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Captive coal expansion plan could undermine Indonesia's climate goals

Indonesia's latest national electricity master plan (RUKN 2024 - 2060) includes plans to expand captive coal capacity and increase coal generation. If implemented, this could drive higher emissions and increase generation costs for captive power.

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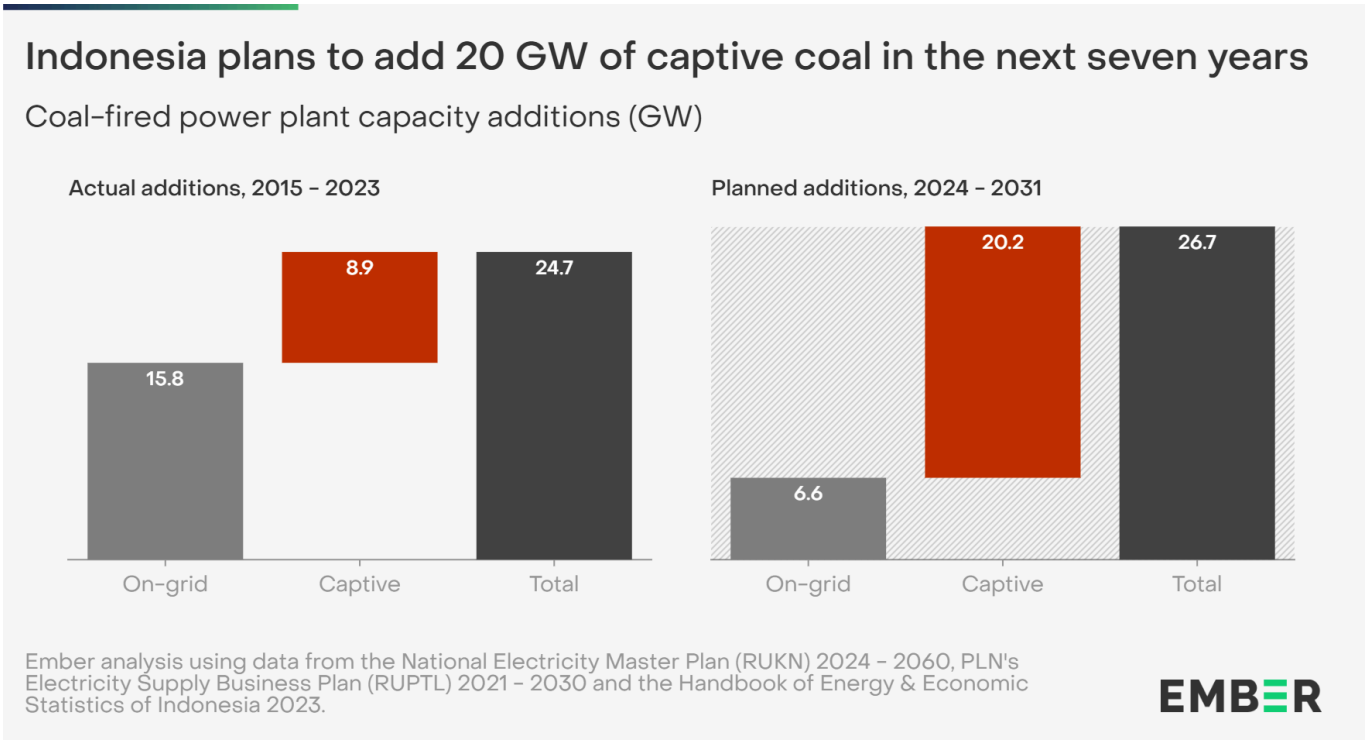
The electricity master plan reveals Indonesia's intent to increase its coal capacity by 26.8 GW in seven years. Captive coal is the main driver of this coal expansion, representing over 20 GW of new coal capacity. Consequently, coal generation is expected to surge and reach its peak in 2037, with a 62.7% higher generation than current level.

However, renewables could play a bigger role in meeting captive demand, as electricity generation from new captive coal plants is becoming more costly and less competitive.

Increasing coal generation beyond 2030 is incompatible with the Just Energy Transition Partnership and the Paris Agreement targets. The government should actively re-evaluate this coal development plan, impose stricter emissions control, and accelerate renewable energy investment.



Indonesia’s energy transition journey remains uncertain

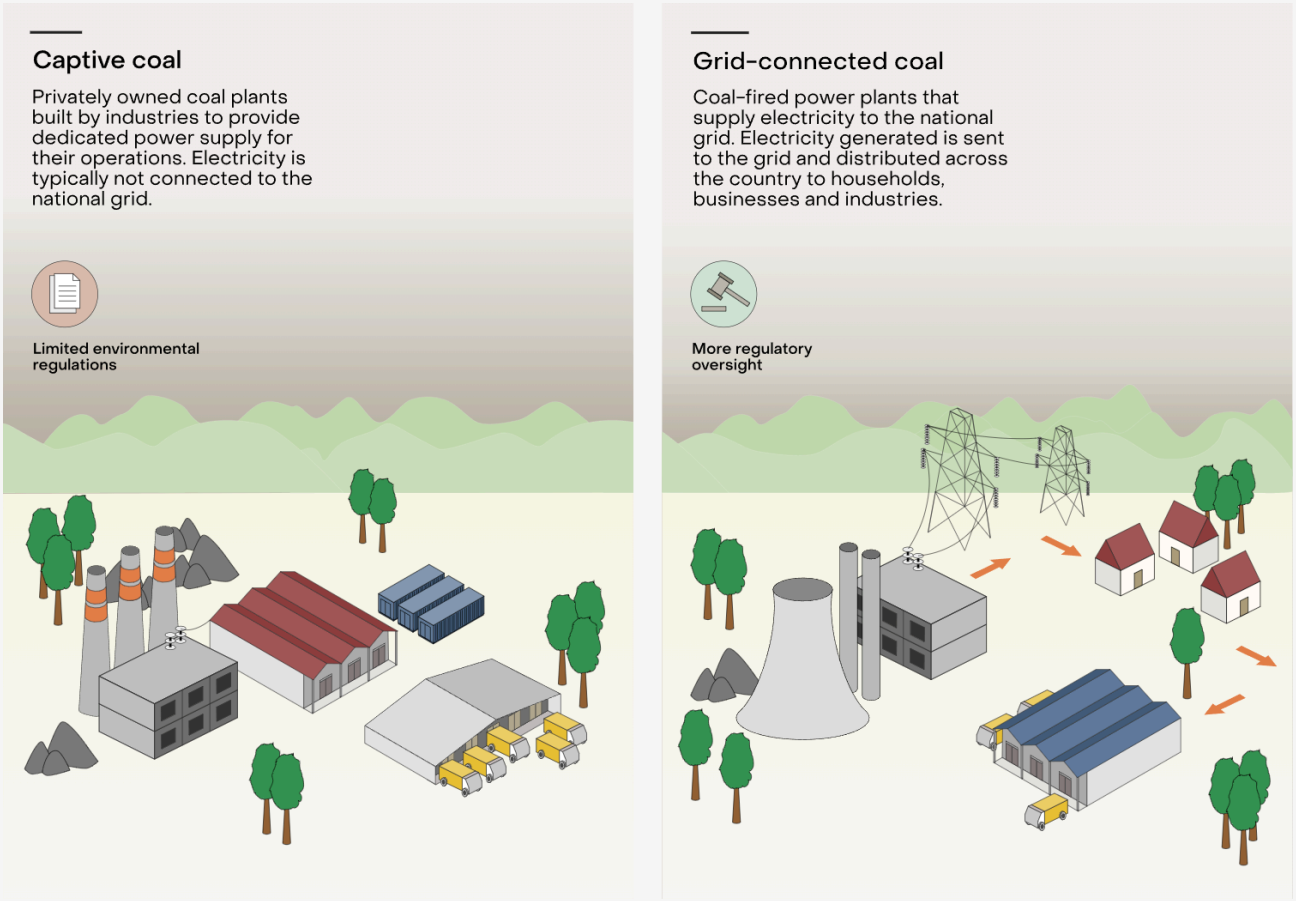
Indonesia’s National Electricity Master Plan, enacted as Ministerial Decree No. 314.K/TL.01/MEM. L/2024, is a key policy document outlining electricity supply scenarios for both grid-connected systems and captive power plants between 2024 and 2060.

This document will be used as a basis for the State Electricity Company (PLN) and private power utilities (PPUs) to develop electricity business plans.

The master plan projects strong growth in renewables, but it also anticipates a sharp rise in coal generation beyond 2030 – putting it at odds with the country's Low Carbon Scenario as outlined in the Long-term Strategy for Low Carbon and Climate Resilience 2050 (LTS - LCCR) and Just Energy Transition Partnership (JETP) targets.

This also contradicted Prabowo's pledge to retire coal-fired power plants within 15 years, which was recently clarified by the Special Envoy for Environment and Minister of Energy. However, Indonesia could still align with its climate targets by refining its power generation strategies and enforcing strict emissions controls.

What is captive coal?



Source: Ember
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Captive coal capacity set to increase by 180% in seven years

Indonesia currently operates 49.7 GW of coal-fired power plants (CFPP), including 38.5 GW of grid-connected thermal power and 11.2 GW of captive coal power. This thermal coal capacity has doubled over the last decade, leading to an electricity oversupply in recent years, straining PLN's cash flow and creating a major barrier for renewable energy expansion.

Captive coal has grown nearly fivefold, from 2.3 GW in 2014 to 11.2 GW in 2023. This significant increase is mainly driven by a massive expansion of mineral smelting industries in North Maluku and Sulawesi. These industries require dedicated and stable power to support energy-intensive metallurgical processes.

Despite these challenges, the master plan projects total coal capacity to reach 76.5 GW by 2031, adding 26.8 GW of new coal capacity. This may include 6.6 GW of new grid-connected CFPP, as specified in the PLN's Electricity Supply Business Plan (RUPTL 2021 - 2030), and over 20 GW of captive coal capacity to support the growing mineral processing industry. If fully implemented, Indonesia's captive coal capacity would be equal to Poland's total coal capacity of 31.54 GW.

Not all new captive coal projects have been fully identified at this stage. The Center for Research on Energy and Clean Air (CREA) and Global Energy Monitor (GEM) estimated that captive coal capacity could reach 26.2 GW by 2026. This suggests that 5.2 GW of capacity is unidentified, presenting an opportunity to review the plan and incorporate more renewables. This should be incorporated into a study on captive coal decarbonisation and the update of the Comprehensive Investment and Policy Plan (CIPP) document.

New captive coal may increase financial and environmental risks

If these new captive coal projects are implemented, they may face regulatory challenges. Under Presidential Regulation No. 112/2022, these plants can only operate until 2050 and must reduce emissions by at least 35% within 10 years of operation. In addition, captive coal plants are not eligible for the capped coal price, requiring producers to purchase coal at market prices, which could further increase generation costs.

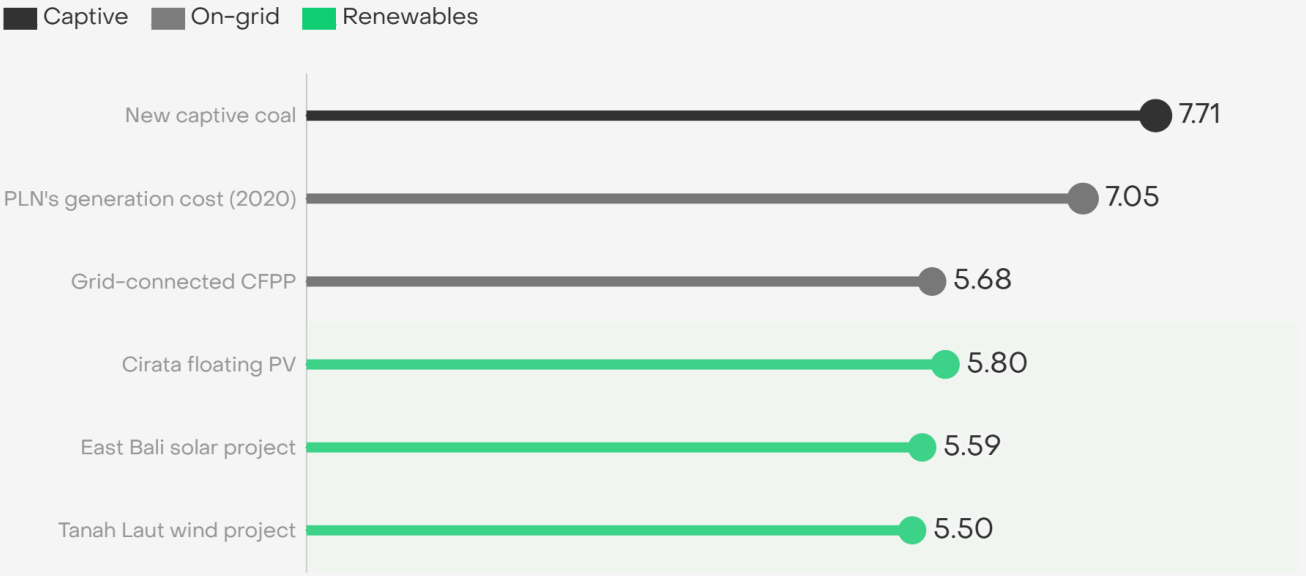
The generation cost of new captive coal could reach 7.71 USc/kWh, higher than the national average generation cost in 2020 (7.05 USc/kWh) and the levelised cost of electricity (LCOE) of grid-connected CFPP (5.68 USc/kWh) using estimates from the Institute for Essential Services Reform (IESR)'s LCOE tool. Furthermore, recent power purchase agreements for solar and wind have demonstrated lower tariffs, presenting opportunities to reduce operational cost and lower emissions for captive power generation.

What is LCOE?

Levelised Cost of Electricity (LCOE) is the average cost of generating electricity over a plant's lifetime, including capital, operation and fuel costs.

New captive coal in Indonesia could be more expensive than renewables

Levelised cost of electricity and RE tariffs (USDc/kWh)



Source: Ember analysis, IEEFA
The levelised cost of electricity (LCOE) for CFPP and captive coal was calculated using IESR's LCOE tool. For captive coal, the following assumptions were used: supercritical technology, a 75% higher fuel price, and a 25-year lifetime.

An additional concern regarding the potential growth of captive coal is the lack of regulatory oversight, particularly in environmental regulations. Captive coal is currently excluded from the power sector emissions trading scheme. Additionally, there is no requirement for emissions reporting. In contrast, both regulations are imposed on grid-connected CFPPs to reduce emissions.

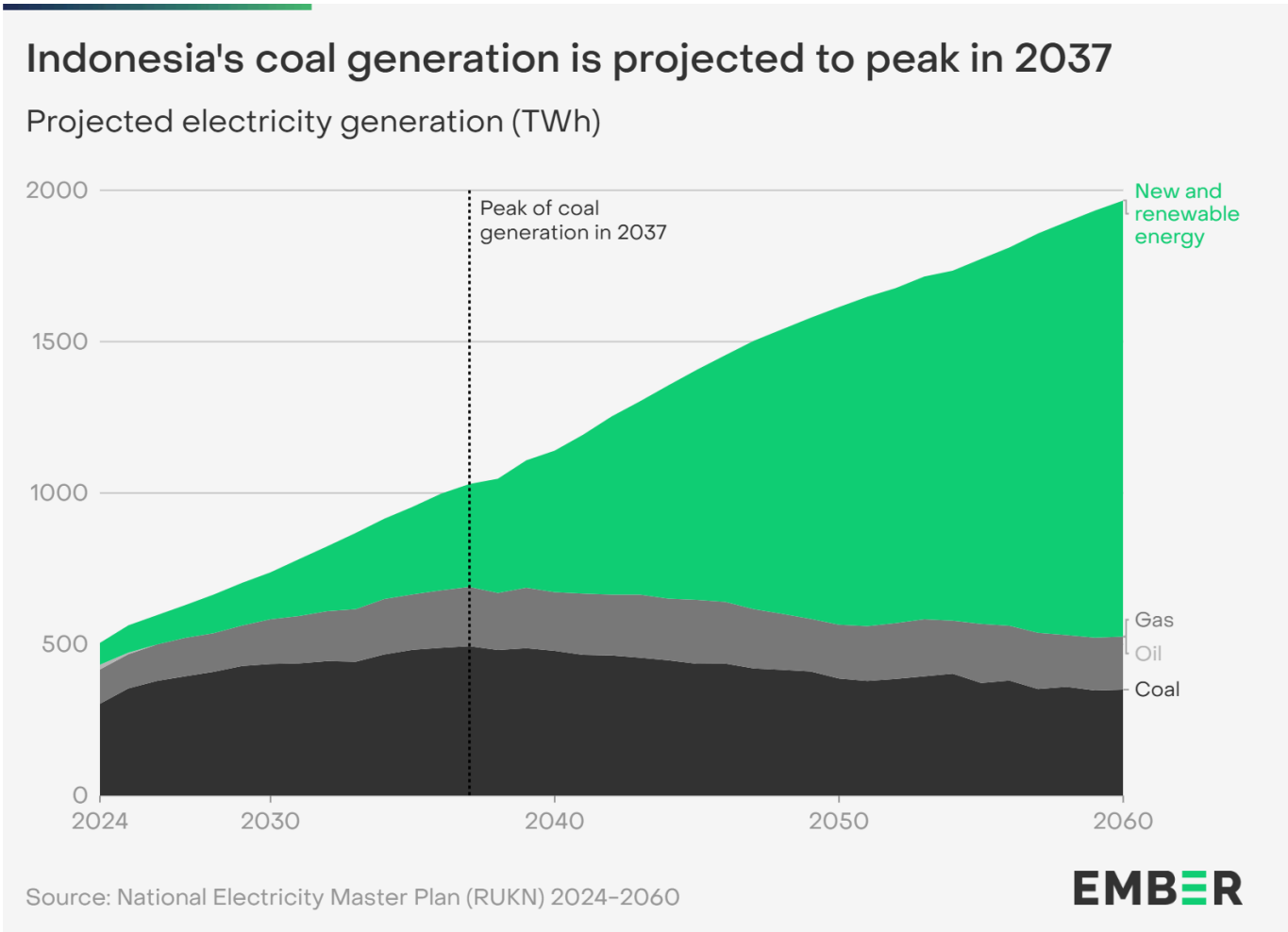
Fossil generation set to rise despite gradual growth of renewables

Under the National Electricity Master Plan (RUKN), electricity demand is projected to grow by approximately 3.8% annually. This would mean that total electricity demand would increase from 482 TWh currently, to an estimated 1,813 TWh by 2060.

This growth is driven by several factors, including population growth, the increasing adoption of electric vehicles and industrial expansion such as new industrial estates, the green hydrogen industry and special economic zones.

While new energy and renewable energy are expected to start dominating the power mix by 2040, coal and natural gas generation will continue to rise over the next decade. Coal generation is estimated to grow at an annual rate of 3.9%, outpacing demand growth. By 2037 coal generation is expected to peak at 494 TWh, a 62.7% increase from current levels.

Renewable energy share is anticipated to reach around 21% by 2030 and 41% by 2040, indicating a six-year delay in achieving the 23% renewable energy target set in the 2014 National Energy Policy (KEN). Similarly, the JETP target of increasing renewable energy share to 34% by 2030 could also face delays.



Rising coal generation could hinder economic opportunities in the global energy transition

The electricity supply scenario outlined in the master plan does not align with the Low Carbon Scenario - Compatible with Paris Agreement target (LCCP). Under LCCP, coal generation should peak at 435 TWh in 2030, whereas the master plan projects a peak at 494 TWh in 2037.

To align with the Paris-compatible scenario, unabated coal generation should drop to around 180 TWh by 2050. In contrast, the master plan projects only a modest decline of coal generation by mid-century.

Consequently, power sector emissions are expected to rise significantly. While the JETP targets cap grid emissions at 290 MtCO2e (million tonnes of carbon dioxide-

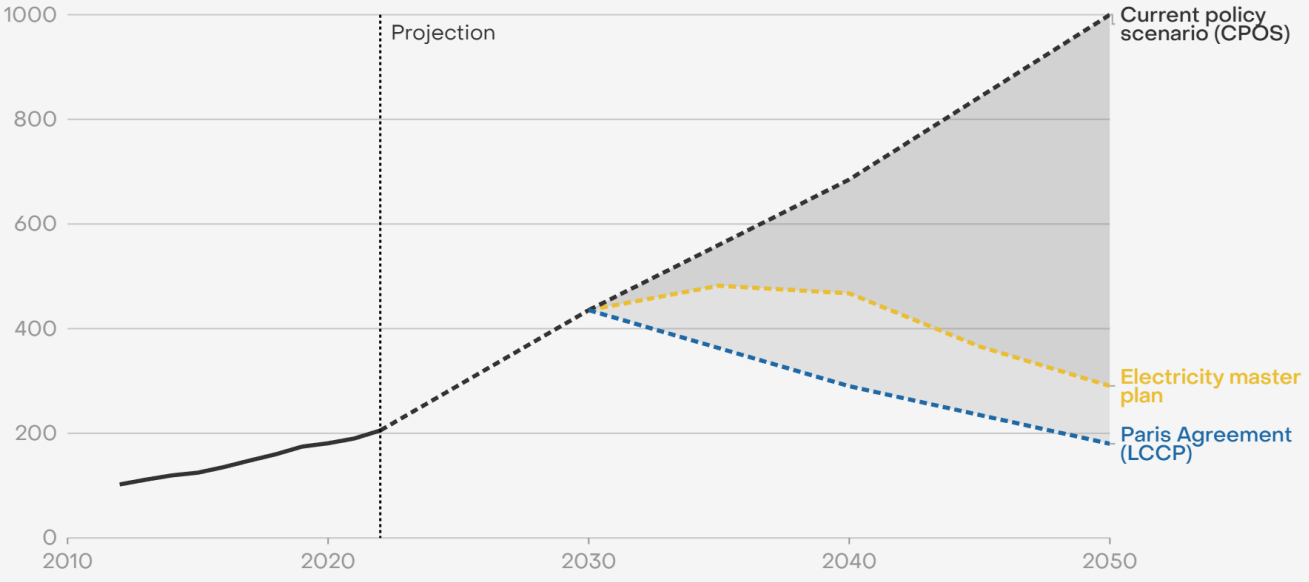
equivalent) by 2030, projections indicate total power sector emissions will reach 598 MtCO2e in 2037—consisting of 432 MtCO2e from grid emissions and 166 MtCO2e from captive power.

Despite increasing CO2 emissions, the potential expansion of coal generation would also drive higher coal demand. Coal consumption for power generation is estimated to rise from 183 million tonnes (Mt) in 2024 to 298 Mt per year by 2037. This increase could further expand the coal mining sector, which currently aims to reach a peak production at 917 Mt in 2025.

The expansion of coal mining will lead to higher carbon dioxide and methane emissions from mining processes. With increased demand of 115 Mt in 2037, coal mine methane emissions are estimated to rise by approximately 100 kt or 13.7% above 2024 levels. However, this rise in domestic demand could be offset by a declining export market, as projected by the government.

Indonesia needs to peak coal by 2030 to align with the Paris Agreement

Unabated coal generation (TWh)



Source: National Electricity Master Plan (RUKN) 2024-2060, Handbook of Energy and Economic Statistics of Indonesia (HEESI) 2023, Long-Term Strategy for Low Carbon and Climate Resilience 2050 (LTS-LCCR)

Notes: Historical coal generation data from HEESI might exclude captive coal generation. Generation from coal-fired power plants with carbon capture and storage (CCS) are excluded. Current policy scenario (CPOS) and Low Carbon Scenario Compatible with the Paris Agreement target (LCCP) are compiled from LTS-LCCR

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Recommendations

The following recommendations aim to minimise the negative impacts of coal expansion. They focus on key areas, including reassessing coal development plans, strengthening emissions reporting and standards and closely monitoring renewable energy progress.

1. **Reassess captive coal development plan**

   Reassessing captive coal development could lower costs and improve sustainability. With new captive coal plants operating for a shorter period than their economic lifetime and lacking access to the capped Domestic Market Obligation (DMO) price, their generation costs would be higher. Shifting to renewables could reduce operational costs, improve sustainability performance, and contribute to Indonesia's climate goals.

2. **Enforce standards for operational captive coal**

   Applying the same standards to captive coal as grid-connected plants could enhance transparency and emissions reductions. Requiring captive coal plants to report emissions, generation output and other relevant data would improve oversight and accountability. Integrating them into the emissions trading scheme could create a market-driven approach to emissions reduction, while ensuring compliance with the 35% emissions reduction target under Presidential Regulation 112/2022 would help curb emissions effectively.

3. **Ensure renewable energy additions are on track**

   Keeping renewable energy additions on track would reduce reliance on fossil fuels. The master plan projects renewable generation to grow from 72 TWh in 2024 to over 155 TWh by 2030, requiring an annual capacity addition of approximately 4 GW. Maintaining this pace would minimise the risk of carbon lock-in, preventing extended or expanded fossil fuel use to meet demand. Developing a strong project pipeline and addressing procurement challenges—such as renewable energy pricing, carbon value ownership, and mandatory partnerships—could accelerate deployment.

4. **Set emissions and renewable targets for private power utility and captive operators**

   Setting clear renewable energy and emissions targets for private power utilities and captive operators could drive industrial decarbonisation. Encouraging private power utilities (PPUs) and captive operators to expand renewable energy use and reduce emissions would help bridge the gap in achieving Indonesia's climate goals. A higher share of renewables in industrial processes could lower emissions while enhancing product competitiveness in a market increasingly driven by sustainability considerations.

Methodology

Power plant capacities and generation for each technology are calculated based on demand and energy mix projections from the master plan.

Captive coal capacities are estimated by comparing projected coal capacity in the master plan with current installed coal capacity and the coal development plan in Indonesia's Electricity Supply Business Plan (RUPTL).

Levelised cost of electricity (LCOE) of captive coal and grid-connected coal-fired power plants (CFPP) are calculated using IESR's LCOE tool, specifically supercritical technology. For captive coal, we assume 75% higher fuel cost based on the Indonesian coal price index (HBA) for 2024 and capped coal price for electricity. In addition, new captive coal will operate for 25 years following the Presidential Regulation No. 112/2022.

Coal consumption is estimated using a specific coal consumption rate calculated from PLN statistics 2023.

Coal mine methane emissions are estimated using coal production data and IPCC's average emissions factors for surface coal mines.

Acknowledgements

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Cover image
Conveyor at the Coal-fired Power Plant 2 – Amurang in North Sulawesi, Indonesia. Credit: Ade Lukmanul Hakim / Alamy Stock