization of the Micro-Hydro Power Plant (*MHPP*) in Karangtengah Village can be understood as a manifestation of the struggle over the control of energy resources between local actors and state actors. From the perspective of Karl Marx, social conflict emerges as a consequence of inequalities in the ownership and control of the means of production. Marx explicitly stated that "the history of all hitherto existing society is the history of class struggles" (Marx & Engels, 1848), indicating that conflict is an inherent part of social structures due to differences in interests among groups. In the context of this study, the "means of production" are no longer interpreted as industrial machinery, but rather as energy infrastructure in the form of the MHPP and electricity distribution systems.

The people of Karangtengah Village, as managers of the MHPP, represent the group that possesses direct control over locally based energy production. They not only operate the power plant, but also determine the distribution system, electricity tariffs, and the collective use of generated benefits. This condition reflects a form of communal ownership over energy resources that provides both economic and social autonomy for the community. Within the Marxian framework, this aligns with Marx's argument that ownership of the means of production determines the social position of a group within society (Marx, 1867).

On the other hand, PLN, as a representation of the state, possesses structural control over the national energy system. PLN operates within a centralized energy model that positions the state as the dominant actor in electricity distribution. PLN's repeated attempts to enter and acquire the MHPP system indicate an interest in expanding its control over energy resources. From a Marxian perspective, this expansion can be understood as an effort to integrate the means of production into a larger centralized system, as reflected in Marx's statement that "capital is dead labour, that, vampire-like, only lives by sucking living labour" (Marx, 1867), which suggests

the tendency of dominant systems to continuously expand control in pursuit of accumulation and dominance.

The conflict between the community and PLN reflects a relationship of domination and resistance. PLN, as the dominant actor, possesses formal legitimacy and structural power, while the community occupies a position of resistance by rejecting PLN's expansion into their area. This rejection is not merely reactive, but rather represents a conscious effort to maintain control over resources that the community has independently developed. In Marxian terms, such resistance can be interpreted as a form of collective consciousness (*class consciousness*) aimed at defending group interests against structural domination (Marx & Engels, 1848).

Furthermore, this conflict is also closely related to the distribution of value and economic surplus. Within the MHPP system, profits generated from electricity usage are managed collectively and redistributed for community interests. In contrast, under the PLN system, the community primarily functions as consumers without access to the distribution of economic benefits. Marx argued that "the appropriation of surplus value is the specific economic form in which unpaid surplus labour is pumped out of the direct producers" (Marx, 1867), demonstrating that inequality in value distribution constitutes the root of conflict within production systems. In this context, differences in the distribution of economic benefits between the MHPP and PLN systems further intensify the potential for conflicts of interest.

In addition, the conflict between MHPP and PLN can also be understood as a contestation between two different models of energy production: the community-based model and the state-centered model. The community-based model emphasizes participation and collective distribution of benefits, whereas the state-centered model prioritizes centralization and institutional control. This contradiction demonstrates that energy is not merely a technical commodity, but also a political arena deeply embedded with power relations.

Therefore, the analysis using Marx's conflict theory demonstrates that the conflict between the MHPP community and PLN constitutes a structural conflict rooted in differing interests regarding the control of energy production systems. The community seeks to preserve control over local resources as a form of independence and autonomy, while PLN attempts to expand control within the framework of the national energy system. Consequently, the conflict reflects not only technical issues of electricity provision, but also broader dynamics of political economy in the governance of energy resources at the local level.

Potential Failures in the Micro-Hydro Power Plant System in Karangtengah Village, Banyumas Regency and Their Possible Solutions

Despite the success of the Micro-Hydro Power Plant (*MHPP*) in Karangtengah Village as a model of community-based energy independence, the system still faces several potential failures that may threaten its long-term sustainability. These potential failures arise not only from technical factors, but also from operational management, institutional arrangements, and social dynamics within the management process. One of the primary challenges is the weakness of operational management, which may result in suboptimal electricity distribution and slow responses to technical disturbances. In addition, the dependence on certain individuals without a clear regeneration mechanism for future managers creates the risk of stagnation in the MHPP management system. Therefore, strengthening managerial capacity is essential to maintain the sustainability of this community-based energy system.

Another potential failure concerns land lease issues related to the infrastructure used for the MHPP. The land ownership status, which is not entirely under community control, creates long-term uncertainty regarding the continuity of the project. Without clear agreements between the community and landowners, the possibility of future disputes remains significant. Such conditions could disrupt the operational stability of the MHPP and potentially halt electricity production altogether. Therefore, stronger legal arrangements and clearer social agreements regarding land use are necessary to ensure the sustainability of the project.

In addition, maintenance and equipment procurement remain significant challenges in the management of the MHPP. Infrastructure components such as turbines, generators, and electricity distribution networks require regular maintenance to operate effectively. Limited

access to spare parts and the high costs of equipment procurement often become obstacles for the community in maintaining operational continuity. If maintenance is not conducted regularly, the risk of infrastructure failure will increase and may disrupt the electricity supply for local residents. Therefore, an adequate funding system and technical support from the Regional Office of Energy and Mineral Resources of Central Java are necessary to ensure the sustainability of MHPP operations.

Nevertheless, despite these potential failures, the MHPP in Karangtengah Village has continued to survive and develop due to the strong social cohesion within the community. Community self-help initiatives (*swadaya masyarakat*) have become the main driving force behind both the construction and management of the MHPP, with residents actively contributing to various aspects of the project. The culture of mutual cooperation (*gotong royong*) is particularly visible whenever technical damage occurs, as community members collectively conduct repairs without relying heavily on external actors. This practice demonstrates a strong sense of social solidarity and the community's capacity to independently manage technological systems. Thus, the success of the MHPP is determined not only by technical factors, but also by the social strength that supports and sustains the system.

Within the broader external context, the presence of PLN also constitutes a factor influencing the sustainability of the MHPP, both as a potential threat and as a potential opportunity. If the approach adopted by PLN is dominative in nature, it may intensify conflicts and weaken the community-based system that residents have independently developed. Conversely, a collaborative approach could create mutually beneficial partnerships between the community and PLN. Therefore, strategies capable of balancing the interests of both parties are essential. A collaborative governance approach may become an effective solution for preserving the sustainability of the MHPP while simultaneously maintaining community energy independence.

4. Conclusion

This study demonstrates that the utilization of the Micro-Hydro Power Plant (*MHPP*) in Karangtengah Village represents a form of community-based energy independence that emerged from limited access to state-provided electricity. Driven by collective dissatisfaction with the absence of adequate electricity services, the local community independently developed and managed the MHPP with support from various external actors. Over time, the system succeeded in generating approximately 15 kW of electricity and supplying power to dozens, and in some cases more than one hundred, households. The community-based management system, characterized by affordable electricity tariffs, has not only fulfilled local energy needs but has also contributed to the economic and social empowerment of the village community.

On the other hand, the success of the MHPP has generated conflicts of interest between the local community and PLN as the state's representative in the energy sector. This conflict emerged due to differing interests, in which the community seeks to preserve local control and energy independence, while PLN attempts to expand and integrate local energy systems into the national electricity network. From the perspective of Karl Marx's conflict theory, this condition reflects a struggle over the control of the means of energy production involving relations of domination and resistance between local actors and actors possessing greater structural power.

Therefore, the conflict surrounding the utilization of the MHPP in Karangtengah Village is not merely technical in nature, but rather constitutes a structural conflict related to the distribution of power and economic benefits in energy governance. Consequently, a more inclusive policy approach is needed by formally recognizing community-based energy systems as part of the national energy framework. In addition, PLN should prioritize collaborative engagement with local communities in order to preserve local energy independence without eliminating the role of the state. Sustainable support from the Regional Office of Energy and Mineral Resources of Central Java is also essential for maintaining the operational sustainability of the MHPP, while the community must continue to uphold participatory and transparent management practices. Through these measures, conflicts of interest in energy governance can

be managed constructively while simultaneously supporting sustainable energy development at the local level.

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