IESR
Institute for Essential Services Reform

Climate Transparency

CLIMATE EMERGENCY COLLABORATION GROUP

CLIMATE POLICY IMPLEMENTATION CHECK

POLICY ASSESSMENT: RENEWABLE ENERGY DEVELOPMENT IN INDONESIA'S POWER SECTOR

Climate Transparency

Climate Transparency is a global partnership with a shared mission to stimulate a “race to the top” in climate action in G20 members through enhanced transparency.

www.climate-transparency.org

Published 30 January 2024

Authors and acknowledgements

IESR Institute for Essential Services Reform

Akbar Bagaskara, Sicha A. Makahekum, Delima Ramadhani, Wira A. Swadana

Climate Transparency

CLIMATE EMERGENCY COLLABORATION GROUP

We would like to express our gratitude for inputs, reviews, and helpful hints to Fabby Tumiwa.

Cover photo: Mumemories

Design of template: Design for development (www.d4d.co.za).

CONTENTS

EXECUTIVE SUMMARY

The development of renewable energy as an indigenous energy resource is part of the energy resources diversification strategy stipulated in the 2014 National Energy Policy. Energy diversification and conservation are two main strategies to reduce reliance on fossil fuels and to ensure energy security of the country.

Indonesia's electricity consumption is projected to increase by 5% to 6% annually in the coming years. In the last five years, electricity demand growth is below 5%, with annual electricity consumption of 1360 kWh per capita. The cause of this situation can be attributed to the discrepancy between the top-down economic growth projection aimed at 5% to 6% annually and the economic downturn prompted by the Covid-19 pandemic in Indonesia. Due to a decline in economic activity, Indonesia was unable to expand its power consumption due to limited industrial activity.

Indonesia has immense renewable energy resources, particularly solar with the highest potential, which has been proven as economically viable[1], yet the current energy plan shows continuous reliance on coal power. Decarbonising power sector is essential in ensuring Indonesia to meet its fair contribution towards Paris target, where Indonesia's power sector would need to at least double its renewable share target to 45% by 2030[2], currently set at 23% by 2025, and phase-out coal by 2040.

This renewable energy share target is enforced through the National Electricity Plan (RUKN 2019-2038) and must be implemented by PT PLN (State Electricity Company) and private business area holders. Since RUKN only serves as the main reference document for power sector development planning in Indonesia, it lacks credible and comprehensive rules to accelerate renewable energy development. This shortcoming must be addressed in the New and Renewable Energy Bill; however, the ratification process is still halted. This uncertain regulatory framework for commercial actors, which revolves around incentives, electricity pricing, and the negotiation process, has discouraged private investment in renewable energy projects.

On the other hand, PLN is facing resource constraints that delay renewable energy deployment, such as lack of capital, lack of bankable project, and lack of experienced personnel to handle RE projects. The government will need to impose stronger supervision and more precise direction on its implementing institutions while providing sufficient technical, financial, and regulatory supports that favour renewable energy development. Indonesia should also improve its monitoring mechanism to ensure greater accountability of non-PLN business area holders and further effectively track progress and address obstacles to RE development projects.

OVERVIEW:
RENEWABLE ENERGY DEVELOPMENTS IN INDONESIA'S POWER SECTOR

The energy sector is the second largest greenhouse gases (GHGs) emissions contributor, accounting for 35% of total emissions, as stated in Indonesia's Third Biennial Update Report (BUR).[3] The power sector accounts for 43% of the total energy sector's CO_2 emission.[4] Indonesia's electricity generation mainly relies on fossil fuels, accounting for 81% of the total, with coal alone constituting 62% in 2021.[5] Despite the inclusion of decarbonisation in the LTS-LCCR 2050, the ambition remains lacking, and the implementation planning must be improved.

The Government of Indonesia (GoI) aims to use the power sector, particularly through the National Electricity Plan (*Rencana Umum Ketenagalistrikan Nasional*/RUKN), to drive its emission reduction to meet its NDC targets. In the electricity sector, the NDC targets an additional 20 GW of installed RE, which will contribute 358 Mt CO_2-eq unconditionally and 446 Mt CO_2-eq conditionally by 2030. Given the importance of reducing carbon emissions in this sector, RUKN is critical in Indonesia's decarbonisation efforts. The Indonesian government has also announced that the RUKN will be aligned with its Nationally Determined Contributions (NDCs) at different intervals due to their different issuance years.

Indonesia's current new and renewable energy (NRE) target is 23% by 2025, with 10.6 GW of additional renewable power generation will be added by 2025 according to the National Electricity Supply Business Plan (*Rencana Usaha Penyediaan Tenaga Listrik*/ RUPTL) 2021-2030.[6] However, by 2022, the installed capacity of renewables was only at 12.3%.[7] This situation is in line with the limited investments made. Indonesia targeted that investment in renewable will reach around USD 4 billion in 2022, yet the realised investment only accounts for USD 1.6 billion.[8] This number is much smaller compared to the Ministry of Energy and Mineral Resource (MEMR) projection that USD 28.5 billion of investment is needed annually to reach net zero emission by 2060.[9] In addition, the Ministry has also identified a number of obstacles to renewable energy investment, including but not limited to complicated bureaucracies, limited technical capacities, lack of planning, and limited access to financing for Independent Power Producers (IPP).[10]

The Just Energy Transition Partnership (JETP), which deals with a total financial commitment of USD 21.5 billion, is expected to reduce the gap in renewable energy financing in Indonesia. As of November 2022, the JETP investment plan also set the target of 44% (previously 34%) renewable energy shares by 2030 and net zero in power sector by 2050.[11] Indonesia needs to align the JETP target with future electricity plans. Although the JETP target is more ambitious than the RUKN, it is still not compatible with the Paris Agreement pathway.[12] This shows that the synchronisation of Indonesia's renewable energy targets is not yet available to guide a more ambitious decarbonisation path for the country.

To provide a more comprehensive review of the implementation of key policies and regulations related to RE development in Indonesia, this report assesses the current National Electricity Plan (RUKN 2019-2038). The assessment will also review its derivative, such as the RUPTL 2021-2030 with PT PLN (Persero) as the main implementing agency, and other applicable instruments in the power sector.

IMPLEMENTATION CHECK OF RUKN 2019-2038

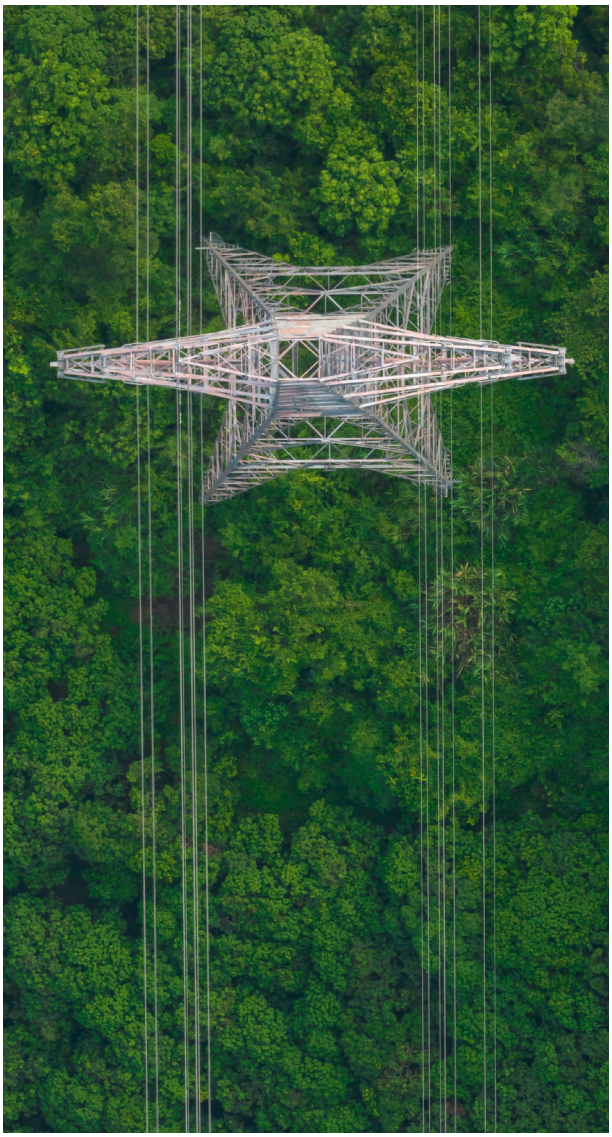
Policy instrument: General National Electricity Plan (RUKN) 2019-2038

RATING MEDIUM

The achievement of renewable energy shares in the power sector is enforced through the National Electricity Plan (RUKN 2019-2038) and supported by the enactment of Presidential Regulation (PR) 112/2022. However, the government has not provided a clear and credible policy direction for its implementing institutions to meet the target under these regulations. PLN, as a state-owned utility, also faces resource constraints that lead to delays in the implementation of renewable energy projects, such as internal budget limitations and a lack of experienced personnel to handle RE projects.

There has been progress in the policy development to catalyse investment for renewables, but investment attractiveness remains low as electricity pricing regulations still favour fossil fuels.[13] The lack of investment is also forestalling the achievement of RE target. MEMR annual performance report indicated that yearly RE shares target has not been met since 2018. The lack of publicly available monitoring and evaluation report from other implementing institutions also adds to the difficulty of tracking the progress of RE development in Indonesia.

All in all, renewable energy development in the power sector has a strong legal basis, but the implementation still faces several roadblocks, indicating that the plan is unclear and the implementing institutions are unprepared. Hence, we rate the implementation of RUKN 2019-2038 as “Medium”. The rating would improve if the government addresses shortcomings regarding resources and monitoring mechanism.



IMPLEMENTATION CHECK OF RUKN 2019-2038

Policy instrument: General National Electricity Plan (RUKN) 2019-2038

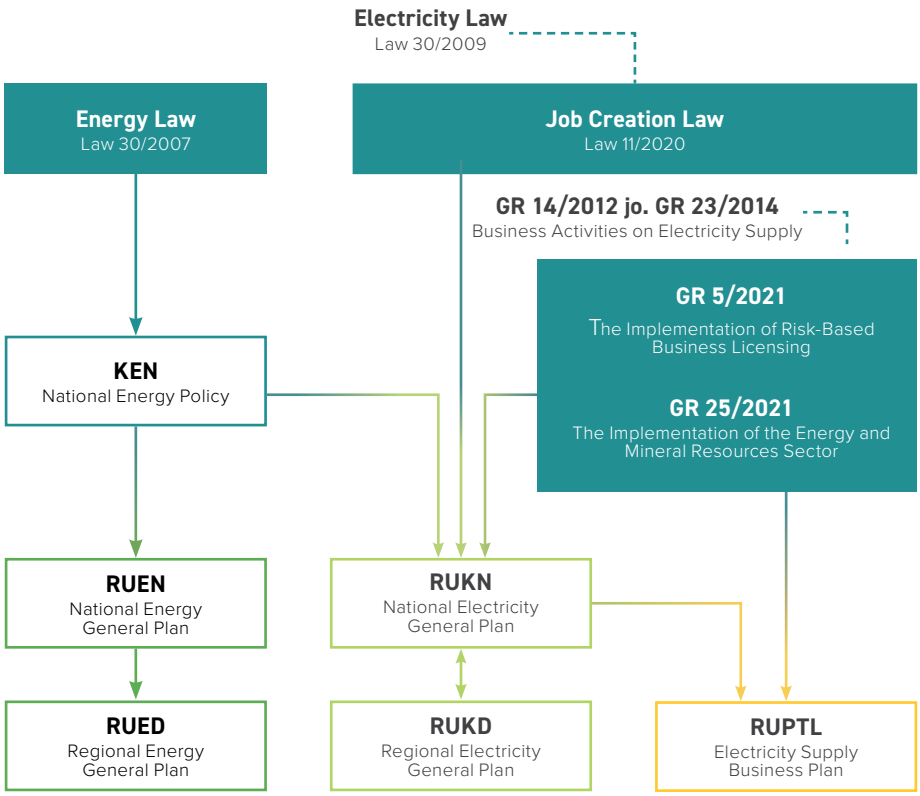
RATING MEDIUM

LEGAL STATUS

STRONG

The National Electricity Plan (RUKN 2019-2038) is enacted through the Minister of Energy and Mineral Resources Decree No.143/2019. The RUKN provides a framework for energy-related plans such as the Electricity Power Supply Business Plan (RUPTL) and Regional Energy Plan (RUED). The RUKN 2019-2038 comes with an assumption that electricity needs will grow around 6.9% annually and is heavily dominated by the demand from the industry sector, followed by household, businesses, public, and transport sectors. In addition, the RUKN 2019-2038 provides a blueprint for national electricity planning that integrates the emission reduction target as outlined in the First NDC.

FIGURE 1. Indonesia's Electricity and Energy Planning Regulation Framework



Source: MEMR, 2021

INSTITUTIONAL FRAMEWORK AND GOVERNANCE

MEDIUM

MEMR is the regulator of Indonesia's energy sector, which has the responsibility to formulate and supervise the implementation of national energy strategy stipulated in the National Energy Policy (KEN). The KEN 2014 laid the foundation for renewable energy target in the primary energy mix to reach 23% by 2025 and 31% by 2050. KEN also outlined the target for increased power plant capacity to reach 115 GW and 430 GW by 2025 and 2050, respectively. This target includes the utilisation of renewable energy, such as solar, hydro, biomass, and wind, in the power sector. To implement these targets, the government has formulated the National Energy Planning (RUEN) 2017-2050 and National Electricity Planning (RUKN) 2019-2038.

The Directorate General of Electricity (DGE), under MEMR, is responsible to formulate and implement policies related to the development and supervision of electricity system in Indonesia, as well as regulate the utility business through the RUKN 2019-2038. According to RUKN 2019-2038 decree, PT. PLN as the state-owned electricity company and other utility business area holders are the main implementers of RUKN. They must integrate the national renewables target into their business plans. PT. PLN and these utility business area holders are obliged to submit their business plan to MEMR. However, the business plan from business area holders outside of PT. PLN are not publicly accessible as they do not have legal obligation to do so. In this case, it is difficult to ensure whether the total target share pledged by all business area holders is aligned with the national renewable energy target prescribed in KEN.

RESOURCING

MEDIUM

The policy instrument outlines the necessary investment in electricity infrastructure from 2019-2038, with the majority (USD 217 billion) directed towards power generation. The financial implications of developing electricity infrastructure will be handled through multiple channels, including loans, bond issuance, and government funds. For the fiscal year 2023, the government has allocated around USD 57.6 million, which is less than 1% of the total budget for infrastructure development[15], for rural electrification through solar and micro-hydro power plants.[15] This number is small, compared to MEMR calculations where USD 28.5 billion is needed annually until 2060 for power sector transition.[16]

As one of the implementers, PLN should have the capability to access necessary capital for RE development. However, the company's internal budget is currently limited, mainly because PLN's income is decreasing due to an increase in average cost of generation without any increase in tariffs since May 2017.

Due to the lack of PLN's fiscal capacity, PLN prioritises private sector investment for renewable energy development to overcome the high upfront cost. Even though PLN's operations currently dominate the electricity supply chain, private sector can participate in the generation side through IPPs. For IPPs wishing to participate in renewables development, the sales price of electricity generated from renewables is regulated by Ministerial Decree 4/2020, which requires IPPs to negotiate with PT PLN before signing a power purchase agreement. To access resources from the private sector, incentives for renewable energy development are also offered, such as tax holidays, allowances, and investment allowances, as outlined in Presidential Regulation (PR) No. 112/2022.

OVERSIGHT

MEDIUM

MEMR provides a publicly available annual performance report that contains the realisation status of RE shares.[17] At the implementation level, PLN provides finance reports on the RUPTL target, which provides monitoring reports for the status of renewable energy projects in Indonesia.[18]

The current monitoring system is already adequate in terms of tracking the progress of RE development and sharing in the PLN's system. However, only PLN's RUPTL is available on the Directorate General of Electricity's website, which means that other business areas' RUPTL is not publicly available, let alone their monitoring reports. Since the RE target share should be imposed on all electricity business areas, all businesses areas' monitoring reports are essential to track the development progress.

According to the existing monitoring reports, RE development has fallen short from MEMR's target, only reached 12.3% by 2022 (out of 15.7%). Historically, the yearly RE share target has not met the target since 2018.

TABLE 1. Yearly RE share target and realisation

Year	RE share	
	Target (%)	Realization (%)
2018	11.6	8.6
2019	12.2	9.2
2020	13.4	11.2
2021	14.5	12.2
2022	15.7	12.3

Source: MEMR, 2023

Several RE projects have been delayed and moved to the new Commercial Operating Date (COD) year. The off-track project has several implications, including unserved energy (except for the Jawa-Bali case) and high utilisation of expensive old fossil plants, e.g., diesel.

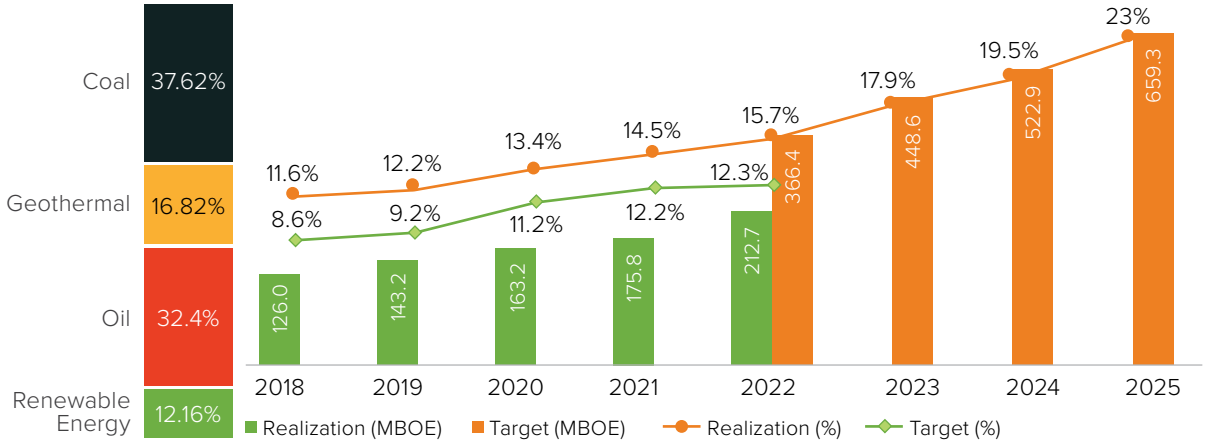
Several hydro and geothermal projects is reported to experience delays; thus, the governments decide to rely on bioenergy through a co-firing scheme to achieve the RE share target by 2025 (RUPTL PLN 2021-2030). However, this solution has its own challenges in the feedstock availability. In terms of investment, it sets a bad precedent for RE project development, which can hinder its attractiveness and increase the risk.

There is a mandatory annual evaluation process conducted by each ministry or agency to report its annual performance on the accountability and good governance as mandated in Presidential Instruction No. 7 of 1999 and Minister of State for Administrative Reform and Bureaucratic Reform Regulation No. 20 of 2010. At the project implementation level, RUPTL should be evaluated annually, as mandated in MEMR's Ministerial Regulation No. 11/2021. In that ministerial decree, the evaluation aims to update the electricity demand projection. Consequently, RUPTL will be annually updating the power supply planning, which should include the projection of additional power plants for each source, energy balance, energy share projection, fuel needs, and greenhouse gas emissions projection.

POLICY ASSESSMENT OF RUKN 2019-2038

DESPITE HAVING A STRONG LEGAL BASIS, 23% RE TARGET REMAINS UNFULFILLED

FIGURE 2. Development of RE share realisation over the year



Source: MEMR, 2023a

Renewable development in Indonesia has a strong legal basis, but the implementation still falls short of the target. One reason is that the achievement of RE development in Indonesia depends on economic feasibility as reflected in the KEN and RUKN documents. Furthermore, many relevant documents have varying RE targets for the power sector, e.g. 45.2 GW in KEN and 31.72 in RUKN of installed RE capacity by 2025. This makes the RE target clauses in different corresponding documents not strong enough to serve as a reference.

According to the RUKN document, there is an obligation to reach the RE target, not only for PLN but also for other utility business areas. Consequently, PLN and these utility business area holders must submit their business plans to MEMR, which must contain renewable energy target shares within their business operation.

Despite the fact that PLN's business area covers 75% of Indonesia's total demand by 2022 , business plans of other electricity business concession holders still play a crucial role. For example, PLN's business plan targets a 23% RE share target by 2025, similar to RUKN's RE target. Consequently, other business areas should have a similar target. However, only PLN's business plan is publicly available, which is planned to be updated annually. Hence, it is enormously challenging to track Indonesia's power sector's ambitions and progress and to synchronise the target at the national level.

Since electricity is a public good in Indonesia, there are also implementation challenges. As a result, it is difficult to increase the electricity tariff as the government must also ensure its affordability to consumers, particularly poor households and SMEs. Subsidy payments to PLN from the government is made based on a revenue model of PLN's accounting cost of electricity supply (BPP) plus a pre-determined margin set by the government and parliament. The State Auditor of the Republic of Indonesia (BPK) reviewed the entire authorised costs booked by PLN for the previous year, which were divided by PLN energy sales to arrive at BPP. The application of BPP plus margin as PLN's revenue model has an issue. It considers PLN's audited costs from the previous year, while current and future costs are sure to differ. Furthermore, as subsidies are correlated with the state budget, GoI also aims to reduce subsidies to PLN. Consequently, PLN's BPP should be minimised.

Another issue is that the MEMR overrides PLN's BPP through pricing regulation, which is regulated through MEMR's Ministerial Regulation (PERMEN ESDM) No. 50/2017 on the Utilisation of Renewable Energy Resources for Electricity Supply, and amended by PERMEN ESDM No. 53/2018. In the regulation, electricity purchases from IPPs are measured against BPP, which is artificially lowered by the coal purchase subsidy limit. Unfortunately, the regulated price causes disagreement between PLN and its developers as the purchase

price cap limits the potential revenue of the project. In addition, PLN is reluctant to agree to renewable prices that could later be perceived as resulting in "state losses" for renewable projects that are not subject to BPP price caps, especially in the 3T (Least Developed, Frontier and Outermost) regions. The Presidential Regulation No. 112/2022 already regulates a new pricing scheme for RE. Even though it can become a new fair signal, the effectiveness of the regulation to attract investors and shorten the negotiation period is yet to be seen, since the regulation has just been implemented in 2023.

Additionally, the MEMR has identified several challenges within PLN for the implementation of RUPTL, such as internal budget limitation, delays in preparing project feasibility and risk studies, and lengthy price negotiation process.[20] The preparation of project feasibility and risk study template for RE projects is essential to make the process more seamless, but such documents are not available and cause project delays. As the number of RE projects in Indonesia is limited, there is a lack of human resources with sufficient experiences to formulate such documents. PLN can learn from other countries on how to formulate RE's feasibility and risk study template, such as India and Brazil[21], and adjust it to Indonesia's context.

The lack of simplified and clear administrative process for RE procurement, as well as low investment attractiveness for IPPs, hinder the progress of renewable energy target achievement in Indonesia. The conclusion is that the enabling environment of RE development in Indonesia is improving but is not enough to achieve the current RE target.

A VARIETY OF SOLUTIONS NEED TO BE IMPLEMENTED TO FILL THE GAPS IN RENEWABLE ENERGY DEVELOPMENT

As there are multiple layers of gaps that challenge the implementation, multiple layers of recommendations should be addressed.

Firstly, the synchronised clauses mandating to achieve RE target should be strictly applied to avoid any confusion of references for the implementation, monitoring, and evaluation. Furthermore, the RE conditionality clause in the reference documents should not become an excuse to halting the RE development targets; thus, it is important to prepare risk mitigation measures to fulfil the conditionality. Supporting law such as New and Renewable Energy Bill should ensure a comprehensive approach to build a better enabling environment, such as funding, incentives, and the creation of its industry, to advance the development of efficient and effective RE development and to support the country's decarbonisation efforts. Thus, the government must accelerate the ratification of New and Renewable Energy Bill to set main regulatory framework for renewable energy development in Indonesia.

Additionally, PLN is not the sole implementer; hence, other business area holder is also obliged to implement the RE target. Furthermore, it is important to synchronise the target based on the capabilities and potential. It can be achieved through providing a clear and comprehensive apparatus from the planning, procurement, and reporting process, especially for business area holders other than PLN. Transparency and accountability should be enforced through mandating all implementing bodies/institutions to submit a publicly available annual report and business plan to Improve the monitoring mechanism to effectively track progress and counter issues.

In terms of resourcing, capital funds or human resource capital have several untapped potentials to further boost the country's RE development. Current PLN's revenue model is using the BPP + margin, which does not help PLN's fiscal capacity and halts the RE development. A new revenue model should be considered in the future. The new proposed revenue model could be based on either cash flow or rate of return methodology to reflect revenue requirements according to PLN's target. Furthermore, improving PLN's sustainable finance framework to align with the globally accepted practices is important to incentivise more sources of financing for RE development. The government must show clear favour towards investment for renewables projects and unlock more sources of capital funds.

1.5°C COMPATIBLE INDONESIA'S POWER SECTOR

Indonesia's electricity sector is mainly powered by coal. In the period of 2017 to 2022, the share of coal in the electricity generation rose from 58.4% to 67.2%.[22] The capacity addition of coal-fired power plants has also sharply risen in the last decade, from 13 GW in 2010 to around 37 GW in 2020. [23] It makes sense that current Indonesia's power sector is not compatible with Paris target. The GoI estimated that it needs USD 247.2 billion to meet the Paris target.[24] In the energy sector, investment of no less than GBP 124.5 billion by 2025 is essential to reduce the prevalence of coal-fired power stations (CFPPs) in Sumatra, Borneo, Java-Bali, and Sulawesi.[25] This additional investment could support Indonesia towards a more reliable and environmentally-friendly system and help the country to be in line with the Paris Agreement.

The 2022 moratorium on new coal plants does not signify an immediate stop to the development of coal plants, as it exempts captive power for downstream industries. Indonesia aimed to phase-out unabated coal power generation by 2050. However, to limit warming to 1.5°C, Indonesia must reduce 9 GW of its coal-fired generation capacity by 2030 and phase-out coal by 2045. Based on IESR study, Paris' compatible coal phase out requires 18 plants (9.2 GW, 8 PLN, and 10 IPP plants) to be put out of operation by 2030, 39 plants (21.7 GW, 18 PLN, and 21 IPP plants) to retire in 2031–2040, and the remaining 15 plants (12.5 GW, 5 PLN & 10 IPP plants) to continue operating beyond 2040 at a low utilisation level and retire before 2045.[26] Retirement costs are estimated to be USD 4.6 billion until 2030 and USD 27.5 billion until 2050.

Currently, Indonesia targets its renewable energy share to reach 23% by 2025. However, the government has fallen short its renewable target by 12.3% in 2022. To limit warming to 1.5°C, Indonesia needs to at least increase its RE target to 45% by 2030. It requires substantial deployment of renewable sources including solar, wind, geothermal, and hydropower, not to mention a significant international support.

TABLE 2. Indonesia's 1.5°C compatible benchmarks for power sector

	IEA	Climate Analytics	IESR	Climate Action Tracker
RE share by 2030 (%)	57	70-75	45	55-82
Coal share by 2030 (%)	20	0-16	39	7-16
Power sector peak emission	2030	-	2025	2030
Annual investment needs by 2030 (USD bn/yr)	25	10-27	15	-

[Source: IEA, 2022; Climate Analytics, 2022; IESR, 2022b; Climate Action Tracker, 2023]

The RE development comes with financial implications. Indonesia will need at least around USD 10 billion of annual investment until 2030 to meet the Paris target. The RE development investment needs listed in Table 2 exclude the amount required for transmission and storage system development. These large financial requirements signify the importance of global cooperation to support Indonesia towards achieving a 1.5°C compatible target in the power sector.

METHODOLOGY: POLICY IMPLEMENTATION CHECK

The Climate Policy Implementation Check provides a concise framework to check from an early stage whether a policy is being implemented from the policy-maker side. Therefore, it can serve as an evaluation tool for civil society. This early check is important, as policy outcomes and impacts on greenhouse gas emissions are typically only measurable several years after the implementation, leaving little time for course correction if the implementation of the policy is weak.

This implementation check is a tool that enables stakeholders to evaluate the implementation status of policies, engage in the exchange of good practices, and hold governments accountable. Multiple tools and assessments already exist to evaluate ambition, but only few assess the implementation. These independent assessments are especially valuable in the run-up to the Global Stocktake, given that formal processes under the UNFCCC are not set up to fulfil this remit.

The framework checks different characteristics of policy implementation, which can be grouped into four categories: legal status, institutions and governance, resourcing, and oversight. For each of these categories, the framework includes specific questions that are designed to make the results comparable across different countries.

TABLE 3. Guiding questions for Climate Transparency Implementation Check

THE CHECK IN A NUTSHELL

Legal Status

Q1: Is there a legal basis for the implementation?

Institutions & Governance

Q2: Are there institutional bodies tasked with implementation of the policy instrument and its laws and regulations?

Q3: Are the rules and regulations clear and credible to meet the policy objective?

Resourcing

Q4: If the policy instrument has budgetary implications, does the budget include it and/or is the cost recovery mechanism clear?

Q5: Are the implementing bodies well-resourced and existing at the appropriate level?

Oversight

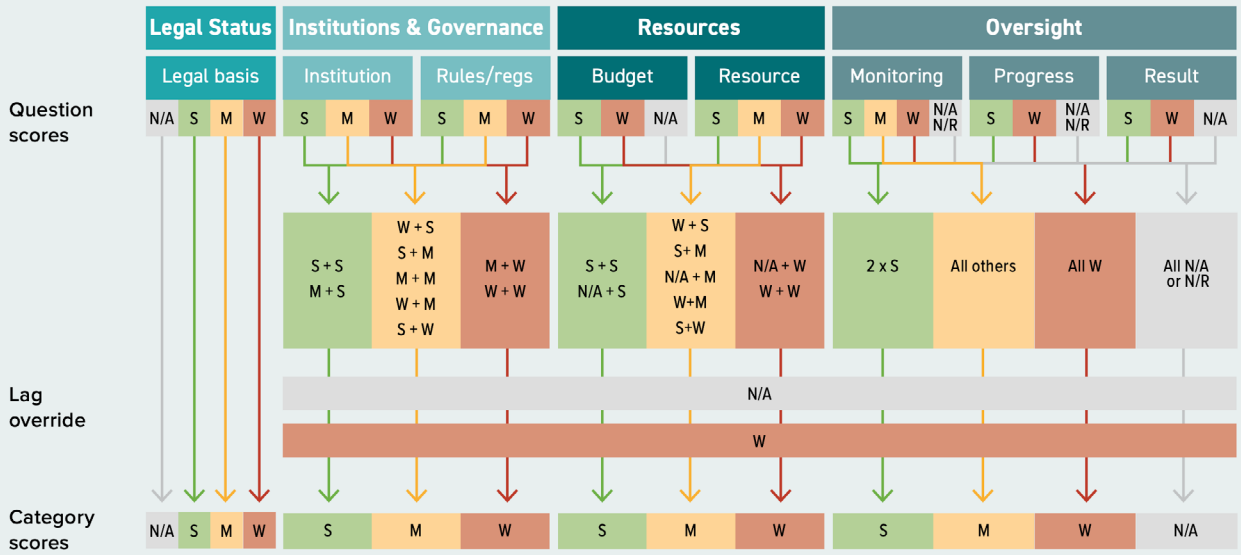
Q6: Have any monitoring results been made public?

Q7: Does the latest monitoring report indicate that the policy's goal will be achieved on time?

Q8: Is there a process of evaluation to assess the quantitative outcome of the policy instrument?

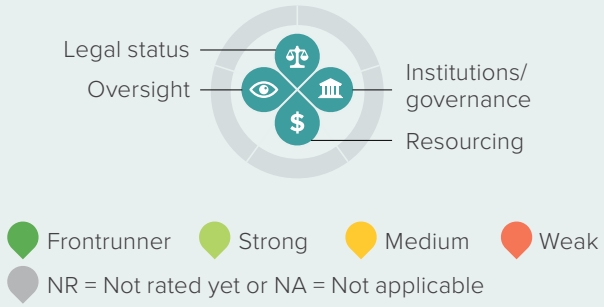
Depending on the answer to each specific question, the implementation of the relevant policy instrument in each category is rated as Weak, Medium, Strong, or Frontrunner.

TABLE 4. Rules for combining ratings per question to an overall rating at category level

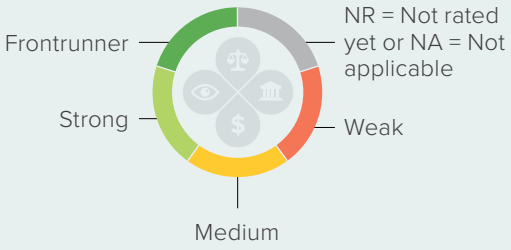


These ratings are combined to produce an overall rating for the policy implementation in the format below.

The four categories



Policy assessment rating (overall)



REFERENCES

[1] IESR. 2022a. Indonesia Solar Energy Outlook 2023. Jakarta, IESR, https://iesr.or.id/pustaka/indonesia-solar-energy-outlook-2023. Accessed 16 Nov. 2023

[2] IESR. 2021. Deep decarbonization of Indonesia's energy system: A pathway to zero emissions by 2050. Jakarta, IESR, https://iesr.or.id/wp-content/uploads/2021/05/IESR-Deep-Decarbonization-Final.pdf. Accessed 16 Nov. 2023

[3] UNFCCC. 2021. "Indonesia Biennial Update Report (BUR3)." United Nations Climate Change, 20 Dec. 2021, unfccc.int/

[4] Climate Transparency. 2022. "Indonesia - Climate Transparency Report: Comparing G20 Climate Action." Climate Transparency, 2022, www.climate-transparency.org/wp-content/uploads/2022/10/CT2022-Indonesia-Web.pdf. Accessed 16 Nov. 2023.

[5] Climate Transparency. 2022.

[6] PLN. 2021, Rencana Usaha Penyediaan Tenaga Listrik (RUPTL) 2021-2030 PT PLN Persero, gatrik.esdm.go.id/assets/uploads/download_index/files/38622-ruptl-pln-2021-2030.pdf. Accessed 17 Nov. 2023.

[5] MEMR. 2023a. Laporan Kinerja Kementerian Energi Dan Sumber Daya Mineral 2022, www.esdm.go.id/assets/media/content/content-laporan-kinerja-kementerian-esdm-tahun-2022.pdf. Accessed 17 Nov. 2023.

[6] MEMR. 2022a.

[7] MEMR. 2022b, Peta Jalan Net Zero Emission (NZE) Sektor Energi.

[10] MEMR. 2023a.

[8] JETP Indonesia Secretariat. 2023, JETP Indonesia Comprehensive Investment and Policy Plan - Public Consultation Draft, jetp-id.org/storage/jetp-comprehensive-investment-and-policy-plan-2023-draft-for-public-consultation-vshare-1698982710.pdf. Accessed 17 Nov. 2023.

[12] Edianto, A. S. 2023. How does Indonesia's JETP compare to net zero pathways? Ember. https://ember-climate.org/insights/commentary/how-does-indonesias-jetp-compare-to-net-zero-pathways/. Accessed 12 Jan. 2024

[13] ADB. 2020. Renewable Energy Tariffs and Incentives in Indonesia: Reviews and Recommendations. https://www.adb.org/sites/default/files/publication/635886/renewable-energy-tariffs-incentives-indonesia.pdf. Accessed 12 Jan. 2024

[14] MOF. 2023. Informasi APBN 2023, https://media.kemenkeu.go.id/getmedia/6439fa59-b28e-412d-adf5-e02fdd9e7f68/Informasi-APBN-TA-2023.pdf?ext=.pdf, Accessed 20 Nov. 2023

[15] MEMR. 2022c, "Pemerintah Perkuat Infrastruktur Energi Baru Dan Terbarukan." Direktorat Jenderal EBTKE - Kementerian ESDM, 23 Sept. 2022, ebtke.esdm.go.id/post/2022/09/23/3269/pemerintah.perkuat.infrastruktur.energi.baru.dan.terbarukan.

[16] MEMR. 2022b.

[17] MEMR. 2023a.

[18] PLN. "Informasi Keuangan." PT PLN (Persero), web.pln.co.id/stakeholder/laporan-keuangan.

[19] MEMR. 2023b. Draft RUKN 2023-2060.

[20] MEMR. 2023a.

[21] MENTARI. 2022. New Paradigm Thematic Paper: Renewable Energy Procurement in Indonesia

[22] MEMR. 2022a.

[23] IRENA. 2022. Indonesia energy transition outlook, International Renewable Energy Agency, Abu Dhabi.

[24] Rahayu, J.T. 2021. Indonesia needs US$247 billion to achieve Paris Agreement's target. Antara News, https://en.antaranews.com/news/176338/indonesia-needs-us247-billion-to-achieve-paris-agreements-target. Accessed 17 Nov. 2023

[25] IESR. 2022b. Enabling High Share of Renewable Energy in Indonesia's Power System by 2030: Alternative electricity development plan compatible with 1.5°C Paris Agreement. Jakarta, IESR, https://iesr.or.id/en/pustaka/enabling-high-share-of-renewable-energy-in-indonesias-power-system-by-2030-alternative-electricity-development-plan-compatible-with-1-5c-paris-agreement. Accessed 17 Nov. 2023

[26] R. Cui, F. Tumiwa, A. Zhao, D. Arinaldo, R. Wiranegara, D. Cui, C. Dahl, L. Myllyvirta, C. Squire, P. Simamora, N. Hultman. 2022. "Financing Indonesia's coal phase-out: A just and accelerated retirement pathway to netzero." Center for Global Sustainability, University of Maryland, College Park, USA; Institute for Essential Services Reform, Jakarta.

www.climate-transparency.org