ENERGY TRANSITION PARTNERSHIP

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

Deliverable 4 (g): Key Recommendations to support the establishment of early coal phase out strategy

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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

This report provides key recommendations for the Government of Indonesia to support the early retirement of coal-fired power plants (CFPPs) and promote the transition towards affordable, reliable, and clean energy sources. The recommendations focus on policy, technical, financial, and social aspects to ensure a comprehensive approach to achieve the desired goals. This report also presents the allocation of resources for the early closure of 32 Coal-Fired Power Plants (CFPPs) in Indonesia, provides recommendations to revise electricity tariffs and enhance energy efficiency and recommendations to grow renewable energy investments to comply with Indonesia's ETP NZE Scenario.

In terms of policy, it is recommended to revise electricity tariffs to better reflect the true cost of energy generation and support the financial sustainability of the state-owned enterprise, PLN. To facilitate a successful energy transition, it is crucial for the Government of Indonesia to prioritize the revision of electricity tariffs as a means to ensure the financial health of PLN and bolster the country's fiscal accounts. This report underscores the essentiality of a financially robust PLN to effectively support the early retirement of coal-fired power plants (CFPPs). Adjusting tariffs will decrease PLN's deficit and provide flexibility to invest in clean energy. The study modelled a fixed and a variable tariff scenario and concluded that the fixed tariff scenario would result in a total subsidy expense of US$319 billion by 2040, being three times greater than what the fixed scenario would require. This highlights the relevance of revising tariffs and identifying costs and benefits of tariffs and subsidies for PLN, the Government, and citizens. Energy efficiency policies should also be prioritized to reduce energy consumption and offset the costs associated with CFPP retirement. This study recommends establishing economy wide energy efficiency policies, regulations and financial mechanisms that incentivize energy efficient practices. Additionally, to achieve Indonesia's renewables targets of 23% by 2025 and 31% by 2050- the government can incentivize renewable energy resources for electricity production instead of improving existing CFPPs.

On the technical front, transforming the fragmented power system into an integrated one through transmission and distribution planning is crucial. Currently Indonesia's power system is composed of mainly 150kV lines which poses a challenge to maintaining energy security during the retirement of CFPPs, and large disparity of reserve margin which illustrated inefficiency in the system. This report identified that only the Java-Madura-Bali subsystem is interconnected though 500kV and 150kV, and the Sumatra subsystem is interconnected to

through 275kV, while the rest of the islands are isolated systems, which highlights the fragmentation of the system. Transforming the system into an integrated one will be crucial for decarbonizing Indonesia's coal phase-out in the long-term. In the short-term, overcapacity in some subsystems can be utilized to reduce retirement costs since it allows to retire the first CFPPs without the need to immediately invest in new renewables that replace them. In addition, this study suggests that a load analysis to be conducted to assess the impact of early CFPP retirement and renewable energy projects on the system. Developing transmission and distribution planning strategies will improve system flexibility and reliability.

From a financial perspective, encouraging zero-interest financing instruments catalyzes the first early retirements of CFPPs. Soft loans with zero interest rates can mobilize private investment and reduce the financial burden. These loans should involve regional governments in decision making and in the early retirement of CFPPs to identify opportunities to develop their regions. To this end, this study recommends that the loan is channeled from the central to the regional government and that the principal payment would be the responsibility of the latter. The study has concluded that PT SMI is the best suited organization to perform the transactions for this mechanism. Thorough assessments of power purchase agreement (PPA) termination costs and debt structures are recommended to be conducted to develop replicable business models and identify potential cost-saving opportunities. In addition, it is recommended that the CFPP ownership and loan structure is carefully examined to spot attractive retirement opportunities e.g., plants with low interest coverage ratios or high debt-to-equity ratios can help identify those CFPPs where a reduction in cost of capital can provide an opportunity to refinance or conduct a leveraged buyout. Transparency and stakeholder buy-in should be ensured by actively socializing the financial design parameters of the proposed mechanism. Finally, ensuring cost efficiency through third-party due diligence is crucial for financiers' assurance and to reduce greenwashing risks. **In the social domain, early development of sub-regional social programs is vital to provide green job opportunities and minimize the impact on the 17,000 affected workers and their communities.** Social programs should focus on upskilling and reskilling the workforce to transition from coal-related jobs to the renewable energy sector. ETP, the World Bank, and JTWG (Joint Technical Working Group)'s expertise can take advantage of spaces like the Just Coal Transition Platform (JCTP) to push the agenda for Just Transition programs. Existing programs such as the Preemployment Card Program, which is expected to reach 2.5 million people in 2023 with a budget of Rp 5 trillion (~US$ 350m) can be expanded to specifically

support employees impacted by CFPP retirements. in their transition to new green jobs.

The early closure of 32 CFPPs in Indonesia requires the allocation of significant resources. The estimated disbursement for the retirement of these CFPPs amounts to US$ 11,8 million (IDR 176,290 bn) or equivalent to US$ 7.6bn at present value, between 2024 and 2038. The Energy Transition Mechanism Country Platform managed by PTSMI will serve as a useful platform to attract grants, financial resources, knowledge, technical cooperation, and investment resources. Customized financial mechanisms will need to be employed based on factors such as contractual obligations, net present value and alternative technology options. Stakeholder engagement and a robust decision-making process involving government, PLN, IPPs, mining sector, private investors, NGOs and international financial institutions are crucial for the timely closure of the CFPPs.

Lastly, there are challenges associated with transitioning from a coal-based electricity system to a low carbon system. These challenges encompass legislative implementation, regulatory framework discrepancies, renewable energy tariffs, power purchase agreement practices, renewable energy certificates, and financing barriers. Currently, renewables in Indonesia account for less than 3% of the estimated national renewable potential (~400 GW). Measures to promote renewable energy include open auctions, temporary subsidies, streamlined negotiation processes, standardized power purchase agreements, and incentives for power wheeling. Enhancing transparency in the renewable energy certificate system and overcoming financial barriers are also crucial. By implementing the proposed enabling actions within their designated timeframes, Indonesia can foster an environment conducive to renewable energy investment, advancing towards a sustainable and competitive clean electricity market.

Report Structure

Report G is part of Phase 3 of the Energy Transition Partnership (ETP) funded study, focusing on recommendations to support the establishment of early coal phase out strategy. The report presents key recommendations directed to policy makers to support the implementation of Indonesia's coal phase-out efforts. The recommendations address policy, technical, financial, and social aspects that are suggested to be considered to ensure a Just Transition.

This report is part of an Energy Transition Partnership (ETP) funded study that aims to analyze, evaluate, and provide suggestions on the retirement pathways for CFPPs with respect to their financial implications to PLN and the GOI.

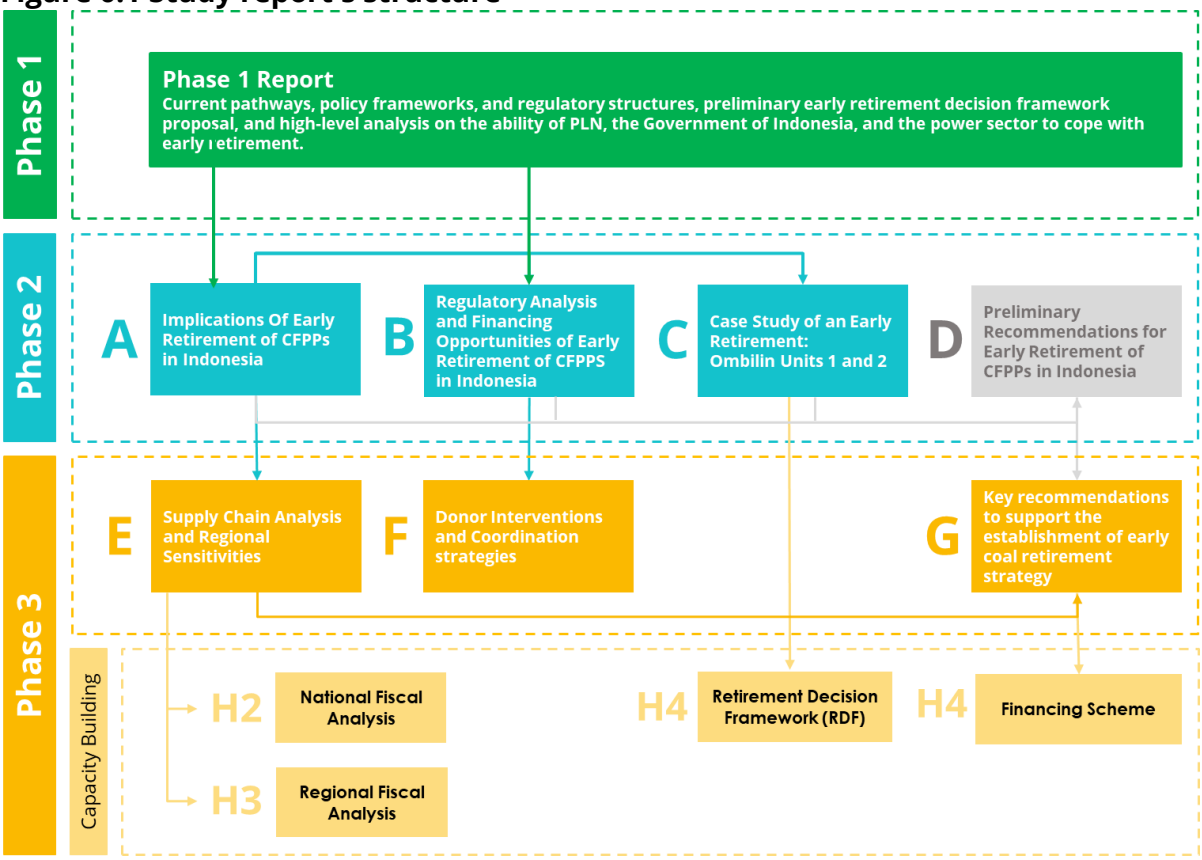
Phase 1 examined the current pathways, policy frameworks, and regulatory structures, providing insights into their implications and identifying opportunities and risks. Also provides a retirement decision framework proposal. It conducted a high-level analysis which developed a hypothesis on the ability of PLN, the GOI, and the power sector to cope with early retirement. The hypothesis that the 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. The output of Phase 1 is: Phase 1 Report.

Phase 2 of this study goes a level deeper than Phase 1, resulting in Reports A – D. In this phase the study examined the current pathways, policy frameworks, and regulatory structures, providing insights into their implications and identifying opportunities and risks, and provides a retirement decision framework proposal **[Report A]**. In addition, it analyzed the regulatory environment and financing opportunities of early retirement of coal-fired power plants **[Report B]**. This phase also showcased a retirement program using Ombilin units 1 and 2 as a case study to illustrate what early retirement would imply **[Report C]**. Finally, preliminary recommendations were presented considering the outcomes and findings of the study until the end of Phase 2 **[Report D]**.

Phase 3 takes what was produced in Phase 2 and results in Reports E to H. This phase evaluated the indirect effects of CFPP retirements on supply chains, examining their implications for short- and long-term including regional sensitivities to examine the impact on East Kalimantan and South Sumatra **[Report E]**. An in-depth analysis on donors and their activities to suggest donor interventions to support early retirement of CFPP was also conducted **[Report F].** In addition, key recommendations for policy makers to support the establishment

of early coal phase out strategy were developed refining and substituting recommendations presented in Phase 2 **[Report G].** Finally, a series of capacity building materials designed for relevant ministry staff, focusing on assessment and analysis methodologies on the retirement decision framework, fiscal analysis, and financial proposals were presented **[Report H]**.

Figure 0.1 Study report's structure



1 Introduction

The culmination of this study are these key recommendations which have undergone thorough assessments, considering their compatibility with existing policies, programs, and ongoing developments, ensuring their alignment and effectiveness. They are written in a concise matter to ensure readability for policy makers. The recommendations also come with a roadmap that strategically guides and proposes policy measures, fiscal frameworks, and resource allocation strategies.

The presented recommendations, roadmap, and findings in this report provide invaluable insights for decision-makers, stakeholders, and development partners. They establish a robust framework for concerted action and coordination, with a strong commitment to support the government in its pursuit of a sustainable, resilient, and low-carbon energy future. As a consortium and as part of the Southeast Asian Energy Transition Partnership, we remain dedicated to continuing our efforts and undertaking the necessary tasks to ensure the viability of early retirement, energy security, and a just transition to a lower carbon economy.

2 Key recommendations

2.1 Policy

Revise electricity tariffs to support PLN's financial sustainability

To facilitate a successful energy transition, it is crucial for the Government of Indonesia to prioritize the revision of electricity tariffs as a means to ensure the financial health of PLN and bolster the country's fiscal accounts. This report underscores the essentiality of a financially robust PLN to effectively support the early retirement of coal-fired power plants (CFPPs). The study proposes a comprehensive approach to revising electricity tariffs, gradually adjusting them to accurately reflect the actual costs of electricity generation. The recommended tariff adjustments primarily target sectors such as big industry, commercial and services sectors that have the capacity to bear higher tariffs, while simultaneously maintaining subsidies for low-income households, SMEs, and agriculture. By aligning tariffs with the true cost of energy generation, PLN's deficit can be reduced, providing the state-owned enterprise with greater financial flexibility to invest in affordable, reliable, and clean energy sources amidst the CFPP early retirement program. To offset any potential increase in tariffs, the study recommends implementing energy efficiency programs that facilitate technology acquisition, promote the adoption of best practices, and mobilize resources for financing energy efficiency initiatives. Detailed information on these recommendations can be found in Section 3.2 and Table 3.3, offering a comprehensive understanding of the proposed measures. This strategic tariff revision not only supports PLN's financial health but also paves the way for a sustainable energy transition in Indonesia.

As CFPPs are retired, in the short term the costs of generation are expected to increase largely due to the cost advantage of coal and the subsidies it receives. This study illustrated this situation by modelling how the generation cost would increase if CFPPs are retired, and no immediate renewable replacement is available. The analysis showed that the weighted average generation cost could increase from US$ 80/MWh to US$ 92/MWh (Chapter 2 of Report E). Therefore, revising the electricity tariffs during this period is crucial to ensure efficient cost recovery for PLN in the interim as the costs start reducing as renewable energy increases in the energy mix in the medium-term. In the long-term, phasing out subsidies entirely and reinvesting public resources in the deployment of clean and efficient technologies is essential. This will support the transition towards cleaner energy and promote economic stability in Indonesia.

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

In chapter 4 of Report A, this study conducted a modeling sensitivity analysis of two electricity tariff scenarios - fixed and variable tariffs - to assess the impact of subsidies required under each scenario on the state's fiscal condition. The findings revealed that the average subsidy rate for the period of 2023-2040 would be US$25.4/MWh under a fixed tariff scenario, and US$9.47/MWh under a variable tariff scenario. The fixed tariff scenario would result in a total subsidy expense of US$319 billion by 2040, three times higher than the variable tariff scenario. These results emphasize the importance of revising electricity tariffs. However, a more detailed analysis is necessary to understand the costs and benefits of reducing electricity subsidies for PLN, the government, and the citizens. While subsidies could be phased out for customers with payment capacity, further examination is recommended to identify viable implementation strategies for reducing subsidization in a controlled manner. By reallocating government resources towards enabling early retirement and supporting the energy transition, the government of Indonesia can mitigate risks related to fluctuations in international commodity prices, such as coal and palm oil, and reduce the need for increased subsidies to cover electricity generation cost deficits.

Prioritize energy efficiency policies

As has been partially captured by this study, early retirement of coal-fired power plants is likely to come with significant costs associated with replacing its electricity generation with renewable energy and the enhancement of the grid infrastructure, estimated at US$80 billion[1]. However, demand side energy efficiency can help mitigate some of these costs by reducing national energy consumption and by improving the efficiency of existing infrastructure. By implementing energy efficiency measures, Indonesia can reduce demand for electricity and partially offset the short-term increase in the system's generation costs that may occur because of early coal phase-out.

In 2021, the peak load reached 42,802 MW, representing a 6.8% increase from the previous year[2] and it is expected to continue increasing as electrification rates in the country grow. Implementing energy efficiency measures on the demand side can help reduce power peaks, enhancing energy security, and minimizing the reliance on fast response generation, which is typically fossil fuel based This will

[1] IRENA (2022). Renewable Pathway More Cost Effective than Fossil Fuels in Indonesia. From: https://www.irena.org/News/pressreleases/2022/Oct/Renewable-Pathway-More-Cost-Effective-than-Fossil-Fuels-in-Indonesia

[2] PLN (2022) statistics PLN 2021. https://web.pln.co.id/statics/uploads/2022/08/Statistik-PLN-2021-29-7-22-Final.pdf

contribute towards Indonesia's climate goals. Additionally, if energy efficiency is prioritized, the CFPP retirement plan could further benefit from the overcapacity in some systems, as identified by this report. These efforts could contribute to energy security and allow for retiring smaller, more inefficient CFPPs sooner.

The government should improve energy efficiency policies, regulations, and financing while retiring CFPPs. The Government should establish regulations that reflect the latest developments in efficiency policy and technology. This can include regulations that require buildings and appliances to meet certain energy efficiency standards, financial incentives such as tax credits or rebates for energy-efficient upgrades, policies that promote energy-efficient practices in the industry and the transport sector or imposing taxes on energy-inefficient technologies and products and providing incentives for efficient ones. By enhancing and promoting these policies, the government can promote energy users to prioritize efficiency and reduce their overall energy consumption.

Incentivize renewable resources for electricity production over the improvement of existing coal-fired power plants

To guide their efforts, the Government of Indonesia should clearly communicate a strategic shift towards prioritizing the development of new renewable energy sources for electricity production instead of improving existing coal-fired power plants (CFPPs). The advantages of renewable energy are evident: it provides a sustainable and cost-effective alternative to coal, a significant contributor to greenhouse gas emissions and air pollution. Moreover, the utilization of renewable resources offers opportunities for economic growth, including reduced dependence on subsidies, the capture of economic benefits through exports, job creation, and decarbonization of the power sector. Several countries have already experienced the benefits of incentivizing renewables. For instance, China witnessed a 19% increase in green jobs within the wind sector from 2020 to 2021[3]. Similarly, Morocco successfully attracted over US$5 billion in investments by crafting policies that incentivized renewable infrastructure. India, too, catalyzed more than US$20 billion in private investments for new renewables[4]. Incentivizing renewable energy entails more than just reducing import taxes on technologies; it also involves creating an enabling regulatory environment with special conditions for interconnection agreements, direct power purchase agreements,

[3] IRENA (2022). Renewable Energy and Jobs, Annual Review 2022. From: https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/publication/wcms_856649.pdf

[4] The World Bank (2022). Renewables are the key to green, secure, affordable energy. From: https://blogs.worldbank.org/energy/renewables-are-key-green-secure-affordable-energy

favorable net metering conditions for household photovoltaic applications, and facilitating financial schemes and market instruments such as renewable energy certificates. Detailed explanations can be found in section 3.3, Table 3.4 of the report.

With renewables currently accounting for less than 15%, less than 1% being variable renewable energy, of the country's energy generation, achieving Indonesia's targets of 23% by 2025 and 31% by 2050 will require significant investment and incentives. However, to achieve this, the government should establish incentives to attract investment in renewable energy. Other incentives can be applied to stimulate the development of new renewables by enabling the regulatory environment in addition to the already existent tax removal or reduction to import technologies in Indonesia to incentivize the development of new renewables e.g., special conditions for renewables in terms of interconnection agreements, direct power purchase agreements between IPPs and consumers, net metering favorable conditions for PV in household applications. Further detail on these other incentives can be found in Section 3.3.The government and its agencies could benefit from capacity building on renewable energy policies and regulations. This can be achieved through training and education programs, as well as close coordination with local governments and the private sector. In addition, providing targeted information to key stakeholders can drive investment and adoption of clean energy technologies.

2.2 Technical

Use transmission and distribution planning to transform the fragmented power system into an integrated one

The current archipelagic and fragmented power system, primarily operating at 150kV, presents significant challenges in maintaining energy security during the closure of any power plant. The study conducted has revealed that while the Java-Madura-Bali subsystem is interconnected through 500kV and 150kV, and the Sumatra subsystem is interconnected through 275kV, the majority of the islands remain isolated systems. This fragmented structure not only hampers operational efficiency but also underscores the urgent need for substantial investments in grid infrastructure.

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

IRENA estimates that around US$80 billion investment is required by 2030 to develop Indonesia's grid infrastructure[5]. By implementing an ambitious long-term retirement program for coal-fired power plants (CFPPs), it is imperative for the government to prioritize transmission and distribution planning. This strategic approach will enable the transformation of the fragmented power system into a robust and reliable network. By integrating the power system through transmission and distribution planning, Indonesia can enhance grid stability, reduce energy losses, and improve overall system resilience. This will facilitate the retirement of CFPPs by ensuring the availability of reliable alternative power sources across the network.

Indonesia can leverage from overcapacity in some sub-systems to reduce retirement costs as overcapacity would allow some subsystems to withstand, in the short-term, the retirement of CFPPs. To optimize investments, the retirement framework proposes short-term energy security analyses to be conducted at a sub-system level. The retirement plan should analyze energy security at a sub-system level and coordinate power plant closures, renewable energy deployment, and transmission investments. A load analysis should be done to model the impacts of both the early retirement of coal-fired power plants and the introduction of renewable energy projects. The impact of renewables coming online must be assessed in the load analysis to avoid congestion in the system. The results of this assessment should guide grid reinforcements and interconnections within national subsystems. Developing transmission and distribution planning strategies in parallel with the early retirement program is crucial to improve the system's flexibility and reliability.

The government should make guidelines to use the transmission and distribution systems efficiently. This includes establishing technical guidelines and transmission fees for power wheeling, implementing regulations for on-site renewable energy installation, and creating transparent guidelines for net metering schemes. The National Energy Council (DEN) is best placed to oversee the drafting and coordination of the National Plan for Indonesia's Power Sector.

[5] IRENA (2022). Renewable Pathway More Cost Effective than Fossil Fuels in Indonesia. From: https://www.irena.org/News/pressreleases/2022/Oct/Renewable-Pathway-More-Cost-Effective-than-Fossil-Fuels-in-Indonesia

2.3 Financial

Establish a zero-interest financing instrument to early retire CFPPs

Zero-cost interest rates offer an attractive opportunity to accelerate the energy transition, drive economic growth and job creation, provide stability for long-term planning, and showcase a firm commitment to sustainable development. In the current high-interest environment, immediate financing options are crucial for the early retirement of coal-fired power plants. The anticipated substitute cash flow from clean energy sources often incurs significant financial costs due to the typically high capital expenditures associated with renewable energy projects. Therefore, accessing zero-cost financing becomes even more imperative to overcome these financial obstacles and facilitate a smoother transition to cleaner energy alternatives.

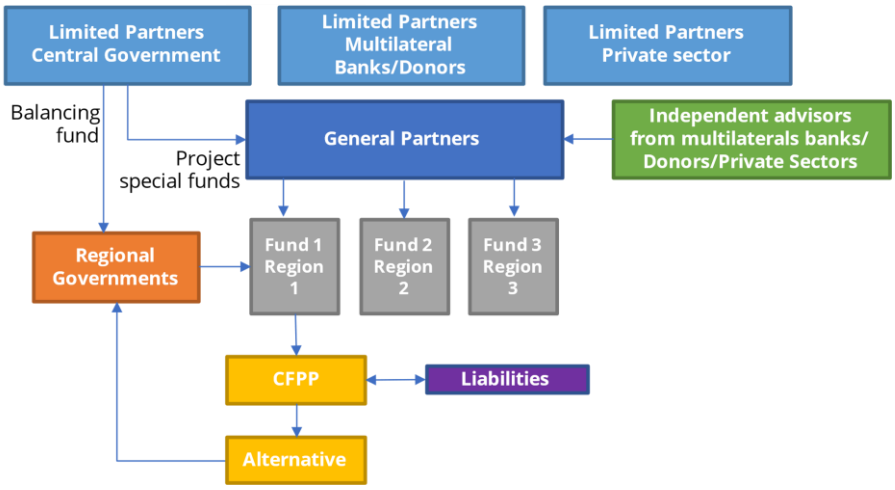
To effectively achieve the targets of CFPP retirement, it is essential to mobilize private investment through soft loans with zero interest rates. However, the high cost of ensuring energy security is hindering progress, so zero-interest loans are needed in the initial stages of CFPP retirement to quickly make financing of replacement generation viable, and to allow for large-scale CFPP retirement. One example is the Green Climate Fund (GCF), which supports developing countries in their efforts to mitigate climate change and adapt to its impacts. It provides financial assistance, including concessional loans, grants, and other instruments, to support projects and programs related to climate action. Usual requirements to access the funds include environmental and social assessments, financial viability studies, implementation plan with milestones and a robust monitoring, reporting and verification (MRV) program.

By involving regional governments and utilizing these financing mechanisms, the early retirement of CFPPs can be effectively supported, enabling regional governments to identify development opportunities and contribute to the sustainable growth of their respective regions. To ensure the active involvement of regional governments in decision-making and the early retirement of CFPPs, the zero-interest loans should include their participation. In compliance with Government Regulation 56/2018 on Regional Loans, direct loans from regional governments to foreign parties are prohibited. However, regional governments can apply for a Regional Loan, which can be sourced from the Central Government's State Budget. The State Budget consists of various funding sources, such as domestic loan forwarding, foreign loan forwarding, and other sources in accordance with laws and regulations.

To share the risk of loan repayment and overall project risk, a Public-Private Partnership (PPP) approach can be established. This allows the local government to co-own the project through the establishment of an Implementing Business Entity in the form of a Limited Liability Company. Generally, there are three types of PPP project structures: usage-based PPP, availability-based PPP, and O&M contracts.

In the loan framework, the central government can channel funds through regional governments, making the principal payment the responsibility of the regional government. The Regional Loan can be acquired by fulfilling several requirements and leveraging the various funding sources available within the State Budget. Additionally, the existing Balancing Fund, which involves the transfer of funds from the central government to regional governments through the General Allocation Fund or Special Allocation Fund, can be utilized as a penalization mechanism if the fund principal and costs are not fully recovered from replacement projects.

Figure 2.1 Finance structure proposed



PT Sarana Multi Infrastruktur (PT SMI) is the only vehicle organization that can perform the required transactions for this mechanism. The regional governments can finance the regional fund either from fiscal transfers and their own sources of revenue, or possibly involving state-owned enterprises (Figure 2.1). The findings of this study show that the central government can obtain economic rents from coal exports, thereby providing an incentive to reduce inefficient coal consumption in CFPPs. However, two major challenges in this approach include the renegotiating with each existing creditor in each CFPP and the cost of funds for PT SMI, which might make zero interest financing a low-cost financing option for CFPP. Therefore, a leveraged buyout of the CFPPs should be considered to

identify other investment opportunities with all relevant stakeholders to ensure that the principal and interest-bearing loans from the existing CFPP are paid. This will require careful coordination and collaboration between the central government, regional governments, state-owned enterprises, and other stakeholders to ensure a smooth transition and successful retirement of CFPPs. In addition, the initial process of identifying opportunities for early retirement of CFPPs through zero-cost financing has the potential to attract other types of financing, such as preferential commercial loans or even concessional public finance and grants from development agencies, for strategic projects related to renewable energy infrastructure. This can bring further benefits for the country in terms of:

(i) **Economic development as it will bring new investment.** The availability of zero-cost financing for retiring CFPPs can attract additional financial resources, including preferential commercial loans and concessional public finance from development agencies. This influx of capital can stimulate investments in strategic projects related to renewable energy infrastructure, such as wind farms, solar power plants, and geothermal projects. These investments contribute to economic growth by creating new business opportunities and attracting both domestic and foreign investment.

(ii) **Job creation from the generation sources that will replace CFPPs.** The transition from CFPPs to renewable energy sources necessitates the development and operation of new generation sources. This shift creates job opportunities across the renewable energy sector, including engineering, construction, project management, operations, and maintenance. The growth of the renewable energy industry can provide employment for skilled workers, supporting job creation and reducing unemployment rates.

(iii) **Environmental sustainability as the retirement of CFPPs will reduce Indonesia's annual GHG emissions.** By replacing CFPPs with cleaner and more sustainable renewable energy sources, such as wind and solar, the retirement process improves air quality, reduces local pollutants, and mitigates greenhouse gas emissions. This transition towards renewable energy infrastructure through zero-cost financing attracts additional funding opportunities, such as preferential commercial loans and concessional public finance, further supporting Indonesia's economic growth while promoting a healthier and more sustainable environment.

Therefore, it is crucial for the government to continue exploring and developing various financing mechanisms and engaging with relevant stakeholders to achieve the early retirement of CFPPs and accelerate the transition towards renewable energy.

PT SMI, which has been appointed as the Platform Manager of the ETM Country Platform for attracting grants, financial resources, knowledge, technical cooperation, and investment resources, should also oversee any zero-cost finance mechanism instrument that is implemented to incentivize and facilitate the early retirement of CFPPs. This will ensure a coordinated and efficient approach to the financing of the retirement of CFPPs, as PT SMI has current and experience in managing blended finance and infrastructure development and is already collaborating with various institutional partners to attract resources. As the Ministry of Finance develops the regulation that will determine the process for the allocation of resources, and the financial mechanisms that will be included to support the platform, the financial structure and transaction mechanisms should be further defined.

Conduct thorough assessments of power purchase agreement (PPA) termination costs and debt structures to develop replicable business models and identify potential cost-saving opportunities

Currently, most PPAs signed between PLN and power generators include take-or-pay clauses, which are designed to secure revenue for the generators to cover their fixed costs. However, these clauses are especially costly for PLN due to the excess installed capacity and the imposed locked fixed expenses for a period of 15 to 20 years[6]. By closely monitoring key indicators related to financial costs and opportunities, such as PPA structures, debt/equity ratios, and interest coverage ratios, the government can identify and monitor the implementation of a strategy to phase out CFPPs. Understanding the costs associated with the early termination of PPAs is essential for establishing an effective coal phase-out strategy. In particular, there is an opportunity for PLN to benefit from ending PPAs with high-capacity factor obligations that force the curtailment of other power plants.

Terminating contracts with IPPs would allow PLN to access discounts on capacity payments, as they would no longer need to be made in advance. Although specific information on the details of PLN's PPA obligations was not available for this

[6] IEA (2022), Enhancing Indonesia's Power System, IEA, Paris https://www.iea.org/reports/enhancing-indonesias-power-system

study, it is recommended that future PPA assessments analyze the differences and similarities between agreements, assess the reasonableness of penalization fees, and explore opportunities for renegotiation. Developing standardized templates with the involvement of institutions like MEMR, PLN, MOSOE, MOF, and CMMIA could also streamline the renegotiation process for PPAs, ensuring a more efficient and effective transition away from coal-fired power generation.

Additionally, the CFPP ownership structure should be carefully examined and understood. This requires support from energy lawyers to identify opportunities for renegotiation of loans e.g., lowering interest rates or through principal haircuts. By understanding common loan structures in CFPPs, plants with low interest coverage ratios or high debt-to-equity ratios can help identify those CFPPs where a reduction in cost of capital can provide an opportunity to refinance or conduct a leveraged buyout.

Ensure transparency and stakeholder buy-in by actively socializing the financial design parameters of the proposed mechanism with all relevant stakeholders

To ensure stakeholder buy-in and transparency, actively socialize the financial design parameters of the proposed mechanism with all relevant stakeholders. The relevance for these stakeholders could include:

- **For national government:** The design parameters for a zero-interest loan must include, loan eligibility criteria, amount of loan, repayment schedule, criteria to measure success in terms of retirement of CFPPs and MRV mechanisms to ensure transparency and accountability,
- **For regional government:** It must evaluate whether to include loan requirements for local content and capacity building, whether it wants to prioritize sites within the region, and mandate mechanisms to ensure that benefits accrue to local communities.
- **For PLN:** The priority will be to align loan repayment schedule with the cash flow of a RE project, and ensure that the eligibility criteria considers financially and technically viable project types e.g. size, technology and return on investment that can provide reliable and affordable electricity.
- **For CFPP employees and local communities:** Communities will want to secure a mechanism that ensures that benefits accrue to the local communities, and current CFPP employees will require capacity building to upskill and reskill to have access to new green jobs' opportunities.

Ensure cost effectiveness and transparency for financers, with third-party due diligence to reduce moral hazard and greenwashing risks

The retirement program's credibility depends on cost-effectiveness for donors, development banks, and commercial banks, which will encourage financing resources. The cost effectiveness is defined as net costs over net impact, which must be separated per relevant stakeholder. To achieve this, an *ex-ante* robust framework, including Environment and Social Safeguards, must be established, which Indonesia has demonstrated having relevant experience. Additionally, an *ex-post* Monitoring, Reporting, and Verification framework must be implemented and conducted utilizing best practices.

Separate and evaluate each relevant stakeholder's impact to clarify the costs and benefits. By taking these measures, financiers can make informed decisions regarding the early retirement of CFPPs, ensuring cost effectiveness and maximizing positive impact across all relevant stakeholders. Having due diligence by a third party can reduce moral hazard and green washing risks and can then make the retirement program more attractive to access JETP or ETM funds.

2.4 Social

Start early in developing sub-regional social programs to provide green jobs opportunities

The implementation of the early retirement program may lead to job losses, both directly and indirectly. The early retirement of the 32 CFPPs considered in this study could result in 4,000 direct jobs at CFPPs are at risk of loss by 2040. In addition, 13,000 jobs are estimated to be lost in mining activities due to lower coal demand forecasts. To minimize the impact on affected workers and communities, it is recommended that social programs be initiated well in advance of retirement. While certain skills may be transferrable from coal to renewable power plants, others may require effective upskilling or reskilling. These social programs can identify opportunities for relocation and provide upskilling and reskilling the workforce across the entire CFPP supply chain, including mining, transportation, and other suppliers. This will not only help to minimize the negative impacts of retirement, but also create new opportunities for job creation. More work needs to be done, leveraging ETP, the World Bank, and JTWG (Joint Technical Working Group)’s expertise and interest and take advantage of spaces like the Just Coal Transition Platform (JCTP) to share best practices.

The government has several ongoing programs that can support employees across the CFPP value chain in their transition to new green jobs. For example, the

Preemployment Card Program, launched in 2020 to support unemployed during the pandemic, has been a successful program that can be expanded. The program offers training scholarships and support during recruitment process, enabling beneficiaries to learn new skills, upskill and reskilling[7]. In 2023, the budget of the program was set at Rp 5 trillion (~US$ 350m), and it is expected to reach 1.5 million people[8]. The program could have an extension focused specifically on the workers that would be impacted by CFPP retirement, leveraging from the already existing structure of the Preemployment Card Program.

Separate social costs from transaction costs

To ensure a smooth and equitable transition during the CFPP retirement, it is recommended that social costs are evaluated separately from transaction costs. The compensation scheme should distinguish between those directly and indirectly impacted by the CFPPs to ensure transparency for financers and beneficiaries. For those directly impacted, a clear methodology should be used to determine compensation amounts based on seniority both in terms of age and years in the company, and additional support needed during the transition period between the CFPP's closure and new green job opportunities. For those indirectly impacted, a socio-environmental impact assessment should be conducted, and the costing methodology should be transparently defined to evaluate fair compensation. This should include the impacts of CFPPs on water and air quality, as well as the rehabilitation and restoration of affected sites. Such an approach will enhance transparency in efforts towards a just transition, thus minimizing social tensions arising from the early retirement of CFPPs.

[7] A.W. Akhlas (2020). It's official: Government, digital companies team up to launch preemployment card. *The Jakarta Post*. 20 March.

[8] Office of Assistant to Deputy Cabinet Secretary for State (2022) Gov't to Continue Pre-Employment Card Program in 2023. From: https://setkab.go.id/en/govt-to-continue-pre-employment-card-program-in-2023/

3 Roadmap steers and suggestions with regards to policy, fiscal frameworks and resource allocation

This study sheds light on the impact the early closure of 32 CFPPs will have on the country's energy supply (~16.9GW). To meet the ETP NZE scenario, which incorporates the early coal phase-out plan endorsed by the MEMR[9] aligned with the Net-Zero Emissions Scenario developed by the IEA[10] and meets the decarbonization requirements set in the Just Energy Transition Partnership (JETP)[11], and transition to a low carbon economy, additional retirement of coal generation will be necessary between 2036 and 2040. This transition will require substantial investments in renewable energy, such as solar PV, wind and geothermal to replace the retired capacity. According to the International Energy Agency (IEA), Indonesia will need to install 25 GW of solar PV and wind energy between today and 2030 to be on track for meeting the target of the ETP NZE scenario toward 2040[12]. However, as of now RE only accounts for a small fraction of the country's electricity generation. Accelerating the penetration of RE at the required scale will require legal and regulatory reforms, along with financial mechanisms that promote competitiveness between RE technologies and conventional fossil fuel-based power technologies.

The early closure of the CFPPs will have fiscal implications for the Government of Indonesia. The magnitude and balance of these impacts will largely depend on the electricity subsidy policy adopted by Indonesia. If tariffs increase following historical trends, the expenditure on subsidies can be reduced by 38.6% compared to the baseline scenario, as is further described in **[Deliverable 3:**

[9] 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.

[10] IEA (2022), An Energy Sector Roadmap to Net Zero Emissions in Indonesia, IEA, Paris https://www.iea.org/reports/an-energy-sector-roadmap-to-net-zero-emissions-in-indonesia , License: CC BY 4.0

[11] The European Commission. (2022, 15 November). Joint Statement by the Government of the Republic of Indonesia and International Partners Group members on the Indonesia Just Energy Transition Plan

[12] International Energy Agency (IEA). (2022). An Energy Sector Roadmap to Net Zero Emissions in Indonesia. https://www.iea.org/reports/an-energy-sector-roadmap-to-net-zero-emissions-in-indonesia

Report A]. To address the increasing deficit, Indonesia should implement a sustained policy to adjust electricity tariffs, reducing subsidies and aligning prices with the Basic Cost of Electricity Supply (BPP). This will enable resource allocation for RE investments and can allow for saved resources to be redirected to market incentives, financial mechanisms, and energy efficiency programs.

This could save governmental resources that serve to support capital investments on renewable energy and promote a competitive environment for renewable energies. At the same time, part of the saved resources could be channeled to consolidate energy efficiency policies and programs for the adoption of efficient technologies and best practices sector-wide, accompanied by fiscal and market incentives, as well as financial mechanisms for accelerating its penetration. Additionally, to guarantee an energy efficient market of technologies, the government must impulse, in collaboration with the private sector, the adoption of Minimum Energy Performance Standards (MEPS) for appliances and systems, as well as the enabling conditions for a market of Energy Service Companies (ESCOs). This could lay the foundations for a national awareness of the socio-economic benefits of adopting energy efficient technologies and practices.

This section provides a roadmap that outlines the necessary policy, regulatory, fiscal, and financial frameworks to be implemented by 2030. The roadmap aims to facilitate the achievement of the ETP NZE Scenario and ensure a Just Transition in the closure of the 32 CFPPs. By following these recommendations, Indonesia can pave the way for a sustainable, resilient, and low carbon energy future.

3.1 Allocation of resources for the early closure of 32 CFPPs

The retirement of 32 CFPPs in Indonesia will involve the disbursement of US$ 11,758 million (equivalent to US$ 7.6 bn at present value) between 2024 and 2038. The results of the payment estimation for IPPs and PLN facilities and their retirement years are referenced in detail in Table 3.1 below and are consistent with the early retirement decision framework referred to in this study **[Deliverable 3: Report A].**

Table 3.2 lists the total disbursement amounts that the Government of Indonesia should pay to the plant owners every year between 2024 and 2038 to cover the value at retirement year for each CFPP.

Table 3.1 Payment estimations for the early retirement of 32 CFPPs in Indonesia

Owner	CFPP	Retirement year (RY)	Remaining Lifetime at RY	Value at RY (MUSD)	Value at RY (MUSD at PV)
IPP	Celukan Bawang Unit 1, 2, 3	2025	20	570.00	464.77
IPP	Cilacap 1, 2	2026	10	674.67	513.93
IPP	Cirebon 1	2031	11	622.29	337.35
IPP	Keban Agung 2	2029	15	281.74	174.99
IPP	Paiton 5, 6	2031	0	0.00	0.00
PLN	Ombilin 1, 2	2024	2	140.80	122.89
PLN	Air Anyir 1, 2	2024	20	91.83	80.14
PLN	Labuhan Angin 1, 2	2024	14	333.36	290.96
PLN	Tanjung Balai Karimun 1, 2	2025	22	20.85	17.00
PLN	Sebalang 1, 2	2025	20	293.33	239.18
PLN	Bukit Asam 1, 2	2026	-4	0.00	0.00
PLN	Tarahan 3, 4	2026	11	242.00	184.34
PLN	Nagan Raya 1, 2	2027	16	281.60	200.40
PLN	Teluk Sirih 1, 2	2027	17	291.39	207.37
PLN	Pangkalan Susu 1, 2	2027	18	528.00	375.75
PLN	Suralaya 8	2027	14	770.00	547.97
PLN	Suralaya 1, 2, 3, 4	2028	-6	0.00	0.00
PLN	Suralaya 5, 6, 7	2028	-1	0.00	0.00
PLN	Pacitan 1, 2	2028	15	756.00	502.63
PLN	Labuan 1, 2	2028	12	666.95	443.42
PLN	Adipala 1	2029	17	807.84	501.77
PLN	Rembang 1, 2	2029	12	665.28	413.22
PLN	Lontar 1, 2, 3	2029	13	1,029.60	639.51
PLN	Paiton 1, 2	2030	-7	0.00	0.00
PLN	Paiton 9	2030	12	663.77	385.17

PLN	Tanjung Awar-awar 1, 2	2031	14	718.67	389.59
PLN	Pelabuhan Ratu 1, 2, 3	2034	10	803.48	355.16
PLN	Indramayu 1, 2, 3	2036	5	435.60	168.05
PLN	Ende 1, 2	2037	8	8.21	2.96
PLN	Tidore 1, 2	2037	9	8.87	3.20
PLN	Anggrek 1, 2	2038	11	38.03	12.80
PLN	Amurang 1, 2	2038	3	13.20	4.44

Table 3.2 Programmed disbursements for the payment of early retirement of 32 CFPPs (2024-2038)

Year	Total Disbursement at retirement year (MUSD)
2024	565.99
2025	884.18
2026	916.67
2027	1,870.99
2028	1,422.95
2029	2,784.46
2030	663.77
2031	1,340.95
2032	0.00
2033	0.00
2034	803.48
2035	0.00
2036	435.60
2037	17.08
2038	51.23

Enabling actions for the allocation of resources for early retirement of CFPPs in Indonesia

Establishment of the ETM Country Platform: In November 2022, the Government of Indonesia officially launched the Energy Transition Mechanism (ETM) Country Platform as a financial vehicle dedicated to fund collection and resources disbursement aimed to the early closure of CFPPs. Due to its experience in managing finance blended finance and infrastructure development, the Government has appointed PT Sarana Multi Infrastruktur (PT SMI) as the Platform Manager. At present, PT SMI is collaborating with various institutional partners to attract: 1) grants (from Bloomberg Philanthropies, Climate Works, UK MENTARI, and Global Energy Alliance for People and Planet), 2) financial resources (from ADB, WB, CIF, JBIC, HSBC, among others), 3) knowledge and technical cooperation (from USAID, GGGI, CPI, ETP, UNDP, among others), and 4) investment resources (from Indonesia's Investment Authority). The Ministry of Finance is currently developing the regulation that will determine the process for the allocation of resources, and the financial mechanisms that will be included to support the platform[13].

Customized Financial Mechanisms: As mapped in this study **[Deliverable 3: Report B]**, there are financial instruments funded by MDPs and countries that support coal-phase out. Each CFPP being considered for closure will require specific financial instruments based on factors such as contractual obligations, net present value (NPV), and alternative technology options. Different financing and refinancing options can include compensation schemes based on carbon abatement, securitization bonds to unlock CFPP assets, investment vehicles for plant acquisition, grants for social programs and repurposing projects, and public investment to support the transition and reduce fiscal burdens.

Financial mechanisms are usually unique to the context of each CFPP considered for closure, such as the contractual specificities and obligations of the facility and the utility, and most important, the net present value (NPV) of the CFPP compared to the alternative technology selected as substitute. For an NPV much lower than that of the alternative technology, a conventional loan can be an option. On the other hand, if a CFPP's NPV is much higher than that of the substitute technology, concessional public finance or even grants should be considered. A brief

[13] PT Sarana Multi Infrastruktur. (2022). https://ptsmi.co.id/indonesia-launches-etm-country-platform-to-accelerate-just-and-affordable-energy-transition

description of most representative financing and refinancing options for coal-phaseout are presented in **[Deliverable 3: Report B]**.

Stakeholder Engagement and Decision Process: As mentioned previously, there are multiple financial options for a CFPP's early closure, and its success is highly dependable on the right selection and blending of mechanisms. Having in mind that a CFPP closure involves multiple stakeholders, the financial scheme selection should be socialized through an engagement and decision process involving the participation of governmental representatives, public utilities, IPPs, the mining sector, private investors, NGO's, country sponsors, and international financial institutions, among other players.

Safeguards and Accountability: An optimum financing structure for early retirement of CFPPs should ensure alignment with the government national plans and policies, and guarantee that the value added and benefits from the transition are distributed fairly among the plant owners, taxpayers, energy consumers, and the affected communities. In line with this, the financial mechanism should also avoid overpayment of assets, greenwashing practices, and avoid moral hazard risks upon the retirement of assets.

For the Government of Indonesia to ensure the corresponding payments to the 32 CFPP's shareholders at the planned closure dates, the following recommended actions should be taken:

Date	Action
By December 31st, 2023	Creation of the ETM Country Platform by December 31st, 2023, through the establishment of legal frameworks.
	Conclusion of regulations by the Ministry of Finance by December 31st, 2023, specifying the process for resource allocation and eligible financial mechanisms.
	Development of a Financial Plan by the ETM Country Platform, in collaboration with PLN, the Ministry of Energy and Mineral Resources, and the Ministry of Finance, by December 31st, 2023. This plan should include tailored financial proposals for each CFPP.
	Implementation of a stakeholder engagement and consultation process by the ETM Country Platform by December 31st, 2023, to socialize and gather input on the proposed financial mechanisms for CFPP early retirement and repurposing.

By following recommendations, Indonesia can effectively allocate resources and ensure a smooth transition towards the early retirement of CFPPs while promoting renewable energy development and sustainable growth.

3.2 Steers and recommendations to reduce electricity subsidies and enhance energy efficiency

The Government of Indonesia plays a crucial role in regulating electricity tariffs in the country. The existing tariff structure poses challenges as household tariffs are set below cost, commercial tariffs are the highest and industrial tariffs fall in between. This results in insufficient revenues for PLN, requiring the government through the national budget to cover PLN's costs plus an additional margin of 7%[14]. In 2019, tariffs covered around 86% of production costs, and the government subsidized in total US$ 4 billion to fill the gap.

Indonesia has undertaken significant efforts to use energy more efficiently with an economy-wide perspective, incorporating well designed policies and regulations, as well as economic incentives and market mechanisms for the adoption and dissemination of new technologies and best practices. However, the Energy Law enacted in 2007, which serves as the primary framework for energy efficiency initiatives, requires substantial amendments to align with international advancements in technology, policy, and regulation. Moreover, energy efficiency is crucial for Indonesia to meet its decarbonization targets as shown in the ETP NZE Scenario. With the projected growth in electricity consumption, curbing the demand through energy efficiency efforts becomes imperative. According to the International Energy Agency[15], more than 2 billion square meters of new residential floor area will be constructed between today and 2030, increasing Indonesia's residential building stock by close to four-times the total land area of Jakarta. In consequence, 22 million additional air conditioners will be functioning over the next decade, underscoring the need for effective energy efficiency measures[1].

To address these challenges, Indonesia must reform tariff pricing to reduce government subsidies, focusing on sectors and customers with payment capacity while maintaining subsidized tariffs for low-income households, small businesses, and basic public services. Simultaneously, comprehensive economy-wide energy

[14] International Renewable Energy Agency (IRENA). (2022). Indonesia Energy Transition Outlook. https://www.irena.org/publications/2022/Oct/Indonesia-Energy-Transition-Outlook

[15] International Energy Agency (IEA). (2022). An Energy Sector Roadmap to Net Zero Emissions in Indonesia. https://www.iea.org/reports/an-energy-sector-roadmap-to-net-zero-emissions-in-indonesia

efficiency policies and programs should be established to facilitate a smooth transition to clean energy. Institutional strengthening, capacity building, and collaboration with local governments and the private sector are vital for effective fiscal and energy efficiency reforms. The medium-term objective is to eliminate electricity subsidies, enabling the redirection of public resources toward the deployment of clean and efficient technologies.

Enabling actions for a reform to electricity subsidies and a sound energy efficiency policy

This section summarizes the challenges faced by Indonesia due to maintaining a policy to electricity tariffs, as well as the main challenges on the consumption of electricity that still prevail despite the progress already achieved by the government on energy efficiency issues. Each challenge is presented in Table 3.3 and complemented with proposed enabling actions (with recommended implementation timeframe) that could lead to a tariff reform free of subsidies and consolidate a national policy framework for the efficient use of electricity, compatible with a sustained socio-economic development and the ETP NZE scenario.

Table 3.3 Challenges and enabling actions for the reduction of subsidies from electricity tariffs and the consolidation of an energy efficiency national policy in Indonesia.

No	Challenges	Enabling Actions	Timeframe
1	**Electricity Subsidies** Electricity subsidies were partly reformed in 2014 with the reintroduction of the automatic electricity tariff adjustment mechanisms that led to the elimination of subsidies in several categories of consumers. However, the mechanism was suspended in 2018, and tariffs were frozen in advance of the presidential elections. Furthermore, in 2020, the government provided electricity bill relief subsidies in order to alleviate the economic shock of the Covid-19 pandemic in around 35 million low-income households. According to IEA, fossil fuel and electricity subsidies for consumers in Indonesia in 2020 amounted to US$ 6.9 billion (0.6% of GDP). With higher prices in 2021, subsidies increased to US$19 billion (1.6% of GDP)[1]. In October 2021, the Indonesian House of Representatives passed a law on tax regulation harmonization, that includes a carbon tax. The tax set at US$ 2.1/tonCO_2 and limited to CFPP's, was initially set to commence in April 2022 but has been	1. The Government of Indonesia should establish a pricing reform on electricity tariffs where subsidies have been eliminated for costumers with proved payment capacity (from the residential, industrial, and commercial sectors), and maintain subsidies only for low-income costumers (poor households, and small and medium enterprises), and basic services for poor neighborhoods such as public lighting or water pumping. In parallel, the government should establish economy-wide energy efficiency policies, regulations and financial mechanisms to award energy efficient costumers and ban inefficient technologies and practices.	2024-2028
		2. The Government of Indonesia should establish a miscellaneous fiscal resolution of taxes and duties imposition to the import and use of energy inefficient technologies and products, on top of VAT, as well as tax incentives, rebates and/or exemptions to the import, acquisition, and use of energy efficient devices	2024-2028
		3. The Government of Indonesia should create a mechanism for periodically updating its carbon tax rate to reflect the regional carbon prices of neighbor countries, which should be made mandatory for all fossil fuel-based stationary combustion sources.	2024-2027
		4. The Government of Indonesia should remove almost all electricity subsidies, tariffs should reflect the real costs of electricity (being at	2028-2030

No	Challenges	Enabling Actions	Timeframe
	pushed back several times in light of rising energy commodity prices.	least equal to the BPP). Remaining subsidies should be focalized only for the poorest households and neighborhoods. The subsidies should be fully reinvested in promoting fiscal incentives, financial mechanisms, policies, and regulations to impulse an economy-wide transformational change towards a clean and efficient use of energy.	
2	**Institutional Framework** Energy efficiency efforts are institutionally scattered within the Ministry of Energy and Mineral Resources (MEMR) and the utilities (mainly PLN). Each institution prioritizes its respective interests, resulting in lack of coordination and duplicated efforts.	1. The Government of Indonesia should appoint one sole focal point within the Ministry of Energy and Mineral Resources (MEMR), responsible for planning and conducting the national energy efficiency policy, programs, standards, regulations, and certification processes, considering always the latest international developments and best practices;	2024-2025
		2. The Government of Indonesia should appoint or establish a governmental institution within the National Standardization Agency (BSN), responsible for primary EE standards, chain-of-custody, and replication of results to ensure data validation. Include laboratory facilities to provide analytical methods and testing materials as standards for analyses done by others to ensure reliable EE data;	2024-2025
		3. The MEMR should establish a permanent National Energy Efficiency Plan to promote with an economy-wide view, the development and deployment of energy efficient technologies and products, including those for lighting, cooling, and air conditioning applications. The program includes policies, regulations, standards, technologies, engineering applications, market and financial mechanisms. The Plan	2024-2025

No	Challenges	Enabling Actions	Timeframe
		has a timeframe of 10 years, its progress evaluated every year, and its content reviewed and updated every 3 years.	
3	**Electricity consumption in Buildings** In 2020, the commercial and residential sectors of Indonesia accounted for 21.7% of the total final energy consumption equivalent to 898 MBOE. Electricity consumption of the commercial and residential sectors contributed with around 66% of total electricity consumption, and coal's share in Indonesia's power generation energy mix was about 64%. Consequently, around 42% of electricity consumed by the commercial and household sectors came from coal-fired power plants[16]. Hence, improving energy efficiency in commercial and residential buildings is essential, both to reduce electricity demand and cut CO2 emissions. Building codes in Indonesia only cover large commercial buildings. The lack of similar measures in residential buildings and combination with lower	1. The MEMR should consolidate a building Energy Efficiency code for residential and commercial buildings with cost-effective EE measures and promoted its compliance with the collaboration of local governments, construction industry associations, professional engineering associations, and specialized financial institutions, among other key players. 2. The MEMR should develop in collaboration with key construction industry players (Industrial Chambers, Professional Associations, financial institutions), an energy performance certificate (EPC) system for building and apartment owners. Economic incentives, such as tax incentives/ rebates, apply only to those entities awarded with the certification. 3. The MEMR should establish a continuous improvement Minimum Energy Performance Standards (MEPS) system with attention to residential and commercial appliances (lighting, cooling, and AC, among others).	2024-2026 2024-2026 2024-2026

[16] Asian Pacific Cooperation Energy Working Group (APEC-ERW). (2022). Follow-Up Peer Review on Energy Efficiency in Indonesia. https://www.apec.org/publications/2022/06/follow-up-peer-review-on-energy-efficiency-in-indonesia

No	Challenges	Enabling Actions	Timeframe
	appliance ownership, limits the coverage in buildings to 5%[3].		
4	**Energy Efficiency in the Industry** Indonesian companies that consume more than 6,000 tons of oil equivalent per year (69,780 MWh) are required to conduct energy management programs and activities[4]. This is a high threshold and currently limits energy management to very large industrial consumers only.	1. The MEMR should lower the energy consumption threshold so that energy management systems are required to be implemented by a larger segment of Indonesia's industry sector. The threshold should cover at least the number of industries that represent 80% of electricity consumption of the industrial sector. 2. The MEMR should establish a continuous improvement Minimum Energy Performance Standards (MEPS) system with attention to industrial equipment (electric motors, industrial pumps, fans, cooling equipment, and AC systems), and electronic devices (computers, data centers, and audio/video). 3. The MEMR should develop a program for the implementation of Energy Management Systems (EMS) in small and medium size enterprises, based on the ISO 50005:2021 (Energy management systems guidelines for a phased implementation). The program includes an award/incentive mechanism based on a competitive process.	2024-2025 2024-2026 2024-2026
5	**Energy Efficiency in Finance** The main barriers that persist in Indonesia for the participation of financial institutions in energy	1. The Government of Indonesia in collaboration with other key public and private financial entities, should establish an Energy Efficiency Fund (EEF) able to extend loans that are repaid through a dedicated entity (public agency, utility, or financial institution). The dedicated	2024-2028

No	Challenges	Enabling Actions	Timeframe
	efficiency activities are: 1) low internal rates of return of EE projects (less than 20%), 2) lack of funding and capital investment in EE projects, 3) ESCO's, difficulty to show profitability and low risk for EE projects. ESCOs business model is considered a high-risk investment from the bank's perspective. Risk-sharing facilities such as public agencies, can reduce risk, by providing partial risk coverage when extending loans for EE projects[4]. If an energy efficiency finance scheme can be established in Indonesia, it will provide an impetus for leasing companies, EE appliances providers, or financial institutions to grow the ESCO industry[4].	entity collects from the borrowers the savings obtained from the reduction of electricity consumption and re-invests the funds in new EE projects. For reducing administrative costs, the EEF provides capital at very low cost to Indonesian banks, which are required to provide low-interest loans to ESCO projects with maximum loan terms of several years. The dedicated public entity provides also partial risk coverage when extending loans for EE projects, as well as EE warranties to ESCOs with limited performance records to protect investment partners against a potential poor performance of an energy performance certificate (EPC) project. The fund is partially financed by a tariff levy on electricity (equivalent to a percentage of the current tariff, to be defined by the Indonesian government). Other sources of funding come from carbon tax collection, the income tax from coal exports, and from international concessional public finance and grants.	

3.3 Steers and recommendations to enhance renewable energy investments to comply with Indonesia's ETP NZE Scenario

Indonesia's renewable energy sector has significant growth potential, with an installed capacity of ~10.8 GW in 2021, accounting for less than 3% of its estimated potential (~400 GW[17]). The country aims to add 40.6 GW of generation capacity by 2030, more than half of it (20.9 GW) coming from renewable sources. By 2025, the target is to have 23% renewable energy in the national energy mix, equivalent to 24 GW of installed capacity. The planned additions will primarily be from hydro (9.3 GW), solar (4.7 GW) and geothermal (3.4 GW).

To achieve the ambitious ETP NZE Scenario, Indonesia will require substantial investments estimated at $150-200 billion annually until 2030[5]. In September 2022 Presidential decree no. 112/2022 issued includes multiple measures to deal with the enormous effort needed to install more than 40 GW of renewable energy in the following 8 years, among them the setting of a competitive pricing regime for renewable electricity, and the establishment of tax incentives for the acquisition and operation of renewable energy technologies. The huge investment needed every year to meet the target of renewable energy installed toward 2030 will also require an enabling environment (in terms of policy, regulatory and institutional adjustments), and versatile financial mechanisms to attract large-scale continued investments. Since the coal mining companies will increase their revenues from the export of more coal available due to the closure of the 32 CFPPs, the Indonesian government should create favorable conditions for them to become capital investors in renewable energy projects.

Enabling actions for enhancing renewable energy investment

This section summarizes the challenges that Indonesia faces to transit from a fossil fuel-based electricity infrastructure mainly controlled by the government to a market-based sector with level field for renewable energies to deploy and grow in a competitive environment. Each challenge is presented in Table 3.4and complemented with proposed enabling actions (with recommended implementation timeframe) that could lead to a competitive clean electricity market, and consolidate a national policy framework for renewable energies, compatible with a sustained socio-economic development and the ETP NZE scenario.

[17] World Economic Forum. (2022). Policy Opportunities to Advance Clean Energy Investment in Indonesia. https://www.weforum.org/whitepapers/policy-opportunities-to-advance-clean-energy-investment-in-indonesia/

Table 3.4 Challenges and enabling actions for an enabling market and investments conditions for renewable energies in Indonesia.

No.	Challenges	Enabling Actions	Timeframe
1	**Legislative implementation mechanisms** A gap between policy enactment and their effective implementation has been frequently observed and is thought to discourage renewable energy uptake. MEMR regulation no. 1/2015 and regulation no. 11/2021 which establish the primary conditions for power wheeling, have not been implemented due to lack of clear technical guidelines and clarity on the transmission fees. While existing regulations allow for 100% renewable energy installation at consumer premises, in practice the maximum amount of renewable capacity that is effectively approved ranges only 15%-20%[5].	The Government of Indonesia should establish the adequate procedures within the MEMR, to ensure that renewable energy policy and regulatory enactments will timely count with the proper guidelines for their effective implementation. Special attention should be taken to: 1. Count with clear technical guidelines and transmission fees for the power wheeling of IPPs and self-generators of renewable electricity through PLN transmission/distribution infrastructure; 2. Count with guidelines for the effective implementation of the regulation in place for allowing on-site renewable energy installation for 100% of consumer needs; 3. Count with guidelines for the clear and transparent implementation of the net metering scheme for renewable energy small scale self-generation.	 2024-2025 2024-2025 2024-2025
2	**Regulatory Framework** In Indonesia, there are discrepancies in the planning and policy documents published by the different national agencies (RUPTL	The Government of Indonesia should implement the following measures to facilitate the uptake of corporate renewable electricity sourcing:	

No.	Challenges	Enabling Actions	Timeframe
	(Electricity Supply Business Plan), RUEN (National Energy Generation Plan), RUKN (National Electricity General Plan)). Those differences force investors/project developers to consider multiple scenarios to build investment plans and project pipelines. Stringent local content requirements discourage investments in renewable infrastructure projects in Indonesia. While local content requirements apply to all renewable energy technologies, the most stringent ones are for solar photovoltaics (PV), for which they have increased from 40% to 60% between 2012 and 2019[5]. As a result, project developers face the following challenges: 1. The procurement of locally manufactured panels is limited to a total national manufacturing capacity of only 500 MWp/year, according to the Indonesian Solar Module Manufacturer Association (APAMSI)[5]; 2. Locally manufactured panels have higher prices and cannot compete with those of panels manufactured abroad. 3. The quality and efficiency of domestic panels are lower compared to those available in the international market.	1. Create a unified coordination body (committee) led by the MEMR, in charge of drafting the National Plan for Indonesia´s Power Sector (a unified planning instrument in substitution of the existing plans RUPTL, RUEN, and RUKN). The purpose is to increase coordination in energy policy and rulemaking, backed by effective implementation, to promote an enabling environment for the uptake of renewable energy investments; 2. Adopt a strategy to define and periodically update the local content requirements for renewable energy investments in order to impulse projects. The strategy considers the national manufacturing capacity, supplier base, local regulations and workforce skills. Initially, local content requirements are minimal and applicable to specific areas of the value chain where appropriate capability and know-how exist.	2024-2025 2024-2025

No.	Challenges	Enabling Actions	Timeframe
3	**Renewable Energy Tariffs** Indonesia currently subsidizes fossil fuel-based power generation (US$5.6 billion in 2021)[5]. Additionally, local coal producers have the obligation of supplying 25% of their annual production to PLN at a price cap of US$70.00/ton, significantly below international market prices. Indonesia has implemented renewable energy tariff caps by linking them to the average local and national electricity generation cost (BPP). Currently, the final tariffs are capped at 85% of the local BPP[5]. Since BPP benchmark is based on subsidized fossil fuel-based generation costs, the current tariff for renewable electricity is not viable for projects to compete with fossil fuel-based infrastructure, limiting their financial viability.	The Government of Indonesia should establish the following measures to adapt the policy and regulatory frameworks for a "fair play" competition between renewable and fossil fuel-based electricity: 1. Set up standardized and streamlined processes for negotiation between PLN and the IPPs; 2. Set up open auctions, differentiated by type of technology (renewable energies type of technology only compete among themselves) in favor of the lowest quoted generation cost to ensure more competitive renewable energy prices; 3. Introduce temporary renewable energy subsidies to the tariff mechanisms, and reduced subsidies to fossil fuel-based technologies.	 2024-2025 2024-2025 2024-2028
4	**Power purchase agreement practices (PPA)** Indonesian regulations do not allow IPPs to enter into direct power purchase agreements with customers. This limits the ability of consumers to procure power produced from renewable	The Government of Indonesia should implement the following actions to create an electricity market structure that allows for direct trade between buyers of all sizes and renewable electricity suppliers:	

No.	Challenges	Enabling Actions	Timeframe
	sources directly. This poses a challenge, especially for commercial and industrial consumers who want to increase their GHG mitigation targets for social responsibility purposes and competitivity strategies. Indonesia does not currently have a standard PPA regime, and so agreements are negotiated on a case-by-case basis, increasing complexity, reducing transparency, and lowering investor confidence. Negotiation processes take longer time and result in high costs for project developers.	1. Adapt the regulatory framework to allow direct power purchase agreements between IPPs and customers through standardized and streamlined processes; 2. Adopt regulations to incentivize renewable energy power-wheeling through standardized and streamlined interconnection agreements between IPPs or self-generators, and PLN, to use the transmission/distribution infrastructure for power supply to costumers interested in consuming clean energy.	2024-2026 2024-2026
5	**Renewable energy certificates and tracking system** Although businesses in Indonesia can buy since 2020 renewable energy certificates (RECs) offered by PLN through a REC scheme, there is no proof that the money raised from the REC's is used to finance new renewable energy capacity, in order to preserve the additionality principle.	The Government of Indonesia should set up the following measures to enhance the transparency and additionality of the existing renewable energy certificate (RECs) system: 1. Establish a mechanism to track funds from RECs, trace their uniqueness, and the use of the funds disbursed by REC purchasers; 2. Establish the mechanism to ensure REC proceeds are invested in new renewable energy capacity in order to build corporate confidence in the REC regime and promote future investments.	 2024-2025 2024-2025

No.	Challenges	Enabling Actions	Timeframe
6	**Renewable Energy Finance** Financial institutions in Indonesia face major barriers for scaling up finance of RE energy projects, including the lack of knowledge and information, a high-risk perception, and insufficient/ suitable financing instruments and funds. For instance, project developers have problems in meeting high collateral requirements for acquiring debt finance, due to high risk perceived by financial institutions caused by high transaction costs and unclear regulatory and policy frameworks. Since RE project lifetimes span more than 20 years, the lack of available long-term financing schemes constitutes another key barrier[18]. The government requires to assist financial institutions by offering capacity building, enhancing access to data, improving monitoring and reporting procedures, and promoting innovative financial schemes among financial institutions to deploy investments in RE projects[6].	The Government of Indonesia led by the Financial Services Authority (OJK) and the Ministry of Finance, in coordination with public and private financial entities, should implement the following measures to incentivize the investment environment in renewable energy: 1. Implement a package of fiscal mechanisms such as tax credits/rebates, accelerated depreciation to the acquisition of RE technologies, land and building tax relief, import duty relief, and tax allowances, to improve the economic viability of RE projects, and stimulate new investments; 2. Develop in collaboration with the SDG Indonesia One Fund, guarantee schemes aimed to de-risk renewable energy projects and help project developers overcome collateral requirements, and facilitate access to capital: 3. Develop in close collaboration with relevant banking institutions, standardized project finance structures for renewable energy projects that could be widely	 2024-2026 2024-2026 2024-2026

[18] Organization for Economic Cooperation and Development (OECD). (2021). OECD Clean Energy Finance and Investment Policy Review of Indonesia Policy Highlights. https://www.oecd.org/env/clean-energy-finance-and-investment-policy-review-of-indonesia-0007dd9d-en.htm

No.	Challenges	Enabling Actions	Timeframe
		replicated. A program for piloting nouvelle financial structures for RE projects is in operation; 4. Create a renewable energy finance facility that offers: 1) project structuring services for developing bankable projects, 2) access to long-term low-interest loans, and 3) innovative finance schemes. The facility's funding sources include carbon tax collection, income tax from coal exports, and international concessional public finance and grants.	2024-2027

Annex 1. Compatibility Analysis of Key Recommendations

1.1 Policy

No.	Recommendation	Compatibility / Relevant Issues
1	Revise electricity tariffs to support PLN's financial sustainability	1. Aligned with Government of Indonesia's intention to increase the efficiency of the state budget and ensure that subsidies are only given to vulnerable communities. The GoI via the National Team for the Acceleration of Poverty Reduction (TNP2K) has assessed and developed a strategy to continue electricity subsidy reform after the COVID-19 pandemic ends[19] which consequently revise the consumers' electricity tariff. 2. Energy prices have always been the subject of several protests. In April 2022, university students held demonstrations in protest of high cooking oil prices.[20] In September 2022, thousands of protesters around the country demanded the reversal of another price hike on fuel—the first since 2013. The government's decision to reduce subsidies led to petrol and diesel prices increasing by around 30%.[21] Electricity tariff revisions need to consider the social tension circumstances. 3. GoI enacted Law 7/2022 on Harmonization of Tax Regulations which address the carbon tax mechanism last year and established Emissions Trading Systems (ETS) for CFPP in mid-February. These carbon pricing instruments will increase the electricity generation cost relative to current costs, thereby increasing the challenge to the revision. 4. Strict Local Content Requirement (TKDN) regulation makes it difficult for electricity prices from RE to be competitive. Considering that retired CFPP will be replaced by RE, TKDN pose an indirect challenge for electricity tariff revision

[19] Tim Nasional Percepatan Penanggulangan Kemiskinan (TNP2K), (2021). *Policy Paper (Naskah Kebijakan) Transformasi Subsidi Listrik di Indonesia: Tujuan dan Usulan Mekanismenya*. TNP2K.

[20] Reuters (2022). *Indonesia police fire tear gas as students protest cooking oil prices, third term for president*. 12 April.

[21] R. Ramli (2022). In the Midst of Protest, Hopes of Reform in Indonesia. *The Diplomat*. 6 October.

No.	Recommendation	Compatibility / Relevant Issues
2	Prioritize energy efficiency policies	1. The MEMR has established a National General Energy Plan (*Rencana Umum Energi Nasional*, RUEN) which takes a comprehensive approach to promote energy efficiency across various sectors and includes the implementation of the national standards on the energy utilizing equipment. 2. MEMR has established MEMR Regulation 14/2012 on Energy Management which mandates the energy management implementation. However, it only obliges energy management for activities which utilize energies of ≥6,000 TOE/year. 3. GoI has established MEMR Regulations 14/2021 on Energy Efficiency Labeling and Minimum Energy Performance Standards (MEPS) for Electrical Equipment regulations. However, the MEPS is still limited to several appliances such as rice cooker, Air Conditioner, refrigerator, and electric fan—does not cover the industrial sector yet. 4. The Ministry of Industry (MoI) has issued regulations regarding guidelines for the preparation of green industry standards (*Standar Industri Hijau*, SIH) as stipulated in the MoI Regulation 51/ 2015. Green Industry Standards are the reference for industry players in developing consensus related to raw materials, auxiliary materials, energy, production processes, products, business management, waste management and / or other aspects that aim to realize green industry. The Green Industry Standards are available for 17 types of industries. 5. GoI under MoEF has established PROPER, an industrial monitoring program that aims to encourage industrial compliance with environmental regulations. Under PROPER, industries will be classified based on their level of environmental friendliness. 6. MEMR has established an annual competition award in energy efficiency called Subroto Award for Energy Efficiency (*Penghargaan Subroto Bidang Efisiensi Energi*, PSBE) which covers the building and industry sector. 7. MEMR has developed Energy Efficiency Handbook for Building Design in Indonesia.

No.	Recommendation	Compatibility / Relevant Issues
2	(*continued*)	8. EE is not seen as core business and standard company investment guidelines require internal rates of return (IRR) which are too high to make EE projects viable (>20%).[22] 9. A lack of comfort with entering off-balance sheet financed projects with EE project developer's due to a lack of reference projects and experience with these service providers. 10. MEMR Regulation 14/2016 on Implementation of Energy Conservation Service Business which regulates the policy framework regarding ESCOs has been revoked in 2018 due to, among others, insufficient capital or collateral for many ESCOs to meet bank collateral requirements and underdeveloped capacity to finance and conduct investment standard audits.[23] 11. Eight banks have formed the Indonesian Sustainable Finance Initiative (*Inisiatif Keuangan Berkelanjutan Indonesia*, IKBI) which is a real commitment from the banking industry in supporting green financing. Currently, the membership of IKBI has grown to 15 institutions consisting of national banks and PT SMI. They have already financed energy efficiency projects in Indonesia. 12. MEMR have developed Guidelines for Energy Efficiency Investment Financing for Financial/Banking Service Institutions in the Industrial Sector which provides references of energy efficiency technology for financial/banking services in the consideration of granting credit for energy efficiency projects in industry sector.

[22] APEC Energy Working Group, (2017). *Energy Efficiency Finance in Indonesia Current State, Barriers and Potential Next Steps*. Asia-Pacific Economic Cooperation, APEC.

[23] Organization for Economic Cooperation and Development (OECD). (2021). OECD Clean Energy Finance and Investment Policy Review of Indonesia Policy Highlights. https://www.oecd.org/env/clean-energy-finance-and-investment-policy-review-of-indonesia-0007dd9d-en.htm

No.	Recommendation	Compatibility / Relevant Issues
3	Incentivize renewable resources for electricity production over the improvement of existing coal-fired power plants	1. President Regulation 112/2022 on Acceleration of Renewable Energy Development for Electricity Supply regulates the ceiling prices for RE electricity which replace the previous regime—RE should have same or less generation price than national/local electricity generation price (*Biaya Pokok Penyediaan Pembangkitan*, BPP Pembangkitan). 2. Currently, the GoI is drafting a New Renewable Energy Law, which will regulate renewable energy businesses, prices, funds, incentives, etc.[24] 3. GoI enacted Law 7/2022 on Harmonization of Tax Regulations which address the carbon tax mechanism last year and established Emissions Trading Systems (ETS) for CFPP in mid-February. These carbon pricing instruments will increase the electricity price from fossil fuel power plants (currently limited to CFPPs) which leverage the RE electricity attractiveness. 4. Import duty exemption regulations are already established, particularly on the capital goods import in the electricity generation industry for public interest development (MoF Regulation 66/2015). 5. Strict Local Content Requirement (TKDN) regulation makes it difficult for electricity prices from RE to be competitive.

[24] Humas EBTKE. (2022). *RUU EBT, Wujud Penguatan Regulasi Pengembangan Energi Baru Terbarukan Tanah Air*. Directorate General of New Renewable Energy and Energy Conservation – Ministry of Energy and Mineral Resources (DGNREEC-MEMR).

1.2 Technical

No.	Recommendation	Compatibility / Relevant Issues
1	Use transmission and distribution planning to transform the fragmented power system into an integrated one	1. Presidential Regulation 112/2022 Article 3 states that in the implementation of accelerating the CFPP retirement, it is necessary to ensure the development of replacement plants, renewable energy (RE) power plants, by considering the conditions of electricity supply and demand. 2. Fragmented power system due to the archipelagic area adds challenge to renewable energy development which is site-specific. 3. Since CFPPs is the largest supplier of electricity in Indonesia (capacity shares more than 50%), the early retirement program of CFPPs needs to carefully consider on energy security, reliability, and system's stability. 4. Overcapacity only occurred in Java-Bali system which consists mostly of large capacity CFPPs (>600 MW); add more challenge since retirement of large CFPPs pose a risk to the energy balance.[25] 5. Power wheeling regulations were initially included in the Draft of Law on New Energy and Renewable Energy however, it has been revoked. In addition, power wheeling is considered as an unbundling mechanism regulated in Law 20/2002 on electricity which has also been revoked by a decision of the Constitutional Court (MK). Through decision Number 111/PUU-XIII/2015 the Constitutional Court decided that unbundling in electricity was not in accordance with the Indonesia Constitution (UUD 1945). Accordingly, the law was replaced with Law 30/2009, by eliminating the unbundling article. 6. For Rooftop Solar PV, GoI has established MEMR Regulation 26/2021 which allows the customer to install rooftop solar PV at 100% of capacity. However, in practice, PLN as the major off taker in Indonesia restrict the installation capacity.

1.3 Financial

No.	Recommendation	Compatibility / Relevant Issues
1	Establish a zero-cost financing instrument to early retire CFPPs	1. The Ministry of Finance is currently developing a regulation that will describe how the funds will be allocated and describe the financial instruments that will support ETM. 2. JETP's financing terms, financial instruments, and policies with which the US $20 bn will be allocated are currently being developed and should be defined by mid-2023—assuming six months after JETP secretariat being established. 3. OJK has issued "Green Taxonomy 1.0", providing a classification of economic activities which supports environmental protection and management efforts. However, it has not yet covered broader activities in the energy transition context, including CFPP retirement. Currently, OJK is updating the Green Taxonomy to include energy transition. 4. ETM Country Platform is expected to be funded through a blended finance sourced from MDBs, governments, philanthropies, and long-term investors. This may delay its implementation since it adds the difficulty of addressing each funder's requirements.

[25] ADB. (2022). *Opportunities to Accelerate Coal to Clean Power Transition in Selected Southeast Asian Developing Member Countries: Technical Assistance Consultant's Report*.

No.	Recommendation	Compatibility / Relevant Issues
2	Conduct thorough assessments of Power Purchase Agreement termination costs and debt structures to develop replicable business models and identify potential cost-saving opportunities	1. GoI already have several pilot projects such as Pelabuhan Ratu CFPP which is in the due diligence stage. Lessons learned from the pilot projects can serve as a reference for future early retirement. 2. Power plants under PLN and its subsidiaries do not have a clear contractual framework, which may affect the valuation process. 3. PLN has established the Holding Subholding (HSH) which includes two generation companies—PLN Nusantara Power and PLN Indonesia Power. With the HSH, PLN's generation assets that were previously scattered will now be consolidated.[26] Asset consolidation will affect the valuation, if there is new PPA and obligations such as take-or-pay. 4. There is a risk of overvaluation of PLN's CFPPs assets due to the extension of CFPPs lifetime in the revaluation of 2015.
3	Socialize the selection of CFPP with relevant stakeholders	1. Following the JETP Secretariat establishment, GoI is currently developing the Comprehensive Investment Plan to access the JETP Fund. 2. UNOPS ETP with Bappenas has developed a study on the financial implications of the CFPP early retirement program. 3. UNOPS ETP is in progress to establish Just Coal Transition Forum which can become a platform to socialize the early retirement of CFPPs program. 4. In collaboration with ADB, the Ministry of Finance is conducting a Strategic Environmental and Social Assessment (SESA) aimed at ensuring that the identification process and mitigation measures are implemented with due regard to their impact on the environment and social economy.

[26] Santika Aristi. (2022). *Holding PLN dengan 4 Sub-Holding Baru Diumumkan Menteri BUMN, Makin Lincah Jadi Perusahaan Energi Berbasis Teknologi Menyambut Masa Depan*. PT PLN (Persero).

No.	Recommendation	Compatibility / Relevant Issues
4	Ensure cost effectiveness and transparency for financers, with third-party due diligence to reduce moral hazard and greenwashing risks	1. In accordance with Presidential Regulation 112/2022, MEMR is currently developing the CFPPs' Early Retirement Roadmap which addresses the potential CFPPs to be retired, RE replacement, interconnection, etc. 2. GoI already have several pilot projects such as Pelabuhan Ratu CFPP which is in the due diligence stage. Lessons learned from the pilot projects can be a reference for future early retirement. 3. PT SMI, appointed as the ETM Indonesia Country Platform Manager, has experiences in managing SDG Indonesia One Fund. 4. ADB ETM has two main programs that support early retirement: Carbon Reduction Fund (CRF) and Carbon Energy Fund (CEF). Specifically, CEF will be focused on new clean energy investments.[27] 5. Additionally, UNOPS ETP aims for extending smart grids[28] while Climate Investment Funds (CIF) has a Grid Reinforcement Project in Cambodia[29] that may be replicated in Indonesia. 6. Since 2022, the government has been developing a new Law on New Renewable Energy (RUU EBT) which will define the renewable energy management plan. This law will regulate the funds for RE infrastructure development. 7. GoI is currently developing a methodology that aligns with international carbon standards to aiming to obtain carbon offsets from the early retirement of CFPPs.

[27] ADB. *Energy Transition Mechanism*.

[28] UNOPS ETP. *2022 Annual Report*.

[29] Climate Investment Fund (CIF). *PROJECT ID: XSREKH074A - GRID REINFORCEMENT PROJECT*.

1.4 Social

No.	Recommendation	Compatibility / Relevant Issues
1	Start early in developing sub regional social programs to provide green jobs opportunities	1. In collaboration with ADB, the Ministry of Finance is conducting a Strategic Environmental and Social Assessment (SESA) aimed at ensuring that the identification process and mitigation measures are implemented with due regard to their impact on the environment and social economy. 2. The Government of Indonesia established the Job Creation Committee through Presidential Regulation 36/2020 concerning Job Competency Development through the Pre-Employment Card Program as amended by Presidential Regulation 76/2020. The committee is responsible for formulating and developing policies for the Pre-Employment Card Program as well as controlling and evaluating the implementation of this program. The Pre-Employment Card Program is a job competency development program targeted for job seekers, workers affected by layoffs, and/or workers who need to improve their competence. 3. In practice, there is an issue that even workers who have access to the pre-employment card have no guarantee of getting another job or starting a new business. Employment opportunities are not properly provided by the government. In fact, some of the training in the Pre-Employment Card access has been criticized for being no different from what is available for free on various online information platforms.[30]

[30] Jumisih. (2002). *Menggugat Janji Manis Jaminan Kehilangan Pekerjaan*. *HukumOnline.com*. 23 April

2	Social costs separately from transaction costs (*continued*)	1. Indonesia has submitted the Investment Plan (IP) for Climate Investment Fund (CIF) Accelerating Coal Transition (ACT) Program. The IP proposes a project pipeline that is broadly split inti three key components: (i) Component 1 – Accelerated CFPP retirement; (ii) Component 2 – Governance, Just Transition and Repurposing; and (iii) Component 3 – Scale up of RE and storage. In summary, through US$600 million in CIF ACT funding, together with US$2.2 billion in MDB co-financing and over US$1.3 billion in commercial co-financing, the IP aims to achieve the goals in three ACT pillars (governance, people, and infrastructure). The goals in People pillar: up to 1,160 (i.e., 89% of) employees of retired CFPPs/coal mines with access to sustained income and up to 2,200 direct beneficiaries of social plans and economic regeneration activities, to be disaggregated by gender, and reflecting other social characteristics (age, disability status, formal vs. informal workers etc.) as well as documented information about the quality of the jobs (income, skilled/ non-skilled positions) whenever relevant and possible.[31] 2. Several programs in the CIF ACT Investment Plan related to just transition[32]: **[1] PLN RBL**: (i) strengthening PLN institutional capacity to manage a just energy transition; (ii) engagement with PLN university for workforce and skills planning (integrating efforts with PRIME STeP loan for storage and solar PV technology training); (iii) supporting communities and workers associated with early retirement of PLN CFPP with special consideration for women and vulnerable groups. **[2] PT SMI ETM Country Platform**: ADB to use CIF ACT grant funds to design and implement just transition framework for the Indonesia ETM country platform under PT SMI. This will then feed into broader ADB engagement with the GoI on national level just transition and related interagency collaboration. **[3] PLN/MEMR Energy Transition Program for Results (P4R)**: Development of just transition framework, support for pilot just transition projects. **[4] IPP CFPP early retirement program (private sector)**: Just transition plans, particularly to safeguard the job security of the employees of the assets retired under the program, will be developed by ADB and the associated costs will be reflected in overall financing structure and budget during due diligence.

No.	Recommendation	Compatibility / Relevant Issues
		[5] Promoting Research and Innovation through Modern and Efficient Science and Technology Park (PRIME Step): (i) targeted R&D for new energy technologies commercialization; (ii) deployment of online and offline solar PV and battery storage trainings targeted to support labor transitions underway; (iii) jobs and skills study to assess supply and demand for upskilling/re-skilling in Indonesian labor market with respect to a just energy transition; (iv) establishing Centers of Excellence for the clean energy transition. **3.** In collaboration with ADB, the Ministry of Finance is conducting a Strategic Environmental and Social Assessment (SESA) aimed at ensuring that the identification process and mitigation measures are implemented with due regard to their impact on the environment and social economy.

[31] Government of Indonesia (18 October 2020). CIF Accelerating Coal Transition (ACT): Indonesia Country Investment Plan (IP).

[32] Idem.

Annex 2. Bibliography of Studies related to Indonesia electricity subsidy

Title	Author/Publisher	Published Year	Brief Description/Content Coverage
Case Study: What is the true cost of coal in Central Java?	Lourdes Sanchez, Lucky Lontoh, Lasse Toft Christensen; International Institute for Sustainable Development (IISD)	Oct 2017	The studies address what is the true cost of CFPPs, especially if considers externalities and subsidies. The studies also mention the LCOE of CFPPs and other RE; in the end, compare the cost structure of both power plants.
Indonesia's Coal Price Cap: A barrier to renewable energy deployment	Richard Bridle, Anissa Suharsono and Mostafa Mostafa; International Institute for Sustainable Development (IISD)	May 2019	The studies cover discussions on coal price cap, why it is important, what does that mean for RE, and how to shore up PLN's finances without locking in coal
RENEWABLE ENERGY TARIFFS AND INCENTIVES IN INDONESIA: REVIEW AND RECOMMENDATIONS	ADB	September 2020	The report proposes a renewable energy (RE) subsidy mechanism to close the gap between the costs of renewable power and conventional power generation, taking into account the additional economic benefits of renewable power for Indonesia. The subsidy should be calculated as the difference between the cost of supply from a given renewable power project and the financial cost that the Perusahaan Listrik Negara (PLN, State Electricity Company) would have otherwise incurred for generation on that system in the absence of the renewable project, i.e., PLN's "avoided cost." To ensure that the Government of Indonesia does not overpay for renewable subsidies, the cost of renewable supply would be capped at its economic value, which is calculated as the economic avoided cost plus the social benefits of externalities.

Title	Author/Publisher	Published Year	Brief Description/Content Coverage
Policy Paper (Naskah Kebijakan). Transformasi Subsidi Listrik di Indonesia: Tujuan dan Usulan Mekanismenya	National Team for the Acceleration of Poverty Reduction (TNP2K)	March 2021	The policy paper addresses the purpose of electricity subsidy reform and propose the new subsidy mechanism including the implementation plan.
Indonesia's Energy Support Measures: An inventory of incentives impacting the energy transition	Anissa Suharsono, Murtiani Hendriwardani, Theresia Betty Sumarno, Jonas Kuehl, Martha Maulidia, and Lourdes Sanchez; International Institute for Sustainable Development (IISD)	June 2022	It is a report—an inventory—designed to identify all support measures available for the energy sector in Indonesia from FY 2016 to FY 2020. The report includes support measures given to various types or sources of energy, and it serves as a starting point for the Government of Indonesia (GoI), as well as all stakeholders, concerned citizens, and the wider public to allow them to "follow the money": to track the flow of public funding and to understand how public money is being spent on different types of energy. Through data visualization of the flow and allocation of the support measures throughout the period observed, this report also aims to shed light on government spending for fossil fuels vis-à-vis renewable energy and clean technology. This stocktaking report takes into account support provided over 5 years, from FY 2016 to FY 2020, for six energy sources: 1) oil and gas; 2) coal; 3) electricity; 4) renewable energy;

Title	Author/Publisher	Published Year	Brief Description/Content Coverage
			5) biofuels; and 6) electric vehicles (EVs) and battery for EV (EV and batteries).