

*) This English version is an interpretation of the original Indonesian version. If there are any differences in words or sentences, please refer to the Indonesian version

Critical Comments from WALHI East Java:

The Japanese Government Must Stop Financing and Practicing False Solutions at the Paiton Coal-Fired Power Plant

Introduction

Amid the escalating climate crisis, the world grapples with the urgent need to transition from fossil fuels to cleaner, more sustainable energy sources. Yet, coal consumption in Indonesia continues to rise, primarily driven by electricity generation and the industrial sector. Indonesia possesses one of the world's largest and youngest coal fleets, with the majority of power plants being less than 20 years old. In 2023, Indonesia's operational capacity reached 43.4 gigawatts (GW), with 65.6% concentrated in the Java–Bali region. Captive power plants, which are dedicated to industrial use and not connected to the grid, are anticipated to double their capacity to 17.7 GW by 2030.

However, in this endeavor, various solutions that seem promising have emerged, one of which is the use of biomass through co-firing technology. Although often promoted as a positive step towards reducing carbon emissions, this approach needs to be critically questioned. Co-firing, which involves mixing organic materials with coal in the electricity generation process, is often seen as a practical transition solution. However, co-firing not only perpetuates dependence on coal but also creates an illusion of progress in decarbonization. By continuing to rely on fossil fuels, we risk becoming trapped in an unsustainable cycle, where temporary solutions divert attention from the urgent need to invest in truly clean renewable energy.

In the practice, biomass co-firing, which combines biomass with coal in power plant boilers, has become a technology that implemented in numerous power plants worldwide. Co-firing with biomass reduces emissions by decreasing coal usage while still utilizing existing infrastructure. This makes it an attractive option for countries with extensive coal power plant fleets and abundant biomass resources.

Biomass co-firing is promoted as a solution to reduce coal usage worldwide, including in Indonesia, which is one of the largest producers and consumers of coal. Indonesia has proven coal reserves of 15,719 million tons and produced 687 million tons of coal in 2022, making it the third-largest producer in the world.¹

Furthermore, the development of bioenergy often overlooks broader social and environmental impacts. The competition between land use for bioenergy and agriculture can threaten food security and ecosystem sustainability. In this context, approaches that

¹ ESDM. (2022). Indonesian Minerals, Coal, and Geothermal Resources and Reserves 2021. <https://geologi.esdm.go.id/storage/publikasi/BZndhEYcRYSYGJHh3XKSnrEVsrE3HwbzDohxcs3veV.pdf>

do not consider long-term impacts can lead to solutions that are not only ineffective but also harmful to communities and the environment.

Coal-fired power plants in East Java continue to be maintained through the use of co-firing technology.

The National Energy Policy of Indonesia targets 23% of energy consumption to come from renewable energy by 2025, but Indonesia is lagging in achieving this target (Government Regulation No. 79/2014). The latest policy has reduced the renewable energy target to 17–19% by 2025, indicating slow adoption of renewable energy, especially from sources like wind and solar. Biomass co-firing has emerged as a false solution to reduce emissions from Indonesia's coal-fired power plants. The growth of the biomass industry in Indonesia risks exacerbating deforestation due to land use changes for planting biomass crops, which threatens local communities, biodiversity, and emission targets.

Currently, 32 power plants involved in co-firing use agricultural or industrial waste products, but future plans indicate that half of all biomass feedstocks will be sourced from dedicated energy plantations. The main challenge in this scenario is ensuring an adequate supply of biomass to meet the energy industry's needs.

In East Java, co-firing has been trialed at the Paiton Coal-Fired Power Plant, using sawdust and briquettes as biomass feedstocks with a planned minimum of 325,500 tons per year. PLN claims, which are worth verifying, that Paiton Unit 1 requires approximately 10,000 tons of coal per day, while Unit 2 requires 8,000 tons. By using biomass, the Paiton power plant reduces coal consumption by at least 325,500 tons per year, resulting in a reduction of greenhouse gas (GHG) emissions by 471,500 tons of CO₂.

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In addition to Units 1 and 2, the Paiton Coal-Fired Power Plant also has Unit 9, which implements co-firing. The total installed capacity at the Paiton power plant complex is 4,700 MW, with PLN contributing 1,460 MW to the high-voltage grid system in Java, Madura, and Bali (Jamali). For biomass feedstock, PLN collaborates with PT. Raja Muda Gemilang, a local company in Probolinggo and Situbondo, involves the surrounding community in biomass provision. They also work with the local wood industry in Banyuwangi, Situbondo to supply around 5% of the biomass co-firing at the Paiton power plant.

Perhutani is also preparing raw materials in the form of wood pellets for the co-firing trial program that combines coal and biomass supplies at the Paiton Coal-Fired Power Plant. Referring to Perhutani's statement about energy plantations in Bojonegoro, Mojokerto, Jember, and Probolinggo, they believe these areas have the potential for further development, with plant species such as Red Calliandra, Acacia, and Leucaena that can be processed into biomass fuel in the form of wood pellets for power generation.

We have found indications of the development of energy plantations through community partnerships. In Probolinggo, Perhutani and Paiton Energy have promoted cooperation through CSR for several Social Forestry Business Groups (KUPS), involving a total of 750 hectares of social forestry land. There is a suspicion that this cooperation could lead to Energy Plantations. Besides in Probolinggo, we also found potential private sector collaboration with KUPS in Mojokerto for energy plantations, especially the wood pellet business.

The Entry Of Japanese Investment That Pro False Solutions

It doesn't stop there; efforts to hinder the energy transition include delaying early retirement through false solutions such as co-firing and, more recently, the Carbon Captive Storage (CCS) project at the Paiton Coal-Fired Power Plant. Indonesia has partnered with Japan through bilateral cooperation between countries and economic cooperation with companies such as Toshiba Energy System and Solution for the CCS project, and Mitsubishi Heavy Industries and Sumitomo Heavy Industries for the biomass co-firing project.

As an important note, Toshiba Energy Systems and Solutions, a Japanese company, plans to explore the installation of carbon capture and storage (CCS) at thermal power plants owned by PLN subsidiary corporation, Nusantara Power (PLN-NP). This step aligns with Indonesia's target of achieving net zero emissions by 2060. On August 22, 2024, Toshiba announced that it had signed a preliminary agreement with PLN-NP. The targeted plants for this project include Paiton Units No. 1 and No. 2, which operate using steam turbines and generators supplied by Toshiba. Since 1981, Toshiba has supplied 32 steam turbines with a combined capacity of 8,263 MW to thermal and geothermal power plants in Indonesia. Currently, nine steam turbines with a total capacity of 1,845 MW are still operating at four thermal power plants owned by PLN-NP. Toshiba seeks to minimize the energy consumption required for CCS technology while optimizing generation efficiency at existing power plants.³

Furthermore, Mitsubishi Heavy Industries, Ltd. (MHI) and PT. PLN Nusantara Power, a sub-holding of state-owned electricity provider PT. PLN (Persero), has signed a Memorandum of Understanding (MoU) marking a significant step in the effort to initiate three technical studies related to the co-firing of lower carbon fuels. The collaboration will be implemented at power plants owned and operated by Nusantara Power, with support from Mitsubishi Power, a subsidiary of MHI that focuses on developing energy solutions.

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In more detail, in the context of this cooperation, PLN Nusantara Power and MHI are committed to collaborating in the research and development of co-firing at the Paiton

³ Toshiba. (2024, August 22). Toshiba and PLN Nusantara Power to Explore Early Application of CO₂ Capture Technology to Thermal Power Plants. Retrieved from <https://www.global.toshiba/ww/news/energy/2024/08/news-20240822-01.html>

⁴ RRI. (2023, March 4). Dorong Co-Firing Menuju Transisi Energi, PLN NP Gandeng Perusahaan Jepang. Retrieved from <https://www.rri.co.id/bisnis/179180/dorong-co-firing-menuju-transisi-energi-pln-np-gandeng-perusahaan-jepang>

Coal-Fired Power Plant. The goal of this initiative is to increase the percentage of co-firing at the Paiton Coal-Fired Power Plant from 30-50% to 100%. Co-firing is the process of mixing biomass with coal as fuel, which is considered more practical and economical compared to retiring the power plant early.⁵

The collaboration with Sumitomo Heavy Industries (SHI) has been ongoing since December 2019 and includes a study on the CFB-type boiler-generating machine at the Paiton Coal-Fired Power Plant. This study aims to prepare for the initial stage of co-firing at a percentage of 30-50%, with the hope of gradually reaching 100% biomass firing if possible. Meanwhile, the collaboration with MHI, which was signed on February 28, 2023, focuses more on the Paiton Coal-Fired Power Plant generating machine with a PC-type boiler that uses sawdust and briquette biomass.

This agreement was further strengthened when the Ministry of Economy, Trade and Industry (METI) of Japan and the Ministry of Energy and Mineral Resources (ESDM) of Indonesia signed an agreement on August 21, 2024, to establish an institutional cooperation framework. This framework aims to facilitate and enhance collaboration in driving the decarbonization of the energy sector. Previously, there was a signing of the MoU which was announced at the Asia Zero Emission Community (AZEC) Public-Private Investment Forum which was held on March 3, 2023 in Tokyo, Japan. The forum, attended by METI, served as a platform to propose various decarbonization initiatives across Asian markets, supported by the technology and expertise of Japanese companies.

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This memorandum of understanding is a continuation of a similar agreement signed with PT. PLN Indonesia Power in November 2022. This collaboration aims to develop solutions that accelerate the decarbonization of Indonesia's energy system, a critical step in addressing global climate change. It will also encourage a study focused on the Paiton Coal-Fired Power Plant, located on Java Island and owned by Nusantara Power. This study will evaluate technical aspects related to the feasibility of using biomass as an alternative energy source. Biomass, which is considered more environmentally friendly, is expected to reduce carbon emissions produced by fossil fuel power plants.

Of course, the arrival of Japanese investment to support false solutions from CCS to co-firing will further hamper the energy transition in Indonesia, especially the plan to retire the Paiton Coal-Fired Power Plant which has previously been discussed by the government and is planned to be carried out in stages with a target of 2030. The introduction of CCS and co-firing implies a postponement of the plant's retirement, and will prolonging the operation of the coal-fired power plant that should have ceased operations due to its long-standing environmental and social impacts. Moreover, this

⁵ Global Energi. (2023, March 4). Targetkan 100% Co-Firing PLTU Paiton, PLN NP Gaet Jepang. Retrieved from <https://globalenergi.co/2023/03/04/targetkan-100-co-firing-pltu-paiton-pln-np-gaet-jepang>

⁶ Ministry of Economy, Trade and Industry (METI). (2024). 2nd AZEC Ministerial Meeting MOU Abstract. Retrieved from https://www.meti.go.jp/policy/energy_environment/global_warming/azec/2nd_ministerial_meeting/2nd_AZEC_mm_mou_abstract_en.pdf

approach could exacerbate the problem by increasing emissions instead of reducing emissions from "decarbonization".

The explanation is, that although Carbon Capture and Storage (CCS) and co-firing technologies aim to reduce carbon emissions, both have the potential for significant negative impacts. CCS requires high costs and energy for installation and operation, which can reduce the efficiency of power plants while increasing fossil fuel consumption. In addition, the risk of carbon leakage and ecological impacts at storage sites are serious concerns, in addition to the potential to prolong dependence on fossil fuels. Meanwhile, co-firing can produce emissions of other pollutants such as nitrogen oxides (NOx) and sulfur oxides (SOx), as well as reduce combustion efficiency due to differences in thermal properties between biomass and coal. The use of biomass also risks causing deforestation, land conflicts, and increased emissions from long-distance transportation, while biomass from food crops can disrupt food security and increase commodity prices.

Notes to the Japanese Government

The Paiton Coal-Fired Power Plant, which has been operating for decades, is one of the old power plants that needs to be retired because since its establishment it has caused various serious problems in the environmental, social, and health sectors. On the upstream side, coal exploitation for the needs of Coal-Fired Power Plant has caused massive deforestation forced local communities to lose their land and livelihoods, and left dangerous mining pits that have so far claimed more than 50 lives, the majority of whom are children. These abandoned open pit minings are not only a physical threat but also pollute the surrounding environment, such as soil and water.⁷

At sea, the environmental impact of the Paiton Coal-Fired Power Plant operation is very much felt. The coastal ecosystem has been severely damaged, including the loss of coral reefs which are an important habitat for fish. As a result, the population of fish such as tuna which are usually caught by fishing community has decreased. Fishing community are forced to go further out to sea to fish, which increases the risk of their safety in the middle of the sea and increases fuel costs, but the catch remains minimal. This has caused many local fishermen to finally stop going out to sea and lose their livelihoods. On the other hand, coal ash produced by the Coal-Fired Power Plant also damages food crops such as corn and threatens local commodities such as tobacco. Many coconut trees have died, and even insects such as beetles, which play an important role in the ecosystem, have begun to disappear from the area.

The impacts caused by this Coal-Fired Power Plant are also very much felt in terms of public health. The emissions produced have increased cases of respiratory diseases, especially acute respiratory infection (ARI), with the incidence reaching 100 cases each year. People living around the Coal-Fired Power Plant often complain of health problems due to exposure to ash and air pollution, including shortness of breath and chronic

⁷ Styawan, W. E., Haq, A., Sudiarjo, T., & Pramandira, A. (2022). *Melihat Ulang Dampak PLTU di Tiga Wilayah: PLTU Paiton, PLTU Pacitan dan PLTU Cilacap*. Cetakan Pertama, Agustus 2022. ISBN 978-623-435-062-3.

coughing. In addition to the environmental and health impacts, the presence of the Paiton Coal-Fired Power Plant also triggers social problems. The employment system applied tends to be detrimental to workers, where many of them only get short-term work contracts, namely 3 to 6 months, with a maximum duration of 1 year. This outsourcing system often violates workers' normative rights, such as inappropriate wage payments or sudden termination of employment without compensation. Not all local residents get jobs at the Power Plant, which causes social jealousy between regions. This tension is exacerbated by the fact that work at the Power Plant tends to be temporary and does not provide long-term welfare guarantees for the surrounding community.

Given the wide and profound impacts, the Paiton Coal-Fired Power Plant is not only a source of electrical energy, but also a source of environmental, health, and social crises. The operation of the Coal-Fired Power Plant should have been stopped, as a commitment to reduce environmental damage, and carbon emissions and accelerate the energy transition to renewable energy. But what happened was the opposite, the government instead introduced the CCS and co-firing schemes as a step towards “decarbonization.” Although co-firing with biomass is often promoted as an innovative energy transition solution, its implementation in Indonesia shows that this approach can slow down the actual energy transition and is not in line with global commitments to address climate change. Japan's involvement in co-firing projects in Indonesia, especially in the Paiton Coal-Fired Power Plant, raises serious questions about the consistency of their energy policies and the environmental impacts they cause.

It should be noted that one of the main problems that arise from co-firing and CCS projects is the serious environmental and social impacts. Biomass projects often trigger land use changes and deforestation, which increase greenhouse gas (GHG) emissions and disrupt local ecosystems. Referring to the Zero Carbon Analytics report, burning woody biomass, especially for co-firing, will produce around 30% more carbon emissions than coal. In addition, it also takes 44-104 years for new trees to absorb emissions released into the atmosphere when trees are cut down. So in this context, the claim that co-firing can reduce carbon emissions is doubtful, because the negative impacts of land use changes often outweigh the expected benefits.

Meanwhile, for CCS, referring to research conducted by Thorbjörnsson et al., although CCS can limit carbon emissions from a Coal-Fired Power Plant, based on their tests, the use of CCS can increase coal consumption by around 31 percent compared to Coal-Fired Power Plants that do not use CCS.⁸ Similar to what Moreaux et al. have expressed in their research, that the implementation of CCS has several negative impacts that need to be considered. First, the high costs associated with the construction and maintenance of CCS infrastructure. Second, environmental risks such as CO₂ leakage from storage sites can cause environmental damage and health risks. Third, CCS can be a distraction from other more sustainable solutions, such as renewable energy. Fourth, the effectiveness of CCS in absorbing global CO₂ emissions is still limited. Finally, concerns regarding

⁸ Thorbjörnsson, A., Wachtmeister, H., Wang, J., & Höök, M. (2015). Carbon capture and coal consumption: Implications of energy penalties and large scale deployment. *Energy Strategy Reviews*, 7, 18-28.

environmental and health damage from capture and storage, including the potential for CO₂ leakage from storage sites, must be taken into account.⁹ This shows that instead of reducing emissions, the use of CCS increases emissions indirectly, through increased coal consumption. If the co-firing scheme is used later, the demand for biomass will also increase, which means that emissions will also increase.

In addition, the emission reduction targets set for co-firing projects are often not achieved. These projects are often influenced by business interests that prioritize short-term profits over genuine environmental protection. There is a risk that the massive expansion of the biomass industry in Indonesia could lead to increased emissions from land-use change, contrary to the intended emission reduction goals. Biomass co-firing in Indonesia, especially at the Paiton Coal-Fired Power Plant, is more of a temporary solution that risks exacerbating environmental problems. While it offers the potential for emission reductions, its negative impacts on forests and local communities make it an unlikely solution for Indonesia's energy transition. In many cases, these projects do not take into account the needs and rights of local communities, who are often the victims of land-use change driven by the biomass industry.

In this context, the Japanese government has pushed false solutions to reduce carbon emissions, such as its support for biomass or ammonia co-firing projects in coal-fired power plants and the implementation of carbon capture and storage (CCS) technology. These false steps are part of the Green Transformation (GX) policy and the AZEC concept, which in practice only extends the life of coal-fired power plants rather than retiring them. Furthermore, despite Japan's commitment to end public financing for coal and other fossil fuel projects by 2021-2022, Japan's three largest banks—MUFG, Mizuho, and SMBC—remain major financiers of the global thermal coal industry. In the future, they will finance CCS-based power plants that are considered commercially unviable and have impacts equivalent to coal.

Therefore, the Japanese government must reconsider the plan for cooperation and financing of co-firing and CCS in Indonesia. This project will undoubtedly prolong the suffering of communities in the coal mining areas and those living near coal-fired power plants, specifically the Paiton Coal-Fired Power Plant. It will extend the burden borne by the Paiton community. In fact, the idea behind the energy transition arose to stop emissions, which indirectly also stops the destruction of ecosystems, and restores people's living space so that it can be more sustainable.

Demands to the Japanese Government

Coal-fired power plants like Paiton have had a real negative impact on people's health and well-being, especially since they rely on coal, the dirtiest energy source. The proposed implementation of technologies like Carbon Capture and Storage (CCS) and co-firing are not solutions, but false solutions that only prolong dependence on fossil fuels. These

⁹ Moreaux, M., Amigues, J. P., van der Meijden, G., & Withagen, C. (2024). Carbon capture: Storage vs. utilization. *Journal of Environmental Economics and Management*, 125, 102976.

technologies are not only expensive and risky but also create new problems such as increased energy consumption, environmental damage, and additional burdens on local communities. On that basis, we call on the Government of Japan to stop supporting CCS and co-firing in Indonesia and instead push for a genuine energy transition.

The Japanese government should play a role in the development of clean, sustainable, and low-risk renewable energy. The Japanese government can play a role in encouraging the acceleration of the renewable energy transition through a grant scheme, not debt, as a form of historical responsibility, because it has been involved in dirty energy projects in Indonesia so far. For example, the Japanese government can play a role in efforts to utilize solar, wind, and micro-hydro power, which are more sustainable, low-risk, and can be applied on a community scale, while supporting Indonesia in achieving its zero-emission target without increasing losses for future generations.

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