Study on the Financial Implications of the Early Retirement of Coal-fired Power Plants in Indonesia

Deliverable 3: Phase 2 Executive Summary

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Glossary

ADB	Asian Development Bank
BESS	Battery energy storage system
BPP	Electricity generation basic cost (*Biaya Pokok Penyediaan*)
CAPEX	Capital Expenditures
CATA	Coal Asset Transition Accelerator
CCGT	combined cycle gas turbine
CCS	Carbon Capture & Storage
CCUS	Carbon Capture Use & Storage
CF	Capacity Factor
CFPP	Coal-Fired Power Plant
COD	Commercial Operation Date
COP	UN Climate Change Conference
CRR	Coal Retirement Roadmap
CT	Carbon Tax
DFI	Development Finance Institutions
EBITDA	Earnings Before Interests, Taxes, Dividends and Amortization
ETM	Energy Transition Mechanisms
ETP	Energy Transition Partnership
ETS	Emission Trading Scheme
EU	European Union
EUR	Euros
FCDO	UK Foreign, Commonwealth and Development Office
FIRE	Friends of Indonesian Renewable Energy
GDP	Gross Domestic Products
GHG	Greenhouse Gases
GW	Gigawatt
IDR	Indonesian Rupiahs
IGCC	Integrated gasification combined cycle
IPP	Independent Power Producer
JTM	Just Transition Mechanism
JTT	Just Transition Transaction
KEN	Indonesia's National Energy Policy
kWh	kilowatt-hour
LCDI	Low Carbon Development Indonesia

LCOE	Levelized Cost of Energy
LTS-LCCR	Long-Term Strategy for Low Carbon and Climate Resilience
MEMR	Ministry of Energy and Mineral Resources
MOEF	Ministry of Environment and Forestry
MOF	Ministry of Finance
MOSOE	Ministry of State-Owned Enterprises
$MtCO_2e$	Megatons of CO_2 equivalent
MW	Megawatt
NDC	National Determined Contribution
NRE	New Renewable Energy
ETP NZE	Net Zero Emissions Scenario
OPEX	Operation Expenditures
PLN	Perusahaan Listrik Negara
PPA	Power Purchase Agreement
PV	Photovoltaic
RE	Renewable Energy
RUEN	National Energy General Plan
RUPTL	National Electricity Supply Plan
SOE	State Owned Enterprise
STEM	Science, Technology, Engineering and Mathematics
US$	US Dollars
VAT	Value-added tax
VRE	Variable Renewable Energy

EXECUTIVE SUMMARY

The study aims to analyze, evaluate, and provide suggestions on the retirement pathways for coal-fired power plants with respect to their financial implications to PLN and the Government of Indonesia. To this end, the report will evaluate the financial and technical implications of early CFPP retirement that will feed into recommendations to ensure a just transition into a low-carbon economy.

The project started with a compilation of relevant documentation (inception report), and from there conducted a high-level analysis (Phase 1) which developed a hypothesis on the ability of PLN, the Government of Indonesia, and the power sector to cope with early retirement. The hypothesis that the Government of Indonesia (GOI) is an enabler for early retirement through its interventionist policies and has a unique opportunity to transition to a lower carbon power system given the international interest in unlocking its renewable energy potential was consulted with stakeholders. This report (Phase 3) goes a level deeper than Phase 2, in defining a common pathway, identifying fiscal impacts and consolidating a retirement decision framework. This report results in the selection of a CFPP to showcase the retirement project and the recommendations resulted from the analysis.

The government of Indonesia has historically implemented policies and measures to protect Indonesian communities from high energy prices. This has translated into subsidizing and compensating coal, oil and gas to avoid peaking in prices to vulnerable end consumers.

Today, Indonesia questions the role of coal in its long-term energy strategy in providing cheap, reliable, low-carbon energy sources. At COP26, the Government of Indonesia declared their commitment to achieving Net Zero Emission by 2060 or sooner[1]. This commitment has shaped its Nationally Determined Contribution (NDC), the Long-Term Strategy for Low Carbon and Climate Resilience (LTS-LCCR) 2050[2] and the recently published Presidential

[1] Ministry of Energy and Mineral Resources (2021, Nov 2) *Speaking at COP26, Energy Minister Gives Indonesia's Commitment to Net Zero Emission.* Head of Bureau of Communication, Public Information Services, and Cooperation. From: https://www.esdm.go.id/en/media-center/news-archives/speaking-at-cop26-energy-minister-gives-indonesias-commitment-to-net-zero-emission.
[2] Ministry of Environment and Forestry (202). *Long-Term Strategy for Low Carbon and Climate Resilience 2050*. Government of Indonesia

Regulation No. 112/2022 on Acceleration of The Renewable Energy Development for Electricity Supply[3].

The GOI reinforced its commitment to decarbonize at the G20 in Bali. The GOI announced its commitment to reach the NZE targets and announced that it would be bringing it forward 10 years to 2050 to meet the conditions set out by the Just Energy Transition Partnership (JETP). The US$20bn committed by JETP to support Indonesia could be the key enabler for Indonesia to address its coal dependence and ensure economic development and growth amid an economic transformation to a low carbon economy.

Though there are a significant number of studies and policies suggesting commitment from the Indonesian Government, there is still vagueness on how to get to the NZE targets. Many studies regarding the net zero emissions roadmap have been identified, specifically in the electricity sector. These studies have been performed by the government, including some with assistance from donors and development partners. These studies covered various energy transition pathways, including Carbon Capture and Storage (CCS)[4], Carbon Capture Use and Storage (CCUS), renewable energy and even nuclear power.[5] In addition, there is a common unfavorable view on renewable energy (RE) potential in Indonesia as the potential is inconveniently placed[6]—emphasizing the growing needs in enhancing the power system, including interconnectivity. By the number of actors and initiatives, it is evident that there is significant will from stakeholders to support the energy transition, though the government has yet to provide a clear roadmap to consider all the aspects identified by the studies conducted.

Two scenarios formulated by the consultants for this study were used to conduct the comparative analysis of the roadmaps, policy, and financial

[3] President of Indonesia. (2022, September). *Peraturan Presiden Nomor 112 Tahun 2022 tentang Percepatan Pengembangan Energi Terbarukan Untuk Penyediaan Tenaga Listrik* [Presidential Regulation No. 112/2022 on Acceleration of The Renewable Energy Development for Electricity Supply]. Government of Indonesia. https://jdih.maritim.go.id/perpres-no-112-tahun-2022

[4] The World Bank. (2015). The Indonesia Carbon Capture Storage (CCS) Capacity Building Program: CCS for Coal-fired Power Plants in Indonesia (Report No: ACS14654).

[5] These are from several studies concerning energy transition roadmaps and implications, including CFPP early retirement plan, performed by the government, PT PLN (Persero), and think tank organizations, with international supports from donors and development agencies.

[6] IESR. (2021). Indonesia Energy Transition Outlook 2022. Tracking Progress of Energy Transition in Indonesia: Aiming for Net-Zero Emissions by 2050. Jakarta: Institute for Essential Services Reform (IESR).

implications of early CFPP retirement in Indonesia. The assumptions that underlie both scenarios incorporated feedback from key government stakeholders and announcements at the G20 in Bali. A Baseline scenario and a Net Zero Emission (ETP-NZE) scenario were constructed. The Baseline scenario describes the future where no early retirement takes place but does eventually transition to a lower carbon power system, and the Net Zero Emission (ETP-NZE) scenario describes a more proactive role where CFPPs are retired early and are primarily replaced by renewable energy (RE) to reach the net zero objectives by 2050. The ETP-NZE scenario is designed to meet JETP and NDC requirements.

Coal dependency will be a significant hurdle for Indonesia to reach its NZE targets as indicated by the baseline scenario. Though Indonesia has significant ambitions to retire coal, and increase the participation of renewable energy, coal remains relevant due to 1) the expected increase in demand, 2) the pipeline of CFPPs to be implemented, 3) the current competitiveness of RE vis a vis CFPPs, where RE are still more expensive for Indonesia than the coal alternative.

Early Retirement of CFPPs can enable fiscal benefits for Indonesia and benefit PLN if done correctly. The early CFPP retirement roadmap offers two opportunities for PLN. First, it would help decrease its exposure to fuel price volatility, second, it would provide a tool to address underutilized or over-dimensioned CFPP capacity. With such, greater fiscal efficiency would be able to be reached to possibly increase economic growth potential, at the cost of greater exposure to volatility. Caution should be taken on the having this greater exposure.

Electricity subsidies' policy is the most relevant policy in terms of fiscal burden. In the ETP-NZE scenario where fixed electricity tariffs are assumed, it is calculated that subsidies would need to increase by an annual average of US$5.36 per MWh. The other less relevant fiscal impacts are on a) expenditures for the fundings payments for early retirement; b) decrease in carbon tax collection (due to the CFPPs retirement) and c) Increase in Income tax from mining companies due to coal exports.

Today there are at least 12 support mechanisms from the government for the electricity sector, the largest being the compensation to PLN for setting end-consumer electricity tariffs below the generation. PLN's dependence on government compensations and subsidies is not minor and special attention should be put into it. Governmental subsidies on tariffs and compensations from

the government make up 20% of the company's total income[7]. Early CFPP retirement can ease off the financial pressure on PLN, which is currently tied up to PPAs and liabilities. This has created not favorable conditions for PLN as it seeks to diversify and invest in the required infrastructure for transitioning to a low carbon system. The Early CFPP retirement program can retire expensive generations, finance transition, and ease up liabilities. Though, special caution must be taken on the impacts, both positive and negative, it may have on the fiscal revenue. Early retirement can reduce government revenue from corporate and income taxes, non-tax revenue and individual income taxes originating from CFPP activities. Also, it might increase fiscal burden as it might increase its expenditure originating from compensations for retirement or subsidies to finance low-carbon technologies.

There are other benefits that are included in CFPP early retirement. Excess capacity from CFPPs is the main obstacle in the energy transition of Indonesia[8]. The early retirement of CFPPs is a key action to address this issue and promote the development of less carbon-intensive energy sources. This would additionally reduce air pollution, which is a significant cause of premature deaths in Indonesia. Additionally, the energy transition would provide Indonesia with a great opportunity to not only create new jobs but also revitalize the employment sector and the economy, which will be more aligned with global trends and needs. For example, in a scenario where the energy transition pathway is aligned with the Paris Agreement's 1.5°C climate ambition, IRENA estimates that in 2050, around 20 million jobs will be in solar energy. Seventy-seven percent of this will be in PV, 15% in solar water heaters (SWHs), and 8% in concentrated solar power. Although in the same scenario 10.5 million fossil fuel jobs are expected to be lost, this number is lower than what is expected to be gained in transition-related jobs.[9] In India, where CFPP retirement is also underway, over 3.5 million jobs are expected to be created through a 500 GW non-fossil electricity capacity goal by 2030.[10]

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[7] PLN (2022) Annual Report: Transition to Net Zero Emissions. From: https://web.pln.co.id/stakeholder/laporan-tahunan

[8] Hambdi, E. and Adhiguna, E. (2021) Indonesia Want to Go Greener, but PLN is Stuck with Excess Capacity from Coal-Fired Power Plants. IEEFA.

[9] IRENA. (2021). *Renewable Energy and Jobs Annual Review 2021*.

[10] Jaiswal, A. and Lata, C. (2021) India's New Climate Target Could Create 3.5 Million Jobs. *Natural Resources Defense Council*. 9 November.

There are risks that need to be considered throughout the CFPP early retirement program. For example, an increase in social tensions in the form of strikes, riots, and protests may occur if risks are not addressed properly. A decrease in local government revenue may negatively impact the delivery of public services and maintenance of public infrastructure. Workers are also expected to lose their jobs upon the shutdown of CFPPs, not only at the CFPPs themselves but also in sectors up and down the value chain. Regional revenues may also be affected as power plants are shut down, due to an overall decrease in income and expenditures. Gender will also play a significant role in the assessment of these risks; how women are affected due to a change family dynamic and a potential increase in domestic violence should be examined.

The implementation of a net zero emissions (ETP NZE) roadmap can result in a 61% emission reduction compared to the baseline scenario. Reducing the energy sector's emissions will be key to achieving the target timely, and since the largest share of energy comes from coal-fired power plants, it is highly relevant to implement an early retirement program. The magnitude of emission reductions can make it attractive to seek result-based payments on emission reduction. Offsets derived from early CFPP retirement seem improbable.

Contractual, energy security, environmental, financial and societal considerations are considered key aspects to prioritize closure of CFPPs. The Indonesian government considers: (i) capacity; (ii) generator age; (iii) utilization; (iv) greenhouse gas emissions; (v) economic added value; (vi) availability of domestic and overseas financing; and (vii) availability of domestic and foreign technology[11]. This study has added a social element and postponed the economic added value and availability of financing, in a parallel analysis, as this framework is intended to focus on a plausible transaction, thereby making more relevant financial and technical aspects. This report thus considers: (i) Energy security: system, installed capacity and capacity factor, (ii) Environmental: emission intensity and heat rate, (iii) Financial: operating profit and years to be compensated, (iv) Contractual: ownership, and (v) Societal: regional poverty rates and the proximity to industrial hub.

A wide variety of coal transition instruments and mechanisms, proposed by both public and private sector entities are emerging across different

[11] Peraturan Presiden Republik Indonesia Nomor 112 Tahun 2022 tentang Percepatan Pengembangan Energi Terbarukan untuk Penyediaan Tenaga Listrik

geographies. The Energy Transition Mechanism (ETM)[12] is the most relevant in the Indonesian context, where it is a public-private finance vehicle launched by the Asian Development Bank (ADB) that aims for the early retirement of coal power plants in developing countries, leveraging from market-based approach, while boosting renewable energy development and growth. Other programs exist such as the ETM Country Platform, the CIF's Accelerating Coal Transition (ACT) Investment Program[13] which plans to allocate US$ 500 million to support the retirement of 2GW of CFPPs and to pilot solutions to repurpose decommissioned coal facilities[14]. The Coal Asset Transition Accelerator (CATA) of the European Climate Foundation[15] is another program, which is an open data project tool that allows to estimate what would be the cost of retiring coal-fired generation and engage the Indonesian government with financial institutions.

In general, refinancing, investment vehicles, compensation and indirect financial support are four mechanisms identified as options to design personalized financial instruments to advance the early retirement of CFPPs. Stakeholder acceptance will be a prerequisite for any financial instrument to be accepted, therefore an early coal retirement plan should be socialized through extensive engagement across the local government and society and with potential developed country sponsors and international financial institutions. In addition, depending on the interested stakeholders and their nature, either more philanthropy-oriented or more investment-oriented, the instrument will require risk-return profiles aligned to their mission. Philanthropies will require impact certainty, thereby suggesting a more results-based mechanism, and the banks will seek certainty. Indonesia's fiscal health and thereby credit rating will either be an enabler or a dissuader of investing in early CFPP in Indonesia. The fact that GOI has low debt rates makes it attractive to provide financing e.g. JETP, however, the acceptance of such should be done with caution to not increase debt significantly.

[12] ADB (2021)" Energy Transition Mechanism Introduction". From: https://www.thkforum.org/wp-content/uploads/2022/04/Energy-Transition-Mechanism-Introduction-ADB.pdf

[13] CIF. Accelerating Coal Transition (ACT) Investment Program. From: cif_act_brief.pdf (climateinvestmentfunds.org)

[14] CIF (2022) Climate investment funds endorses new blueprints unlocking $1 billion for just coal transitions in South Africa and Indonesia. From: https://cif.org/news/climate-investment-funds-endorses-new-blueprints-unlocking-1-billion-just-coal-transitions

[15] European climate Foundation (2021). "A socially just energy transition is in our grasp": New collaboration to speed up the move from coal to clean power. November 2, 2021. From: Embargoed 4 November 2021 ECF release on CATA DRAFT.docx (europeanclimate.org)

To ensure that early retirement of CFPPs in Indonesia meet its climate and social objectives, key recommendations include: (1) enhance access to external funding, (2) implement fiscal incentives to favor the investment of renewable energy, (3) develop a clear transition roadmap, (4) reduce environmental and public health impacts from electricity generation, (5) assess job opportunities and challenges from the transition to a clean low carbon power sector, (6) assess and manage socio-economic risks and impact. A carbon tax is an attractive macroeconomic tool to incentivize power producers to transition to lower carbon technologies. Additional ones could include that of energy efficiency standards, a cap-and-trade scheme, or financial incentives for low carbon technologies. A clear roadmap, aligning the different parties, a clear health commitment to disincentivize polluting activities and ensure that just transition mechanisms are put into place.

By considering technical, financial and social parameters, Ombilin units 1 and 2 were selected for the proposed early retirement program as a result of the decision framework devised to prioritize early retirement. Ombilin is highly polluting due to its low efficiency. Its operation for over 20 years has caused skin and respiratory issues among Sawahlunto residents[16]. Ombilin's early retirement would reduce GHG emissions and improve the air quality resulting in health benefits for the community. The consumption of high calorific coal is also an opportunity for that coal to be exported. The West Sumatra electric system is able to withstand the early retirement of Ombilin due to the existing overcapacity. Even after Ombilin is retired, the system would still have 500MW of overcapacity. Lastly, the low levels of poverty in the province suggest that the socio-economic impact of the retirement would not be so harsh on the local community.

This report compiles and describes the current evolving landscape in Indonesia regarding the early retirement of coal-fired power plants. It achieves an understanding of regulatory, energy system and sociopolitical factors that will define the viability of options to abate emissions from CFPPs to reach the net zero targets Indonesia has announced. This report provides an in-depth analysis on the fiscal impact of early CFPP retirement in Indonesia.

[16] Mongabay (2022) Warga di Sekitar PLTU Ombilin Keluhkan Masalah Kesehatan. From: https://www.mongabay.co.id/2022/04/12/warga-di-sekitar-pltu-ombilin-keluhkan-masalah-kesehatan/

This report highlights assumptions, missing datapoints[17] and interpretations to be used for Phase 2 deep dive analysis. This report should be scrutinized by many stakeholders to ensure a common understanding of the situation in PLN, their ambitions and priorities. By doing so, a relevant tool to support early retirement can be designed for the relevant stakeholders to prioritize CFPP early retirement. A summary presentation was also prepared to accompany the dissemination events. Meetings with relevant and interested stakeholders will be undertaken to discuss technical assumptions, and interests in the decarbonization pursuit and start ideating recommendations originating from their own institutions.

For this project to deliver the results set forth, this report will be shared and discussed with key stakeholders. Stakeholder engagement is a prerequisite for the end results to be relevant to Indonesia and its stakeholders.

This preliminary report will be shared with the relevant stakeholders and will be presented in person during the consultant trip to Indonesia in mid-February. The most relevant comments and feedback to the study will be considered and incorporated in Phase 3 of the project. Phase 3 includes a thorough development of the recommendations and regional sensitivities from early CFPP phase out.

[17] As per this report submission, a Non-Disclosure Agreement (NDA) between ETP and PT PLN (Persero)—facilitating data collection in this study—is still under the review of PLN's legal team.