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# Inclusive Development and Community Rights in Pelabuhanratu's Just Energy Transition

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**Abstract.** Climate change urges countries to adopt environmentally friendly energy production methods. The Co-firing Power Plant in Pelabuhanratu, part of the Just Energy Transition (JETP) partnership, aims to fulfil Indonesia's commitment to energy transition while addressing local social justice issues. This research examines the complexities of local community rights in Indonesia's just energy transition, with a focus on the co-firing power plant, particularly in Pelabuhanratu. A neo-Gramscian approach is used to analyse power dynamics and social transformation through concepts of counter-hegemony and coalition-building. The research methodology includes in-depth interviews, participatory observations, focus group discussions, and document analysis to capture various stakeholder perspectives and experiences. The biomass co-firing supply chain at Pelabuhanratu involves key actors such as Panglong, Suppliers, Agents, and CFPP, who are responsible for sourcing and distributing sawdust to the power plant. While the program creates economic opportunities, the main challenges include biomass price fluctuations, price manipulation by intermediaries, and environmental impacts from biomass burning, such as air pollution and deforestation of young trees. Women's participation in the program is limited, with most locals engaged in low-skilled jobs. The research also shows that negative environmental and social impacts remain significant barriers to achieving a just energy transition. The neo-Gramscian approach reveals that, despite material benefits, local communities remain trapped in power relationships that favour the dominant class, with little room to challenge existing policies. A more inclusive and just energy transition requires the formation of alternative institutions, improved education, and better access to resources.

**Keywords:** Sustainability; renewable energy; policies; just transition

# Introduction

Climate change prompts countries to adopt environmentally friendly energy production methods, like replacing conventional power plants with co-firing facilities, and substituting coal with biomass materials such as wood pellets and palm kernel shells (Ko & Lautala, 2018; Cahyo et al., 2024) The Pelabuhanratu co-firing power plant in Jayanti Village, part of the Just Energy Transition Partnership, is projected to fulfil national commitment to energy transition and significantly fostering local social justice (Nabhani, 2023). However, inadequate management of the energy transition has resulted in impacts on the local community's fundamental rights and ecological degradation. Fish catches have declined by 80%, and deforestation from cultivating Kaliandra wood for co-firing fuel threatens local agriculture (Tanjung, 2023). This underscores the need for reassessment of the co-firing project, especially regarding local community involvement, as current participation is insufficient, leaving them marginalised and without equitable rights.

This research aims to explore the complexity of local community rights in Indonesia's just energy transition, particularly in co-firing power plants. It seeks to understand how Pelabuhanratu's co-firing power plant activities influence community involvement, benefits, and potential vulnerabilities, leading to acceptance and/or resistance. The findings are expected to inform socially just energy transitions and promote inclusivity in similar projects. The proposed research is influenced by the neo-Gramscian approach. Drawing on theories of counter-hegemony and coalition-building, the study aims to analyse how the co-firing power plant activities collaborate with various stakeholders, including local communities, government agencies, and environmental organisations, to promote inclusive development and environmental sustainability (Winkler, 2020). The research methodology involves desk studies and in-depth interviews. Desk studies examine just transition energies on humanitarian impacts, while interviews gather local perspectives on co-firing agenda development and participation. N-Vivo facilitates data coding based on research questions, ensuring comprehensive insights.

PLN's (National Electricity Company) clean energy production via co-firing power plants hit 1.04 TWh in 2023 (Benardy, 2024). With plans for 52 locations by 2025, PLN demonstrates dedication to eco-friendly tech and cutting its carbon footprint in Indonesia. However, ecological focus often overshadows inequality in the just energy transition. Just transition entails ensuring equitable benefits across societal segments (Jenkins et al., 2016). Procedural deficiencies persist, resulting in biased policies neglecting vulnerable communities (Sekaringtias et al., 2023). Hence, promoting social justice becomes crucial to prevent exclusion, especially of the most vulnerable. For instance, co-firing power plant activities lack local community involvement in clean energy management (Simanjuntak et al., 2022). Moreover, threats to local livelihoods from company activities render the community vulnerable, questioning the actual beneficiaries of co-firing power plants.

Utilising a Neo-Gramscian perspective to examine marginalisation in Pelabuhanratu co-firing, this research will delve into the discourse surrounding the development of Pelabuhanratu co-firing. Insufficient community involvement in energy project participation can lead to resistance or rejection, hindering fair access distribution and alignment with local needs. Two main challenges in implementing community participation in the energy transition are the gap between legal mandates and actual involvement, which causes tension, and the communities' lack of awareness and capacity to engage effectively. Based on this, using Pelabuhanratu co-firing power plant activities as a case study, the research aims to explore the impact of power plants on local communities and assess their involvement in the co-firing power plant ecosystem. Additionally, it seeks to determine if the co-firing power plant promotes human rights for

vulnerable groups to engage in its activities. These problems delve into the socio-economic and environmental effects of just energy transitions, focusing on community dynamics and human rights issues within the co-firing framework.

## Literature Review

The interlinkage between energy transition and social and economic impacts cannot be undermined. The change in energy generation and consumption will also impact the well-being of the society where the energy plant is located. As Miller et al. (2013) argue, the energy transition will be "one of humanity's great challenges" in the 21st century. The energy transition process requires not merely technological change but also changes in how society and people do their daily business. Despite perceiving the energy transition as a betterment for their livelihood, closing coal plants for electricity, for instance, in India, is being called a "disaster" because the transition to renewable energy will impact the workforce in coal plants (Agrawal et al., 2024). Several articles have found various social and economic impacts caused by the energy transition towards renewable energy. On the one hand, the transition towards renewable energy can harm society and environmental sustainability (Aall et al., 2022; Osman et al., 2023); they argue that the energy transition will lead to a deprivation of climate change efforts. On the other hand, the transition towards renewable energy will benefit the environment and society. For instance, a transition towards renewable energy will increase the quality of life in society, reduce pollution, and bring more prosperity since it will open many job opportunities (Aall et al., 2022; Uzondu & Joseph, 2024).

The concept of Just Energy Transition with inclusive development rights represents a critical intersection of climate policy, social equity and sustainable governance. The transition towards renewable energy is significantly affecting the community rights. Maskun et al. (2023) note that JET involves acknowledging social justice in energy policies, emphasising that it should represent and include diverse community voices in decision-making. Li & Zhang (2023) argue that it is imperative to integrate local needs and rights into the energy system design to ensure vulnerable communities are not left behind during the transition. There is a complex interplay of governance, social justice, and community engagement in ensuring inclusive development, particularly in the context of local communities. Understanding the impacts within the local communities is critical in examining inclusive development. Empowerment and social justice are essential for effective community engagement and impact assessment. Just Transition emphasises the importance of recognising distributional, procedural, and recognition justice, underscoring that the energy transition processes should be socially equitable and acknowledge the historical marginalisation of local communities (Bennett et al., 2019).

Furthermore, Gupta and Vegelin (2016) mention that sustainable development goals must integrate inclusive development to prevent ecological concerns from overshadowing the social and political dimensions traditionally overlooked in resource governance. Hence, aligning energy projects at Pelabuhanratu with the local community's needs and rights becomes vital, affecting policy formulation and implementation. Gupta & Vegelin (2016) highlight the limitations of existing research on the social impacts of the Just Energy Transition, advocating for a more comprehensive assessment that incorporates the diverse effects of energy transition on communities.

Recognising gender as a multifaceted social construct within energy transition dialogues is pivotal. Musango & Bassi (2021) argue that while there is growing concern over gender issues in the context of energy transitions, these discussions often remain understudied, failing to delve deeply into the implications for both women and men. They emphasise the necessity of a systemic

assessment where the distinct energy needs and roles of various genders are acknowledged. This highlights the importance of incorporating gender perspectives in designing and implementing energy policies, contributing to social equity.

In addition to recognising gender diversity, it is crucial to focus on how JET initiatives can promote empowerment. Kaufman et al. (2017) discuss the influence of government policies in Sweden that support gender equality across both the marketplace and home environments, demonstrating how inclusive governance can positively affect societal attitudes toward gender equity. This serves as an essential model for JET initiatives, wherein inclusive policies can create spaces for women's leadership and participation, thus enhancing the overall effectiveness of energy projects.

In transitioning from coal to biomass, there are both positive and negative effects on the environment and social aspects of societies living within the plant. The positive side is that Indonesia will accelerate the transition towards zero-net carbon emission to produce the national electricity needs up to 32.6 GW (Erdiwansyah et al., 2024), which aligns with the Sustainable Development Goals (SDGs). Furthermore, the transition towards biomass will also increase Indonesia's energy resiliency (Gulagi et al., 2025). The transition towards biomass will also impact the job creation and rural development, which subsequently foster local communities that create jobs in biomass production, harvesting, and processing (Ben-Iwo et al., 2016). The increasing demand for biomass can also leverage agricultural productivity. Therefore, the change from coal to biomass will positively affect the climate change target and social and economic aspects, particularly in rural areas like Pelabuhanratu.

However, the transition to biomass electricity production will have several negative aspects that the local and national governments should prevent. For instance, the increasing dependence on biomass feedstocks such as palm oil is also linked to deforestation and biodiversity loss (Bausano et al., 2023). Further, the unintegrated technological advancement, inadequate and incomprehensive policies, and logistical challenges in biomass collection and processing will hinder the potential of biomass as an electricity resource. Not merely from a technical and economic perspective, social understanding also matters in developing biomass energy. Incomprehensive knowledge of using biomass in producing electricity will hinder its acceptance and implementation in rural areas.

Therefore, as the transition towards biomass can result in positive and negative effects, this research is pivotal and vital to analyse whether the positive effects of the transition towards biomass will outweigh the adverse effects on society in Pelabuhanratu. The complexities of inclusive development within the framework of Just Energy Transition at the Pelabuhanratu co-firing power plant underscore the urgent need to integrate local community rights and voices in environmental governance. This research examines the influence of the Just Transition Energy plan in Pelabuhanratu, Indonesia, on regional communities. The objective is to attain a profound understanding of the effects and impacts of the energy transition on these communities. Furthermore, this study will investigate the responses of both local and national governments to the social and economic challenges that emerge from the energy transition program.

A neo-Gramscian concept of hegemony posits that hegemony emerges from contestation among competing ideologies. The dominant class sustains its supremacy through forms of consent and coercion that are vastly experienced as natural rather than as overt domination. Neo-Gramscian hegemony theory thus offers a lens for analysing power and control within a society's social-economic structures. Employing this framework, the study will examine the economic, sociocultural, political, and environmental contexts embedded in the Pelabuhanratu coal-fired power plant's supply chain. Core concepts, ideology, hegemony, material conditions (fundamental conditions), and social forces (agents of change) serve as analytical anchors for

unpacking the dynamics of structural domination operating throughout the Pelabuhanratu supply chain.

# Method

This research is grounded in primary data collection through in-depth interviews and field observations of key actors involved in the biomass co-firing supply chain of the Pelabuhanratu CFPP. Fieldwork was conducted explicitly in Jayanti Village, the host community where the CFPP is situated. The selection of Jayanti Village as a primary field site is closely linked to its direct and strategic relevance to the operational dynamics of biomass co-firing at the Pelabuhanratu CFPP.

The Pelabuhanratu CFPP was chosen as the case study for this research due to its significance as one of the 52 power plants in Indonesia that have adopted biomass co-firing since 2020. Notably, this plant is considered one of the more successful implementations of biomass co-firing in Southern Java. Moreover, it has consistently emerged in public discourse and media coverage as a prime candidate for early retirement as part of Indonesia's broader decarbonization agenda.

This selection reflects the complex dilemma surrounding energy transition strategies in Indonesia. On one hand, early retirement of the Pelabuhanratu CFPP may be necessary to achieve the country's NZE target by 2060. On the other hand, such a decision risks dismantling an emerging biomass supply chain that has successfully engaged and empowered local communities. This trade-off illustrates the tension between climate commitments and local economic sustainability.

Traditionally, the power generation sector operates through a high-technology business model, which tends to exclude low-skilled local labour. However, with the introduction of biomass co-firing, a labour-intensive economic transition has taken place. This shift has created new roles for residents as key contributors within the biomass supply chain. While this inclusion fosters local financial incentives, it also introduces new vulnerabilities, particularly if the power plant is prematurely decommissioned without an adequate exit strategy. Thus, both Jayanti Village and the Pelabuhanratu CFPP represent a crucial context for examining the social dimensions of Indonesia's energy transition.

The study employs a Neo-Gramscian analytical framework to explore the distribution of benefits, power, and participation across actors within the biomass supply chain. The multi-actor nature of this chain introduces inherent risks of inequality and asymmetrical power relations. Understanding how these actors negotiate their roles and interests is essential for assessing the degree to which the energy transition aligns with the principles of justice and inclusivity.

Furthermore, the push for energy transition in Indonesia is not an isolated domestic initiative, but a response to increasing global pressure to reduce carbon emissions. Translating this national ambition into local realities introduces complex justice challenges for communities, especially when competing interests intersect. As such, presenting a systematic and grounded perspective on these transition processes, alongside their impacts on local livelihoods, becomes a critical endeavour.

Qualitatively, the study will amplify the voices and experiences of supply chain actors, particularly marginalised groups, while also capturing the broader environmental implications. Through holistic field observations and narrative analysis in Jayanti Village, the research seeks to provide an integrated understanding of how biomass co-firing operates socially, economically, and politically in the context of Indonesia's just energy transition.

# Result and Discussion

## Mapping the Actors of Supply Chain

The Co-Firing Biomass program at the Pelabuhanratu Coal-Fired Power Plant (CFPP) plays a crucial role in Indonesia's energy transition by utilising sawdust as a biomass material mixed with coal for electricity generation. The supply chain supporting this program consists of several interconnected actors who perform different yet interdependent roles.

There are four categories of actors in the Co-Firing Pelabuhanratu supply chain: Panglong, Supplier, Agent, and CFPP. Panglong acts as the sawdust producer, selling wood waste (sawdust) to collectors or suppliers. The sawdust produced by Panglong is then purchased by the collectors/suppliers, who own trucks for transporting the sawdust. The Agent, a subsidiary of CFPP, buys sawdust from the collectors and distributes it to CFPP. To understand further, the supply chain process of sawdust procurement from the producer to the power plant can be seen in the following figure 1.

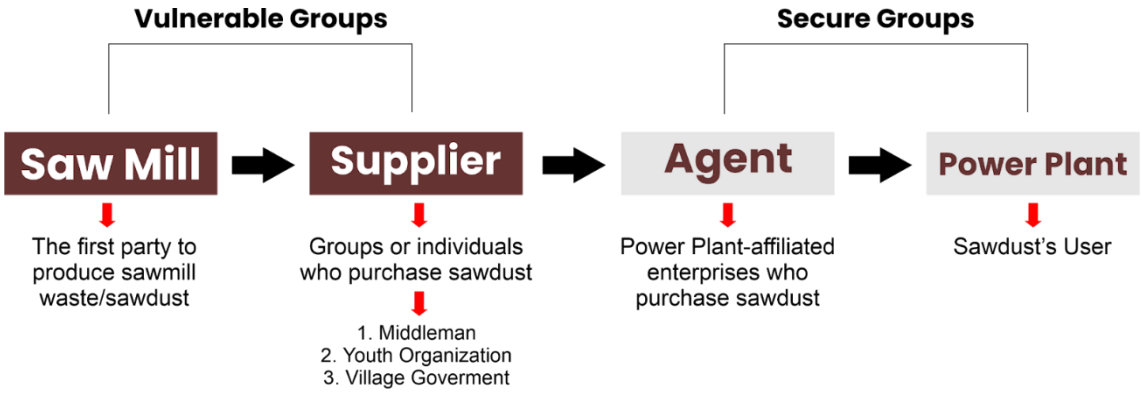


**Figure 1**. Mapping Supply Chain Sawdust of Co-Firing Biomass in CFPP Pelabuhanratu
Source: Analysis by researchers

From Figure 1, the actors involved in the sawdust supply chain can be broadly categorised into two distinct groups: vulnerable actors and secure actors. This classification reflects their capacity to influence decision-making processes, institutional recognition, and resilience to market or policy changes within the co-firing framework.

The vulnerable group comprises actors with limited bargaining power and minimal influence over key strategic decisions. These include Panglong (sawmills) and suppliers, both of which face structural disadvantages in the supply chain hierarchy. Panglong typically produces sawdust as a byproduct of timber processing rather than as a primary source of revenue. Consequently, their interest in long-term co-firing engagement is low, compounded by the uncertainty of raw material availability. Similarly, suppliers, though crucial in transportation and distribution, lack formal authority to negotiate pricing or influence policy. This dependency on both upstream producers for material and downstream actors for market access leaves them highly exposed to market volatility and policy shifts.

Conversely, the secure group includes the Agent and the CFPP, who maintain structurally dominant positions due to institutional authority and formal recognition under the co-firing program. The Agent, operating as a subsidiary of CFPP, functions as the principal intermediary, managing procurement contracts, price-setting, and supply distribution. The CFPP itself, as the ultimate consumer, determines demand and enforces compliance with energy transition targets. Both actors benefit from legal and organisational frameworks that insulate them from supply-side vulnerabilities, allowing them to exert significant control over the flow of resources and pricing structures.

In the category of stakeholders who are directly impacted, the key actors identified include Panglong, the Agent, and the Supplier. Panglong, as the leading sawdust producer, utilises wood processing waste but does not view sawdust as a long-term source of income due to limited raw materials. The Agent, positioned in the middle of the supply chain, is interested in meeting co-firing targets and plays an essential role in determining sawdust prices. The Supplier, who directly supplies to the Agent and CFPP, is highly dependent on the availability of sawdust from Panglong and plays a dominant role in the distribution and purchasing process.

In the category of stakeholders with decision-making authority or other influence, the Agent and Karang Taruna occupy significant positions. The Agent can influence the price of sawdust by regulating the distribution between Panglong and the Supplier. On the other hand, Karang Taruna acts as an informant, possessing relevant information but not directly involved in logistics or strategic decisions, thus having a low level of participation.

Panglong and the collectors are stakeholders with vital resources in this process. Panglong has wood processing machines and is the sole sawdust producer, making its role crucial in ensuring the availability of supply. Collectors, with their logistical capacity in the form of vehicles and capital, facilitate transportation from Panglong to the Agent. These two actors show high participation due to their critical role in the sawdust distribution process.

CFPP, as the final consumer of sawdust for co-firing, plays a significant role in meeting targets set by the government for the energy transition. However, despite having authority over supply needs, its involvement in the supply chain is relatively low since it is not directly involved in the collection or distribution of sawdust.

This asymmetrical relationship underscores a governance challenge inherent in the co-firing supply chain: while downstream actors control resources and policy, upstream stakeholders remain marginalised and economically insecure. Such disparities not only threaten the stability of sawdust procurement but also raise questions about the inclusivity of Indonesia's broader energy transition strategies.

## Stakeholder Interests and Influence: The Power–Interest Matrix

The dynamics described above are further illustrated in the stakeholder matrix (Figure 2), which positions actors according to their level of interest and power to influence.

| | | Power to influence | |
|---|---|---|---|
| | | **High** | **Low** |
| **Level of interest** | **High** | **Agent<br>CFPP** | **Village Government<br>Middle-Men** |
| | **Low** | **Sawmill** | **Karang Taruna<br>LPMD** |

**Figure 2**. Stakeholder Matrix
Source: Analysis by Researchers

The matrix reveals that the Agent and CFPP occupy a high power–high interest quadrant, indicating their strategic dominance. The Agent serves as a crucial intermediary linking upstream producers with the CFPP, exerting influence over pricing, supply volumes, and distribution flows. Similarly, the CFPP, as the end user, has a strong interest in securing a consistent supply of sawdust to meet co-firing targets, even though its involvement in logistics remains indirect.

In the high interest–low power quadrant, village government and collectors appear as stakeholders significantly affected by co-firing activities but with limited influence. Village authorities are concerned with local externalities such as traffic and potential revenue from

retribution fees, while collectors are motivated by their role in distribution. However, both lack formal authority to shape policy or pricing structures.

Panglong (sawmills) occupy a high power–low interest position. Although it controls a critical resource, sawdust, its low economic reliance on this byproduct reduces its engagement in long-term strategic planning for the co-firing supply chain. Finally, Karang Taruna and LPMD (Village Community Empowerment Institution) belong to the low power–low-interest quadrant, serving primarily as local facilitators and information providers without strategic roles in decision-making.

Based on this classification, strategies for strengthening the supply chain should prioritise enhancing coordination and empowering actors with high interest but low power, such as village governments and collectors, through formal inclusion in planning and incentive mechanisms. Additionally, consolidating partnerships between the Agent and CFPP, as primary controllers of the supply system, remains critical to ensuring stability and compliance with national energy transition goals.

## Community Engagement and Supply Chain Dynamics

The operational flow of the biomass co-firing supply chain involves a multi-tiered process beginning at the community level and extending to the CFPP. The business process mechanism can be conceptualised in three primary stages:

Information Dissemination and Socialisation

The average village community became aware of the CFPP biomass co-firing development program approximately 2–3 years ago, around 2022–2023. However, some local officials, such as the Secretary of Jayanti Village, reported receiving information about the program as early as 2013. In an interview conducted on April 15, 2025, the Village Secretary also highlighted the interconnection between local and global supply chains, stating:

"The first acquisition was in 2004, with partial completion by 2007, and construction commenced in 2010 or 2011. It became operational in 2012 or 2013, if I recall correctly. Regarding renewable energy, it seems that the diminishing coal reserves—partly due to monopolised exports, including sales to Australia and Japan—have contributed to shortages within Indonesia. I suspect that illicit activities also drive such shortages in areas such as Kalimantan."

Local-Level Engagement and Institutional Involvement

The operational supply chain mechanism of the CFPP biomass co-firing program is segmented into several stages. Information dissemination began with local authorities, including village heads and secretaries, who were then tasked with informing community groups such as BUMDES (village-owned enterprises), PKK (Family Welfare Movement), and youth organisations like Karang Taruna (Village Youth Organisation). The program aims to foster local employment opportunities and facilitate community empowerment through procurement processes. From the perspective of local authorities, the initiative also provides a platform to attract CSR partnerships, particularly with PT PLN Indonesia Power, to support community-beneficial projects such as the improved management of coastal wood waste.

Procurement, Processing, and Transportation

In this supply chain system, the community primarily functions as raw material suppliers, collecting and delivering wood and sawdust to authorised agents who have formal agreements with the CFPP. These agreements include pricing mechanisms for biomass materials that are used as a coal substitute. Suppliers have specific targets requested by the company. One of the problems in the supply chain mentioned in previous research is the availability of supply chain quality that has not met the qualifications of the company and coal delivery scheduling (Avita &

Yuniarto, 2015, 2). However, when sawdust availability falls short, the supply is supplemented through increased deforestation activities, often involving premature logging of young trees. This issue was underscored during a Focus Group Discussion (FGD) with members of LPMD (Village Community Empowerment Organisation) and Village Youth Organisation on April 17, 2025:

"Now, with the biomass supply activity, sawdust production has increased. The consequence of this is a rise in tree felling. It's becoming increasingly difficult to find trees that have reached the full planting cycle of five to ten years—most of the wood now is still immature."

Despite the intention to empower communities through the supply chain, actual labour absorption remains limited. Most residents are engaged as biomass suppliers or work at sawmills, with some employed in low-skilled positions such as cleaning services. As explained by the Jayanti Village Secretary:

"Many residents are employed at the CFPP, but primarily in basic roles. There are subsidiaries like Haliora and HPI, private companies under PLN, handling tasks such as coal management and grounds maintenance. Another example is Samaratu (company), a cooperative responsible for catering, administrative supplies, and other logistical needs. Various other PTs (companies) are also involved."

Moreover, women's participation in the CFPP biomass supply chain remains minimal. The research did not find evidence of women working as suppliers or agents collaborating with CFPP-affiliated companies. A representative from the Family Welfare Movement emphasised:

"There are very few women working in office roles; you could count them on one hand. We don't really understand the system. Employment often requires a formal contract—say, for six months—and insider connections are essential. Without them, it's hard to get in."

These findings illustrate that while the program generates localised economic activity, its benefits remain disproportionately skewed toward external corporate actors and intermediary agents. Communities predominantly serve as suppliers or labourers, lacking representation in strategic decision-making processes.

## Opportunities and Challenges

Implementing biomass co-firing at the Pelabuhanratu CFPP opens new business opportunities for the surrounding community, especially in providing raw materials such as sawdust, wood waste, and other agricultural residues. Community involvement in the biomass supply chain creates jobs and encourages the local economy through a circular economy approach (Nabhani 2023). However, the main challenge faced is the uncertainty of biomass prices. The purchase price is too low for buyers, such as PLN, who are often unable to cover the production and distribution costs of the community. This results in the community's profits being very thin or insufficient to meet daily living needs. Without transparent and fair price regulations, this business opportunity risks being unsustainable for local communities.

One of the significant benefits of the co-firing program is that communities can gain financial benefits from the sale of wood waste or agricultural products that previously had no economic value. The results of our interview with one of the Sawmills in Cidadap Village revealed that the additional income from selling sawdust is significantly more profitable than previously burning waste. In addition, utilising this waste also helps overcome environmental problems that previously arose due to indiscriminate waste disposal, such as that carried out by village-owned enterprises in Loji, which formed a sawdust manufacturing business from tree waste on the beach. However, this co-firing business is only used as a side business, not a primary job for most people. This is due to price fluctuations, uncertain demand volumes, and relatively small profit margins.

The allocation of proceeds from sawdust sales remains a significant issue in the area. High distribution costs are often not comparable to the income received by the community. In addition, there are price manipulation practices by collectors or intermediaries. One of the methods found is mixing sawdust sacks with water so that the weight of the scales increases when received at the CFPP, which increases the collector's profit. Still, the quality of the sawdust decreases and is detrimental to the buyer (Wicaksono 2024). This manipulation practice not only harms biomass recipient companies but also creates injustice in the supply chain and suppresses the income of biomass producer communities. This phenomenon highlights the need for transparency and stricter supervision in the biomass distribution and sales process, ensuring that all parties can enjoy fair economic benefits.

The Pelabuhanratu community is also concerned about the potential for excessive forest exploitation if co-firing is made a long-term business. The increasing demand for biomass is feared to encourage illegal logging and deforestation, especially if the supply of agricultural waste is insufficient. In addition to environmental issues, community resistance arises from air pollution from CFPP activities. The Executive Director of the Indonesian Renewable Energy Society (METI) stated that there was a 5% reduction in carbon emissions through co-firing. (Setiawan 2021) However, many residents in Pelabuhanratu report health problems such as itching and respiratory problems due to dust and emissions from biomass burning. Unfortunately, until now, there has been no significant effort from the company or government to address public health complaints systematically. This adds to the social challenges in implementing co-firing around the Pelabuhanratu CFPP (Tanjung 2023).

In general, co-firing at the Pelabuhanratu CFPP opens new business opportunities and adds types of jobs, such as truck drivers, and now also sawdust collectors. However, various studies and field reports show that the increase in community income from this business has not been able to change economic conditions significantly. Most people only receive temporary and insufficient additional income to improve their standard of living sustainably. Studies in several other areas also found that the co-firing program does increase employment, but has not had a significant impact on the welfare of the community as a whole.(Nabhani 2023) Thus, although co-firing provides new economic opportunities, structural challenges such as price, distribution, and environmental impacts remain significant barriers to creating sustainable benefits for the people of Pelabuhanratu.

## The Expectation for CFPP

The presence of a coal-fired power plant (CFPP) implementing a co-firing scheme in Jayanti Village has been met with various expectations from both local government officials and the community. The Village Secretary of Jayanti stated that the co-firing program, which currently utilises a mixture of sawdust and coal, is expected to evolve into a broader waste management solution. He emphasised that waste will remain a persistent issue as long as human life continues to exist. Thus, the utilisation of waste as an alternative fuel source is seen as a promising long-term breakthrough, especially considering the annual increase in waste volume at various locations, including within Sukabumi Regency.

In response to the initiative, the Head of Jayanti Village proposed the integration of village-level programs to support the sustainability of co-firing activities. One such proposal includes a financial contribution of IDR 5,000 per truck from fuel transport fleets, to be allocated for the maintenance of village roads used by these vehicles. Additionally, he suggested the establishment of designated parking areas for sawdust transport trucks to prevent them from lining the roadside, which could disrupt traffic and daily community activities.

From the community's perspective, there is a hope that the power plant will contribute to social welfare, particularly in the area of public health. A resident expressed the expectation that the CFPP could assist underprivileged individuals, especially in addressing health issues linked to environmental impacts, such as acute respiratory infections (ARI) and various skin diseases. This reflects a broader aspiration that the presence of the CFPP not only focuses on energy production but also considers its social and health impacts on the surrounding population.

There are several environmental impacts of CFPP operation in Jayanti Village based on the local government and community members' perspectives. The operation of the coal-fired power plant (CFPP) in Jayanti Village has resulted in various environmental impacts experienced by the local community. One prominent issue is noise pollution caused by the chimney-cleaning process. According to the Secretary of Jayanti Village, during this procedure, the CFPP emits a loud noise similar to the sound of boiling water, lasting approximately 15–20 minutes. This maintenance activity occurs every three months and is typically preceded by notifications from the CFPP to the surrounding residents. However, it was noted that during the early stages of the plant's operation, the chimney cleaning was carried out without any prior announcement, leading to significant discomfort among villagers.

Similar concerns were raised by A. Agur, a resident living in proximity to the CFPP. He stated that machine noise is audible daily and disrupts the lives of nearby residents. Although the level of noise has reportedly decreased compared to the plant's early operations, the continuous sound of machinery remains a significant source of disturbance. As such, the ongoing operations are perceived as falling short of environmentally friendly standards.

Another reported impact is the increase in ambient temperature. A local wood-processing business owner mentioned a prevailing perception among community members that the local environment has become noticeably warmer since the CFPP began operating. While no scientific data currently substantiates this claim, the community's perception reflects growing concern regarding microclimatic changes potentially linked to the power plant's presence.

Additionally, coastal communities that rely on fishing have reported a reduction in fish populations around the CFPP. Local fishermen believe that the difficulty in catching fish in nearby waters may be related to the plant's operation, although this assumption has yet to be confirmed by empirical research. On land, the reduction in green space has also become an issue, according to A. Agur, since the establishment of the CFPP, there have been no reforestation or greening initiatives. The company's activities appear to be focused solely on creative economic development, with limited attention to ecological sustainability.

Although the co-firing program implemented by the CFPP is intended to reduce greenhouse gas emissions by incorporating biomass, particularly sawdust, this initiative has generated new environmental concerns. According to the Village Community Empowerment Institution (LPMD) and the Jayanti Village Youth Organization (Karang Taruna), the CFPP consumes approximately 4,000 tons of sawdust per month. If one ton of sawdust requires an average of 30 cubic meters of wood, and a single tree yields only about four cubic meters, then thousands of trees must be felled each month to meet the biomass demand. Consequently, the large-scale use of sawdust risks contributing to significant deforestation, potentially undermining the emission-reduction goals of the co-firing program itself.

## Hegemony of Energy Transition in Neo-Gramscian Analysis

The current global challenges manifest in various interrelated crises that are difficult to contain. One crisis can exacerbate another, creating a domino effect that worsens the international situation. For example, the increase in carbon emissions not only triggers climate change but also demands comprehensive and just energy transition policies. The challenges include technological

gaps, access to funding, and resistance from sectors that have long relied on conventional energy sources. Nevertheless, the energy transition remains a crucial component of the ongoing global call for sustainable development.

The energy transition presents challenges that go beyond the energy crisis itself, extending into various dimensions of downstream crises such as economic, political, social-cultural, and environmental issues. The neo-Gramscian theoretical approach within the framework of just energy transition opens up a broad space for debate in assessing the extent to which the parameters of a just transition are achieved across all aspects. The objective is to ensure that a just energy transition does not become a boomerang that further worsens social conditions. In this regard, no party should be left behind or neglected (Winkler, 2020).

Gramsci, through his theory of hegemony, succeeded in unveiling the transformation of power relations within established social structures. Hegemony signifies a disparity between the dominant and the dominated classes. The process of hegemony does not necessarily operate physically, but through the establishment of certain consensuses. Among other things, Gramsci's concept of cultural hegemony refers to ideas and ideologies shaped by material conditions (Winkler, 2020). The dominant class plays this role by creating a consensus that emphasises material centrality. In this way, the dominant class not only controls the economic structure but also the entire structure of social consciousness (Newell & Ford, 2021). Hegemony functions as a form of cultural, moral, and intellectual leadership exercised by dominant groups. It is often sublimated into various institutions, media, religion, and everyday practices, shaping a shared worldview accepted by both dominant and subordinate groups (Blondeel, 2019).

Gramsci's concept of hegemony is closely linked to the material basis of society. It refers to the domination of a social class within the political and economic system, relying on the legitimacy of consent and coercion (Heras, 2024). Material conditions are the primary premise that allows an ideology to be produced to build public belief in its ideological truth. What is accepted as truth is derived from material conditions, or what Gramsci refers to as the fundamental conditions. Class disparities and discrimination inevitably collide with material conditions, thereby creating the categories of the bourgeoisie and proletariat (subaltern) within a social structure.

In the supply chain structure of the biomass co-firing project at the Pelabuhanratu power plant, the agent (subsidiaries of the power plant) and the power plant company represent the dominant class. At the same time, the suppliers (drivers and collectors) and the wood-processing workshop (panglong) constitute the subaltern class. Economically, the dominant class (CFPP) serves as the provider of employment, thereby having the right to control the economic life of the community. The consequences of economic threats weaken resistance, making subaltern groups vulnerable due to their financial conditions. Similarly, the selling price of sawdust to agents (Rp. 320/kg) is excessively low, and the buying price from suppliers is governed by a free market dynamic due to price control by the agents. Furthermore, the scarcity of wood poses a serious issue for the workshop. These vulnerabilities result in no alternative but to depend on the agent's price determinations, the free market, and wood availability.

In the Neo-Gramscian approach, key concepts such as culture, social norms, and ideology represent forms of control based on consensus that are accepted as truths by the broader society. In other words, hegemonic capacity lies in the ability of ideological leadership to shape the common sense of subaltern groups in such a way that they end up legitimising their own subjugation (Haas, 2019). Accepting conditions without questioning or challenging the situation faced by subaltern groups constitutes a form of passive consent (Haas, 2019). This condition does not require much effort from the bourgeoisie to maintain control over the social consciousness structure of the subaltern class. Similarly, in the village of Loji, one of the communities directly

affected by the Pelabuhanratu power plant, the residents passively accepted their circumstances without daring to question the social, environmental, and health issues they face.

In another form, Gramsci observed that active consent from subaltern groups is highly likely to occur. Specifically, when the surplus value outweighs the material conditions of the subaltern class, they will actively participate in endorsing, supporting, and producing those social conditions (Haas, 2019). This is evident in the active role of the people of Jayanti Village in supporting the biomass co-firing program at the Pelabuhanratu power plant. Among other things, the creation of new jobs for 70% of the village population (unskilled labourers) with minimum wage rates, their support for truck mobilisation activities by proposing a toll-free (Rp 5,000/truck) for road improvements and receiving special treatment from the Pelabuhanratu power plant company, all illustrate this active involvement.

The community, as an actor not directly involved in the supply chain, has the potential to generate counter-discourse. This is because the public was not included explicitly in the design and implementation of the co-firing program, which may lead to passive acceptance of the policy. Counter-discourse is likely to emerge if there is potential resistance from the community, especially when the community suffers significant losses in areas such as health, for example, the spread of skin diseases, acute respiratory infections (ARI), and other conditions.

The supply chain structure of the biomass co-firing at the Pelabuhanratu power plant requires a transition strategy that is more just and inclusive. First, one alternative strategy within the Neo-Gramscian approach is to implement counter-hegemony or counter-discourse from the subaltern groups. This strategy is feasible to challenge dominant assumptions, beliefs, and established behavioural patterns (Blondeel, 2019). Second, building community capacity with coherent and revolutionary common sense through ideological training and political struggle (Haas, 2019), third, developing alternative institutions as political space and economic supporters for the community, such as organising Village-Owned Enterprise (VOE), cooperatives, and multi-stakeholder forums and fourth, strengthening the resource and material base. Open access to education enables the development of a more educated younger generation.

In addition to the discussion given by the Neo-Gramscian approach, the CFPP in Pelabuhanratu will also be analysed by the Just Transition Framework. The Just Transition Framework, as highlighted by the CIPP, includes the three competing interests of energy security, energy equity, and environmental sustainability (Imelda, n.d). The CIPP defines the just transition as an energy transition in which the resulting social, economic, and ecological risks and opportunities are equitably distributed among stakeholders according to their capacity and conditions, affirmatively enabling vulnerable underserved stakeholders to participate in decision-making that mitigates the risks and captures benefits from opportunities (Imelda, n.d). Furthermore, it consists of three main foundations: human rights, gender equality, and accountability. The two pillars feed into a set of standards, level three of the framework, that represent various areas in which JETP investment may have impacts (Imelda, n.d). The diagram lies as follows:

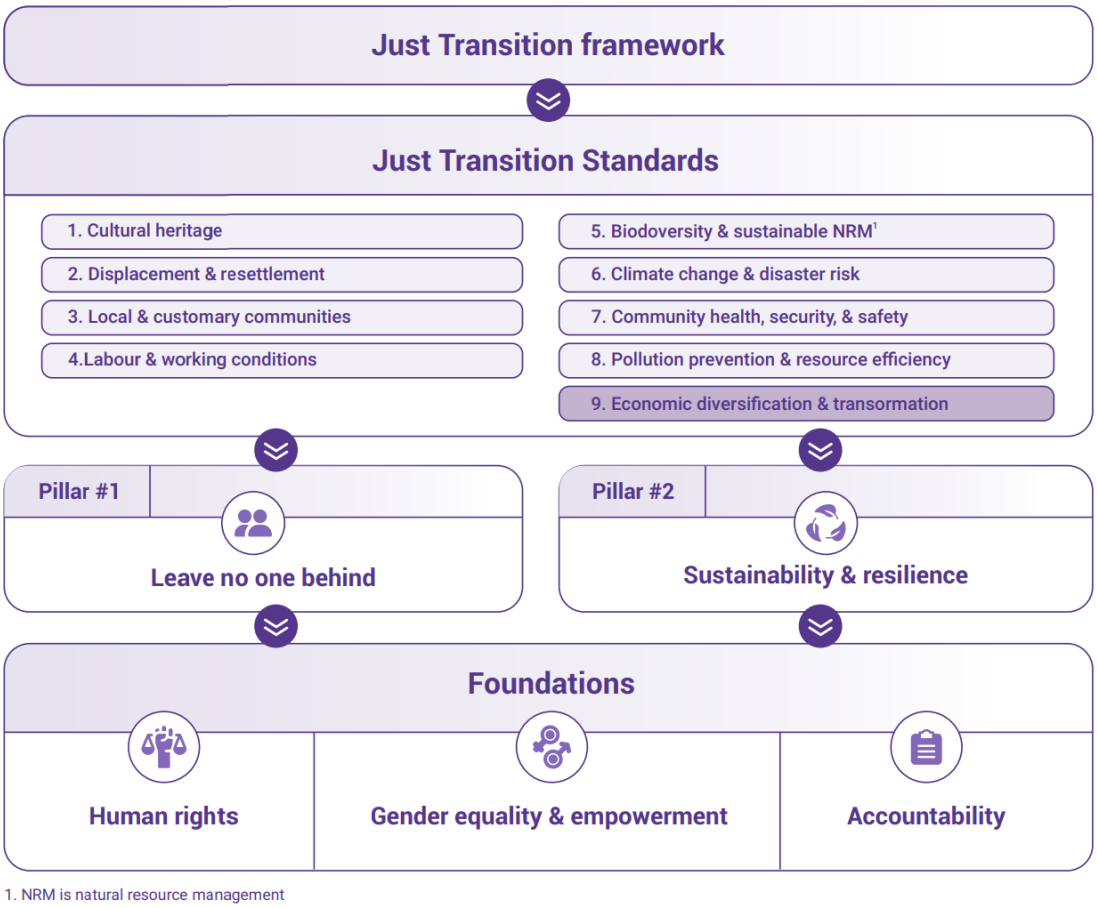


**Figure 3**. JETP Indonesia's Just Transition Framework (JETP Indonesia Secretariat, 2023)

In short, the Just Energy Transition aims to cover three aspects: economics, social, and environment. In the economics aspect, the JETP aims to create new jobs for the locals with a livable wage to reduce the economic gap. Furthermore, in the social aspects, the JETP aims to protect human rights and empower gender equality. Lastly, in the environment, the JETP seeks to facilitate an energy transition by defunding and transitioning away from fossil fuels. As mentioned above, the JETP aims to ensure that the resulting economic, social, and environmental impacts are equally beneficial to all stakeholders and those involved. However, how about the implementation of JETP in the Co-firing Power Plant in Pelabuhan? How is the reflection of the JETP there? The answers are below.

In the Co-firing Power Plant in Pelabuhanratu District, Sukabumi, the primary fuel used to support the power plant is through sawdust particles. The sawdust is made from the wood shavings and other waste left over after trees are cut. From the supply chain of the sawdust, there can be seen the economic impact on the local people. The sawdust business creates new jobs for the locals, as there must be some people who collect trees and saw them until they become dust. In the second layer of the supply chain, the dust is then distributed by the supplier and brought to the power plant by local trucks. The sawdust business is proven to create new jobs for the locals with a livable wage, as they have a positive calculated margin in the supply chain. Furthermore, the power plant also opens jobs and hires local people for needed formal positions. Even though the jobs are not in managerial positions, 70% of the local people, mainly from the Loji District, are absorbed to work in the power plant with an approximate amount of paycheck around Rp3.000.000,00 per month, close to the UMR (Minimum Regional Wage) in the Sukabumi Region, which is Rp3.508.626,00 (Idris, 2024).

The economic benefits received by local people working in the power plant also impact the social conditions of the community. With the new jobs, the family can improve their livelihood and educate the children. However, there are some disadvantages. The JETP aims to support and empower gender equality. Nonetheless, from the findings in the field, the power plant has not yet started a specific and affirmative program for women. The jobs available to women are limited to roles, such as administrative staff or receptionists.

Meanwhile, the bigger opportunities are possessed by the man. The findings argue that this is because, according to local values, men are expected to be the breadwinners of the family, thus highlighting the importance of them getting a job to support their family. This limits the women's participation in the power plant supply chain, which can further be considered in the following evaluations of the program.

Lastly, the discussion of the final pillar is the environment. The main goal of the JETP is to shift energy use from fossil fuels to renewable sources. The use of sawdust to power the plant demonstrates a significant step toward this goal. However, two questions arise: Is using sawdust truly beneficial for the environment? And is co-firing proven to be effective in all aspects? Sawdust is produced from trees. These trees are reportedly supported by BUMN (Indonesian State-Owned Enterprises), Perhutani–State Forestry Corporation. Due to high demand for trees, new planting areas are opened, but this leads to increased emissions (Taufiqurrohman, 2025). This problem worsens because re-growing trees takes a long time, especially with daily plant operations. As a result, emissions from new planting areas surpass those from biomass energy (Taufiqurrohman, 2025). From this analysis, using sawdust is not entirely justifiable, nor did it meet initial expectations. The supply chain for sawdust production is flawed; thus, its use is also questionable. This dilemma is mirrored in the nickel industry, which adopts the same decarbonisation concept. The government faces a dilemma: shifting to renewable energy for nickel processing either increases the final price of nickel products or raises the carbon footprint. At this point, no final consensus has been reached on which priority to choose.

There are also effects from the co-firing power plant on people's health. Community health is a key aspect of just energy standards. However, this standard appears not to be implemented correctly in the JETP at the Co-Firing Power Plant in Pelabuhanratu. After the co-firing plan was put into action, locals began experiencing skin conditions; many feel itchy and suffer from rashes. Additionally, the co-firing power plant also pollutes the air, resulting in dust and respiratory problems for the community.

Therefore, it can be concluded that the JETP at the Co-Firing Power Plant in Pelabuhanratu does not fully meet all the criteria and standards. Among the three main pillars, economic, social, and environmental, the programme only satisfies at least two, with an incomplete achievement in the social aspect since there is no ongoing initiative to promote gender equality. Particularly in terms of environmental impact, the co-firing process fails to transition into renewable energy, as it generates higher emissions during the initial supply chain to produce sawdust. The concept of 'just' energy aims to ensure that the shift from fossil fuels to renewable sources is fair and has a positive impact on social, economic, and environmental factors, especially for vulnerable groups. Judging from the impacts, the supply chain, and the fact that it does not meet all criteria and standards, it can be further concluded that the JETP at the co-firing Power Plant in Pelabuhanratu is not yet just, but there is room for improvement.

## Conclusion

This research finds that co-firing does not significantly affect the economic landscape of society. Through interviews and empirical observation, this study reveals that there is only a slight

economic and social change in accordance with this project. For males, there is a slight increase in terms of the number of job opportunities, yet these jobs are still fragile. This issue has caused an imbalance in benefit distribution between males and females. Furthermore, the society tends to act passively in the face of this imbalance, accepting the existing condition that is caused by a lack of knowledge regarding the issue and the means to advocate for their interests vis-à-vis companies and business sectors. After conducting a thorough discussion with various stakeholders, this research recommends several ways to mitigate risks and setbacks of this project. First, there is a need to enhance and adapt the technology to be more climate- and society-friendly. Second, there is a need for a comprehensive analysis of how this project will benefit not only the renewable energy transition but also the economic and social benefits.

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