ENERGY TRANSITION PARTNERSHIP

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Policy Brief

International Benchmarking of Incentives and Disincentives for Energy Transition Projects

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Environment and Climate Change Canada
Environnement et Changement climatique Canada

Australian Government
Department of Climate Change, Energy, the Environment and Water

CIFF CHILDREN'S INVESTMENT FUND FOUNDATION

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Executive Summary

Coal dominates Indonesia's energy sector, accounting for 40.37% of the primary energy mix and 54.3 GW of installed on-grid capacity as of 2024. Against this backdrop, Indonesia's current energy landscape underscores the urgency of reform. Despite an increase in renewable energy ("RE") share to 14.65%, progress remains slow. The Government of Indonesia ("GoI") has introduced key regulations, including Presidential Regulations ("PR") 112/2022 and Ministry of Energy and Mineral Resources ("MEMR") Regulation 10/2025, to accelerate RE development and Coal-Fired Power Plant ("CFPP") early retirement. However, challenges persist, particularly in improving the investment climate for Independent Power Producers ("IPPs"), which are expected to deliver 70.6% of the planned 69.5 GW RE capacity in the Accelerated Renewable Energy Development ("ARED") scenario under the PT Perusahaan Listrik Negara (Persero) ("PLN") 2025-2034 Electricity Supply Business Plan ("RUPTL"). By studying nations that have successfully integrated RE and reduced dependency on coal for electricity generation, Indonesia can gain valuable insights to enhance its energy mix and meet its energy transition goals.

As such, this policy brief presents an in-depth analysis of international best practices and lessons learned from selected countries regarding incentive mechanisms and the removal of disincentives for energy transition projects. In this brief, incentives refer to mechanisms that reduce investment risks, promote RE, and attract private-sector participation. These encompass fiscal measures that ease tax and customs burdens to improve project viability, financial measures that mobilise capital and lower financing costs to accelerate the transition, and risk-reduction and facilitation measures that streamline processes, reduce regulatory uncertainty, and enable faster, more secure implementation. Conversely, disincentives such as fossil-fuel subsidies, the Coal Domestic Market Obligation ("DMO"), and the Coal Domestic Price Obligation ("DPO") undermine these efforts by sustaining support for coal and counteracting policies aimed at increasing RE penetration in the energy mix.

To identify relevant lessons, this brief adopts a structured methodology for selecting best-practice countries. The methodology for selecting best practice countries involved a two-stage approach: filtering and short-listing, followed by a pros and cons analysis. The filtering process aims to identify potential best-practice countries for energy transition by evaluating key attributes deemed relevant and important for applicability to Indonesia, resulting in a shortlist of countries with some degree of similarity. The filtering process considered factors such as coal production, the share of coal and renewable electricity generation, economic size (the comparison uses gross domestic product ("GDP") to evaluate similarities with Indonesia's developing-country status), government type (e.g. whether they are a single-party state), electricity market structure, economic performance, growth of renewable electricity generation, and energy security.

This approach highlights India and Slovakia as best-practice countries for benchmarking RE development, coal phase down and the early retirement of CFPPs. India has strengthened its RE sector through a combination of measures, including incentivising domestic manufacturing to reduce plant costs, implementing demand-side incentives, and adopting efficient procurement processes to align

supply with growing demand. In addition, India's promotion of biomass co-firing offers a practical model for Indonesia to gradually reduce coal dependency. For Indonesia, these lessons suggest the importance of pairing local content requirements with performance-linked incentives to build domestic manufacturing capacity, while introducing clear procurement schedules and financial support for biomass co-firing to accelerate coal substitution. In addition, Indonesia could benefit from implementing Renewable Purchase Obligations ("RPOs")[i] to create predictable demand for RE, and from standardising Power Purchase Agreements ("PPAs") and tender processes to reduce transaction costs that could help improve investor confidence.

Slovakia stands out as the only country on the shortlist to have fully eliminated coal subsidies and accelerated its coal exit timeline from 2030 to 2024. The country is expected to achieve a coal-free electricity mix by the 2024–2025 heating season, following the closure of its last CFPP. This closure was driven by financial challenges linked to a sustained decline in electricity prices, increasing relevance of the EU Emissions Trading System ("EU ETS"), and increasing coal prices. Slovakia's success in retiring CFPPs was largely underpinned by economic factors, combining market-based disincentives to discourage coal use with targeted incentives that supported CFPP owners and developers during the transition. Indonesia could draw on Slovakia's experience by announcing coal phase-out timelines early, integrating land-use planning into its early retirement roadmap, and leveraging concessional finance through platforms such as the Energy Transition Mechanism to mitigate socio-economic impacts.

These best practices provide valuable insights that could be considered to address issues and gaps in the existing incentive mechanisms and in the removal of disincentives for energy transition projects in Indonesia.

Overview of Indonesia's Current Condition

Indonesia's electricity consumption per capita grew from 0.386 MWh in 2000 to 1.445 MWh in 2023, reflecting substantial economic and demographic growth[1]. This rise is driven by Indonesia's economy expanding to the 16th largest globally, with GDP increasing from US$165 billion in 2000 to US$1.4 trillion in 2024[2] and GDP per capita at purchasing power parity ("PPP") rising from $4,682.50 to $16,448.30 during the same period[3].

In part to support this electricity demand, Indonesia has grown to become one of the largest thermal coal producers globally. In 2024, Indonesia recorded a total thermal coal production of 835 million metric tonnes[4], making it the world's largest exporter of thermal coal, while still using a significant portion of production domestically[5]. In 2024, coal accounted for 40.37% of total energy supply in the primary energy mix, followed by oil (28.82%), gas (16.17%), and RE (14.65%). Although the share of RE supply in the primary energy mix has been increasing (6.71% in 2017 to 14.65% in 2024), it is still far

[i] The RPO in India is equivalent to the Renewable Portfolio Standard ("RPS") outlined in Indonesia's Draft Law on New and Renewable Energy (*Rancangan Undang-Undang Energi Baru dan Energi Terbarukan*)

behind the share of coal, which has also been surging (30.67% in 2017 to 40.37% in 2024) and remains the primary source of energy in Indonesia[6]. The power plant installed capacity in Indonesia is still dominated by coal as the main source of electricity. As of 2024, Indonesia has a total installed on-grid capacity of 100.6 gigawatts ("GW"); coal accounts for about 54% (54.3 GW), while RE accounts for only 14% (13.8 GW)[7].

Despite the slow uptake of renewables and the heavy reliance on coal for electricity generation, the Government of Indonesia ("GoI") has stated its aims of expediting the development of RE and the early retirement of CFPPs with the issuance of Presidential Regulation (PR) No. 112 of 2022 ("or PR 112/2022") on the Acceleration of Renewable Energy Development for Electricity Generation. Moreover, the Ministry of Energy and Mineral Resources ("MEMR") has issued Regulation No. 10 of 2025 ("MEMR Regulation 10/2025") on the Electricity Sector Energy Transition Roadmap, which provides guidance for implementing the energy transition in the electricity sector and supports the achievement of net-zero emissions targets. PR 112/2022 also serves as the legal basis for PT. Perusahaan Listrik Negara (Persero) ("PLN"), a vertically integrated Indonesian state-owned utility company, to pursue the CFPP early retirement program and replace the CFPPs with RE power plants, while considering grid stability and electricity supply and demand. The ARED scenario in PLN's 2025-2034 RUPTL signals a major transition towards renewable energy, with planned capacity rising to 61% from 53% in the previous RUPTL, while fossil fuel capacity is expected to fall from 47% to 24%[8].

In terms of electricity market structure, Indonesia's electricity generation, transmission, and distribution activities are dominated by PLN. At least 47.1% of the generation capacity is owned by PLN, while the remainder is owned and operated by Independent Power Producers ("IPPs")[9]. However, the ownership of transmission and distribution assets is predominantly held by PLN. PLN is also responsible for executing procurement for both fossil fuel and RE power plants by opening tenders for the IPPs to supply electricity to the national grid. PLN also acts as the main offtaker for purchasing electricity generated by the IPPs under long-term PPAs.

However, it is noted that the ARED scenario under the 2025-2034 RUPTL plans for 70.6% of the total RE capacity of 69.5GW to be built over that period to be developed by IPPs, while PLN focuses on development of 47,758 km of transmission and distribution lines over the same period[10]. This further emphasises the need for improvement in the investment climate for IPPs, including new incentive mechanisms, if these targets are to be met.

This overview of Indonesia's power sector and energy transition objectives provides a context for comparing best-practice countries. By studying nations that have successfully integrated RE and reduced dependency on coal for electricity generation, Indonesia can gain valuable insights to enhance its energy mix and meet its energy transition goals.

Methodology for Identifying Best-Practice Countries in Energy Transition

The selection process for identifying best practice countries in the international benchmarking study involved a two-stage approach, involving:

1. **Filtering and short-listing**: Potential best practice countries were filtered based on eight key attributes deemed relevant and important to create a shortlist of countries with some degree of similarity to Indonesia.
2. **Pros and cons analysis and final selection of best practice countries**: The countries shortlisted were further assessed through analysis of pros and cons. This analysis was prefaced with a general, qualitative overview of the general power sector attributes of the shortlisted countries and focus on defining a quantitative scoring system for two sets of considerations related to: (i) RE development; and (ii) CFPP early retirement and coal phase-down. The pros and cons analysis identified best-practice countries for benchmarking incentive mechanisms and the removal of disincentives for the three types of energy transition projects.

A summary of this approach can be observed in the figure below:

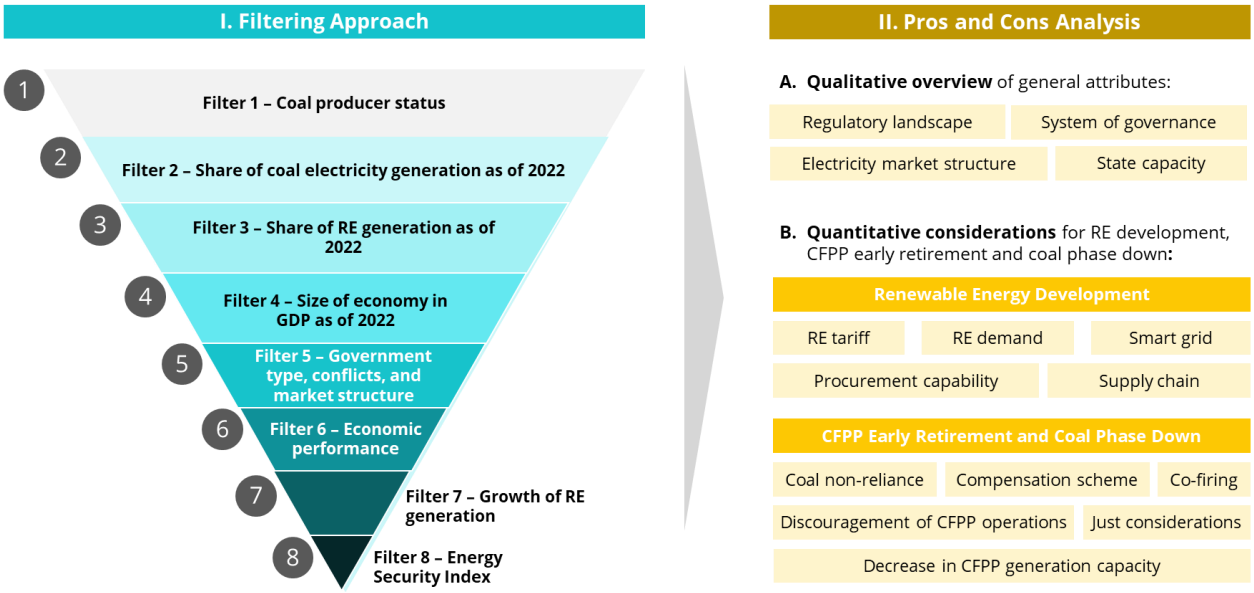

Figure 1 Methodology for Selecting Best Practice Countries

Based on this methodology, from 55 countries that have a coal producer status two shortlisted countries were identified after obtaining the highest scores in the pros and cons analysis. These countries—India and Slovakia—were selected based on their relevance to Indonesia for the three types of energy transition projects.

Table 1 Scoring Summary for Best-Practice Countries

Category	Summary of the Best Practice Countries		
	RE Development	CFPP Early Retirement	Coal Phase Down
Short-listed	India	Slovakia	India

To deepen understanding of incentives and initiatives to accelerate the energy transition, the project conducted multiple stakeholder consultations, including an overseas policy visit to Slovakia on 21–25 July 2025 and a hybrid focus group discussion on 15 September 2025 in which consultants from India presented best practices in bolstering RE and phasing out coal to key Indonesian government institutions.

Best-Practice from International Experience in Energy Transition

India

Traditionally, India's power sector has been heavily dependent on conventional fuels to meet energy demand. However, given its climate change commitments, India has increased the share of renewables in the installed capacity mix at a rapid pace. As of September 2024, India ranks 4th globally for the total renewable power capacity additions with combined installed RE capacity of approximately 203.18 GW (including hydro)[11]. Since the Paris Agreement in 2015, India has put forth enhanced ambitions on climate action and announced the "*Panchamrit*" targets at the 26th Conference of Parties 26 (COP-26) summit, which include achieving net-zero by 2070 and installing 500 GW of non-fossil fuel-based energy capacity by 2030[12].

The Government of India has introduced several policy and regulatory support mechanisms to aid the country's energy transition from conventional fossil fuels to more sustainable and RE sources. The support mechanisms involved several incentive mechanisms aimed at encouraging clean energy adoption and reducing reliance on polluting energy sources:

Table 2 India's Incentive Mechanisms for Energy Transition

Project Type	Incentive Mechanisms
RE Development	**Fiscal incentives**: Accelerated Depreciation, Generation-Based Incentives, tax holidays, duty exemptions, reduced Goods and Services Tax rates, and Production Linked Incentives **Financial incentives**: Viability gap funding, concessional loans, sovereign green bonds, and financial assistance for solar pumps and decentralised solar projects such as the Prime Minister's Farmer Energy Security and Upliftment Mission or *Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan* ("PM-KUSUM") **Risk reduction and business facilitation measures**: RPOs and improved grid access, Feed-in tariffs, Renewable energy certificates ("RECs"), Transmission charge waivers, etc.

Project Type	Incentive Mechanisms
CFPP early retirement and coal phase-down	**Fiscal incentives**: Coal cess/levy, Reduction in fossil fuel subsidies **Financial incentives**: Biomass co-firing in thermal power plants, capacity factor reduction **Risk reduction and business facilitation measures**: Supply of Round-the-Clock ("RTC") power. RTC power means delivering a contracted amount of electricity every hour, 24/7, using a portfolio of resources to provide a firm, uninterrupted supply. India implements this through RTC tenders/PPAs that require continuous availability, encouraging hybrid projects that combine renewable sources such as solar, wind, and hydro with energy storage, complemented by baseload generation from RE or potentially fossil fuels (e.g., natural gas or coal), and aggregate capacities to meet consumers' demand[13].

Slovakia

Slovakia's electricity mix is dominated by nuclear power, which supplied 62% of total annual production in 2024, followed by hydroelectric power at 18%[14]. Coal and natural gas were historically also significant sources of power production. Coal's share has steadily declined, from 19.6% in 2000 to 14.6% in 2010, 9.5% in 2019, and under 3.1% in 2024, with remaining output mainly used to burn through stockpiles, signalling the end of coal-fired power in Slovakia[15]. Slovakia officially ended coal-based power generation in 2024, although the Vojany Power Plant (220 MW) may still produce limited electricity from coal[16]. All CFPPs are expected to be fully closed by the 2024–2025 heating season: Novaky (220 MW) has shut down, and Teko (121 MW) is burning through its remaining coal stocks[17]. Moreover, the use of natural gas was priced out of power production due to the conflict in Ukraine[18].

The European Green Deal is the latest strategic document of the EU, which announces the strategic goal to create a climate-neutral economy in the EU by 2050. The EU required its member states to pledge carbon emission reduction goals and to describe the measures that should lead to achievement of the reduction goal in the national strategic documents.

Slovakia's coal phase-out was driven by economic and climate commitments. Since domestic coal contribution to the electricity mix was largely subsidised by the government as a service of general economic interest, it was not economically viable when facing the rise in overall operational costs following the increase in the carbon allowance price. A definitive coal phase-out is one step toward achieving the greenhouse gas emissions reduction target of 22.7% by 2030 compared to 2005 levels, as set out in the Integrated National Energy and Climate Plan. In 2017, coal-fired electricity (3,540 GWh) accounted for 37.5% of total carbon dioxide emissions, while in 2022 it accounted for 32% (2,054 GWh) —a decline of 5.5 percentage points over 5 years and emissions decreased by about 4 million metric tonnes[19].

The final updated version of the National Energy and Climate Plan from April 2025 set the new goal for RE in total energy production at 25% (instead of the former 23%) by 2030. In order to support stability of national grids and a common electricity market development, the EU also sets targets for system interconnection. Cross-border trading allows for higher penetration of RE without raising the

probability of a blackout, especially in unexpected short-term peak consumption periods. In summary, the incentives Slovakia implemented to accelerate its energy transition are as follows:

Table 3 Slovakia's Incentive Mechanisms for Energy Transition

Project Type	Incentive Mechanisms
RE Development	**Fiscal incentives**: Excise duty exemption **Financial incentives**: EU grants, green auctions **Risk reduction and business facilitation measures**: Feed-in tariff, RE grid access, grid interconnectivity and flexibility, Guarantees of Origin
CFPP early retirement and coal phase-down	**Fiscal incentives**: Cessation of subsidies, EU Emissions Trading System **Financial incentives**: Just Transition Fund **Risk reduction and business facilitation measures:** Support for Land Repurposing

International Best Practices and Lessons Learned for Indonesia

Moving ahead in its energy transition journey, it is critical for Indonesia to create a supportive ecosystem for the energy transition, with the aim of ensuring a reliable and affordable energy supply for consumers while reducing the carbon emissions.

The table below summarises international lessons relevant to Indonesia, should the government choose to adopt similar measures in the coming years. Some policies can be implemented in the short term, while others will be feasible only after foundational incentives are established and operating within Indonesia's energy transition framework.

Table 4 International Best Practices and Lessons Learned for Indonesia

Topic	International Best Practices	Lessons Learned for Indonesia's Potential Implementation
RE Development	CFPP Early Retirement	Coal Phase Down

Renewable Purchase Obligations
 	
(Lesson from India)
	• RPOs are quantity-based mandates that require a defined share of electricity to come from renewable sources, and in India, state electricity regulatory commissions ("SERCs") set the required purchase percentages for obligated entities such as distribution companies ("DISCOMs"), open-access consumers, and captive generators. The scheme aims to increase renewable adoption, cut dependence on fossil fuels and greenhouse gas emissions, reduce market risk for developers/investors, and build viable markets for clean technologies that are not yet cost-competitive. RPOs are classified into solar and non-solar, with national targets set by the Ministry of Power and incremental state targets set by SERCs based on resource potential, demand patterns, and tariff impacts, and updated periodically to raise the renewable share over time.
	• Since 2010, RPOs have helped expand India's non-hydro renewable capacity from ~14 GW to ~155 GW by 2024 (around a 10x increase)[20] by creating a stable, mandatory market with long-term targets that provide predictable demand, reduce investor risk, and steadily increase renewable penetration. This is further supported by India's REC mechanism, under which obligated entities meet their RPOs by purchasing RECs from renewable generators. The REC market provides an additional revenue stream for RE producers, incentivising greater renewable generation and increasing demand for clean power.
	• Key challenges include uneven implementation due to misalignment between national and state targets; low RPO compliance; REC and green power markets that are still developing, and procurement hurdles (slow distributed and open-access growth; grid and land constraints; delays in PPAs and tariff approvals; weak wind tenders); and DISCOMs' lock-in to long-term thermal PPAs with capacity charges, which deters new RE commitments.
		As of this writing, Indonesia has not implemented any mechanisms similar to that of India's RPO. Moreover, its applicability may be limited, given that Indonesia has only one utility company, PLN, compared to approximately 100 DISCOMs in India. However, the concept of RECs can still be applicable in the Indonesian context. Although RECs have been introduced by PLN in 2020, the purchase of RECs in Indonesia is on a voluntary basis. To create more demand for RE, increase the adoption of RE, and develop a viable market for clean energy technologies, Indonesia can consider the following:
		• **Applicability of RPO:** there are two options that Indonesia may explore to implement a similar mechanism to the RPO.
		  ○ The first approach involves requiring predetermined consumers (mainly industry or high electricity use consumers) to purchase electricity generated from clean sources at certain level. However, this would necessitate PLN's ability to distinguish between energy produced by RE plants and that from fossil-fuel-based plants. This can be achieved through allowing power wheeling and direct PPAs between the RE IPPs to consumers. PLN could benefit from this arrangement through charging transmission fees.
		  ○ The second approach involves mandating RPOs through the purchase of RECs from PLN. However, REC availability is currently limited due to the constraints on new RE projects[21]. This can support PLN in achieving its RE generation targets under the 2025-2034 RUPTL, which calls for significant new RE supply. For this mechanism to be viable, RECs must be backed by additional RE developments otherwise, the RPO system cannot function effectively due to insufficient supply.
		• **Policy & regulatory framework:** A clear, supportive policy and regulatory framework including, if adopted, RPOs would strengthen investor confidence and create a conducive environment for investments in the RE sector. This could be reinforced by increasing massive procurement of new renewable projects to build a pipeline of PLN-recognised RECs, which would facilitate RPO implementation and

Topic	International Best Practices	Lessons Learned for Indonesia's Potential Implementation
RE Development	CFPP Early Retirement	Coal Phase Down
		compliance. If RPOs are introduced, targets should be calibrated to reflect resource availability and grid conditions across Indonesia's islands. • **Availability of grid infrastructure to integrate RE:** With the aim to ensure project viability, investments in grid infrastructure and connectivity are necessary. Lack of adequate grid infrastructure would impact the RE development and offtake. • **Setting the RPO targets:** Depending on the availability of PLN's REC supply, RPO targets could be phased in over several years. This would give long-term visibility for market participants, support system planning and help in optimising the power procurement portfolio of the obligated entities. Initially, it may be preferable for RPOs to apply to industrial and other energy-intensive consumers, while excluding households. • **Penalties for non-compliance with RPOs:** The penalties for non-compliance with RPOs need to be carefully considered, given that these penalties will indirectly be borne by the consumer through increased tariffs. • **Monitoring framework:** An appropriate monitoring and reporting framework is necessary for effective implementation of REC purchases and RPO targets, thereby reducing grid dependency on conventional power sources.
Utility-scale RE tender + waiver of transmission charges **(Lesson from India)**	• India moved from feed-in tariffs to tariff-based competitive bidding, scaling utility-scale tenders amounting to around 218 GW issued, with 150 GW allotted; in Fiscal Year ("FY") 2024, the annual target of 50 GW was exceeded with a record issuance of more than 69 GW, underpinned by standardised PPAs, payment security, and reverse auctions. It waived the Inter State Transmission System ("ISTS") charges/losses for renewables (initially solar/wind, later extended to pumped storage hydro, Battery Energy Storage System ("BESS"), large hydro >25 MW, offshore wind, green hydrogen/ammonia) to cut delivered costs. It also built enabling grid infrastructure via the Green Energy Corridor ("GEC") with grants from the Indian	In Indonesia, utility-scale RE tenders, coupled with waivers of transmission charges, could effectively promote RE development, provided the government finances the waiver either through direct subsidies or through grants. To drive the successful development and implementation of utility-scale projects in the country, it is important to consider the following key aspects: • **Developing a pipeline of projects:** Through the RUPTL and the National Electricity General Plan or *Rancangan Umum Ketenagalistrikan Nasional* ("RUKN"), an RE master plan outlining the project pipeline serves as a guiding document for project development. To support this pipeline, transmission and RE procurements should follow a regular schedule that specifies timing, capacity (MW), expected value, and potential investment, and be updated regularly to drive consistent,

Topic	International Best Practices	Lessons Learned for Indonesia's Potential Implementation
RE Development	CFPP Early Retirement	Coal Phase Down
	Ministry of New and Renewable Energy and international loans to evacuate and integrate renewable power[22]. • These measures accelerated deployment and discovered lower tariffs, improving cost-competitiveness and progress towards national targets (target of 500 GW by 2030). The ISTS waivers reduced landed costs, improving project viability and interstate offtake. The GEC is enabling integration of about 44 GW of renewables, bolstering grid stability and readiness for higher variable shares. • Although ensuring that financial incentives and subsidies remain adequate and sustainable over the long term is challenging, the Government of India has worked to improve loan access and encourage industry participation. Consistent financial support is essential to sustain engagement from both new entrants and existing players. • Challenges include cross-subsidisation from the ISTS waivers (prompting calls for capacity caps or budget-funded subsidies), flexibility needs that reduce offtake of standalone solar/wind in favour of firm products, and uneven tendering where RPO-compliant, resource-rich states slow issuance. Aggressive bidding has harmed project viability, delaying commissioning and dampening participation, while land, right-of-way and forest clearances have slowed transmission and projects. Addressing these issues will require clearer cost allocation, continued firm/dispatchable procurement models, and stronger risk-sharing and implementation discipline.	sustainable growth. By adopting a long-term strategic approach, the plan demonstrates government commitment to sector development and enhances investor confidence in the country's adoption of RE. • **Policy and regulatory framework:** A well-defined, supportive policy and regulatory framework creates a favourable ecosystem for project development. Government initiatives would help accelerate deployment by providing market certainty and stability, incentives for RE development, and support for technological advancement, thereby boosting investor confidence. Additionally, the government could address bottlenecks in the existing framework that hinder project development and the growth of the supporting ecosystem. For example, to implement waivers similar to India's ISTS policy, further studies are needed to analyse the transmission subsidies required for PLN quantifying the required subsidy and clarifying whether transmission charges and/or losses would be covered. This analysis would assist the government in designing regulations if it chooses to implement waivers of transmission charges. • **Stakeholder engagement:** Engaging stakeholders including PLN, the government, and donors such as the World Bank and Asian Development Bank could help secure grants or low-cost loans to fund the waivers. Establishing effective communication channels and incorporating stakeholder feedback into decision-making processes fosters a sense of ownership and facilitates smooth project implementation.
Production Linked Incentives ("PLI") **(Lesson from India)**	• Surging solar demand outpaced domestic manufacturing, making India heavily reliant on imported photovoltaic ("PV") cells and modules. To curb import dependence, the government introduced tariff barriers (e.g., safeguard duty), made domestic manufacturing one of the key pillars of India's long-term development strategy[23], and implemented a PLI scheme across 14 key sectors, comprising labour-intensive and heavily import-dependent sectors. Implemented by the Ministry of New and Renewable Energy, the PLI scheme	PLIs have enabled India to reduce import dependence while increasing the production capacity and competitiveness of its solar PV modules. Indonesia can draw on these lessons by tailoring performance-linked incentives and complementary policies to catalyse domestic manufacturing and reduce supply-chain risks. To strengthen Indonesia's manufacturing capacity to meet its local content requirements ("LCR"), it is important to consider the following: • **Policy framework to boost manufacturing and reducing import dependence:** To stimulate the domestic manufacturing sector, the

Topic	International Best Practices	Lessons Learned for Indonesia's Potential Implementation
RE Development	CFPP Early Retirement	Coal Phase Down
	targets manufacturers of high efficiency- PV modules/cells. Financial rewards are awarded based on the volume of high-efficiency solar modules they produce and sell, the level of local value addition, the performance of their modules, and the degree of manufacturing integration. This is offered for a period of five years to selected solar PV manufacturers following commissioning[24]. Aimed at building domestic manufacturing capacity, the scheme has a total outlay of approximately US$3 billion, and awards incentives through a transparent bidding process. • As a result, PV manufacturing scaled rapidly modules from 15 GW (2020) to 64.5 GW (2023) and cells from 3 GW to 5.8 GW[25] supported by 48,337 MW of PLI allocations to domestic solar PV module manufacturers and strong job creation (101,487 jobs under the PLI Tranche-II scheme)[26]. India is moving toward upstream integration, improving supply security, cost control, and attracting new entrants like ReNew and First Solar while strengthening micro, small & medium enterprises ("MSME") ancillaries. Overall, domestic capacity growth reduces import dependence and underpins India's progress toward ambitious renewable targets. • Despite the gains from PLI, implementation faced challenges: early investor scepticism driven by the perceived lower quality and higher cost of domestic modules versus imports, though measures like Domestic Content Requirement and Make-in-India have since attracted investment and boosted demand. PLI also does not fully address research and development gaps or dependence on key inputs from China, prompting parallel initiatives to foster innovation, build local raw-material ecosystems, and prioritise integrated manufacturing to enhance resilience. Moreover, rapid PV technology shifts (e.g., from polycrystalline to mono-PERC and beyond) require manufacturers to design flexible, upgradable production lines and continuously adapt to remain competitive.	Indonesian government has recently prohibited the export of quartz sand and silica sand, which are essential materials for solar PV modules. However, limited manufacturing capacity, reliance on imported materials and equipment, and a limited number of RE projects have reduced the effectiveness of the LCR policy. Drawing on India's experience, Indonesia could introduce PLI-style financial incentives to support domestic manufacturing of solar PV modules and/or other RE technology components. These measures should be supported by a clear and supportive policy framework with long-term commitments and a defined incentive period (e.g. five years, as in India). • **Enhancing domestic market and demand:** With the RE segment in Indonesia still at an early stage, it is critical to encourage the adoption of RE sources including solar energy through favourable policies, incentives for rooftop installations, and utility-scale solar projects to create a sustainable domestic market for locally manufactured solar PV modules. Introduction of policies focusing on local value addition could also aid in enhancing investor confidence to set up the manufacturing facilities. • **Establishing parameters:** It would be beneficial for the policy to define the performance standards such as module efficiency and temperature co-efficient, to maintain the quality of the solar modules and to be competitive with the imported goods. Moreover, the financial incentives may be linked with parameters such as LCRs to promote the use of domestically sourced materials and services in the manufacturing of solar PV modules.

Topic	International Best Practices	Lessons Learned for Indonesia's Potential Implementation
RE Development	CFPP Early Retirement	Coal Phase Down
EU Emission Trading System **(Lesson from Slovakia)**	• Slovakia has progressively integrated its energy sector into a market-based approach to cutting emissions by participating in the EU Emissions Trading System ("EU ETS"), a cap-and-trade scheme that limits total emissions and requires polluters to surrender tradable allowances. Allowances are obtained via auctions, free allocation, or secondary markets, with one allowance equal to one tonne of CO_2e. Auction revenues are channelled to energy-related priorities, including premiums for renewable operators. • The EU ETS has contributed to emissions reductions in covered sectors and generated revenues that can further support clean energy and climate initiatives. By adding a carbon cost, it shifts the merit order toward low-marginal-cost renewables (wind and solar) and away from coal, making coal-fired plants largely peak-only and less competitive. Overall, it strengthens the price signal favouring decarbonisation. • It is difficult to isolate the ETS's exact impact due to overlapping policies and economic factors, and there is a risk of carbon leakage if firms move to jurisdictions with weaker rules. The ETS alone cannot deliver Slovakia's climate targets and must be complemented by measures such as FITs, increased nuclear generation, energy efficiency in buildings, and air pollution taxes. Rising carbon costs also elevate electricity prices from polluting sources, requiring careful policy design to manage competitiveness and affordability.	While the EU ETS is a sophisticated mechanism, Indonesia can still draw useful lessons from it and consider adoption once foundational incentives to accelerate the energy transition are in place. Some of these lessons include: • **Complementary measures:** Carbon tax policies are powerful tools for reducing emissions, but they are most effective as part of a broader energy/climate and just transition strategy. Complementing carbon tax with measures like energy efficiency standards and RE can drive more effective energy/climate transition results. Additionally, incorporating early-stage incentives like FITs for RE can accelerate their deployment. Complementing this with just transition grants and financial instruments (for measures such as land repurposing, industrial zones, reskilling) is key to enable economic restructuring and diversification for the affected vulnerable regions where coal mines and CFPPs are located. • **Managing the risk of investment losses:** Nations implementing a carbon tax system need to consider the risk of loss of investment by investors that seek to move their business operations to countries with less stringent carbon policies. If Indonesia adopts more strict carbon policies in the future, policymakers may explore risk mitigation measures such as carbon border adjustments for products made in other countries with less strict carbon rules (such as has been implemented by the EU). • **Interoperability between EU ETS and Indonesia's ETS:** Once more foundational incentives are already underway, Indonesia can consider linking with other emissions trading systems, which can reduce the cost of cutting emissions, increase market liquidity, stabilise carbon prices, align carbon prices across countries, and assist global cooperation on climate change. To enable potential EU–Indonesia ETS linkage, Indonesia would need to expand coverage beyond power plants to align with EU sectors (energy, heavy industry, forestry, aviation), transition from an intensity-based cap to an absolute cap with tradable allowances, make its ETS mandatory, and harmonise MRV standards with EU requirements. Currently, Indonesia has only just started with the Technical Emissions Ceiling Approvals ("PTBAE") for CFPPs. Therefore, more targeted policy development, adaptation to

Topic	International Best Practices	Lessons Learned for Indonesia's Potential Implementation
RE Development	CFPP Early Retirement	Coal Phase Down
		the local context, and further studies will need to be undertaken once foundational incentives are established and functioning in Indonesia, in order to enable large-scale implementation of carbon policies.
Biomass co-firing in thermal power plants **(Lesson from India)**	• The Indian government has introduced mandatory co-firing requirements, financial incentives, regulatory support, and market mechanisms to promote the adoption of biomass co-firing. These measures enhance RE investments, accelerate technology adoption, and attract private sector investment, creating a conducive environment for cleaner energy production. • India is advancing biomass co-firing by mandating 5% blends in FY 2024–25 rising to 7% in FY 2025–26, setting Indian Central Electricity Authority ("CEA") benchmark pellet prices[27], and overseeing implementation through The National Mission on Use of Biomass in Thermal Power Plants ("SAMARTH") with boiler-specific Standard Operating Procedures and an exemption pathway via the CEA Exemption Committee for Biomass. • The viability of co-firing is supported by capital subsidies, Reserve Bank of India priority lending, and tariff recovery via Energy Charge Rate. This means that co-firing costs are recoverable under India's existing tariff regimes, since they are included in the Energy Charge Rate and passed through in tariff determination. Moreover, the procurement for biomass pellet purchases is streamlined through the Government e-Marketplace ("GeM") portal and long-term contracts, with ongoing capacity-building via SAMARTH and the National Power Training Institute conferences and trainings. • As of 15 October 2024, 65 thermal plants have co-fired 1.1 million tonnes of biomass, generating 1,408 MU of power and avoiding 13.4 million tonnes of CO_2; success is driven by a co-ordinated policy mix (financial incentives, regulatory support, benchmark pricing), stable procurement via GeM and long-term contracts, strong leadership from the National Thermal	Indonesia has currently reached a biomass utilisation target equivalent to approximately 3% of the coal volume managed by PLN, with the potential to reduce emissions by up to 3.3 million tonnes of CO_2e per year[28]. However, it has yet to successfully develop a landscape to support the implementation of co-firing, from financial incentives such as facilitating access to financing, to business facilitation mechanisms such as infrastructure development to support the storage, transportation and distribution of biomass feedstock. Therefore, to reach a 5% biomass utilisation similar to what India has achieved, it could be beneficial for Indonesia to establish several key mechanisms outlined below: • **Financial Support and Market Development**: Implementing financial incentives, subsidies, and facilitating easy access to loans, as seen in India, can foster a supportive environment for biomass utilisation and benefit co-firing CFPPs in Indonesia. By adopting such financial mechanisms, Indonesia can encourage participation from both existing and new stakeholders in the biomass sector, thereby promoting sustainable energy solutions and contributing to environmental goals. • **Regulatory Clarity and Support**: Providing clear guidelines and support for tariff adjustments and regulatory compliance can ensure that financial burdens related to biomass co-firing are manageable. Establishing a transparent process for tariff determinations and pass-through mechanisms will help in sharing costs equitably across stakeholders. • **Supply Chain Development**: Building a supply chain that ensures consistent quality and availability of biomass material is critical for successful implementation. This includes infrastructure investments to support storage, transportation, and distribution, particularly addressing seasonal availability and quality control. • **Market Stability through Long-term Contracts**: Establishing long-term procurement contracts for sustainable biomass material ensures

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	Power Corporation and other thermal power plants, and active stakeholder engagement. • Key hurdles supply chain gaps, boiler retrofit needs, financial sustainability, tariff pass-through delays, and pellet price volatility are being addressed through SAMARTH guidance and SOPs, CEA price benchmarks and exemption processes, subsidies and RBI priority lending, GeM-enabled procurement with long-term contracts, and tariff recovery.	market stability, reduces volatility, and provides a secure demand for suppliers. This can help in building confidence among stakeholders and create a profitable market to further encourage investments in biomass conversion to pellets for use in power plants.
Support Mechanisms for Coal Phase Out **(Lesson from Slovakia)**	• Since 2005, Slovakia subsidised domestic coal production and coal-fired generation to ensure security of supply and protect jobs in Upper Nitra, mandating annual coal-based volumes with preferential grid access and a regulated subsidy per MWh[29]. Over time, these subsidies imposed rising systemic costs on consumers exacerbated by EU ETS allowance prices since 2017 and as EU priorities shifted toward clean energy, partners pressured Slovakia to shorten the duration of coal subsidies. It coupled this with a Just Transition approach: an Action Plan for Upper Nitra, EU Just Transition Fund financing, workforce upskilling, and early planning for brownfield repurposing, including Slovenské elektrárne's plans to install solar PV on the former Nováky plant site and ash ponds. • The decision to accelerate the transition away from coal was fundamentally economic. Electricity production at the CFPP Novaky was viable only because it was subsidised. Once subsidies were withdrawn, coal generation became uneconomic. However, the management of the removal of the subsidies was announced sufficiently long before it entered into force. Therefore, local stakeholders had sufficient time to prepare and adapt. Additionally, national and local authorities could prepare support scheme and effectively communicate with the local public, how the socio-economic challenges related to the subsidy removals will be addressed. On the national level, expected loss of generation capacity prompted national authorities and investors to plan construction of new RE capacity to replace the coal power plant.	There are several differences between the Slovak and Indonesian contexts. In Indonesia, coal remains economically viable under the DPO scheme, so transitioning would require deliberate regulatory intervention; in Slovakia, by contrast, the shift was primarily driven by economics. Moreover, although Indonesia does not currently have an ETS or access to the EU's Just Transition funding, it could still benefit from similar grants, which may be channelled through platforms such as the Energy Transition Mechanism ("ETM") Country Platform via PT SMI. Indonesia can learn from Slovakia's coordinated, place-based approach combining transparent policy timelines, dedicated funding, and proactive site repurposing to design a just, well-sequenced coal transition. To implement a well-supported approach to coal phase-out, Indonesia could consider the following: • **Early announcement and stakeholder engagement:** As part of the preparation for coal subsidy removal and consequent coal phase-out, Indonesia can develop a stakeholder engagement strategy, including not only directly affected enterprises, but also local public administrations, the mining unions, civil society and other businesses active in the region. Policy changes should be communicated early and clearly, providing sufficient time for stakeholder engagement, planning and preparation for the transition. Engaging these groups early in the planning process facilitates the identification of local needs and opportunities, driving an inclusive transition and provides a net benefit to communities. • **Strategic planning:** Adopting lessons from Slovakia's Report on Land Use Plan, Indonesia can provide a strategic approach that extends beyond the financial and operational focus of its current Early Coal Retirement Roadmap outlined in PR 112/2022 and MEMR Regulation

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	• The transition is also supported by dedicated EU grants and loans, which may incentivise the build-up of wind turbines and PV installations of various sizes. Furthermore, EU grants were available for Just Transition measures directed towards economic diversification, skills development, and site regeneration, easing the shift from coal to cleaner energy. Planning for renewable capacity and reusing existing grid connections supports faster integration of renewables. • Coal's phase-out risked significant socio-economic impacts in Upper Nitra due to high employment dependence and regional isolation. Plant owners were reluctant to retire assets before end-of-life, requiring clear repurposing visions, financial support, and environmental approvals to unlock early closure. Coordinating multi-level authorities, executing land remediation, and attracting investment to brownfields have remained complex, execution-sensitive tasks.	10/2025. By incorporating land use planning into its roadmap, Indonesia can aim to ensure that decommissioned sites are effectively utilised for sustainable development, potentially boosting local economies and supporting national energy objectives. Currently, the roadmap primarily mandates the early retirement of CFPPs without emphasising future site use, which could serve as a valuable incentive for CFPP owners and developers. Further, the development of strategic documents up to the regional level is vital. Indonesia could create a comprehensive plan that involves national and regional authorities, industry stakeholders, and local communities to ensure a coordinated approach to coal phase-out. • **Financial support mechanisms**: Indonesia can target its financial support to mitigate socio-economic impacts and drive economic diversification in coal-dependent regions. Funding and planning support can target RE, building efficiency, circular waste management, worker reskilling, clean public transport, and stronger secondary education to equip youth with future-ready skills. Indonesia could adopt similar mechanisms, prioritising workforce retraining and regional development to manage coal plant closures.

Key Findings for Indonesia's Energy Transition

Indonesia has set ambitious targets for RE integration into the energy mix but needs to accelerate adoption if the targets are to be met. International experience offers valuable lessons for near-term RE acceleration and longer-term policy design.

India has boosted its RE sector by incentivising **domestic manufacturing** to lower plant costs, implementing **demand-side incentives** and **efficient procurement** to **align supply with rising demand**, **and promoting biomass co-firing** offering a model for Indonesia to reduce coal dependency.

- India's RPO targets reinforce this by requiring specific entities to source a certain percentage of their energy from renewable sources. The establishment of **clear RPO targets** can transition Indonesia's currently voluntary REC system into a more structured framework. This includes implementing **penalties for non-compliance with RPOs** and in parallel **increasing the procurement for RE projects to increase the supply of RECs**. As has been demonstrated in India, this also provides the platform for incentivising the development of an in-country manufacturing ecosystem for RE technology components such as solar panels, reducing the reliance on imports and generating economic value-add.
- India supports the **development of a RE project pipeline** by **strengthening its grid infrastructure** to accommodate greater RE penetration and waived ISTS charges to **lower RE project costs**. Indonesia could implement this through direct subsidies and grants, coupled with a regularly updated RE procurement schedule that specifies **timing, capacity, value, and investment**.
- On Indonesia's LCR regulations: MEMR Regulation No. 11 of 2024 on the Use of Domestic Products in the Development of Electrical Infrastructure allows temporary relaxation of local content requirements for certain technologies. For example, solar power plants can be fully exempt if they meet specific criteria[ii], but only until 30 June 2025; thereafter, solar power plants must comply with the 40% LCR. To prepare, Indonesia should **strengthen its domestic manufacturing capacity** and could pair the LCR with **PLI-style financial incentives** to support domestic manufacturing of solar PV modules. These measures should be anchored by a clear and supportive policy framework with long-term commitments and a defined incentive period.
- India has mandated biomass co-firing in thermal power plants, setting clear targets and providing financial incentives, which Indonesia currently lacks, to encourage adoption. India has also established benchmark prices for biomass pellets to ensure fair trade and viability, which could be adapted to stabilise Indonesia's biomass market. To reach 5% biomass utilisation as in India, Indonesia could introduce strong **financial incentives and financing**

[ii] The PPA must be signed by 31 December 2024, the project must commence commercial operations by 30 June 2026 and the solar modules must either be assembled domestically or imported by a foreign solar module company committed to investing in domestic solar module production.

access, **clarify tariff/pass-through rules**, invest in storage, transport, and distribution to ensure **reliable biomass supply and quality**, and secure **long-term procurement contracts** to stabilise the market.

Slovakia was identified as the only country on the shortlist that has officially **ended its coal subsidies entirely** and **accelerated its coal exit timeline** from 2030 to 2024. Slovakia is expected to be coal power-free in terms of electricity production in 2024-2025, following the closure of its last coal power plant which succumbed to financial difficulties stemming from various factors, including the long-term decline in electricity prices and the rising costs of CO_2 permits and the coal price itself[30]. The successful retirement of CFPPs was largely due to economic factors, with the effective use of **market-based disincentives** to furthering coal use coupled with **incentives that supported CFPP owners** and **developers in the coal exit**. Key findings based on Slovakia's experience include:

- Slovakia's EU ETS participation shifted the merit order toward renewables and generated auction revenues for clean energy. Indonesia can **phase in carbon pricing once foundational RE incentives are in place**, earmark proceeds for RE premiums, grid upgrades, and efficiency, and pair it with complementary policies while managing loss of investment and affordability risks.
- Slovakia advanced coal subsidy removal with **sufficient notice and backed it with grants/loans like the EU Just Transition Fund, workforce reskilling, and regional diversification**. Indonesia could announce timelines early, engage unions, local governments, and communities, and channel concessional finance (e.g., via the ETM Country Platform/PT SMI) to mitigate socio-economic impacts and build replacement capacity ahead of retirements.
- Following Slovakia, Indonesia can consider adopting **strategic land-use planning, streamlining permitting and remediation, and converting CFPP sites** into solar, wind or storage hubs to accelerate RE integration and attract investment.

Conclusion

Based on lessons learned from Slovakia's and India's energy transitions, Indonesia's next step is to further explore and develop a policy framework that prioritises economically viable and practically implementable policies to accelerate the energy transition. By comparing Indonesia's context and regulatory framework with international experience incorporating stakeholder interviews, hybrid discussions, site visits and desktop research proposed policy options were developed and scored, which is presented in "*Policy Brief: Prioritised Incentive Measures to Advance Indonesia's Energy Transition*."

References

[1] IEA. (2025). Countries & Regions: Indonesia - Electricity.
[2] World Bank. (2024). GDP (Current US$): Indonesia.
[3] World Bank. (2024). GDP per capita, PPP (Current International $): Indonesia.
[4] S&P Global. (2025). Indonesia plans to revise coal production quota timeline back to one year.
[5] IEEFA. (2025). Indonesia.
[6] Ministry of Energy and Mineral Resources Indonesia (MEMR Indonesia). (2025). Handbook of Energy & Economic Statistics of Indonesia 2024.
[7] Ministry of Energy and Mineral Resources Indonesia (MEMR Indonesia). (2025). Handbook of Energy & Economic Statistics of Indonesia 2024.
[8] MEMR and PT PLN Persero. (2025). Rencana Usaha Penyediaan Tenaga Listrik (RUPTL).
[9] MEMR Indonesia. (2025). Statistik Ketenagalistrikan 2024.
[10] MEMR and PT PLN Persero. (2025). Rencana Usaha Penyediaan Tenaga Listrik (RUPTL).
[11] Press Information Bureau (2023), India's total renewable energy installed capacity,
[12] Press Information Bureau (2023), PM's address during the national renewable energy summit,
[13] IEEFA. (2021). Understanding Round-the-Clock Tenders in India: The Current Context and Ways Forward.
[14] IEA. (2025). Slovak Republic Energy Mix.
[15] IEA. (2025). Slovak Republic Energy Mix.
[16] European Commission. (2025). Slovakia.
[17] Beyond Fossil Fuels. (2025). Europe's Coal Exit.
[18] Brookings. (2025). Ukraine's energy sector is a key battleground in the war with Russia
[19] IEA. (2024). Countries & Regions: Slovak Republic - Emissions
[20] MNRE - Physical Achievements | MINISTRY OF NEW AND RENEWABLE ENERGY | India
[21] Halimatussadiah, Alin and Kruger, Wikus J.L. and Wagner, Fabian and Afifi, Fachry Abdul Razak and Lufti, Roes Ebara Gikami and Kitzing, Lena. (2024). The Country of Perpetual Potential: Why is it so Difficult to Procure Renewable Energy in Indonesia?
[22] Ministry of Power (2023), Green Energy Corridor project highlights and objectives
[23] PIB (2020) - Government Reforms and Enablers across Seven Sectors under Aatma Nirbhar Bharat Abhiyaan
[24] Ministry of New and Renewable Energy. (n.d.). Production Linked Incentive (PLI) Scheme: National Programme on High Efficiency Solar PV Modules.
[25] Mercom India. (2024) India's State of Solar PV Manufacturing
[26] PIB (2023) - Government allocates 39600 MW of domestic Solar PV module manufacturing capacity under PLI
[27] PIB (2023) - Policy to regulate price of biomass pellets for co-firing with coal in thermal power plants
[28] CNN. (2025). PLN EPI Genjot Ekosistem Biomassa, Demi Target 3 Juta Ton di 2025.
[29] IEA. (2025). Slovak Republic 2024: Energy Policy Review.
[30] TheMayor.eu. (2024). Slovakia shuts down its last coal plant today.