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CHALLENGES IN THE EARLY RETIREMENT OF STEAM POWER PLANTS

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Abstract

Indonesia plans to retire coal-fired and fossil-based steam power plants (PLTU) in phases to accelerate the energy transition. This paper explores the challenges associated with the early retirement of PLTU in Indonesia. Key obstacles include the country's heavy dependence on coal, financing issues, and regulatory gaps. To address these challenges, developing alternative energy sources, innovative financial instruments, and supportive regulations is critical for expediting the energy transition. From an oversight perspective, Commission VI of DPR RI needs to encourage the National Electricity Company (PLN) to accelerate the adoption of new and renewable energy (NRE). Commission XII of DPR RI should push the government to establish a comprehensive roadmap for the early retirement of PLTU to reduce carbon emissions, decrease reliance on coal, and attract investment. From a legislative perspective, Commission XII of DPR RI needs to prioritize finalizing the drafting of the NRE Bill to support the acceleration of Indonesia's energy transition.

Introduction

At the G20 Summit in Brazil on November 19, 2024, President Prabowo Subianto announced Indonesia's plan to retire steam power plants (PLTU) and all fossil-fuel power plants within the next 15 years while adding 75 gigawatts (GW) of new and renewable energy (NRE) capacity during the same period ("Suntik mati PLTU," 2024). During a briefing on the outcomes of the 29th Climate Change Conference (COP29) on December 10, 2024, President Prabowo's Special Envoy for Energy and the Environment, Hashim Djojohadikusumo, clarified that Indonesia does not plan to shut down all coal-fired PLTU by 2040 but will instead gradually phase them out (Violetta, 2024).

As one of the world's largest coal producers, Indonesia remains heavily reliant on coal as the primary energy source for its power plants ("Suntik mati PLTU," 2024). The early retirement program for PLTU is part of Indonesia's efforts to accelerate its energy transition

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from fossil fuels, particularly coal, to cleaner and more sustainable energy sources. The initiative aims to reduce greenhouse gas (GHG) emissions, improve air quality, and decrease dependence on fossil fuels (Kementerian ESDM, 2024a). This paper explores the challenges associated with Indonesia's early retirement plans for PLTU and their implications for the country's energy transition.

PLTU Early Retirement Plan

On November 16, 2022, the Government of Indonesia and the International Partners Group (IPG) established the Just Energy Transition Partnership (JETP) during the G20 Summit in Bali to accelerate the energy transition in the electricity sector. Through JETP, Indonesia committed to achieving net zero emissions (NZE) in the electricity sector by 2050, including through the early retirement of coal-fired PLTU (JETP Indonesia, 2023).

The government is currently preparing a roadmap for the early retirement of PLTU, guided by Presidential Regulation Number 112 of 2022 on the Acceleration of Renewable Energy Development for Electricity Supply. The roadmap outlines criteria for early retirement, including plant capacity, age, utilization rates, greenhouse gas (GHG) emissions, economic added value, funding availability, and technology. The government plans to retire 13 PLTU early while ensuring economic stability, avoiding electricity supply shortages, and preventing spikes in electricity prices (Kementerian ESDM, 2024a).

Two plants, PLTU Cirebon-1 and PLTU Pelabuhan Ratu, are scheduled for early retirement before their contract terms expire in 2035 and 2037, respectively. However, as of December 2024, negotiations for these retirements are still ongoing ("Suntik mati PLTU," 2024).

Suppose Indonesia retires all PLTU early by 2040. In that case, it needs to annually reduce coal-fired power plant capacity by 3 GW, add 8 GW of renewable energy capacity to achieve a 65 percent energy mix, and integrate 4 GWh of battery storage to optimize solar energy use during nighttime peak loads (Setyawati & Sucahyo, 2024).

The early retirement of PLTU to achieve NZE in the electricity sector by 2050 presents significant opportunities. Accelerating the retirement timeline to 2040 could reduce GHG emissions, support global climate targets, and enhance investment opportunities in renewable energy (NRE). However, this acceleration requires strong commitments in funding, renewable energy infrastructure development, and social and economic mitigation strategies. These include job retraining programs and new employment opportunities for workers affected by the transition.

Challenges of Early Retirement of PLTU

The plan to accelerate the early retirement of coal-fired PLTU in Indonesia faces significant challenges, including high dependence on coal, financing issues, and regulatory barriers.

High dependence on coal remains a critical challenge. In 2023, Indonesia's installed power plant capacity reached 91,164 MW, with 50.60 percent from PLN power plants and

49.04 percent from non-PLN power plants (Kementerian ESDM, 2024b). As shown in Table 1, coal dominates PLN's energy mix, contributing to over 67 percent in recent years. Meanwhile, the share of renewable energy (NRE) in Indonesia's power mix remains low, accounting for only 12.99 percent in 2023. By the first half of 2024, this figure had risen slightly to 13.93 percent, still far from the year-end target of 19.5 percent (Kementerian ESDM, 2024c). PLN is addressing this issue by constructing a "green super grid" to connect renewable energy sources with demand centers (Nurdifa & Hidayatullah, 2024).

Financing issues also present a major hurdle. The cost of retiring coal-fired power plants is estimated at IDR 444 trillion by 2050, posing a significant challenge given the government's limited budget (Fadila, 2024). Accelerating renewable energy adoption requires an investment of around USD235 billion by 2040 to build new NRE power plants, transmission networks, and smart grids (Nurdifa & Hidayatullah, 2024). Funding sources include commitments from the JETP at USD20 billion and the Energy Transition Mechanism (ETM) from the Asian Development Bank (ADB), such as the IDR21 trillion allocated for PLTU Cirebon-1. Alternative mechanisms, such as d NRE swaps, could provide additional funding. For instance, Indonesia could negotiate an NRE of IDR94.8 trillion maturing in 2025 to be exchanged for early retirement funds for PLTU (Arif, 2024).

Regulatory barriers further complicate the transition. Article 3 paragraph (4) of Presidential Regulation Number 112 of 2022 prohibits the construction of new PLTU except in specific cases, such as industrial projects classified as National Strategic Projects. However, this exception undermines efforts to accelerate the energy transition. Additionally, funding mechanisms like JETP and ETM have faced delays due to legal uncertainties and concerns about potential state losses (Waluyo, 2024). The roadmap for PLTU early retirement, mandated under Article 3 paragraph (1) of the same regulation, remains incomplete. Moreover, the Draft Law on New and Renewable Energy, intended to serve as the legal framework for renewable energy development, has yet to be ratified.

To ensure the energy transition's success, the government needs to finalize the roadmap for PLTU's early retirement and enact comprehensive regulations. Clear and consistent policy implementation is essential for achieving Indonesia's energy transition goals.

Table 1. Primary Energy Mix of PLN Power Plants (Percent)

No.	Energy Source	2019	2020	2021	2022	2023
1	Fuel Oil (+Biofuel)	4.18	3.67	3.95	3.54	3.58
2	Gas	21.40	16.80	17.16	15.96	17.31
3	Coal	62.98	66.30	66.01	67.21	67.05
4	Biofuel	0.57	0.77	0.77	0.81	0.93
5	Hydro	6.01	7.16	6.90	7.35	6.17
6	Geothermal	5.11	5.73	5.55	5.48	5.24
7	Biomass	-	0.12	0.23	0.32	0.45
8	Other Renewable Energy (Wind)	0.33	0.22	0.19	0.16	0.20

Source: Kementerian ESDM, 2024b.

Conclusion

The energy transition through the early retirement of PLTU faces significant challenges, including high dependence on coal, financing constraints, and regulatory barriers. To overcome these issues, it is crucial to develop alternative energy sources to meet national electricity needs, implement innovative financial instruments and incentives, and establish supportive regulations to accelerate the transition.

Commission VI and Commission XII of DPR RI play a key role in ensuring the success of this transition. Commission VI needs to supervise PLN's efforts to develop and expand renewable energy. At the same time, Commission XII should encourage the government to establish a clear roadmap for the early retirement of PLTU. This roadmap should aim to reduce carbon emissions, decrease coal dependency, and attract investments in renewable energy. Additionally, Commission XII needs to expedite the completion of the NRE Bill to provide a strong legislative framework for the energy transition.

Through collaborative efforts between DPR RI, the government, and stakeholders, Indonesia can address these challenges and move closer to achieving a cleaner, more sustainable energy future.

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