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Unlocking Indonesia's transmission grid investment

Establishing a dedicated, state utility transmission subholding could lower financing costs, attract long-term infrastructure capital, and support grid expansion

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Key findings

Indonesia's Electricity Supply Business Plan (RUPTL) 2025–2034 requires an average annual transmission investment of USD2.4 billion to support large-scale renewable energy deployment, industrial electrification, and inter-island grid integration. Realized investment has averaged only USD1.4 billion annually since 2019. Closing this gap requires structural reform to transmission financing, not just increased budget allocations.

Indonesia’s electricity transmission is financed through the national electricity utility PLN’s consolidated balance sheet, blending its low-risk profile with fuel price volatility, foreign exchange exposure, and subsidy risk. This misalignment inflates financing costs, obscures grid expenses, and risks turning transmission into a bottleneck for the energy transition.

Establishing a separate PLN transmission company through corporate restructuring and financial ring-fencing within a state-owned framework offers a pragmatic solution. Clearly defining transmission assets, costs, and revenues would allow regulated tariffs to support cost recovery, unlock long-term infrastructure finance, and reduce reliance on national budgets while preserving state control.

Transmission separation experience from India and Vietnam demonstrates that comparable ring-fencing within PLN could unlock lower-cost, long-term transmission financing, and improve investment scale and transparency. It would also support renewable energy integration and regional electricity exports, and strengthen financial sustainability, without altering state ownership or Indonesia’s constitutional framework.

Executive summary

Indonesia is a growing economy — driven by rapid electrification, rising industrial demand, ambitious renewable energy targets, and emerging export opportunities — that requires sustained, long-term grid investment. However, delays in expanding and modernizing the country's electricity transmission network are constraining economic growth, renewable energy deployment, and regional electricity trade. Current institutional and financing frameworks are not designed to deliver investment at the required scale or pace.

Transmission is a capital-intensive, long-term infrastructure asset with stable and predictable usage patterns. When financed as a low-risk regulated utility, it can attract long-tenor capital at interest rate spreads close to those of sovereign borrowing. However, within Indonesia's national electricity utility, PT Perusahaan Listrik Negara (PLN), transmission investment competes with generation and supply activities that carry different risks and policy obligations, including fuel price volatility, foreign exchange exposure, subsidy timing risk, and long-term power purchase commitments. As a result, the inherently lower-risk profile of transmission is embedded within PLN's broader capital structure and priced according to the utility's blended corporate risk rather than its stand-alone level. This misalignment increases financing costs, obscures the true economics of grid infrastructure, and risks turning transmission into a bottleneck in Indonesia's energy transition.

Establishing a separate PLN transmission company through corporate restructuring and financial ring-fencing within a wholly or majority state-owned framework offers a practical solution. By clearly defining transmission assets, costs, and revenues, regulated tariffs could support cost recovery and facilitate access to long-term infrastructure finance, reducing reliance on state budgets while preserving state control.

Transmission separation would not imply privatization, market liberalization, or constitutional unbundling. Transmission would remain a regulated monopoly under state ownership and government oversight, consistent with Indonesia's Electricity Law and recent Constitutional Court rulings. Rather, the reform would be institutional and financial in nature, aimed at improving transparency, accountability, and investment capability to raise capital for Indonesia's ambitious transmission expansion and modernization plans.

This report provides case studies of alternative corporate structures that have enabled similar entities in India and Vietnam to consistently raise substantial capital. Power Grid Corporation of India Limited (PGCIL) is a majority government-owned, corporatized, and commercially-oriented pure transmission entity that operates under an independent, rate-of-return regulatory structure. The company has domestic and foreign bond ratings that underpin a robust debt issuance program. Corporate financial credibility is further supported by listings on domestic stock exchanges, requiring transparent accounting and financial reporting in accordance with regulatory obligations for listed entities. PGCIL has eliminated the need for public budget allocations, and sovereign guarantee support is limited to legacy multilateral development bank debt on its balance sheet. This approach

allows PGCIL to self-finance an average of USD2.5 billion in capital investment in grid development each year over the past decade[1] — an amount similar to what PLN requires for its investment plans.

State-owned power company Electricity of Vietnam (EVN) operates under a universal service mandate and a base tariff structure similar to PLN. EVN has established wholly-owned subsidiaries for generation, distribution, and transmission. The transmission entity, National Power Transmission Corporation (EVNNPT), was created to rationalize system expansion and operations. EVN is actively structuring and positioning EVNNPT’s corporate operations to support an international credit rating and broaden access to capital from diverse sources.

Clear governance also allows these separate transmission utilities to deliver on investments that create broader benefits for their national energy sector and economy. For Indonesia, a dedicated PLN transmission subholding would support large-scale renewable integration, enable electricity export projects to be financed on cost-reflective transmission tariffs, and strengthen the country’s position in regional initiatives such as the Association of Southeast Asian Nations (ASEAN) Power Grid. International experience demonstrates that regulated, state-owned transmission infrastructure can be both financeable and commercially viable.

The establishment of Danantara, Indonesia’s sovereign wealth fund tasked with holding and managing the country’s state-owned enterprises — including PLN — further sharpens the case for reform. Danantara's mandate is to allocate state capital on a disciplined, returns-based foundation. This directive is challenging given the current transmission structure, where investment is recorded as an undifferentiated line item on PLN's consolidated balance sheet. A ring-fenced transmission company would create the institutional platform necessary for Danantara, alongside other domestic and international institutional financiers, to invest in grid expansion on terms that reflect transmission's stand-alone risk profile.

This report finds that transmission separation is not an end in itself, but an enabler of national electricity system improvement and cost-effectiveness. Aligning grid governance and financing efficiency with the underlying economics of transmission infrastructure can reduce system costs, accelerate renewable energy deployment, and support Indonesia’s long-term economic and energy objectives. With national plans for grid expansion exceeding USD24.4 billion over the next 10 years and complementary renewable energy additions four times that amount, the energy transition cannot be funded solely by the state budget. The framework proposed in this analysis is designed to build the institutional and financial capacity for PLN's transmission function to progressively self-fund its expansion, alongside support from the state, Danantara, and capital markets.

[1] Power Grid Corporation of India Ltd. Annual Reports, FY 2016-2017 to FY 2024-2025.

Transmission investment in Indonesia

- PLN’s transmission investment needs exceed USD24.4 billion over the next 10 years, while average annual realized investment between 2019 and 2024 was only USD1.4 billion per year.
- PLN’s internal capital generation is insufficient to meet this target, while public financing capacity remains constrained.
- Establishing a wholly state-owned, independently regulated transmission company could enable transmission-focused investment from domestic and global capital markets.

1 Introduction

1.1 The scale of Indonesia’s transmission investment challenge

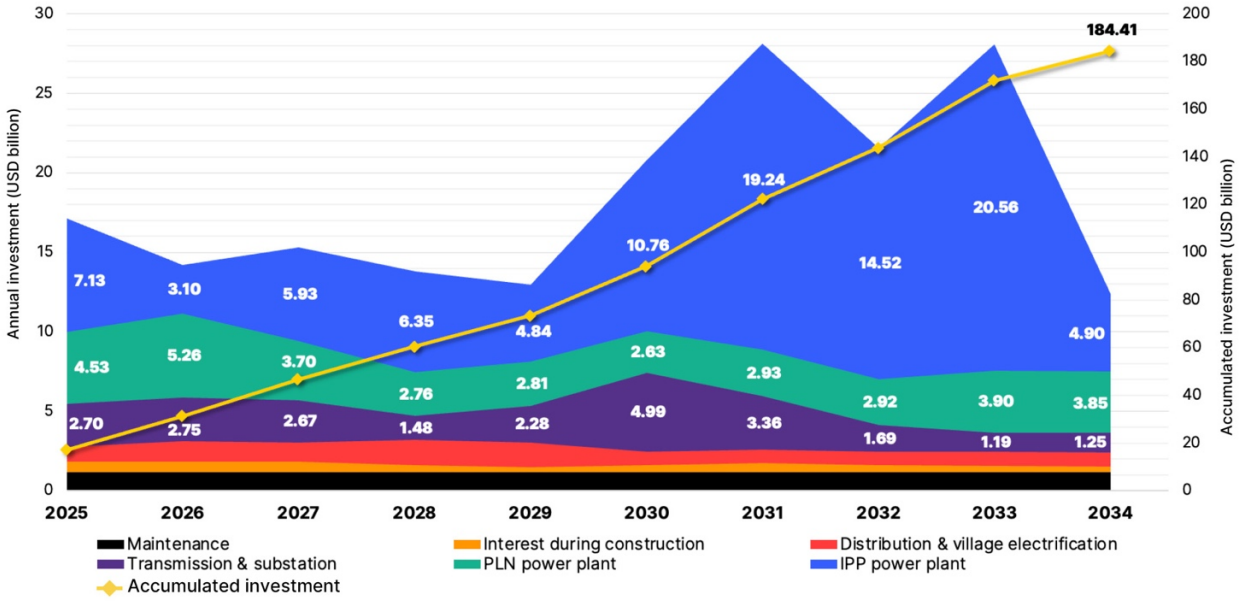
Discussions on Indonesia’s power sector development are dominated by generation: coal retirements, renewable targets, battery storage, hydrogen, and new power plants. Yet the most significant constraint on the country’s energy transition is the physical network that transmits electricity nationwide and delivers high-quality, reliable power to all customers.

Indonesia’s national electricity utility, PT Perusahaan Listrik Negara (PLN) has plans to expand its transmission network between 2025 and 2034 to cover 47,758 circuit kilometers (ckm), supported by an additional substation capacity of 107,950 megavolt-amperes (MVA).[2] The program is estimated to require total investment of IDR392.1 trillion[3] (USD24.4 billion[4]).

The government’s National Electricity Plan (RUKN) projects USD103.1 billion in investment between 2025 and 2060[5] for power transmission networks, including internal and inter-island interconnections, equivalent to more than USD3 billion annually. By comparison, PLN's realized investment in transmission and substations totaled USD1.1 billion in 2024 and averaged approximately USD1.4 billion annually between 2019 and 2024.[6, 7] Sustained transmission investment, well above the historical range, will be needed to achieve the Electricity Supply Business Plan (RUPTL) target.

[2] PLN. Electricity Supply Business Plan (RUPTL 2025-2034). Section V.9. 26 May 2025.
[3] PLN. Electricity Supply Business Plan (RUPTL 2025-2034). Section VI.1. 26 May 2025.
[4] Rates based on RUPTL assumption USD/IDR 16,000 (2025) and IDR16,100 (2026-2034).
[5] MEMR. *Rencana Umum Ketenagalistrikan Nasional* (RUKN). 5 March 2025. Page 139.
[6] MEMR. Laporan Kinerja Direktorat Jenderal Ketenagalistrikan 2019-2024.
[7] Rates based on the average currency exchange for the respective year.

Figure 1: Projected investment needs (disbursement) for electric power generation, transmission, distribution, and maintenance

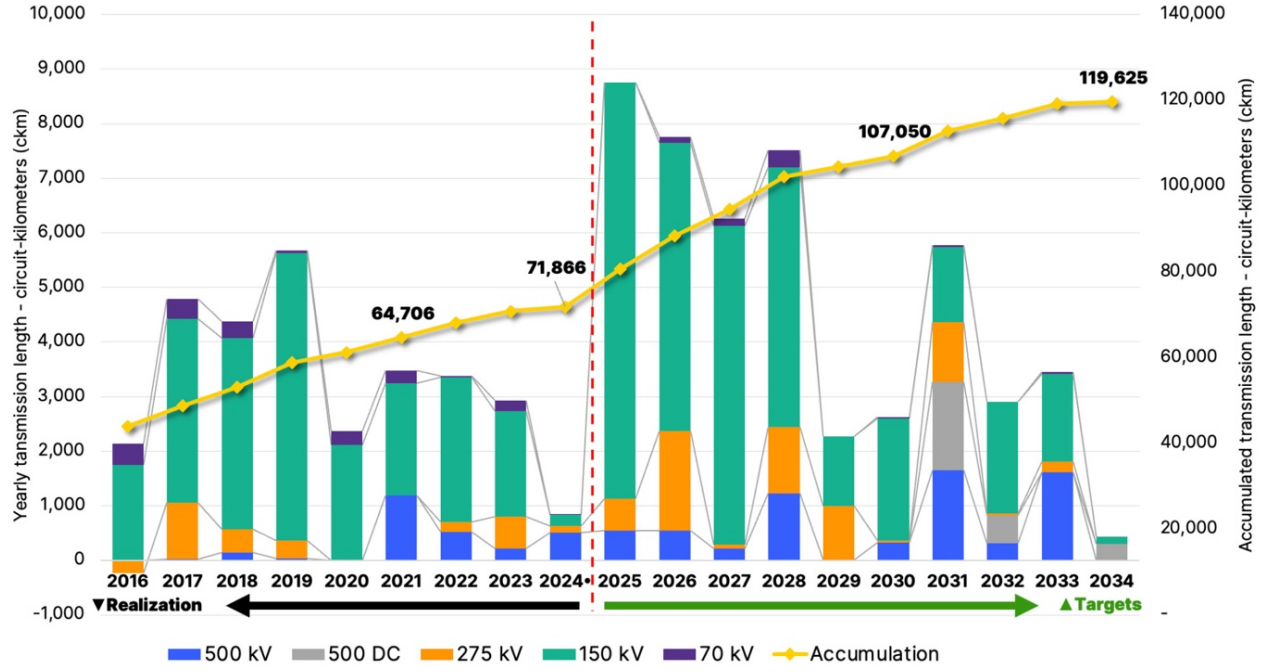


Source: PLN. Indonesia's Electricity Supply Business Plan 2025 – 2034 (RUPTL 2025-2034); IEEFA.

This scale of investment reflects the broader evolution of Indonesia's power system. The existing grid was originally designed around large, centralized power plants with limited transmission pathways connecting generation to demand centers. As demand grows and the generation mix becomes more diverse, the system increasingly requires a more interconnected and flexible network capable of linking various sources of supply to multiple demand centers.

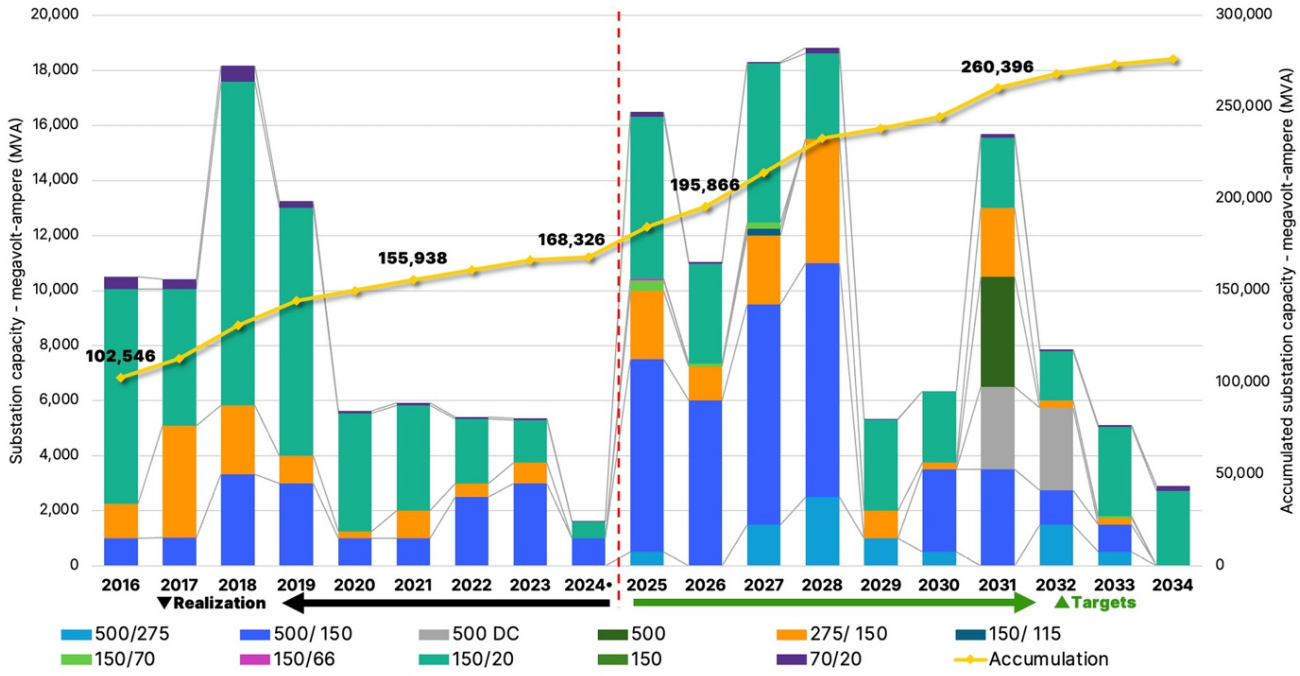
The transition toward renewable energy is expected to reduce exposure to fuel costs while shifting a greater share of system costs toward upfront capital investment in infrastructure. Renewable resources reinforce the need for a more interconnected grid due to their distributed, multi-point connections. At the same time, rising electricity demand is increasing the need to move larger volumes of power across regions. Transmission expansion is therefore a structural requirement of power system development, rather than a consequence of any single generation technology.

Figure 2: Yearly addition of transmission network



Source: PLN. RUPTL 2025-2034; IEEFA.

Figure 3: Yearly addition of substations



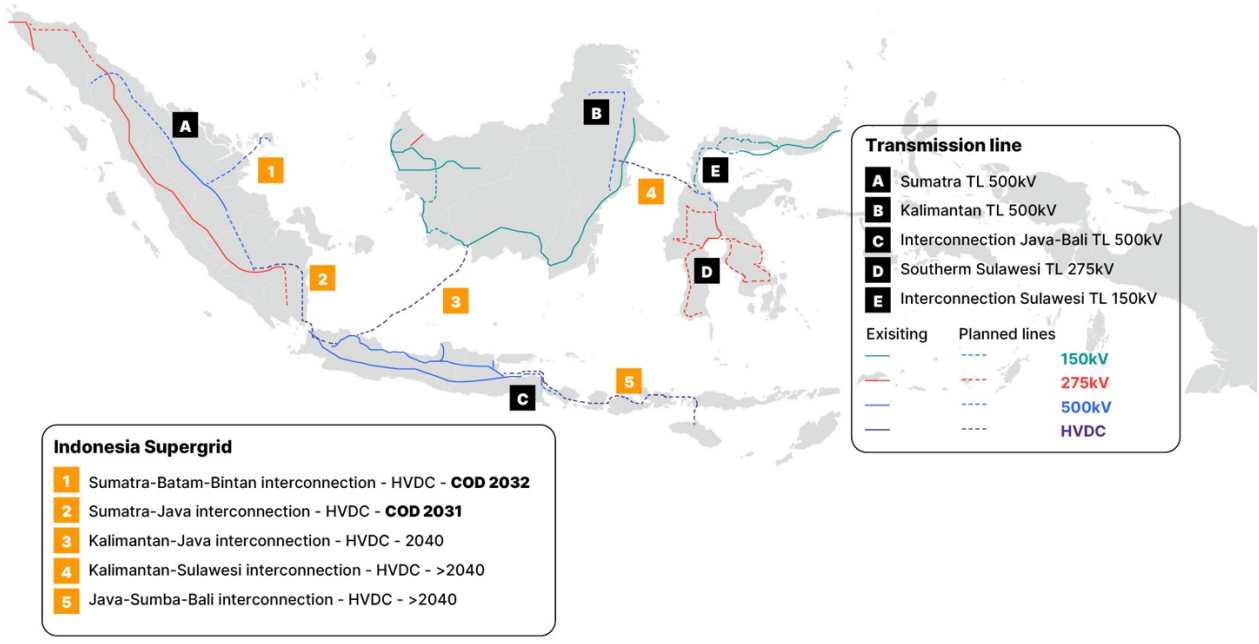
Source: PLN. RUPTL 2025-2034; IEEFA.

When grid capacity is constrained, dispatch decisions are determined by available transmission capacity rather than by least-cost generation principles. Expanding transmission and improving regional transfer capacity across redundant pathways reduces congestion and enables access to lower-cost generation sources, improving system efficiency and potentially reducing overall costs.[8]

This grid constraint is particularly pronounced in Indonesia, where demand centers, industrial development, and energy resources are distributed across islands with limited interconnection. Without adequate transmission, renewable energy zones in Sumatra, Kalimantan, Sulawesi, and eastern Indonesia cannot connect to demand centers, and industrial estates are unable to electrify at scale. Consequently, the system relies more heavily on higher-cost local generation while lower-cost resources remain underutilized. Therefore, an improved grid is not just supporting the energy transition — it determines the speed, cost, and feasibility of the transition.

Indonesia's industrial and downstream development strategy, which includes more than 25 Special Economic Zones (SEZs)[9] and 175 industrial zones[10], continues to expand and will require reliable, scalable, and cost-competitive electricity supply. Many of these areas are geographically distant from existing generation centers, reinforcing the need for transmission planning.

Figure 4: Indonesia Supergrid



Source: MEMR. National Electricity Plan (RUKN).

[8] Rocky Mountain Institute (RMI). High Voltage, High Reward Transmission. 3 February 2025.
[9] Indonesia Economic Forum. Indonesia SEZ Business Forum 2025 Strengthens Global Investment Appeal of 25 Special Economic Zones. December 2025.
[10] Invest Indonesia. Indonesia Industrial Estates Reach 175 Sites, Investment Up 9.26%. 2 January 2026.

The scale of grid expansion required to support renewable energy deployment, industrial electrification, and inter-island power integration is well established. The challenge is whether Indonesia's current institutional and financing framework can deliver this investment in a timely manner and at a reasonable cost.

This presents several strategic questions for Indonesia's power sector: how can PLN reliably mobilize sufficient capital to support large-scale transmission expansion over the coming decades? Can this investment remain fiscally sustainable while delivering stable returns on state assets and meeting legal requirements? And can transmission infrastructure be developed quickly enough to keep pace with the rapid growth in renewable energy generation targeted under national policy frameworks?

This investment challenge is further shaped by Indonesia's evolving state asset management framework. In February 2025, PLN and other key state-owned enterprises were placed under the oversight of *Badan Pengelola Investasi Daya Anagata Nusantara* (Danantara), the government's sovereign investment holding company. Danantara is mandated to manage state assets in a disciplined manner, supporting national development objectives while ensuring financial sustainability and generating returns for the state. This adds an additional dimension to transmission investment decisions, which must now balance system needs, affordability, and the financial performance expectations associated with state-owned assets.

In many countries undergoing large-scale energy transitions, reforms to transmission ownership, financing, and regulation have played a critical role in unlocking new capital and accelerating grid development. Evaluating whether similar approaches could strengthen Indonesia's transmission investment framework is, therefore, an important policy consideration.

1.2 Why PLN's current financing model is becoming a constraint

Despite the central role of transmission in Indonesia's energy transition, its financing framework has not evolved in tandem with growing policy ambitions and investment needs. This is increasingly evident as Indonesia enters a new phase of state asset management under Danantara.

Under PLN's vertically integrated structure, transmission investment competes internally with generation development, fuel procurement, distribution expansion, and several policy-driven obligations. Although transmission is one of the lowest-risk and most economically productive segments of the power system, it is financed through the same corporate balance sheet that absorbs fuel price volatility, foreign-exchange exposure, subsidy timing risk, and long-term power purchase commitments. From a lender or investor's perspective, this blurs the distinction between fundamentally different risk profiles within the same utility.

The establishment of Danantara has brought this structural misalignment into sharper focus. As the country's investment holding company for state-owned enterprises, Danantara operates through a dual structure. Danantara Asset Management (DAM) oversees and enhances the performance of state-owned enterprises, while Danantara Investment Management (DIM) deploys capital into

strategic investments and projects. Danantara's mandate is to allocate capital in a disciplined way, prioritizing projects that support long-term national objectives while maintaining financial sustainability and generating profits for the government.

This structure distinguishes Danantara from external sovereign investment platforms such as the Indonesia Investment Authority (INA), which now primarily focuses on mobilizing external capital. In contrast, Danantara's asset management function places greater emphasis on improving capital efficiency within state-owned enterprises themselves, including PLN.

In December 2025, Danantara began collaborating with PLN to accelerate investment in renewable energy generation.[11] Renewable generation projects are visible and increasingly bankable, with clear capacity targets, defined project economics, and strong alignment with Indonesia's climate and industrial policies.

While generation projects can be packaged, financed, and evaluated on an individual project basis, the transmission infrastructure required to absorb and deliver that new capacity remains embedded in PLN's consolidated finances. Transmission assets are therefore largely invisible to investors, despite being essential for connecting new generation projects to customers. As a result, the grid is not structured as a distinct, investable infrastructure platform — even though it underpins every renewable project Danantara seeks to enable.

Additionally, the current tariff and cost-recovery framework does not clearly reflect the capital-intensive nature of transmission investment. The Ministry of Energy and Mineral Resources (MEMR) sets end-user tariffs with Parliamentary approval. For subsidized consumer groups, tariffs have been fixed at low levels since 2017. For non-subsidized groups, a quarterly tariff adjustment mechanism exists but has not been consistently applied, with the government maintaining flat tariffs despite changes in macroeconomic parameters. The resulting average tariff is below PLN's Basic Cost of Providing Electricity (BPP) — the consolidated average cost of supplying electricity covering generation, transmission, and distribution. The Ministry of Finance absorbs the difference through two instruments: subsidies, which are budgetary allocations covering the gap between PLN's cost of supply and the tariffs paid by subsidized customer groups; and compensation, which reimburses PLN for under-recovery incurred from non-subsidized customers.

Transmission costs are therefore embedded within BPP and recovered through this combined mechanism. However, they are not separately priced, benchmarked against a regulated return, or separated from other obligations within PLN's balance sheet. Within the state utility's internal capital allocation, this blending makes it challenging to prioritize transmission compared to more visible and easily packaged generation projects, and harder for external capital to price transmission at its true risk profile. The result is persistent underinvestment in grid expansion, even where it is critical to operations.

[11] PLN. Danantara Indonesia and PLN Explore New Renewable Energy Investment Opportunities. 23 December 2025.

This distinction in risk profiles is essential for capital mobilization. Investors — whether sovereign funds, development banks, or institutional investors — favor assets with clear risk allocation, transparent cash flows, and ring-fenced governance. Renewable generation, typically implemented through special purpose vehicles (SPVs), increasingly meets these criteria. Transmission, despite its lower risk, remains invisible to financiers and regulators, because its revenues and liabilities are blended into PLN's broader balance sheet.

Table 1: Differences in financing structures

Characteristic	Renewable Generation Projects	Transmission Infrastructure
Financing structure	Typically financed through project finance or IPP structures	Financed through PLN's consolidated corporate balance sheet
Revenue visibility	Long-term Power Purchase Agreements (PPAs) or contract-based tariffs	Revenue embedded within regulated utility operations
Risk allocation	Ring-fenced at the project level within special purpose vehicles	Blended with broader PLN operational risks
Investor participation	IPPs, private investors, development finance institutions	Primarily financed by PLN and sovereign-backed borrowing
Investment visibility	Individual projects with clear financial metrics	Grid investment treated as internal utility capital expenditure inside the utility's general operations

Source: IEEFA analysis.

However, transmission investment currently lacks investor visibility and access to capital, remaining tied to PLN's corporate balance sheet rather than structured as a stand-alone infrastructure opportunity. Consequently, grid expansion risks lagging behind generation growth — not because of policy resistance, but due to financing constraints — leading to delays, curtailment, or higher overall system costs resulting from insufficient transmission capacity.

The question, therefore, is not whether the state supports renewable energy or grid development, as it clearly supports both. The more pressing consideration is whether Indonesia's institutional and financial structures can deliver both at the scale and speed required. Without addressing how transmission is financed, the risk is not that renewable investment will fail, but that it will be constrained and made more expensive by an under-capitalized grid.

Reforming transmission finance is not contrary to Danantara's objectives; it is a necessary complement to them.

1.3 Transmission is a low-risk asset being financed as high risk

From a financial perspective, electricity transmission is among the lowest-risk infrastructure investments in the energy system. Yet in Indonesia, it is still financed as if it carries the same risks as fuel-dependent generation and power trading. This divergence between intrinsic asset risk and applied financing structure is a key reason grid expansion is slower and more expensive than necessary.

This misalignment also presents a structural challenge for Danantara. A capital allocator with a returns-based mandate cannot accurately assess a transmission asset whose risk profile is obscured within PLN's consolidated accounts — where it is priced as though it carries the same exposure as fuel procurement, foreign-exchange obligations, and subsidy timing risk. Transmission networks are natural monopolies; once a line is built, there is no economic rationale for duplicating it along the same corridor. Demand for transmission services is also largely non-discretionary and inelastic — electricity must flow from generators to consumers regardless of fuel prices, dispatch decisions, or market cycles. A transmission line is indifferent to the source of power and earns revenue by providing access and reliability, not by taking market positions.

These characteristics give transmission three financial properties that are uncommon within the power sector:

1. **Revenues are stable and predictable.**
   Under a regulated tariff framework, transmission companies recover their costs and earn a regulated return on invested capital.[12] While system flows may fluctuate, the grid is used in all economic conditions. Even during downturns, electricity demand (and therefore grid utilization) is far more stable than fuel or power prices.

2. **Costs are largely fixed and shielded from global commodity volatility.**
   Transmission assets have no fuel input and minimal exposure to international price swings. Once constructed, operation and maintenance costs are relatively low and largely domestic. This insulates transmission cash flows from the shocks that have repeatedly affected generation portfolios, particularly those reliant on imported fuels.

3. **Assets are long-lived and depreciate slowly.**
   High-voltage lines and substations typically operate for 40 to 60 years.[13] This makes them well suited to long-tenor financing and attractive to institutional investors, such as pension funds and insurers, whose liabilities extend over similar time horizons.

These characteristics have led high-voltage transmission to be evaluated as a distinct infrastructure asset class, more comparable to toll roads, pipelines, or water networks than to generation assets.

[12] OECD. Transmission grid financing - Lessons from international case studies and toolkit for policymakers. January 2026.
[13] Rocky Mountain Institute (RMI). High Voltage, High Reward Transmission. 3 February 2025.

Investors typically apply lower risk premiums to transmission assets because they deliver stable, regulated cash flows over long periods.

The Organisation for Economic Co-operation and Development (OECD) notes that when transmission systems are positioned in stand-alone regulated entities with clear cost-recovery frameworks, they can raise long-term debt at interest rates only modestly above sovereign borrowing.[14] In such models, transmission is viewed as public infrastructure with predictable revenues, rather than a commercial business exposed to market volatility.

For example, in France, the state-owned, stand-alone transmission utility RTE benefits from rate of return tariff regulation, enabling it to borrow at a low interest rate of 1.66% with an average debt maturity of approximately 10 years.[15] Similarly, Power Grid Corporation of India Limited (PGCIL) (explored in detail in Section 3.2), is a stand-alone, majority state-owned utility with a regulated rate of return revenue model. International rating agency Fitch Ratings has assigned PGCIL the same credit rating (BBB–) as the Government of India for long-term local currency borrowing.[16, 17]

In 2025, PGCIL issued a 10-year, domestic currency bond (Bond LXXXII) at a rate of 6.98%, on a stand-alone basis without sovereign guarantee, compared with a 6.62% yield for the 10-year Government of India bond.[18, 19] Over the past decade, PGCIL has issued three local currency bonds annually, raising about USD800 million a year.[20] Additional debt is arranged through term bank loans, working capital, and commercial paper facilities. Meanwhile, equity returns are supported by a market-linked rate of return embedded in transmission tariffs set and adjusted periodically by an independent regulator.

Table 2: Risk profile and financing structures of power sector assets

Power Sector Asset	Market Exposure	Revenue Stability	Typical Financing Structure	Typical Investor Return
Thermal generation	High	Medium	Corporate or project finance	10–14%
Renewable IPP projects	Low–medium	High	Project finance SPV	8–12%
Transmission infrastructure	Very low	Very high	Regulated infrastructure asset	6–10%

Source: OECD, IEA infrastructure finance benchmarks; IEEFA analysis.
Note: Returns are USD-based for typical OECD industrialized markets.

[14] OECD. Transmission grid financing - Lessons from international case studies and toolkit for policymakers. January 2026. Page 21-22.
[15] Ibid. Page 50.
[16] Fitch Ratings. Power Grid Corporation of India. 12 February 2026.
[17] Fitch Ratings. Fitch Affirms India at 'BBB-'; Outlook Stable. 25 August 2025.
[18] Bombay Stock Exchange. Power Grid Corporation of India Ltd Board Meeting Outcome on LXXXII Issue 2025-2026 on Private Placement. 5 August 2025.
[19] Trading Economics. India 10-year Government Bond Yield. Accessed 19 April 2026.
[20] Power Grid Corporation of India Limited. Annual Report 2024-2025. August 2025. IEEFA analysis of Consolidated Financial Statements, Note 23: Other Equity.

Since transmission remains embedded within PLN's vertically integrated structure, its low-risk profile is overshadowed by higher-risk activities, including coal procurement, foreign exchange exposure, tariff subsidy dynamics, distribution operations and customer collections, and long-term contractual obligations. Investors assess PLN as a whole, rather than reflecting the lower risk of the transmission category.

PLN has a BBB credit rating, slightly better than that of India's PGCIL[21], which means PLN should be able to raise debt more cost-effectively. Yet PLN remains an infrequent issuer in the longer-term bond markets. After a six-year issuance hiatus, in January 2026, PLN launched a foreign currency bond issuance — USD500 million for five years at 4.75% and USD1 billion for 10 years at 5.45%.[22] This was the first issuance under a board-approved USD15 billion global medium-term note framework established in 2022, which allows periodic foreign currency bond issuance up to the framework's ceiling.[23]

However, reliance on foreign currency borrowings increases exposure to exchange rate risks. With IDR-USD depreciation averaging 2%–3% annually over the last decade, the effective interest rates on those bonds in Indonesian Rupiah terms increase to 6.85%–7.90% and 7.60%–8.61%, respectively. Adverse macroeconomic developments, such as geopolitical disruptions in the Persian Gulf, could further amplify currency impacts, with immediate effects on interest payments and principal redemptions, both of which must be paid in USD at current exchange rates.

On the equity side, PLN faces challenges in establishing its cost of capital, as government subsidies and compensation payments obscure performance. For subsidized consumer revenue segments, PLN receives "allowable cost plus a 7% margin" above the subsidized level, which implies a permitted rate of profit.[24] It is unclear how unsubsidized segments generate returns on deployed capital. Based on PLN's 2024 annual report, the implied return on equity (ROE) — calculated as net profit over the change in balance sheet equity — is 1.7%[25], suggesting that PLN is unlikely to cover its cost of investment capital under current cash flow conditions.

The gap between what transmission earns and what it costs to finance is measurable. Section 2.3 quantifies the unrecovered transmission capital at approximately IDR48 per kilowatt-hour (kWh) under PLN's current cost structure, and projects the fiscal consequences across the RUPTL 2025–2034 investment program.

The result is a systematic mispricing of capital. Indonesia is effectively paying a high-risk cost of capital to finance a low-risk asset. Across the billions of dollars in required grid investment,

[21] Fitch Ratings. Fitch Affirms Indonesia's Perusahaan Listrik Negara at 'BBB'; Outlook Stable. 14 January 2026.
[22] Cbonds.com. New issues: Perusahaan Listrik Negara issued international bonds (US71568QAZ00, US71568QAX51). 28 January 2026.
[23] Singapore Stock Exchange (SGX). U.S.$ 15,000,000,000 Global Medium Term Note Program Listing Prospectus. 26 January 2026.
[24] PLN. Annual Report 2024. Government electric subsidy. Page 233.
[25] PLN. Annual Report 2024. Table of Equity. Page 228. Table of Consolidated Statements of Profit or Loss. Page 231.

incremental increases in financing costs translate into significantly higher tariffs, larger subsidy requirements, or slower network expansion due to foregone investment.

The consequences of this risk misalignment are already visible in Indonesia's grid. PLN's RUPTL 2025–2034 highlights the geographical mismatch between renewable generation potential and the existing transmission network and calls for a substantial expansion in inter-island interconnectors to close this gap.[26]

Globally, the International Energy Agency (IEA) identifies a similar pattern, with more than 1,650 gigawatts (GW) of advanced-stage renewable projects delayed due to grid connection constraints.[27] As the backbone of electricity systems, grids must anticipate future demand and generation patterns. Mobilizing investment in grids requires regulatory frameworks that reduce risks, promote proactive investment, and enable timely cost recovery. Across systems, the cost of capital applied to the grid directly influences the expense and pace of the energy transition.

From an energy system perspective, constraining transmission investment is counterproductive. Strengthening and expanding the grid is widely recognized as the most effective way to enable high shares of renewable energy and connect resource-rich regions to demand centers.[28] When grid investment lags behind generation, supply becomes stranded, evidenced by large volumes of renewable capacity stuck in connection queues due to network bottlenecks.[29] Limited interconnection reduces the ability to balance supply and demand across regions. In contrast, a robust grid improves cost-efficiency, reliability, and overall system optimization.

Despite its system-wide importance, transmission expansion typically accounts for less than 10% of total system investment.[30] Treating the grid as a residual investment — constrained by corporate balance-sheet limits rather than system needs — raises long-term costs, even if it appears fiscally conservative in the short term.

This investment shortfall underscores the significance of ownership and financing structure. Separating transmission into a regulated PLN subholding is a way to ensure that a low-risk, high-value infrastructure business is financed at an appropriate cost of capital, enabling faster build-out, lower system costs, and greater resilience.

[26] PLN. Electricity Supply Business Plan (RUPTL 2025-2034). 26 May 2025.
[27] International Energy Agency (IEA). Building the Future Transmission Grid. 25 February 2025.
[28] International Journal of Renewable Energy Research. Transmission Grids to Foster High Penetration of Large-Scale Variable Renewable Energy Sources. March 2022.
[29] OECD. Transmission grid financing - Lessons from international case studies and toolkit for policymakers. January 2026.
[30] Assessing the impact of renewable energy penetration and geographical allocation on transmission expansion cost: A comparative analysis of two large-scale systems, Sustainable Energy, Grids and Networks, Volume 38. June 2024.

1.4 Operationally ready, financially constrained

A key reason transmission reform in Indonesia is both feasible and low risk is that PLN is already functionally separated in practice, even though it remains financially integrated.

Across Indonesia's major grids, PLN operates its transmission system through dedicated regional transmission units, including three Transmission Head Units (*Unit Induk Transmisi* [UIT]) and three Load Dispatch and Control Center Head Units (*Unit Induk Penyaluran dan Pusat Pengatur Beban* [UIP3B]).[31] The UITs manage network infrastructure and maintenance, while the UIP3Bs oversee electricity transmission, system operations, and load dispatch, including maintaining system stability and reliability.[32] These units also manage substations, high-voltage lines, grid control centers, outage coordination, and new generation connections. From an engineering and operational perspective, transmission already functions as a distinct system, separate from generation and retail activities.

In practical terms, this means that the most complex aspect of separation — the technical system operations — has already been achieved. Electricity flows are managed independently of generation ownership, grid reliability standards are applied system-wide, and workforce specialization, asset management practices, and operational accountability for transmission are already in place. The only aspect that remains is financial and corporate separation.

Financially, transmission assets and cash flows remain embedded in PLN's consolidated balance sheet. Revenues from regulated network services are pooled with power sales proceeds, and grid capital expenditure is financed alongside coal generation, fuel procurement, and distribution. As a result, the transmission business is not visible to external financiers, regulators, or internal capital planners as a stand-alone infrastructure asset.

This financial visibility matters because capital markets, institutional investors, and infrastructure lenders allocate funding to entities with clearly identified and ring-fenced assets, risks, and revenues. Despite being one of PLN's most stable business segments, transmission cannot currently be financed on this basis because it does not exist as a discrete financial entity.

Establishing a PLN transmission company would address this without disrupting operations. Engineers would continue to operate the same network, control centers would manage the same power flows, and customers would continue to receive electricity through PLN. The only difference would be that the transmission system would gain its own financial identity.

[31] PLN. Annual Report 2024. Page 136 and 139.
[32] PLN. Annual Reports. 2024.

Establishing a PLN transmission company would provide:

- A dedicated balance sheet and debt capacity
- A transparent, regulated revenue stream
- An investment plan aligned with system expansion needs
- Clear accountability for delivery and performance

From a transition risk perspective, this approach can be implemented in a phased and manageable way. Financial separation could begin with asset ring-fencing and internal transfer pricing, before evolving into full corporate separation. Over time, transmission assets would need to be assigned to a dedicated entity, supported by clear revenue and cost structures. Operationally, workforce and system management functions could continue to be provided by PLN, either through service agreements or other arrangements, avoiding large-scale organizational disruption. This tiered strategy aligns financial structures with operational realities, while remaining consistent with existing institutional arrangements and policy constraints.

There is also a clear governance benefit of this separation. A financially separate transmission entity makes costs transparent to regulators, policymakers, and the state as owner. It becomes easier to track how much the grid costs and earns, as well as how much investment is needed. This clarity is essential for credible long-term planning in an increasingly capital-intensive system.

Within the Danantara framework, this transparency becomes even more valuable. A stand-alone transmission company allows the state to value the grid as a strategic infrastructure asset rather than a residual component of a vertically integrated utility. It enables capital to be allocated deliberately, rather than implicitly constrained by PLN's overall balance sheet, and provides clearer visibility on the expected returns from transmission investment.

International experience supports this strategy. The OECD finds that transmission companies can attract lower-cost, long-term capital when supported by clear regulatory and financial structures that allow investors to assess risk independently.[33] In Indonesia's case, the operational foundations for such a model already exist within PLN; what remains is to align the financial architecture with these operational realities.

In practical terms, Indonesia does not need to unbundle PLN to reform transmission financing. It needs to complete an ongoing process: transitioning from functional to financial separation so that the grid can be financed, expanded, and managed in accordance with its economic role.

Rather than weakening PLN, this reform would strengthen it by allowing the utility's most stable infrastructure business to support growth, reliability, and the energy transition at scale.

[33] OECD. Transmission grid financing - Lessons from international case studies and toolkit for policymakers. January, 2026

2 Proposed PLN transmission model

2.1 A separate PLN transmission company

A separate PLN transmission company refers to the placement of high-voltage transmission assets and activities into a distinct, wholly state-owned entity within the national utility group. It would have its own balance sheet, financial accounts, and funding arrangements, and a sole mandate to own, operate, maintain, and expand the national transmission network as a regulated public service.

In the context of PLN's existing corporate structure, the proposed entity would most accurately be a subholding rather than a subsidiary. Following PLN's 2022 restructuring, the utility operates through four subholdings sitting one level below the PLN holding: PLN Indonesia Power and PLN Nusantara Power for generation, PLN Energi Primer Indonesia for fuel and primary energy supply, and PLN Icon Plus for adjacent services.[34, 35] Each has its own board of commissioners and directors, audited public financial statements, and a portfolio of underlying operating companies. In contrast, a subsidiary is a directly owned operating company whose financials are typically consolidated into the parent without separate disclosure.

The transmission entity proposed in this report carries holding-level functions, including treasury, capital planning, regulatory engagement, and strategic oversight across regional transmission units spanning all of Indonesia's major grids. Its scale, capital program, and institutional mandate place it structurally alongside the existing four subholdings rather than beneath any one of them or as a PLN subsidiary. At the same time, the proposed transmission subholding would function beyond the existing model. The four current entities publish stand-alone financial statements and operate with corporate autonomy but have not functioned as independent capital-raising platforms. Bond issuance, external credit ratings, and the bulk of long-term debt remain concentrated at the PLN holding. The transmission subholding proposed in this report would extend the established model into full financial ring-fencing, with regulated tariff revenues, stand-alone credit standing, and the capacity to issue long-tenor infrastructure debt in its own name. Section 3 examines international precedents for this structure.

Under this structure, the transmission company would earn revenue through regulated transmission charges set by the government or an independent regulator using a strict formula. These charges would recover the full cost of providing transmission services, including operating expenditure, asset maintenance, depreciation, and an allowed return on invested capital that reflects the company’s cost of capital and supports access to long-term, market-based financing. The company would not generate electricity, sell power to end users, or be exposed to fuel prices or wholesale electricity

[34] Tempo. SOE Ministry Inaugurates PLN as Holding Company with 4 Subholdings. 21 September 2022.
[35] PLN. Company Profile 2025. September 2025.

markets. This approach minimizes working capital requirements and focuses investment and cash flow on the integrity and growth of the physical infrastructure.

Figure 5: Proposed corporate structure

Source: IEEFA analysis.

For PLN, the value of this structure lies in financial ring-fencing rather than just organizational separation. Transmission assets already operate as a distinct system. Establishing a separate corporate entity provides clarity regarding cash flows, costs, and investment needs. Ring-fenced assets and accounts operated by a corporate management structure would allow transmission investment to be evaluated, financed, and regulated on its own merits, rather than within PLN's consolidated balance sheet.

This institutional clarity expands financing options available to the grid. A dedicated transmission company can access corporate debt, long-tenor infrastructure bonds, bank financing, and development finance at the entity level, rather than relying solely on project-by-project funding or periodic capital injections. It also enables portfolio-based financing, allowing multiple transmission assets to be funded under a consistent regulatory framework.

Importantly, the RUKN recognizes that state-owned enterprises may raise funding directly through instruments such as bond issuance, direct borrowing, or revenue-based financing.[36] A separate

[36] MEMR. *National Electricity General Plan* (RUKN). 5 March 2025. Chapter II.B.4 Page 38.

transmission company would provide the vehicle to apply these mechanisms systematically to the grid, rather than on a selective or provisional basis.

Additionally, establishing a separate transmission company does not constitute privatization, nor does it require changes to ownership or system control. The transmission network would remain under state ownership, and planning and operational authority would continue to be subject to public oversight. Generation and retail activities would continue within PLN's existing structure.

Realizing the full benefits of a separate PLN transmission entity requires a dedicated revenue model and corporate financial management structure. Implementing such a model does not require immediate electricity market reform. A separate transmission company can operate under Indonesia's current market arrangements, established through internal accounting structures and transactions. Its primary purpose would be to ensure that the grid, as a long-lived and capital-intensive asset, is supported by a financing and regulatory structure that reflects its economic characteristics. Implementation would require a defined mechanism for transferring transmission assets and liabilities into the new framework at an appropriate valuation. However, progressing to a self-financed, commercialized operating entity would require the full range of corporate measures to be in place.

In practical terms, a separate PLN transmission company would create a stable institutional platform for long-term grid investment, allowing costs to be aggregated transparently, financing to be raised predictably, and accountability for delivery to be clearly assigned. This framework would serve as the foundation for the later development of tariffs, capital market financing, and potential third-party access arrangements.

2.2 Legal durability and risk allocation

The case for a separate PLN transmission company rests on how it allocates legal authority and financial risk in a way that is durable under Indonesia's constitutional, regulatory, and fiscal framework.

From a constitutional perspective, electricity transmission falls within the category of essential public infrastructure subject to state control. Establishing a separate transmission company would not alter this principle. Ownership would remain public, tariffs would be regulated, and system planning and operational oversight would continue under government authority. The reform alters only the corporate structure and not control. This distinction is important because Indonesia's constitutional doctrine has consistently defined "state control" as effective authority over ownership, regulation, and pricing.

Institutionally, transmission separation strengthens governance by clarifying responsibilities. In a vertically integrated structure, transmission costs and risks are often consolidated with generation and supply activities, making it challenging to distinguish which parts of the system are driving investment needs or financial pressure. A separate transmission company would allow network risks

to be clearly identified and managed within a single entity, while unrelated risks such as fuel procurement, power purchase agreements (PPAs), and market exposure are excluded from the transmission balance sheet.

This risk allocation has direct implications for regulatory oversight. Regulators would be better able to assess whether transmission costs are efficient, investment plans are justified, and tariffs reflect actual system needs. For the state as owner, separation would improve transparency and accountability without changes to market structure or end-user pricing arrangements.

From a financing perspective, this structure aligns with how lenders and rating agencies assess regulated infrastructure. Credit analysis for transmission companies focuses on revenue stability under regulated tariffs, cost pass-through mechanisms, and insulation from non-network risks. By ring-fencing transmission activities, a dedicated transmission company can be evaluated on these fundamentals rather than inheriting the broader utility's composite risk profile.

Finally, separation would improve resilience to policy change. Grid investment cycles extend over decades, while consumer tariff policies, fuel pricing arrangements, and subsidy mechanisms may change frequently. A transmission company operating under a defined regulatory framework would provide continuity for long-term planning and investment, reducing uncertainty for both the state and financiers.

The formation of a separate PLN transmission company would therefore not be disruptive. Rather, it would represent an institutional adjustment designed to strengthen legal clarity, improve risk allocation, and enhance the credibility of long-term grid investment, while remaining consistent with Indonesia's constitutional principles and public ownership objectives.

2.3 Transmission tariffs and cost recovery

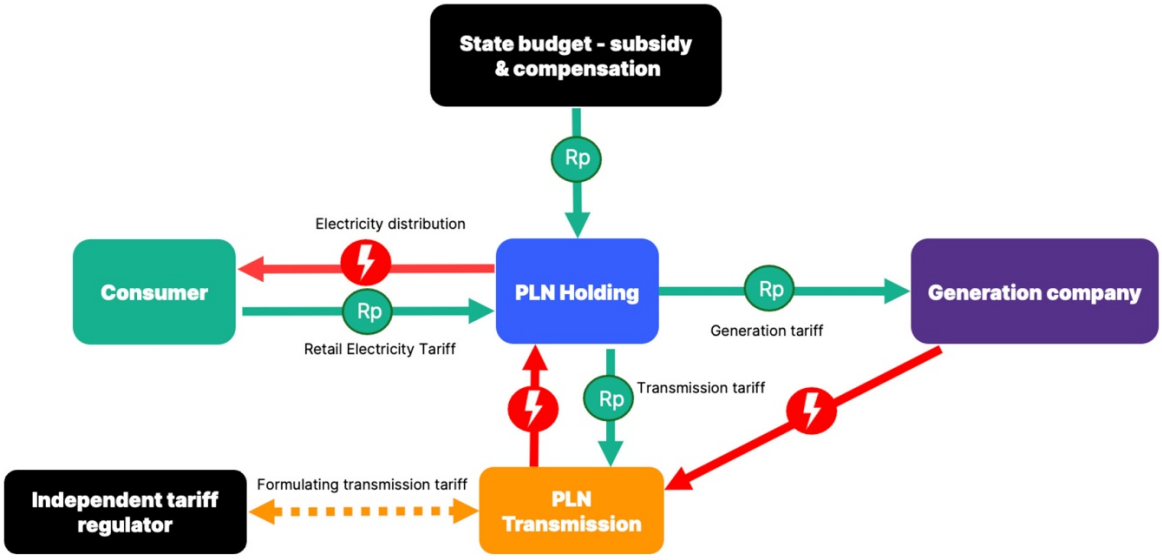
Transmission tariffs are the mechanism through which a transmission company recovers the cost of building, operating, and maintaining the electricity grid. For a separate PLN transmission company, tariff design is not merely a technical detail but a core governance issue, because it determines how grid costs are recovered, how responsibilities are assigned, and how grid investment is sustained over time. These tariffs would reflect actual costs, free of subsidies or other support that currently obscure them.

2.3.1 Who pays the transmission tariff

In a transmission tariff framework, the parties that use the grid pay for it. In Indonesia's current structure, this means that PLN's electricity supply business is the primary user of the transmission system, as it purchases electricity from independent power producers (IPPs) or sources it from its own subholding generation companies, dispatches it across the transmission network, and sells it to end consumers.

Under a separate transmission company model, this relationship becomes explicit. The transmission company would charge regulated transmission tariffs to PLN's retail supply business for use of the grid, while electricity purchase from IPPs would continue to be governed by PPAs. End-user electricity tariffs would then reflect the combined cost of generation, transmission, distribution, and retail services, even if these components remain consolidated for customers.

Figure 6: Proposed PLN transmission model



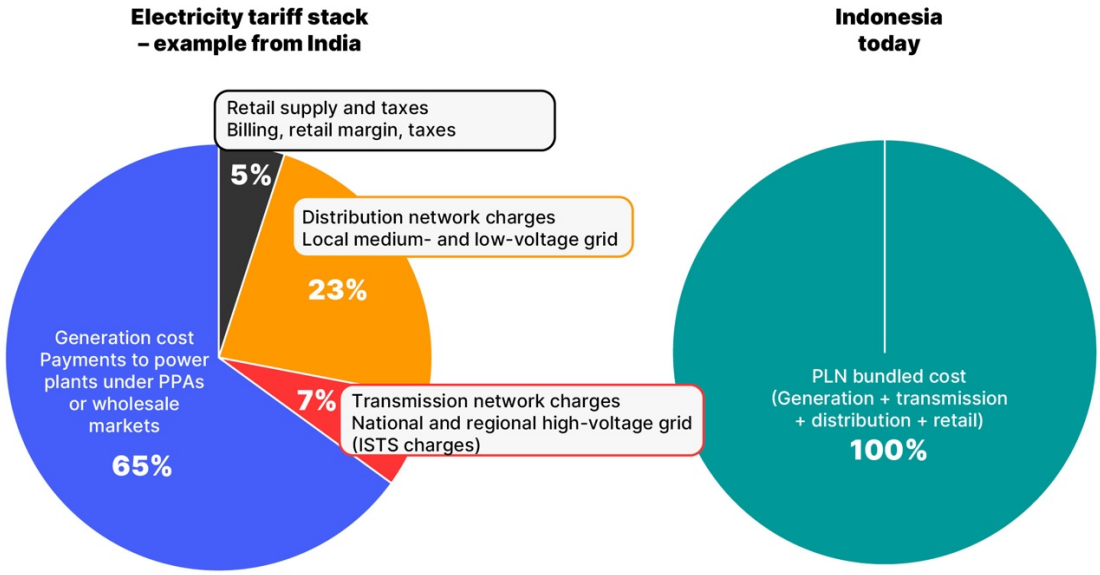
Source: IEEFA analysis.

This distinction is important because it clarifies that transmission tariffs are not a substitute for electricity prices — they are a separate charge for a distinct service within the electricity value chain.

2.3.2 Separation from IPP electricity prices

Transmission tariffs are fundamentally different from the cost of purchasing electricity from IPPs. Generation prices reflect the cost of producing electricity, including capital, fuel, and operating expenses of power plants. Transmission tariffs, by contrast, reflect the cost of maintaining and expanding the network that delivers electricity, regardless of how it is generated. Whether power comes from coal, gas, solar, or hydro, it relies on the same transmission infrastructure.

Figure 7: Electricity price components



Source: IEEFA analysis.
Note: Illustrative ranges based on typical tariff structures. The exact proportion varies by state and tariff order, but transmission costs generally account for a smaller share of total electricity tariffs relative to generation and distribution[37]. ISTS: Inter-State Transmission System.

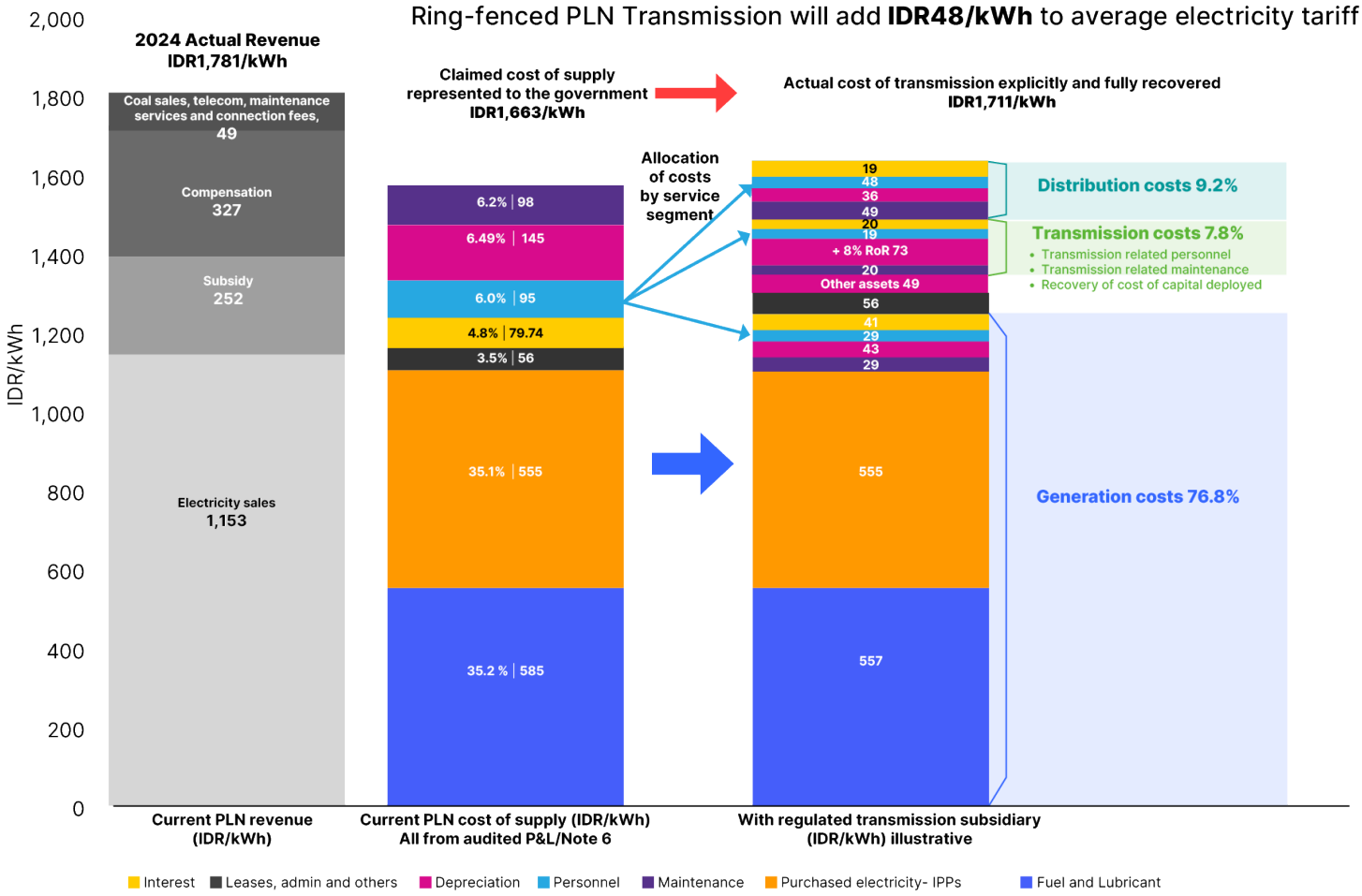
In Indonesia, transmission costs have historically been embedded within PLN's overall financial structure. As a result, transmission can appear financially viable only because it is supported by state compensation or cross-subsidies.

Separating transmission tariffs makes this distinction clear. It ensures that network costs are no longer implicitly covered by generation margins or government compensation for electricity pricing but are instead calculated and recovered based on the actual cost of providing grid services.

This separation does not introduce new costs to the electricity system. However, it makes the full cost of grid investment, particularly the cost of capital, explicit, and ensures that it is recovered in a structured and sustainable manner. It also clarifies how government financial support is used: the share allocated for infrastructure and the proportion reflecting operational or pricing decisions. These distinctions are not currently visible within PLN's consolidated accounts.

[37] FSR Global. Understanding Electricity Tariff in India. 13 November 2023.

Figure 8: Segment breakdown from financial report



Source: IEEFA analysis; PLN 2024 Audited Financial Report.

Figure 8 illustrates the scale of this challenge using PLN's published financial data. In 2024, total operating expenditure, including interest, was IDR509.2 trillion, while electricity sales were 306,219 gigawatt-hours (GWh). This implies a full supply cost of IDR1,663/kWh, compared with an average consumer tariff of just IDR1,153/kWh.

Within this overall cost, transmission is invisible as a discrete component. PLN's 2024 audited financial statements disclose transmission asset depreciation separately: the depreciation charge on transmission equipment was IDR7.6 trillion, equivalent to approximately IDR25/kWh. However, there is no clear mechanism to recover a return on the capital invested in their assets. This capital base is significant, with transmission assets valued at approximately IDR278 trillion.

PLN's President Director has stated that the rate of return on transmission investment is around 2%, against a cost of funds of approximately 8%–9%.[38] This gap indicates that transmission investment is not compensated on a full cost-recovery basis. In practice, the shortfall is absorbed through a combination of state capital injections, concessional financing, and transmission expansion limits.

2.3.3 Transmission tariffs in a subsidized electricity system

Indonesia’s electricity system includes explicit subsidies and compensation mechanisms that keep end-user tariffs below full economic cost for certain customer groups. Establishing a separate transmission tariff does not eliminate or alter this policy. Instead, it changes how subsidies are allocated within the system.

Under a separate transmission company, transmission tariffs would be calculated on a full cost-recovery basis and charged to PLN’s supply business as a system user. If end-user electricity tariffs remain below the total supply cost, the resulting gap would still be covered by government subsidies or compensation, allocated to the PLN retail supply business. Subsidies would become explicit rather than implicitly embedded within PLN’s consolidated balance sheet.

The right column of Figure 8 illustrates a cost-reflective transmission tariff structure under a ring-fenced PLN transmission company. Every non-transmission component — fuel and lubricant costs, purchased electricity from IPPs, maintenance, personnel, and other operating costs — is unchanged from the current PLN cost structure.

The only difference is that transmission costs are explicitly separated and recovered: operating and maintenance expenditure, depreciation of transmission assets, and a regulated return on the asset base at a rate consistent with the true cost of capital. Under this structure, the full supply cost rises to approximately IDR1,711/kWh. The increase of around IDR48/kWh over the current supply cost reflects unrecovered transmission capital costs.

Whether that additional cost is passed to consumers or absorbed through additional government compensation is a policy decision. Extending compensation support to include full transmission cost recovery would be consistent with the existing framework and provide a clear incentive for grid expansion.

This transparency also strengthens fiscal control. It allows the government to distinguish between the cost of investing in, building, operating, and maintaining essential infrastructure, and the policy decision to subsidize electricity consumption. It also prevents grid investment from being constrained by the under-recovery of costs unrelated to transmission.

[38] Warta Ekonomi. Rapat Dengar Pendapat (RDP) bersama Komisi VII DPR RI di Jakarta. 15 May 2025.

2.3.4 What tariff transparency reveals

A clearer separation of transmission tariffs would reveal information that is currently obscured. In some cases, it may show that electricity prices do not fully reflect the cost of delivering reliable power, particularly as the grid expands and modernizes to support renewable energy and electrification.

This does not imply that electricity tariffs must immediately increase. It means that policy choices become clearer. The government retains full discretion over which customer groups are subsidized, how cross-subsidies are applied, and how quickly pricing structures evolve. Through this shift, grid underinvestment would no longer serve as a mechanism for maintaining affordability.

From a system perspective, underpricing grid services proves more costly over time than underpricing electricity consumption. Low retail tariffs provide short-term affordability for consumers, while underpriced transmission leads to congestion, reliability issues, slower integration of new generation, and weaker long-term economic growth. These costs accumulate over time and are ultimately borne by the same consumers the low tariffs were intended to protect. Making grid costs visible helps avoid these outcomes.

Figure 8 quantifies this point: the gap between the two columns — approximately IDR48/kWh — is not a new cost created by separation. It is an existing cost that is currently absorbed through underinvestment rather than explicit cost recovery.

2.3.5 Implications for financial sustainability

For a separate PLN transmission company to be financeable, electricity tariffs do not need to be fully cost-reflective at the consumer level. Instead, the transmission component of the tariff should be clearly defined and sufficient to recover its costs. The key requirement is that the transmission company’s revenues are predictable and supported by a credible payment mechanism that covers all costs. As long as transmission charges are regulated, transparently calculated, and supported either by PLN’s retail supply business revenues and/or explicit state compensation, investors can assess risk with confidence.

The transmission capital under-recovery in Figure 8 illustrates that a transmission company with revenues backed by a regulated tariff and supported by government compensation, channeled through PLN's supply business rather than embedded within transmission accounts, presents a feasible risk profile. This contrasts with transmission enclosed within PLN's consolidated balance sheet, earning a 2% return against an 8%–9% cost of funds.

Therefore, separating transmission tariffs does not require immediate electricity price reform. It enables more transparent accounting, allowing grid investment to scale without relying on hidden subsidies or balance-sheet stress within PLN.

2.4 Financing the grid through capital markets

Once transmission revenues are supported by regulated and transparent tariffs, a separate PLN transmission company can be financed as infrastructure rather than as a policy-dependent expenditure. This shift enables grid investment to draw on a broader set of financing instruments aligned with the extended asset lives and stable cash flows of transmission networks.

2.4.1 Corporate-level financing

At the corporate level, a dedicated transmission company could raise financing directly against its regulated revenue base. This structure would allow investors and lenders to evaluate the company based on transmission tariff stability and regulated asset value. Financial instruments may include:

a. Long-term bond issuance, particularly in domestic or international capital markets, including green bonds, sustainability bonds, or other thematic infrastructure bonds suited to long-term grid assets
b. Long-tenor bank loans, including bilateral and syndicated facilities
c. Working capital and liquidity facilities, which help manage cash flow during construction and tariff recovery cycles

Bond issuance can take several forms depending on investor demand and market conditions. Transmission companies increasingly issue infrastructure bonds, including green or sustainability bonds, to finance projects that support climate and energy transition objectives. Grid expansion, interconnection projects, and network upgrades that facilitate renewable energy integration often qualify under these sustainable finance frameworks.

In addition to domestic bond markets, large utilities may access international investors through global bond issuance, expanding the investor base and extending financing tenors. However, there may be associated currency risks if revenues are denominated in local currency. In practice, such instruments are typically used once a transmission company has established a stable regulatory framework and a credible operating track record.

Corporate-level financing reduces reliance on project-by-project funding and allows transmission investment to be planned and executed as a rolling multi-year program.

2.4.2 Project-based financing

For specific transmission corridors or major interconnection projects, project-based financing can still play an important role. Under this approach, financing is raised at the level of an individual project or SPV.

This structure can be particularly suitable when projects involve higher construction risk or complex delivery schedules. Key characteristics of project-based financing include:

a. Isolation of construction and completion risks within the project entity
b. Financing terms that transition to regulated revenue streams once the asset enters service
c. The ability to refinance projects at the corporate or portfolio level once operational risks decline

This sequencing allows higher-risk construction phases to be financed separately, while long-term operation benefits from lower-cost capital.

2.4.3 Multilateral and bilateral development finance

Multilateral development banks (MDBs) and bilateral development finance institutions (DFIs) can play a valuable role during the early stages of institutional reform. These organizations typically provide long-tenor funding, technical assistance, and policy credibility, particularly in sectors undergoing structural changes.

Their support is most effective when used to:

a. Finance initial investments under the new transmission company structure
b. Support the development of regulatory frameworks and tariff methodologies
c. Catalyze participation from private and institutional investors

MDBs and DFIs can play a key role in attracting private capital for entities and investments they support, particularly in the early stages of reform. By sharing risk with private entities and participating alongside lenders, they help build confidence in new investments. Even a modest share of financing from MDBs can enhance commercial investor interest. MDBs may also provide guarantees to mitigate perceived policy or regulatory risks during the initial phase of a PLN transmission entity's operations. As the transmission entity becomes commercially independent, MDBs and DFIs can evolve toward supporting more market-based financing structures.

Beyond corporate loans, MDBs and DFIs may also participate in specific transmission projects, particularly those that play a key role in strengthening national or inter-regional interconnections, such as the Association of Southeast Asian Nations (ASEAN) Power Grid. Their role can include funding part or all of the debt associated with a specific transmission line or subsystem.

Development finance is most effective as a catalyst rather than a permanent funding source. As the transmission company establishes strong operational performance and financial stability, reliance on concessional or development finance can gradually be replaced with market-based funding.

2.4.4 Portfolio-based corporate financing and capital recycling

One of the main advantages of a dedicated transmission company is the ability to aggregate assets and revenue streams across the network. Since transmission infrastructure operates as an integrated

system rather than as isolated projects, financing can be structured at the corporate level based on combined regulated revenues.

This portfolio-based approach allows the company to raise debt against its balance sheet rather than on an individual project basis. In practice, financing is supported by predictable tariff revenues, rather than secured directly against individual transmission assets, while maintaining state ownership and grid control.

Several financing strategies can be applied within this framework:

a. Portfolio-based corporate financing, where debt is raised against the network's combined cash flows
b. Refinancing existing corporate debt that may have been at higher interest rates or less favorable terms to mitigate funding costs
c. Optimizing the financing structure, including tenor and currency mix; for example, substituting domestic currency debt for foreign currency borrowings to reduce exchange rate risk

This structure also enables capital recycling. As assets become operational and generate stable revenues, the company can refinance earlier investments and redeploy capital into new projects. In this way, existing infrastructure supports continued grid expansion without requiring proportional increases in public capital.

In some markets, more advanced mechanisms, such as securitized cashflow financing or infrastructure investment trusts, have been used to attract long-term institutional capital by packaging operational transmission assets into investable portfolios. However, these approaches introduce additional legal and regulatory considerations, particularly regarding asset ownership and control, and would require careful assessment in the Indonesian context.

In practice, portfolio-based financing allows transmission investment to be delivered as a continuous program rather than a series of discrete projects, improving both capital efficiency and scalability.

2.4.5 Equity and strategic capital

Equity financing, while not essential, can complement debt funding once the dedicated transmission company's governance and revenue model are established. Options include:

a. Public offering on the Jakarta Stock Exchange to garner public participation in a key infrastructure company
b. Capital injections from the state or state-owned investment vehicles
c. Minority equity participation through private placements or strategic partnerships
d. Capital market instruments that are designed to strengthen the balance sheet while maintaining public ownership

Danantara can play a key role as a potential source of strategic equity. As the state's investment holding company with operational oversight of PLN, it has both the institutional mandate and the financial interest to assess whether a ring-fenced transmission subholding is a viable stand-alone investment. A corporatized transmission company — with transparent regulated revenues and its own balance sheet — would provide the financial structure that Danantara's capital allocation function requires. If the transmission business meets the investment criteria, the wealth fund could serve as an equity anchor for the subholding. This would reinforce the company's credit standing and support access to broader capital markets, without requiring additional fiscal commitments from the central government budget.

Equity funding could improve credit metrics and increase the transmission company’s capacity to undertake large-scale grid investments while maintaining prudent financial leverage.

2.4.6 Implications for public finance

Together, these financing mechanisms could reduce dependence on ad hoc budget allocations and enable transmission investment to be funded through structured and predictable sources.

Public capital is not eliminated from the system; rather, it is used more strategically. Government resources can be directed toward targeted affordability measures, early-stage infrastructure risks, or other priorities within the broader energy transition.

By financing long-term transmission assets through capital markets, a separate PLN transmission company could transform grid expansion into a scalable infrastructure program rather than a recurring fiscal constraint.

Table 3: Financing instruments for transmission infrastructure

Financing Instrument	Typical Source of Capital	Key Characteristics	Relevance for a PLN Transmission Company
Corporate Bonds	Domestic capital markets, institutional investors	Long-tenor debt backed by regulated revenues; suitable for large infrastructure portfolios	Allows transmission company to finance grid expansion at scale through bond issuance
Green / Sustainability/ Transition Bonds	ESG-focused investors, climate funds, pension funds	Bonds linked to climate or sustainability objectives; often used for grid expansion supporting renewable energy integration	Transmission investments often qualify as sustainable infrastructure; labeled bonds expand the universe of capital sources
Global Bonds	International capital markets	Bonds issued to global investors, typically in USD or other major currencies; expands investor base	Useful for large-scale financing once regulatory credibility and stable revenue streams are established
Bank Loans	Commercial banks	Bilateral or syndicated loans with medium to long tenors	Provides flexible financing during construction and early operational phases
Project Finance	Banks, infrastructure investors	Financing structured around a specific transmission project or corridor	Useful for large interconnection projects or high-risk construction phases
Development Finance	Multilateral development banks (ADB, World Bank, AIIB), bilateral DFIs	Long-tenor financing with technical assistance and policy support	Can support early investments and strengthen regulatory credibility Can help co-finance large value projects of importance, pioneering nature
Portfolio Financing / Asset Recycling	Infrastructure funds, institutional investors	Financing based on a portfolio of operating assets; allows refinancing of mature assets	Releases capital for continued grid expansion
Equity Capital	State capital injections, strategic investors, public	Strengthens balance sheet and improves credit metrics	Supports long-term investment capacity while maintaining state ownership. Creates interest from domestic funds, overseas Indonesian investors

Source: IEEFA analysis.

2.4.7 The cost of capital advantage, quantifying the RUPTL

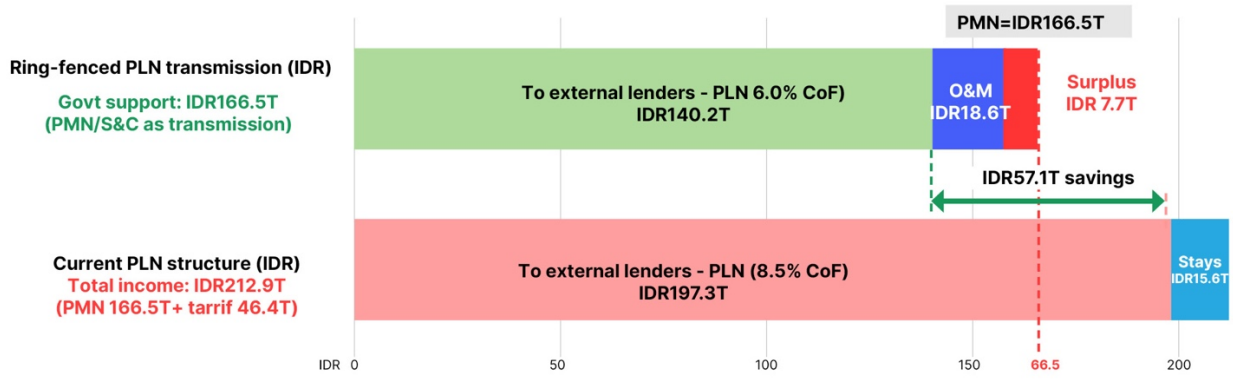
The financing instruments outlined in this section are not merely alternative funding sources. When deployed together, they can materially lower the cost of capital compared with PLN's current consolidated approach to transmission investment. At the RUPTL 2025–2034 scale, this difference could determine whether Indonesia's grid expansion delivers value for money or creates a lasting financing burden.

This analysis uses PLN’s published figures as its starting point — specifically the investment totals, viability gap, and required rate of return set out in the RUPTL 2025–2034. PLN identifies a viability gap of IDR240 trillion across transmission and village electrification — representing the additional government support, in the form of state capital injection (PMN), required to achieve a commercially viable return of 9–10%.[39] The Institute for Energy Economics and Financial Analysis (IEEFA) estimates that transmission accounts for IDR166.5 trillion of that total, based on its 69.4% share of investment in the RUPTL.[40] PLN is unable to recover the true cost of transmission from users, as consumer tariffs are frozen and the government does not intend to increase them. The government's compensation obligation does not change whether transmission is financed through PLN's consolidated balance sheet or through a ring-fenced entity.

Notably, the exchange rate assumptions in RUPTL's financial projections have been exceeded. The RUPTL was prepared on an assumption of USD/IDR 16,000 in 2025 and USD/IDR 16,100 from 2026 through 2034.[41] Both the 2024 average rate and the current rate are materially weaker than the these assumptions[42], implying that actual investment requirements in Indonesian currency terms are likely to be higher than the plan implies. The figures in this section are based on the published RUPTL projections. This is evidence that dynamic cost recovery adjustments are needed to keep current operations operational and investment incentivized.

[39] PLN. Electricity Supply Business Plan (RUPTL 2025-2034). Section VI.2 and VI.3. 26 May 2025.
[40] PLN. Electricity Supply Business Plan (RUPTL 2025-2034). Table 6.1 - Section VI.1. 26 May 2025.
[41] PLN. Electricity Supply Business Plan (RUPTL 2025-2034). Section VI.3.2. 26 May 2025.
[42] xe.com. US Dollar to Indonesian Rupiah Exchange Rate Chart.

Figure 9: Fiscal leakage under current PLN structure versus ring-fenced PLN transmission, RUPTL 2025–2034



Source: IEEFA analysis.

Under the current PLN structure, the IDR166.5 trillion state capital injection is absorbed into the utility's consolidated financing pool. It supports a 10-year financing cost of IDR197.3 trillion at an 8.5%[43] cost of funds, for the total IDR392.1 trillion transmission and substation investment.

The government's capital injection is used entirely for covering lender costs, with IDR197.3 trillion flowing to external creditors. Only IDR15.6 trillion remains for the transmission system, leaving limited reinvestment capacity.

A ring-fenced transmission company could access several financing options by drawing on the capital sources outlined earlier. MDB loans to Indonesia for energy infrastructure are typically structured at rates significantly below commercial market terms, with both the Asian Development Bank (ADB) and the World Bank actively lending to PLN for grid infrastructure and energy transition investment at sovereign-guaranteed preferential rates.[44, 45, 46]

Domestic green and sustainability bonds, issued against a regulated revenue base and qualifying under environmental, social, and governance (ESG) mandates, also price close to the 6.86% sovereign rate.[47] This aligns with the experience of India's PGCIL, which issues bonds at 7.1%–7.5% against an Indian sovereign rate of approximately 7.1%, reflecting market confidence in regulated cash flows. Bank loans structured with MDB participation through B-loan arrangements, a structure where MDB and private loans are issued in parallel[48], may help compress the commercial rate toward the lower end of the market range. A state equity injection through PMN or Danantara, absorbing 10% of new capital expenditure (capex), reduces leverage and improves the credit profile

[43] Warta Ekonomi. Rapat Dengar Pendapat (RDP) bersama Komisi VII DPR RI di Jakarta. 15 May 2025.
[44] ADB. Public Sector Financing: Lending Policies and Rates. March 2026.
[45] ADB. Indonesia: Accelerating Indonesia's Clean Energy Transition Program (Phase 1). November 2025.
[46] World Bank. IBRD Financial Products: Lending Rates & Fees.
[47] OECD/CEIC. Indonesia 10-Year Government Bond Yield, Q4 2024 (6.86%). December 2024.
[48] International Finance Corporation. B Loan. February 2026.

of the remaining debt. IEEFA estimates an IDR-equivalent effective rate of approximately 6.04% for this tranche of the blended capital stack, 2.5 percentage points below PLN's current consolidated rate of 8.5%.

Under a ring-fenced arrangement, the same IDR166.5 trillion flows as a structured transmission tariff, under which PLN’s supply business pays the transmission entity for use of the network. With a 6.04% blended cost of funds, the 10-year financing cost falls to IDR140.2 trillion, meaning only that amount flows to external lenders. The remaining IDR27.3 trillion, comprising IDR18.6 trillion in operating and maintenance costs and a IDR8.7 trillion surplus, remains within the system. In total, IDR57.1 trillion less exits Indonesia to service external debt.

On its own, the IDR57.1 trillion in savings is not transformative compared to the IDR392.1 trillion in total transmission investment. It represents approximately 14.6% of total investment, or IDR5.7 trillion annually over the RUPTL period. Narrowly viewed, this may raise questions about whether the institutional complexity — ring-fencing, new regulatory frameworks, a separate legal entity, and revised concession arrangements — is proportionate to the savings.

The more important argument is structural rather than financial. Under the current PLN framework, the IDR166.5 trillion PMN is a structural requirement. Without it, the transmission function faces a IDR150.8 trillion deficit over the RUPTL period, reflecting the difference between an 8.5% financing cost and a 2% rate of return[49] without government support. Program viability depends on continued government financial assistance.

Under a ring-fenced structure, the dynamics reverse. With a 7.5% regulated return against a 6.04% blended cost of funds, the transmission entity generates a surplus of IDR16.2 trillion. PMN support would continue to be distributed to PLN and passed on to the ring-fenced entity as transmission tariff revenue. This surplus enables the next phase of grid expansion.

This structural case for ring-fencing extends beyond financing cost comparisons. The current model relies on recurring state capital injections for transmission, generates IDR197.3 trillion in financing costs that flow predominantly to external creditors, and lacks a transparent mechanism for cost recovery that could attract private infrastructure capital in future RUPTL cycles.

The ring-fenced model reduces fiscal leakage, removes structural reliance on PMN, and establishes the regulated revenue certainty required by infrastructure investors. The reform does not alter the government's obligation; it changes the value delivered.

[49] Warta Ekonomi. Rapat Dengar Pendapat (RDP) bersama Komisi VII DPR RI di Jakarta. May 15, 2025

2.5 PPPs and concession-based approaches as complementary tools

Public-private partnerships (PPPs) and concession-based approaches can support transmission development under a separate PLN transmission company but are not a substitute for public ownership or regulated grid planning. They should be viewed as complementary delivery mechanisms within a publicly planned transmission system.

In a typical transmission PPP, a private partner finances, builds, and maintains a transmission line for a fixed concession period. During this period, the transmission company retains responsibility for system planning, grid operation, and overall network management, while the private partner is paid an availability-based fee linked to performance. The private party does not own electricity, trade power, or influence dispatch decisions.

These models can be useful for specific projects, particularly large or complex transmission lines that require rapid delivery or specialized expertise, such as long-distance, island-to-island connectors that have clearly defined start and end points. They can mobilize private capital without affecting the transmission company’s balance sheet, while competitive procurement can improve cost discipline and construction efficiency.

However, PPPs are most effective when embedded within a strong public transmission framework. A separate PLN transmission company provides this arrangement by ensuring that concession projects align with national grid plans, are integrated into tariff structures, and operate under consistent regulation. Regulation can provide PPPs with approved tariff frameworks that cover costs while protecting system users. Without this institutional coordination, concession projects may become fragmented, creating operational complexity and long-term contractual risks for the power system.

When properly designed, payments to private partners can be transparently incorporated into regulated transmission costs and reflected in tariffs. This allows policymakers to compare PPP-based projects with publicly financed alternatives consistently and ensures that long-term financial obligations are visible within the regulatory system rather than embedded in opaque contractual arrangements.

In summary, PPPs and concessions expand the range of delivery options for transmission projects. They add flexibility in how specific infrastructure is financed and constructed, while Indonesia’s grid remains a publicly owned, regulated transmission company.

2.6 Beyond cost reduction, the revenue upside of an open network

Under the current integrated model, transmission revenue is an internal transfer. There is no arm's-length tariff, no published access framework, and no legal mechanism for a third party to contract

independently for network capacity. A ring-fenced PLN transmission company would change this structure. Separation would create a legal and commercial entity responsible solely for operating the network and recovering costs from all users through regulated, published terms. As it has no downstream interest in electricity generation or upstream interest in supply, the transmission company would have no incentive to restrict access or structure tariffs to disadvantage competitors.

Two components of the RUPTL investment program make this open revenue model catalytic.

The first is inter-island interconnection and joint utilization of shared transmission. The joint utilization of transmission lines, known internationally as power wheeling, would allow private companies and IPPs to sell electricity directly to end users through PLN's network, subject to a regulated network access charge. A joint report by IEEFA, Institute for Essential Services Reform (IESR), and RE100[50] found that enabling shared access to the transmission network could unlock up to USD150 billion (IDR2,570 trillion) in renewable energy investment and help bridge the estimated USD146 billion gap required to meet Indonesia's 2030 clean energy targets. The mechanism is particularly relevant to the RE100 corporate market: over 130 member companies of that initiative operate in Indonesia, collectively representing approximately 3 terawatt-hours (TWh) of annual electricity demand, and have identified grid access as the primary barrier to sourcing renewable energy locally. Under the current bundled PLN structure, a transparent wheeling tariff does not exist, and no transmission business license has been issued to any private entity. Power wheeling has been referenced in regulation since MEMR Regulation No. 1 of 2015 but has not been implemented.[51] A ring-fenced transmission company provides the legal and commercial basis for setting, publishing, and invoicing those charges.

The second potential advantage is catalyzing cross-border transmission. Indonesia and Singapore signed a Memorandum of Understanding (MOU) in June 2025 covering the export of up to 3.4GW of renewable electricity to Singapore by 2035[52], with potential investment of USD30–50 billion in solar generation capacity and estimated annual foreign exchange earnings of USD4–6 billion. TotalEnergies, RGE, and Singapore Energy Interconnections have signed an MOU to jointly develop a subsea interconnector between Riau and Singapore.[53]

Danantara’s Chief Investment Officer has confirmed interest in the Indonesia–Singapore renewable energy project. Speaking at the Fitch Ratings Annual Indonesia Conference in April 2026, he stated that Danantara is targeting around USD30 billion of investment, encompassing solar generation infrastructure and the associated transmission network to serve both the export link and domestic grid needs.[54] Danantara also engaged in discussions with Singapore's Temasek Holdings on renewable energy, cross-border electricity trade, and low-carbon industrial development.[55] This

[50] IEEFA, IESR, and RE100. Accelerating renewables investment in Indonesia: Shared use of the transmission network. April 2025.
[51] IEEFA. After years at an energy crossroads, can Indonesia pivot in 2026? 24 December 2025.
[52] Antara News. Indonesia agrees to supply clean electricity to Singapore. 13 June 2025.
[53] TotalEnergies. TotalEnergies, RGE and SGEI to develop Singapore-Indonesia interconnector for electricity imports. 30 May 2025.
[54] The Jakarta Post. Danantara eyes $30b solar project on power exports to Singapore. 26 April 2026.
[55] Petromindo. Danantara, Temasek explore broader clean energy and investment cooperation. 24 April 2026.

suggests that Danantara views the transmission network as a deployable infrastructure asset — precisely the commercial logic that a ring-fenced transmission structure is designed to support.

Cross-border transmission at this scale requires a single legal entity that can invoice a foreign counterpart for network services, maintain transparent regulated tariffs, and operate independent of any generation or supply commercial interests. A ring-fenced transmission company could provide this structure, which the current integrated framework cannot support.

Indonesia has yet to establish an open-access regulatory framework; the New and Renewable Energy Bill, which could facilitate such access, remains under parliamentary deliberation[56]; cross-border agreements have not been commercially finalized; and wheeling tariff design has not been initiated. These are regulatory sequencing constraints, not structural objections. None of them prevents the establishment of a ring-fenced transmission entity — but all become significantly easier to resolve once such an entity exists. A corporate transmission entity creates a clearly defined counterparty with which regulators can set tariffs, developers can contract, and foreign governments can negotiate. The existing financing framework not only diverts government support to external lenders but also constrains revenue streams that depend on a neutral, ring-fenced platform. A ring-fenced transmission company would do more than reduce the cost of grid expansion. It would create the conditions for the grid to begin generating its own revenues.

[56] PwC. Preliminary overview of the latest draft of the New and Renewable Energy Bill (*Rancangan Undang-Undang Energi Baru dan Energi Terbarukan*– RUU EBT) as of July 2025. August 2025.

3 International experience: Transmission separation as infrastructure reform

Indonesia is not alone in facing the challenge of financing and expanding its electricity transmission network amid rapid demand growth, rising renewable energy deployment, and continued state ownership of energy infrastructure. Several emerging economies with comparable policy, institutional, and market characteristics have encountered similar constraints and responded by reorganizing transmission governance and financing.

This chapter examines case studies from India and Vietnam. While their power systems differ in scale and structure, both countries illustrate how corporate separation and financial ring-fencing of transmission, combined with regulated tariffs and continued public ownership, significantly improved grid investment outcomes. These examples demonstrate that transmission reform can be a practical infrastructure solution, rather than an ideological market reform.

3.1 Why transmission separation matters

India and Vietnam share several structural similarities with Indonesia. Their electricity sectors have historically been dominated by state-owned utilities responsible for generation, transmission, and distribution. Electricity has been treated as an essential public service, and reforms perceived as "unbundling" or privatization have often been politically sensitive.

At the same time, both countries experienced periods when transmission infrastructure struggled to keep pace with growth in electricity demand and new generation capacity. The rapid expansion of renewable energy projects placed additional pressure on transmission networks originally designed for more centralized generation systems.

While the capability to implement transmission expansion and modernization projects is inherent in both India and Vietnam, the institutional and financial structures created constraints. Transmission investment has often competed with generation and distribution projects within vertically integrated utilities for capital. Without structural changes, grid expansion could become dependent on government budget allocations, multilateral loans, or sporadic financing arrangements rather than a sustained, systemic investment strategy.

India and Vietnam addressed this problem by ring-fencing transmission as a distinct infrastructure activity. Dedicated transmission companies were established within the state-owned power sectors. These entities retained public ownership but were given clearer financial accounts, regulated revenue frameworks, and the ability to access capital markets and development finance more directly.

This institutional shift proved critical in enabling the grid to expand in parallel with generation growth and renewable energy deployment.

3.2 India: Building a national transmission platform

3.2.1 Power Grid Corporation of India Limited (PGCIL): Evolution of a commercial transmission utility

PGCIL provides a relevant international example of how a state-owned transmission company can operate as a financially independent infrastructure entity — raising the majority of its capital requirements on its own — while remaining under government control.

Established in 1989, PGCIL was tasked with owning, developing, and operating India's interstate transmission network. Its initial mandate was to consolidate high-voltage transmission assets, previously held by state and central electricity supply companies, into a single national transmission entity. Over time, it evolved from a government department into a commercially operated transmission infrastructure company responsible for planning and expanding the backbone of India's national electricity grid.

Currently, PGCIL operates the third-largest high-voltage transmission system in the world, behind China State Grid Corporation and China Southern Grid Corporation, managing more than 184,000 circuit-kilometers (ckm) of transmission lines and 290 high-voltage substations across India. The growth of this network reflects sustained investment in national grid infrastructure over more than three decades.

Since its inception, PGCIL's corporate objective has been commercialization rather than privatization. The Government of India has retained majority ownership while introducing institutional mechanisms that permitted the company to operate under commercial and independent regulatory discipline. Transmission tariffs that establish PGCIL's cash flow are determined by the Central Electricity Regulatory Commission (CERC) under a regulatory framework that allows for the efficient recovery of investment costs, operating expenses, and a return on capital through transmission charges.

This regulatory model has enabled PGCIL to progressively diversify its financing sources. As the company's asset base expanded, it increasingly financed grid development through corporate borrowing, infrastructure bonds, and internal resources, reducing reliance on government funding. MDBs, such as the World Bank and the ADB, supported grid development programs during the company's initial expansion, but now most capital is raised domestically. The Government of India no longer provides direct guarantees for PGCIL's borrowings.

The government has moved toward encouraging monetization of PGCIL's assets as an additional means to unlock capital for reinvestment. The Ministry of Finance has taken deliberate steps to divest portions of its PGCIL holdings.

The sections that follow will review the elements of PGCIL's structure, operations, and oversight that have enabled the company to effectively self-finance as a majority government-owned, stand-alone transmission utility.

3.2.2 India's regulated transmission tariff structure

A key factor supporting the financial sustainability of India's transmission system is the regulatory framework governing transmission tariffs. This framework has permitted full cost recovery for both operations and maintenance, and for earning market rates of return on capital deployed in building that system. The regulated ROE for transmission investment in India over the past decade has been around 15%, providing PGCIL with sufficient earnings to pay dividends to shareholders while reinvesting self-generated equity into new infrastructure.

There is no direct comparison with PLN's return. In Indonesia, subsidies and government compensation blur performance, as PLN's cost-plus margin applies within a vertically integrated electricity tariff structure in which generation, transmission, and distribution costs are consolidated into a single electricity price. This price embeds subsidies and other government compensation to help cover costs. While PGCIL's and PLN's returns are not directly comparable, the financial structure of Indonesia's state utility results in an under-recovery of capital costs.

In India, transmission tariffs are set separately from generation and retail electricity prices. Transmission companies, such as PGCIL, earn revenue solely for providing grid infrastructure services rather than producing or selling electricity. Therefore, the regulated return reflects the capital-intensive nature and long asset life of transmission infrastructure, rather than the profitability of electricity sales. It also aligns with the actual cost of capital faced by PGCIL at the time tariffs are determined.

Transmission tariffs in India are established through a regulatory mechanism overseen by the CERC. The tariff for each transmission asset is calculated using a cost-recovery methodology that includes capital cost, depreciation, interest on loans, operation and maintenance expenses, and a regulated ROE. These components together form the Annual Fixed Cost (AFC) that transmission companies are permitted to recover through transmission charges. The CERC periodically reviews tariffs to ensure that costs remain realistic, reasonable, and remunerative.

The regulated tariff structure is designed to ensure the recovery of capital costs, including a fixed ROE. For 2024–2029, the CERC has set a ROE of 15%.[57] This reflects the current market rates of return for companies comparable to PGCIL's operating and risk profile listed on the two Indian stock exchanges, the Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE).[58] By

[57] CERC. CERC (Terms and Conditions of Tariff) Regulations, 2024-2029. 1 April 2024. Chapter 8, Paragraph 30 (3).
[58] Peer companies include National Thermal Power Corporation, ROE = 13.3%, Calcutta Electricity Supply Company, ROE = 11.3%, Tata Power Company, ROE = 11.0%, Torrent Power Company, ROE = 19.0%. Screener.in. Accessed 19 April 2026.

establishing a market-compatible rate, PGCIL can continue to attract investor interest and sustain cash flow for raising and servicing debt, while promoting further investment.

Notably, under CERC regulations, transmission investment projects must include an equity investment contribution from PGCIL of up to 30% of the approved investment cost.[59] The tariff design ensures that PGCIL generates enough retained earnings to fund those contributions for project-level capital investment.

Individual transmission project tariffs in India are set for five-year periods. At the end of each period, PGCIL can petition the CERC to adjust the tariff through a "true-up" mechanism. This allows PGCIL to recover costs that exceed initial assumptions, ensuring that the company remains financially whole and able to sustain operations and expansion.

Project-level tariffs impact the pricing of the Inter-State Transmission System (ISTS), which functions as an integrated national transmission network. The total cost of the interstate network, or Yearly Transmission Cost (YTC), is calculated by combining the approved tariffs across all operational transmission projects. This amount is then allocated among system users based on contracted network access and usage, ensuring charges reflect use of the national grid rather than individual transmission lines.

This pricing approach reflects a key principle of India's electricity sector reforms: transmission functions as a common carrier network, providing non-discriminatory access to multiple users, including generators, distribution companies, and large electricity consumers. The Electricity Act 2003 formally established transmission as a separate licensed activity, enabling transmission charges to be recovered transparently while supporting open access to the grid.[60] A detailed explanation of tariff components and adjustment mechanisms is provided in Appendix A.

For Indonesia, the relevance of this framework lies not in replicating India's specific tariff levels, but in adopting the principles of institutional and financial sustainability. A separate PLN transmission company would enable transparent calculation and recovery of transmission investment costs, operating expenses, and capital returns through regulated network charges. This approach could build on Indonesia's existing cost-plus regulatory structure while improving financial transparency and creating a clearer investment framework for long-term grid expansion.

3.2.3 PGCIL capital raising

PGCIL inherited a fragmented grid, focused mostly on state-level demand, split into regions, asynchronous, and highly skewed between generation sources and demand centers. Planners

[59] Ibid. Chapter 5, Paragraph 18.
[60] Central Electricity Regulatory Commission. The Electricity Act, 2003. 26 May 2003.

recognized the need to revamp how the grid was structured, built, and operated, and that public funds alone would not be sufficient to deliver the scale of investment required.

These circumstances influenced PGCIL's corporate financial design, with the company raising tens of billions of dollars from domestic and international equity and debt markets.

However, PGCIL's financial transformation was gradual. For the first 20 years of its operations, over 80% of the company's borrowing — particularly foreign currency from MDBs — was backed by sovereign guarantees. Reliance on central government support declined only after PGCIL became a publicly traded company.

Currently, the company is structured as a commercial entity with professional executive management. While PGCIL remains majority government-owned, only two of its ten directors represent the state. Three are private, independent directors, while the remaining five are executive leaders responsible for finance, personnel, and operations.

PGCIL's treasury strategy allows it to access capital funds consistently across a range of maturities. The company has demonstrated its ability to service its debt portfolio, enabling it to return to capital markets regularly with a high degree of predictability. This stability allows institutional investors and mutual funds to plan their own capital allocations and portfolio designs with PGCIL considered as an anchor investment.

Today, less than 18% of PGCIL's loans are sovereign-backed[61], and that share continues to fall. These arrangements primarily relate to the remaining balances of MDB loans, some of which have repayment schedules extending to 25 years. As these loans get repaid, the percentage of sovereign support has been declining annually as PGCIL nearly exclusively sources new capital from the open market. For example, in fiscal year (FY) 2025, no foreign currency borrowings were initiated.[62]

3.2.3.1 PGCIL in the equity market

As PGCIL matured, the Indian government, through the Ministry of Finance and the Ministry of Power, encouraged the company to operate more like a private sector commercial corporation, as listing as a publicly traded entity would help drive corporatization and professionalism. Publicly listed companies in India are regulated by the Securities and Exchange Board of India (SEBI) and are subject to more stringent reporting requirements than privately held companies. This enhanced transparency creates greater confidence in corporate management and, therefore, generates more opportunities to raise capital cost-effectively.

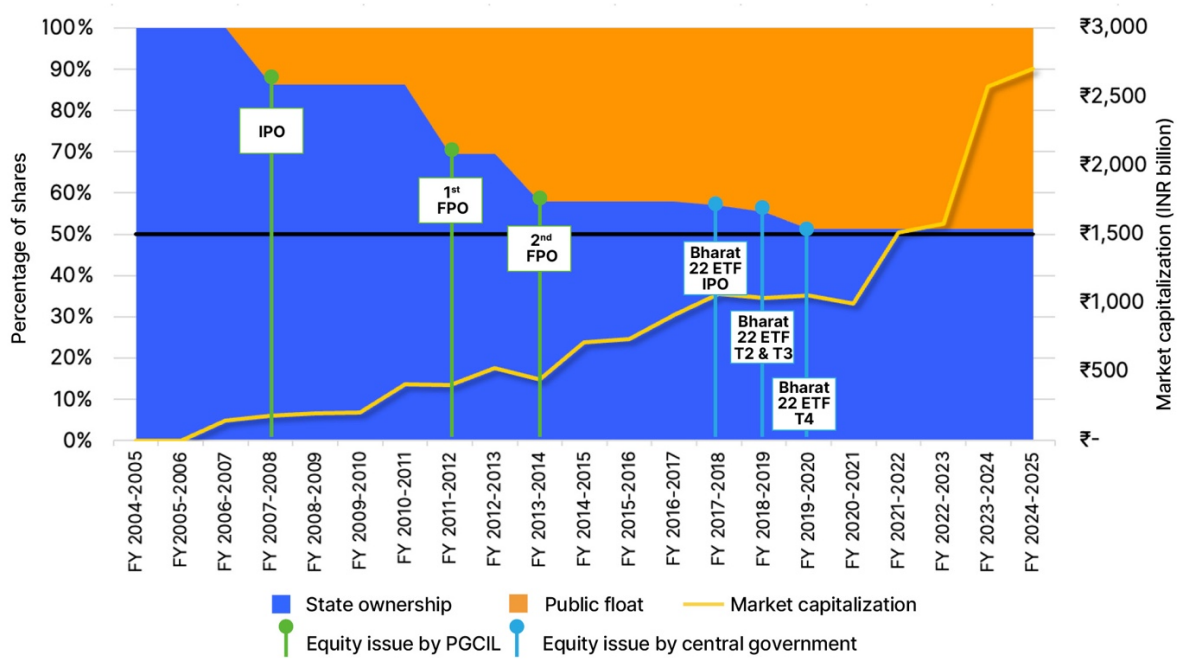
[61] ICRA. Power Grid Corporation of India Limited: Ratings reaffirmed. 18 December 2025.
[62] PGCIL. Annual Report 2024-2025. 3 August 2025.

From the outset, the government sought to maintain majority central ownership of PGCIL while also maximizing the financial benefits of listing. As long as the government retains a 51% equity stake, the company is considered a state-owned entity.

PGCIL's stock debuted simultaneously on the BSE and NSE on 7 October 2007, with 13.9% of the company sold, raising INR29.8 billion (USD750 million).[63] At that point, the Initial Public Offering (IPO) was the largest debut of a stock in Indian history, with shares over-subscribed 117 times.[64]

As PGCIL's market capitalization expanded and financial performance improved, additional equity issues and sales were pursued. In November 2010, a follow-on public offering raised INR76 billion (USD1.7 billion), through a 10% new share issue and a 10% existing share sale.[65] A second and final follow-on offering occurred in December 2013, selling 15.4% of the company for INR78.7 billion (USD1.28 billion), reducing the government share to 57.89%.[66] Figure 10 the progression of equity sales and government shareholding percentage.

Figure 10: PGCIL change in equity ownership FY2005 to FY2025

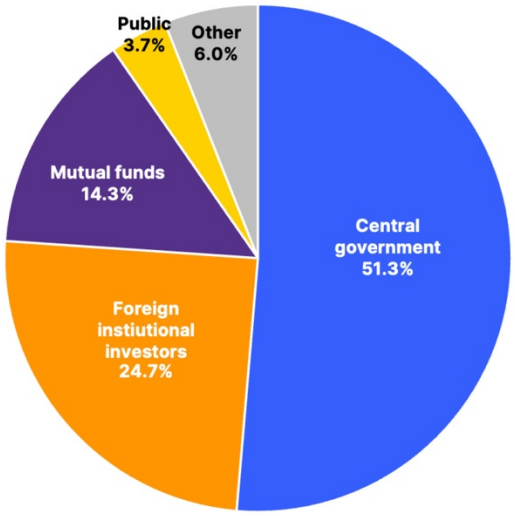


Source: Powergrid Corporation of India Limited. Annual Reports[67]. Ministry of Finance, Department of Investment and Public Asset Management.

[63] Note that, in this chapter on PGCIL, all USD quoted figures are calculated at the INR exchange range appropriate to the date referenced. Thus, for this figure, the exchange rate in October 2007 was approximately IDR 39.7 to USD 1.00.
[64] The Asset. Record demand in Power Grid IPO. 9 October 2007.
[65] BSE2NSE.com. Power Grid Corp of India Ltd – FPO – November 12 FY10. 11 November 2010.
[66] Kotak Investment Banking. Power Grid Corporation of India follow-on public offering prospectus. 15 November 2013.
[67] Powergrid Corporation of India Limited. Annual Reports. 2024.

Currently, PGCIL's shareholding is diversified across domestic mutual funds and institutions, foreign institutional investors, and the general public. As one of 30 companies comprising the BSE Sensex (sensitive index of India's largest publicly traded companies), it is a widely held stock with thousands of domestic participants through direct shareholding, mutual funds, and exchange-traded funds (ETFs). Thus, there is diverse national capital market participation in the company (Figure 11).

Figure 11: PGCIL shareholder categories, FY2025



Source: Trendlyne. Powergrid Corporation of India Ltd. Accessed 14 April 2026.

Additional sales of government equity in PGCIL occurred from 2017–2019, driven by a Ministry of Finance government asset monetization scheme. The government created an ETF called Bharat 22, comprised of minority shares in 19 central public sector enterprises (CPSEs) and government shareholdings in three private sector companies. Units in this ETF were sold via an IPO in November 2017 and through three further fund offerings until 2019. The last offer reduced the central government's shareholding in PGCIL to its current and final holding of 51.34%. The details of this monetization process are discussed later in this section.

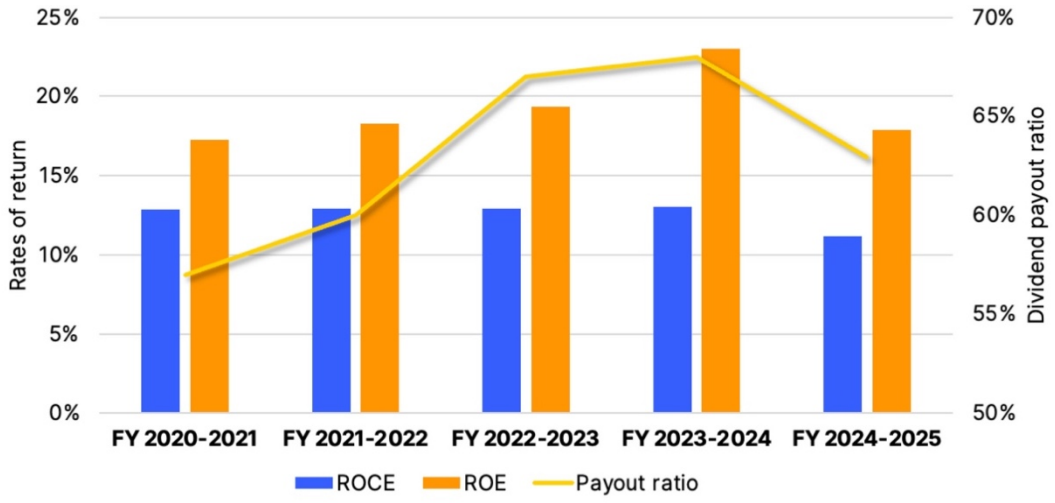
3.2.3.1.1 Dividends to government

PGCIL provides investors with stable dividend payouts. From FY2021 to FY2025, profitability after tax has remained around 33% of gross revenues, allowing the company to deliver a ROE at an average of 18.9%.[68] This places PGCIL in the midrange for BSE Sensex companies, despite the company's overall lower risk profile.[69] Return on capital employed, a measure of capital productivity through investment projects, has been 12%–13% consistently.[70] This performance in profitability and

[68] IEEFA analysis of PGCIL Annual Reports, FY2020 to FY2025.
[69] Investing.com Powergrid Corp of India Ltd ROE. Accessed 14 April 2026.
[70] Smart Investing. Powergrid Corp of India Ltd ROCE. Accessed 14 April 2026.

investment efficiency is a consequence of well-structured and reliably regulated transmission tariffs by the CERC and accounts for about 90% of PGCIL's cashflow (Figure 12).

Figure 12: PGCIL return history FY2021 to FY2025



Source: Investing.com Powergrid Corp of India Ltd Return on Equity (ROE). Accessed 14 April 2026. Smart Investing. Powergrid Corp of India Ltd Return on Capital Employed (ROCE). Accessed 14 April 2026.

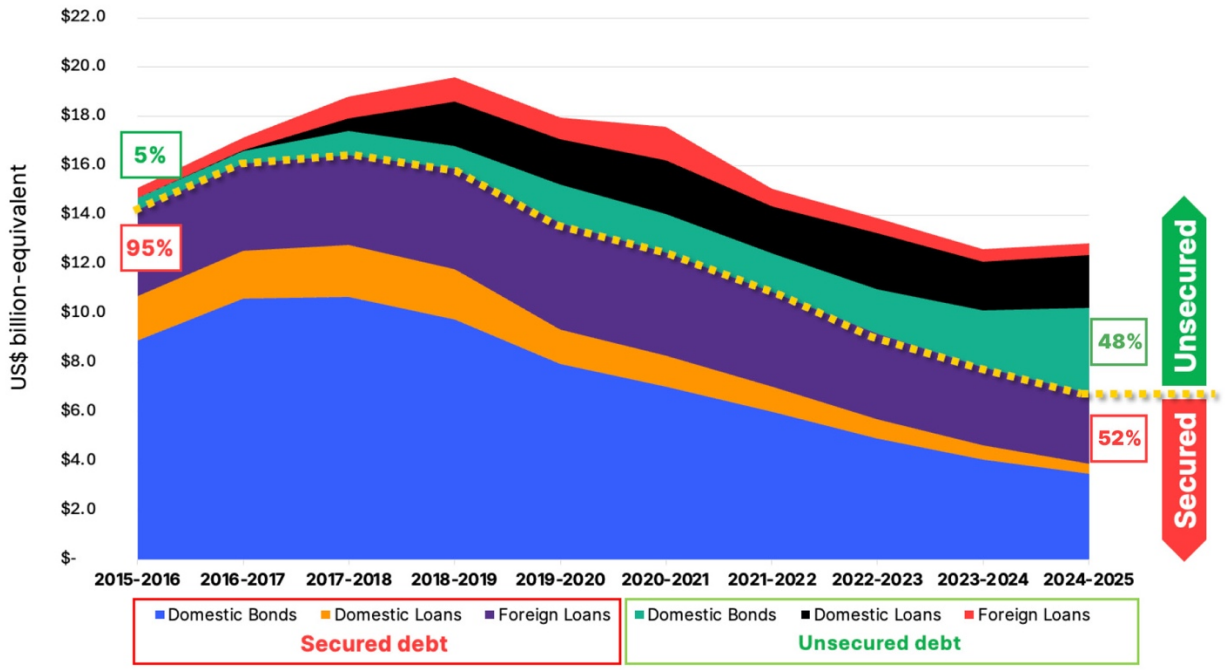
The company's dividend payout ratio has increased over time, improving from about 55% a decade ago to 63% in FY2025. As a 51.34% shareholder in PGCIL, the Government of India received dividends of approximately USD587 million that year. Despite this high payout, PGCIL continues to fund its own capital investment projects through self-raised finance.

3.2.3.2 PGCIL debt fundraising and management

PGCIL has consistently raised debt capital to support its investments in new transmission lines. It maintains a regular bond issuance program, with board-approved borrowing limits set every 12 to 18 months based on anticipated project-level capital investment requirements. This program is complemented by targeted term bank loan borrowings in local currency and, less frequently, in foreign currency. Loans are arranged on both secured and unsecured bases. The company targets maintaining a 70:30 debt-to-equity ratio, providing robust debt service coverage. All domestic credit rating agencies assess the company at a consistent AAA-equivalent level.

This section explores how PGCIL's borrowing plan, market approach and risk and pricing management have evolved, enabling access to larger funds at lower cost and on more favorable terms. Figure 13 illustrates this evolution, showing the changing composition of its debt across domestic bonds, national bank borrowing, and foreign loans, as well as the mix of secured and unsecured assets.

Figure 13: PGCIL debt composition history FY2016 to FY2025



Source: Powergrid Corporation of India Limited. Annual Reports FY2016 to FY2025[71]. IEEFA analysis.

PGCIL is a frequent issuer in India's domestic bond market, typically issuing debt with maturities of 10–15 years to align with the long life of its transmission assets. Over the past decade, it has averaged three local currency bond issuances annually, raising approximately USD800 million per year with a weighted average maturity of 10.7 years.[72]

Historically, PGCIL has also availed debt from MDBs to fund specific large transmission construction projects, with borrowing ranging from USD250 million to USD800 million per project. It also supplements funding through term bank loans between USD200 million and USD500 million annually. It maintains liquidity through working capital facilities of about USD700 million and a 364-day commercial paper program with a USD1.4 billion limit.

[71] Powergrid Corporation of India Limited. Annual Reports. 2024.
[72] Power Grid Corporation of India Limited. Annual Report 2024-2025. August 2025. IEEFA analysis of Consolidated Financial Statements, Note 23.

Overall, PGCIL's treasury funding management approach is based on self-raised, self-supported financing, with a strong reliance on local currency borrowing to hedge exchange rate risk. The following sections explore the company's evolving debt risk management strategy.

3.2.3.2.1 Moving toward majority unsecured debt

In FY2016, 95% of PGCIL's debt was on a secured basis.[73] This meant that if there were claims against the company's assets, the Government of India would need to provide support in the event of default. This arrangement strained the government's ability to manage its contingent liability exposure in its balance sheet — a situation it has actively sought to minimize. Additionally, this procedure required PGCIL to obtain government approvals for its capital investment and funding programs, which could be a protracted process.

Accordingly, PGCIL pursued a corporate debt management strategy to shift borrowing from secured to unsecured facilities, thereby providing it with greater planning and borrowing flexibility. However, because interest rates for unsecured debt were higher than those for secured debt, PGCIL wanted to close that gap. To accomplish this, the company had to substantially improve its financial performance while simultaneously shifting away from higher-risk funding practices. The elimination of foreign currency borrowing became a key focus area.

As of FY2025, the proportion of unsecured debt is 48% and rising quickly. PGCIL's new unsecured bond issues are attracting rates previously achieved only by its secured offerings.[74]

3.2.3.2.2 Diversifying away from sovereign support for foreign currency debt

PGCIL initially relied heavily on loans from MDBs, such as the World Bank and ADB, to fund its capital investment programs. The World Bank, from 1989 to 2009, lent PGCIL USD3.2 billion to create institutional structures and support operational projects, on a sovereign-guaranteed basis.[75] The ADB funded both transmission sector development as well as specific transmission infrastructure projects for PGCIL. Between 2000 and 2017, ADB provided about USD3.8 billion in loans to PGCIL.[76, 77, 78, 79, 80, 81]

PGCIL was the first CPSE in India to secure non-sovereign guaranteed, foreign currency commercial borrowing. In March 2012, the ADB facilitated a USD250 million commercial loan for PGCIL without

[73] PGCIL. Annual Report FY2016.
[74] PGCIL. Annual Report FY2025.
[75] World Bank. Meeting India's Demand for Electricity. March 2010.
[76] Asian Development Bank. Energy sector in India – building on success for more results. August 2007.
[77] Projects Today. PGCIL, ADB signs $400 loan agreement. 31 March 2008.
[78] Wire and Cable India. ADB $750 loan to India. 1 October 2011.
[79] Government of India Public Information Bureau. India Signs Three Loan Agreements with ADB Worth US $826 Million for Facilitating Power Transmission within India. 30 March 2012.
[80] Asian Development Bank. ADB Lends $1 Billion for Renewable Energy Transmission, Grid Expansion in India. 10 December 2015.
[81] Government of India Public Information Bureau. India and ADB Sign $175 Million Loan Agreement to help improve Solar Transmission System. 7 April 2017.

sovereign guarantee, based solely on the strength of the company's commercial operations.[82] This was complemented with a USD500 million sovereign-backed loan as part of an over USD1 billion transmission line project.[83] The USD250 million non-sovereign loan reduced reliance on the Ministry of Power and the Ministry of Finance for securing foreign loans.

This financing method was repeated in 2015 for a pioneering 800-kilovolt (kV) high-voltage direct current (HVDC) transmission project in Rajasthan. The ADB provided two loans — a USD500 million sovereign-guaranteed and a USD500 million non-sovereign commercial loan — as part of the overall USD3.4 billion investment cost of the project. PGCIL's last US dollar loans were borrowed from the ADB in 2017 when the bank provided a USD175 million loan for two USD450 million solar-linked transmission projects in Gujarat and Rajasthan. Both the HVDC and solar transmission project loans were disbursed in 2021, the final year in which PGCIL added new foreign currency debt to its balance sheet.

Building on its 2012 experience of borrowing without sovereign support and having internalized international lending due diligence processes, PGCIL sought to gain an international corporate debt rating and pursue a global bond offering. In January 2013, PGCIL obtained a BBB- rating from Fitch Ratings for its debut foreign currency bond issue, placing PGCIL as a stand-alone credit at the lower end of the investment grade.[84]

A week later, PGCIL successfully issued a USD500 million bond that was well-received by international institutional investors, with the offering oversubscribed 19 times — the largest order book for an Indian global bond at the time.[85] It also achieved the lowest recorded interest rate for a 10-year Indian corporate note, coming in at the cost of 10-year US Treasury notes plus a 2.1% margin. PGCIL has maintained its BBB- international credit rating since.[86]

3.2.3.2.3 Reducing foreign currency exposure

While PGCIL gained valuable experience from its global bond issuance, it has since stepped back from foreign bond markets. The company has also not entered into any material new foreign currency bank borrowings since the final ADB loan agreement in 2017. Consequently, foreign currency debt on its balance sheet is declining.

Existing ADB loans, with repayment periods from 15 to 25 years, will remain on the balance sheet into the 2040s. However, the overall share of foreign currency exposure is expected to decline annually. Given the limited foreign currency earnings, this approach aims to reduce exchange rate

[82] Construction Week. India signs 3 loan agreements with ADB. 1 April 2012.
[83] Asian Development Bank. National Grid Improvement Project, Report and Recommendations to the President. September 2011.
[84] Reuters. Fitch rates Power Grid's USD500m notes final 'BBB-'. 14 January 2013.
[85] The Asset. Power Grid garners largest demand among Indian bond issues. 11 January 2013.
[86] Fitch. Fitch Affirms India's POWERGRID at 'BBB-'; Outlook Stable. 12 February 2025.

exposure and insulate against macroeconomic shocks. As of FY2025, less than 18% of PGCIL's debt has sovereign backing.[87]

The company's debt management and fundraising program for FY2027 has been approved at a total debt ceiling of USD16.67 billion. The plan has been reviewed by all major credit rating agencies in India and assigned a AAA-equivalent rating.[88, 89, 90]

Figure 14 shows how a leading Indian ratings agency, ICRA, has assessed the FY2027 capital program. This assessment result aligns with PGCIL's ratings from other agencies.

Figure 14: ICRA's assessment of PGCIL's FY2027 debt program

	Rated Amount			
Instrument	**(INR bn)**	**(USD bn Equivalent)**	**Rating**	
Long-term Bond Program - Current	805.8	8.92	**AAA (Stable)**	69%
Long-term Bond Program - Proposed	90.0	1.00	**AAA (Stable)**	8%
Commercial Paper /Short Term Borrowing Program	120.0	1.33	**A1+**	10%
Long-term Term Loans	37.1	0.41	**AAA (Stable)**	3%
Long-term Unallocated Limits Approved	13.5	0.15	**AAA (Stable)**	1%
Cash Credit Limits	49.5	0.55	**AAA (Stable) / A1+**	4%
Bank Guarantee Limits	29.5	0.33	**AAA (Stable) / A1+**	3%
Letters of Credit	20.0	0.22	**AAA (Stable) / A1+**	2%
Total	1,165.4	12.9		

Source: ICRA. Power Grid Corporation of India Limited: Ratings reaffirmed. 18 December 2025.

3.2.3.3 PGCIL alternative capital raising schemes

The Government of India has encouraged major state-owned enterprises to recycle capital tied up in existing assets. This approach recognizes that public sector capital was initially deployed to build the asset base of many CPSEs that have performed well.

[87] ICRA. Power Grid Corporation of India Limited: Ratings reaffirmed. 18 December 2025.
[88] Rating agency assessments. CareEdge, 21 November 2025.
[89] CRISIL. 5 December 2025.
[90] ICRA. 18 December 2025.

Over time, corporatization and improvements in financial and operational systems have reduced risk and enhanced investor value. The first phase of value realization occurred through listing leading CPSEs on domestic stock exchanges. Now, further value can be unlocked through financial structuring that allows monetization while retaining state ownership and control.

3.2.3.3.1 National Monetization Pipeline

In 2022, the Government of India launched an initiative to unlock value from state investments in existing companies through an initiative called the National Monetization Pipeline (NMP).[91] Under this program, all CPSEs were encouraged to identify opportunities to monetize assets. The first NMP phase operated from 2022 to 2025, with a new phase (NMP 2.0) extending from FY2026 to FY2030.

PGCIL transmission assets have been identified for action under the NMP. Proposals to achieve this goal have certain recommendations:

- **Form:** Leasing existing PGCIL assets to private parties who can operate and maintain assets under PPP models, using an infrastructure investment trust or by contracting these services back to PGCIL.
- **Length:** Terms can run from 20 to 30 years.
- **Create no liabilities:** No guarantees or additional charges are placed on the PGCIL balance sheet.
- **Use of proceeds:** Capital raised is allocated to reserve accounts to repay higher-cost debts, with any surplus directed to new PGCIL capital investments.
- **Upfront payments:** Private participants provide an upfront payment in return for regulated cash flows from operations.
- **Asset retention:** Control reverts to PGCIL at the end of the term.

With support from the Ministry of Finance, PGCIL has actively implemented alternative means to raise capital through bundling and engineering cash flows from operating assets. These approaches have been effective in mobilizing funds.

[91] NITI Aayog. National Monetization Pipeline Monetization Guidebook. August 2021. Transmission is Category 5. Page 22. Power sector strategy. Page 43. Considerations for securing future cashflows, Section 2.2.4.5.

3.2.3.3.2 Securitization

In October 2023, PGCIL raised INR18 billion (USD217 million) through the issuance of 10-year, non-convertible bonds secured against cash flows of four operational SPVs.[92] Most of PGCIL's transmission lines and associated substations are undertaken as bundled projects, established and funded under an SPV model. Each SPV has an approved tariff set by the CERC, based on its operating costs recovery of invested capital. Since the cash flows of each SPV are well-defined and highly predictable, they are well-suited for securitization. PGCIL chose to issue these bonds on a private placement basis to target high-quality institutional investors seeking low-risk, stable cash flows.

3.2.3.3.3 Powergrid Infrastructure Investment Trust (PGInvIT)

The success of initial securitization programs encouraged the Government of India to pursue more advanced fundraising structures, notably infrastructure investment trusts (InvITs). These companies acquire specific assets from a CPSE (PGCIL in this case) and then contract with PGCIL subsidiaries to operate and manage those assets for the investors' benefit. A trustee manages the interests of the InvIT unit holders.

PGCIL launched its first trust, the Powergrid Infrastructure Investment Trust (PGInvIT), in January 2021.[93] Five sets of transmission asset SPVs were placed within the PGInvIT. The assets included six 765kV transmission lines and five 400kV lines, with a total circuit length of approximately 3,700ckm, along with three substations with an aggregate of 6,630MVA of transformation capacity. The portfolio also included 1,956km of optical fiber.

The IPO of PGInvIT raised INR77 billion (USD1.03 billion), including INR50 billion (USD684 million) in fresh equity and INR27 billion (USD347 million) from the book equity value sale.[94]

Key features of the PGInvIT, following SEBI regulations, were:[95, 96]

- At least 80% of proceeds must be invested in operational assets
- At least 90% of earnings must be distributed to unit holders on a semi-annual basis
- The debt-to-equity ratio on the trust's balance sheet should not exceed 70:30

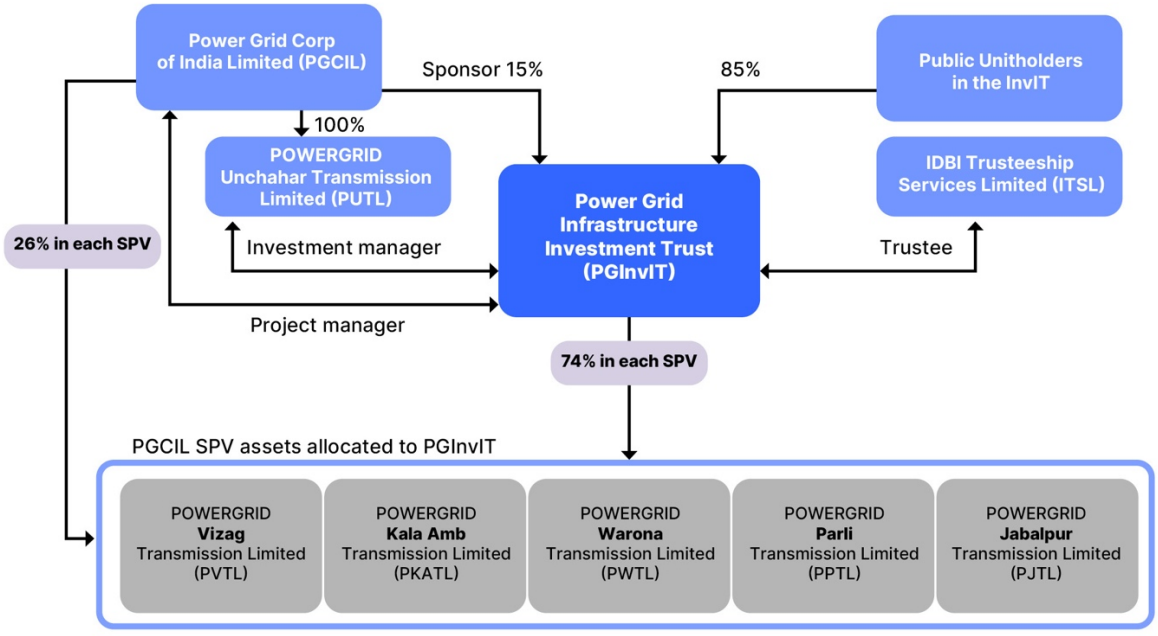
[92] T&D India. PGCIL To Raise Over Rs.2,000 Crore from Securitization of Cash Flows. 25 September 2023. PGCIL. Annual Report FY 2022-2023.
[93] Marketfeed. Powergrid InvIT IPO: all you need to know. 30 April 2021.
[94] Securities and Exchange Board of India. PGInvIT Prospectus. 25 January 2021.
[95] India Bonds. What is an InvIT (Infrastructure Investment Trust)? 20 May 2024.
[96] Securities and Exchange Board of India. Securities and Exchange Board of India (Infrastructure Investment Trusts) Regulations, 2014 [Last amended on December 11, 2025]. 11 December 2025.

- The trust's sponsor (PGCIL) must retain 15% of the trust for at least one year after listing
- The assets within the trust must have a 26% sponsor (PGCIL) shareholding for at least three years after listing, to ensure underlying operating agreements remain valid and the assets operate as intended
- InvITs can acquire or invest in new assets, subject to the stated operating asset and leverage limits

The InvIT may initially assume the debt associated with the assets. Following an equity IPO, funds raised are used to repay this debt, leaving mostly unlevered assets to benefit from regulated cash flows. This structure provides the fund manager with flexibility to re-leverage the trust and pursue new investments. In the case of PGInvIT, PGCIL has used the capital raised from the InvIT's acquisition of its assets to expand the utility's own capital investment program.

The structure is relatively aggressive, given that PGCIL retains only a 15% ownership interest in the InvIT, while divesting 74% of its holdings in each underlying transmission SPV (Figure 15). This implies that neither PGCIL nor the Government of India retains majority control of the assets. While legally permissible, PGInvIT is the first instance where less than 51% of equity has been maintained in existing public infrastructure investments. Nevertheless, this arrangement still allows PGCIL to retain a degree of control. After the sale to the InvIT, PGCIL retains a 26% blocking vote in each SPV project company, which protects its position, since a 75% supermajority of private shareholders would be required to approve asset disposals or equity dilution.

Figure 15: PGInvIT structure



Source: World Bank. Infrastructure Investment Trusts (InvITs) - Case Studies. Accessed 14 April 2026

3.2.3.3.4 Government CPSE equity disinvestment program via exchange traded funds (ETFs)

The Government of India, through the Ministry of Finance's Department of Investment and Public Asset Management (DIPAM), announced a disinvestment program to reduce shareholdings in CPSEs. Its goal is to unlock value generated by long-term public investment embedded in these companies.

One mechanism is the sale of portfolios of minority shareholdings in CPSEs through the creation of ETFs. Many of the CPSEs included in an ETF are commercially operated, listed on domestic stock exchanges, and are profitable. In designing the ETFs, DIPAM determines share contributions to ensure sufficient fund size while maintaining a majority government share in each CPSE, thereby ensuring the 51% threshold is maintained.

In 2017, the government created the ETF vehicle Bharat 22, a fund comprising shares of 19 of the government's top CPSEs and government holdings in three large private sector companies.[97, 98] PGCIL was included as one of the fund's primary components. The ETF was placed in the market in four tranches, spanning November 2017 to October 2019. Overall, the government raised about USD5.9 billion from the issues. During the process, the government reduced its shareholding in PGCIL by 6.56%, bringing its total share to 51.34%, where it remains today.

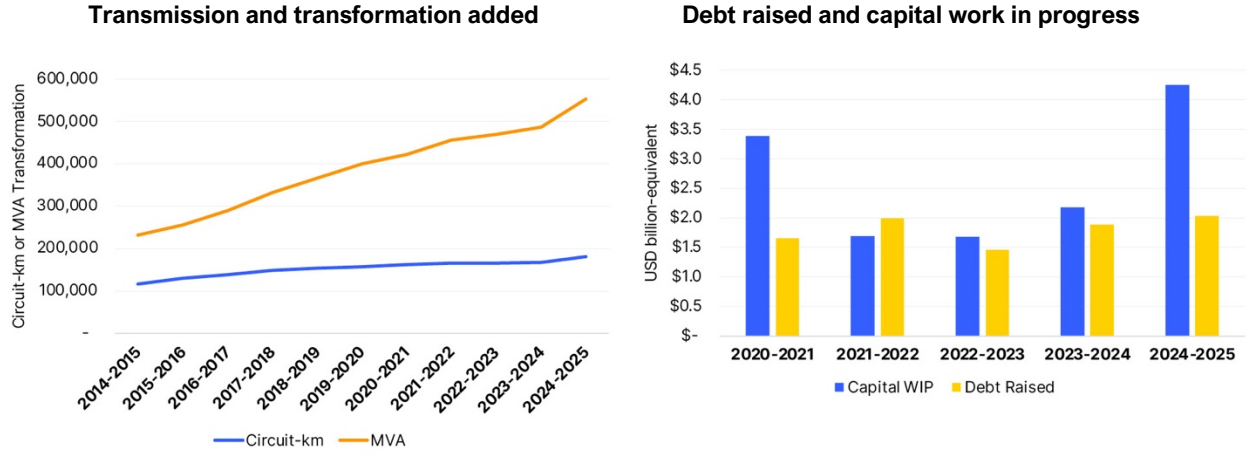
This form of monetization does not necessarily create direct value for PGCIL — it represents a slight dilution in government shareholding but does not impact operations. Such ETFs are a means of fundraising for general government fiscal purposes. While this is not its explicit purview, DIPAM functions as a parent state-owned enterprise holding company, representing the government in the Bharat 22 ETF. This is similar to Danantara's state investment management position in Indonesia.

3.2.3.4 PGCIL's ability to pursue system expansion

Taken together, equity issuance, debt finance fundraising, and asset securitization and monetization practices have enabled PGCIL to raise substantial capital for transmission expansion and improvements. The company has consistently raised between USD1.5 billion and USD2.0 billion dollars annually in debt to support its projects. This sustained funding has allowed PGCIL to nearly double the length of its transmission lines over the past decade and increase transformation capacity by 240% (Figure 16). It has also supported high technical performance, with system availability consistently above 99%. PGCIL owns and operates the only two 800kV HVDC transmission systems in Asia outside China, reflecting its operational capabilities.

[97] Bombay Stock Exchange. Bharat 22 ETF listing. Accessed 10 April 2026. This provides the current composition of the ETF, its pricing, and any announcements associated.
[98] Securities Exchange Board of India. Bharat 22 ETF Draft Scheme Information Document. 27 September 2017.

Figure 16: PGCIL capital investment progression



Source: Powergrid Corporation of India Limited. Annual Reports FY2016 to FY2025[99]. IEEFA analysis.

Note: WIP = Work in Progress.

This expansion has been supported by shifting toward greater capital self-reliance. Government-backed borrowing has decreased, foreign currency exposure has been nearly phased out, and the share of unsecured borrowing has increased from a mere 5% to nearly 50% of total debt.

Looking ahead, most new capital is expected to be raised in domestic currency on an unsecured basis at a lower cost. This is enabled by a ring-fenced corporate structure, supported by full-cost recovery tariffs, and supervised by an independent regulator. All generators and buyers of electricity on the grid are treated equally in terms of access and payment for transmission services.

3.3 Vietnam: Separation to accelerate grid expansion under state control

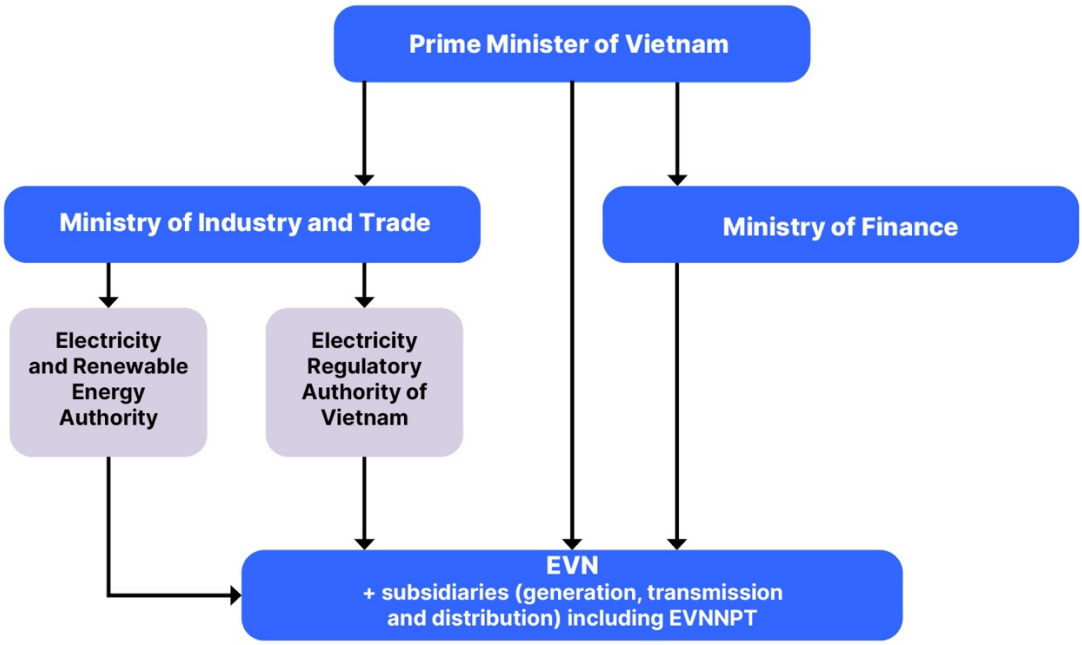
Vietnam's experience with electricity transmission reform is more recent than India's and less complete, but for that reason, it may be more directly illustrative for Indonesia. The two countries share a similar institutional starting point: a state-owned, vertically integrated utility under close government oversight, electricity treated as an essential public service, and a policy environment in which privatization or market liberalization remains sensitive. Vietnam's reform trajectory highlights both the drivers of change and the practical constraints within which reform has been implemented.

[99] Powergrid Corporation of India Limited. Annual Reports. 2024.

3.3.1 EVN and EVNNPT: Structural separation within a state-owned group

Vietnam's electricity sector is dominated by Electricity of Vietnam (EVN), a wholly state-owned group that reports directly to the Prime Minister and operates under the oversight of the Ministry of Industry and Trade (MOIT) and the Ministry of Finance. Within this structure, transmission has been formally separated into a dedicated subsidiary, the National Power Transmission Corporation (EVNNPT), which is wholly owned by EVN and responsible for developing and operating the national transmission system (Figure 17).

Figure 17: Outline of EVN's governance structure



Source: International Institute for Sustainable Development (IISD)[100]. Adapted and updated from Intelligent Energy Systems & East West Energy and Climate Link JSC (IES & EWEC), 2023.

EVNNPT operates 215 substations and approximately 33,054km of transmission lines, including 12,565km of 500kV and over 20,489km of 220kV lines, with a total transformer capacity of more than 288,250MVA.[101] Vietnam's power system has the largest installed generation capacity in Southeast Asia, reaching 87.6GW by the end of 2025[102], and EVNNPT's network forms the backbone of this rapidly transforming system.

The Government of Vietnam has maintained that transmission of electricity at 220kV and above constitutes a state monopoly activity for national security reasons — a position stated in the

[100] International Institute for Sustainable Development (IISD). State of Transition. 8 July 2025.
[101] EVN NPT Transmission Operational Information. Last accessed 28 April 2026.
[102] EVN. Vietnam's power system ranks second in ASEAN. 30 December 2025.

amended Electricity Law of 2024.[103] Private ownership of lower-voltage transmission infrastructure has been permitted under certain conditions, but the main high-voltage network remains exclusively under EVN and EVNNPT control.

3.3.2 Transmission as a binding constraint: The 2023 power crisis

A visible infrastructure failure sharply accelerated Vietnam's reform trajectory. In June 2023, the country's northern region experienced severe blackouts, disrupting commercial and industrial activity nationwide. The crisis resulted from a combination of drought-reduced hydropower output, unplanned outages at aging coal plants, and transmission bottlenecks that prevented power from flowing from surplus southern and central regions to demand centers in the north. A World Bank assessment estimated the economic cost of the 2023 crisis at approximately USD1.4 billion, equivalent to roughly 0.3% of national gross domestic product (GDP).[104]

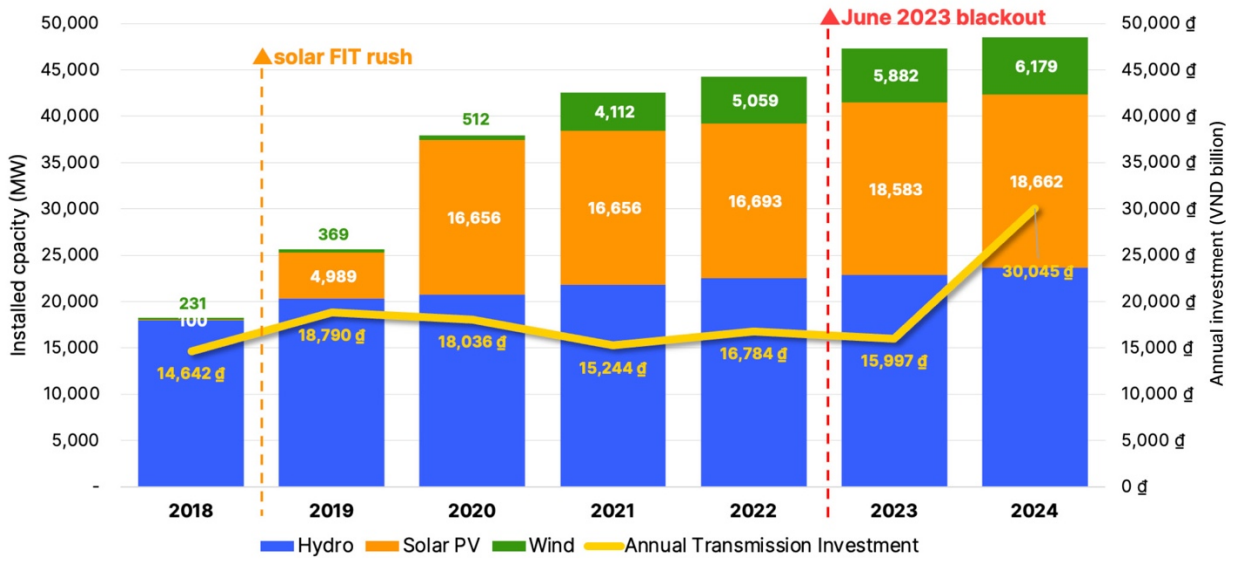
The bottlenecks were not caused by renewable energy growth. They were the result of a decade in which transmission investment was deprioritized within EVN's capital allocation. Vietnam's North–South backbone transmission system was built in two phases: Circuit 1 in May 1994[105] and Circuit 2 in September 2005.[106] For the 19 years between Circuit 2's completion and the emergency construction of Circuit 3 in 2024, no new double-circuit 500kV North–South corridor was added.

Between 2005 and 2023, Vietnam's electricity production and consumption grew more than fivefold.[107] The single North–South corridor, with two circuits sharing the same right-of-way, and vulnerable to the same weather events and outages, was the sole high-voltage backbone of an economy growing at 7–8% annually. By the time the solar and wind boom was underway in 2018, the grid was already nearing operational capacity.

Between 2018 and 2023, more than 21GW of solar and wind capacity was added[108], supported by generous feed-in tariffs that then amplified an existing structural weakness. Generation in the central and southern regions expanded rapidly, while the transmission capacity needed to move that power north lagged. The result was a system in which power was abundant in one part of the country but could not reach the load centers that needed it. The 2023 blackouts were the visible outcome of this mismatch, but the underlying constraint had been building for years before renewable energy deployment.

[103] Frasers Law Company. Vietnam's Electricity Law 2024. 9 January 2025.
[104] World Bank. Making Public Investment Work for Growth. Page 22. 10 August 2023.
[105] EVN. Celebrating 30th Anniversary of North–South 500kV Circuit 1. 27 May 2024.
[106] EVN GENCO3. North-South 500kV Transmission Line: Miracle after miracle. 1 February 2025.
[107] IEA. Viet Nam Country profile. Accessed 26 April 2026.
[108] IRENA. Renewable capacity statistics 2025. 26 March 2025.

Figure 18: Vietnam's generation–grid mismatch: solar, wind and hydro installed capacity vs. transmission capital expenditure (2018–2024)



Source: IEEFA analysis; IRENA Renewable Capacity Statistics 2025[109]; EVNNPT annual reports[110] and annual investment review[111, 112].

The government's response was to accelerate grid construction. The most evident example was the 500kV Circuit 3 transmission line, a 519km double-circuit project connecting the central and northern regions, completed in just six months by the end of August 2024.[113] The line doubled transmission capacity on the critical North-Central corridor from 2,500MW to 5,000MW and is credited with preventing a recurrence of the 2023 blackouts during peak demand in 2025.

EVNNPT continued this development in 2025, completing substations and connecting lines in the Central Highlands and South-Central regions, resolving localized conditions where renewable generation lacked an evacuation path. The next section examines what enabled this acceleration despite a period of financial strain at the group level.

3.3.3 The ring-fence advantage: How EVNNPT kept investing while EVN faced financial crisis

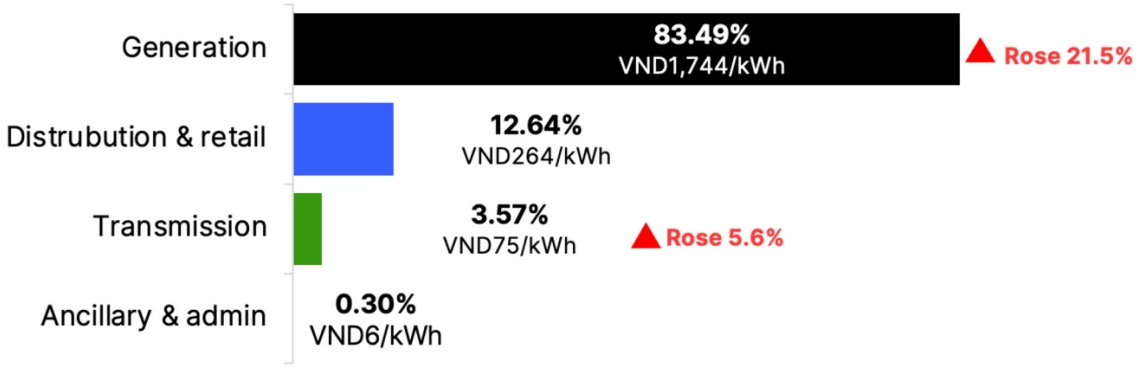
Between 2022 and 2023, EVN experienced one of the worst financial crises among state-owned utilities in Southeast Asia. Global coal prices surged more than sixfold from their 2020 lows of USD60

[109]IRENA. Renewable capacity statistics 2025. March 26, 2025.
[110] EVNNPT. Annual Report 2021-2022. Page 48. January 29, 2024
[111] EVNNPT. Press release: EVNNPT to ensure safe and stable operation of transmission grid in 2024. January 6, 2024
[112] EVNNPT. Press release: EVNNPT successfully completes its tasks in 2024. January 8, 2025
[113] EVN. Various Press Release: 500kV circuit-3 transmission line. 2024

per tonne, reaching USD350–400 per tonne for imported thermal coal.[114] The Vietnam government, reluctant to pass these costs to consumers in the face of inflationary pressure, held the retail electricity price frozen at VND1,864/kWh, unchanged since March 2019.[115] With fuel costs doubling and revenues stagnant, EVN reported a loss of VND36.3 trillion (USD1.55 billion)[116], in 2022 alone, followed by a further loss of more than VND26.8 trillion (USD1.05 billion) in 2023[117], bringing a combined two-year loss to more than VND47.5 trillion (USD2 billion). By the end of 2024, after a return to profitability, EVN still carried an accumulated deficit of VND38.7 trillion (USD1.48 billion) on its balance sheet.

Generation and fuel procurement were the primary reasons for the financial crunch. Transmission played no role. Across Vietnam's national high-voltage network, the total cost of transmission in 2023 was just VND18,879 billion (VND74.61/kWh), representing 3.6% of EVN's total cost of electricity supply.[118] In 2022, while generation costs increased by 21.5% and imported coal costs rose as much as 163%, transmission costs increased by only 5.56%. On every financial metric, EVNNPT was the most stable segment of the EVN group during its most challenging period (Figure 19).

Figure 19: EVN 2022–2023 cost of supply breakdown from EVN Electricity production cost of VND441 trillion / 2,088.90 VND/kWh



Source: IEEFA analysis.

The separation of EVNNPT created conditions under which transmission investment could continue and expand, while the rest of EVN was forced to limit operational expenses and capital expenditures.

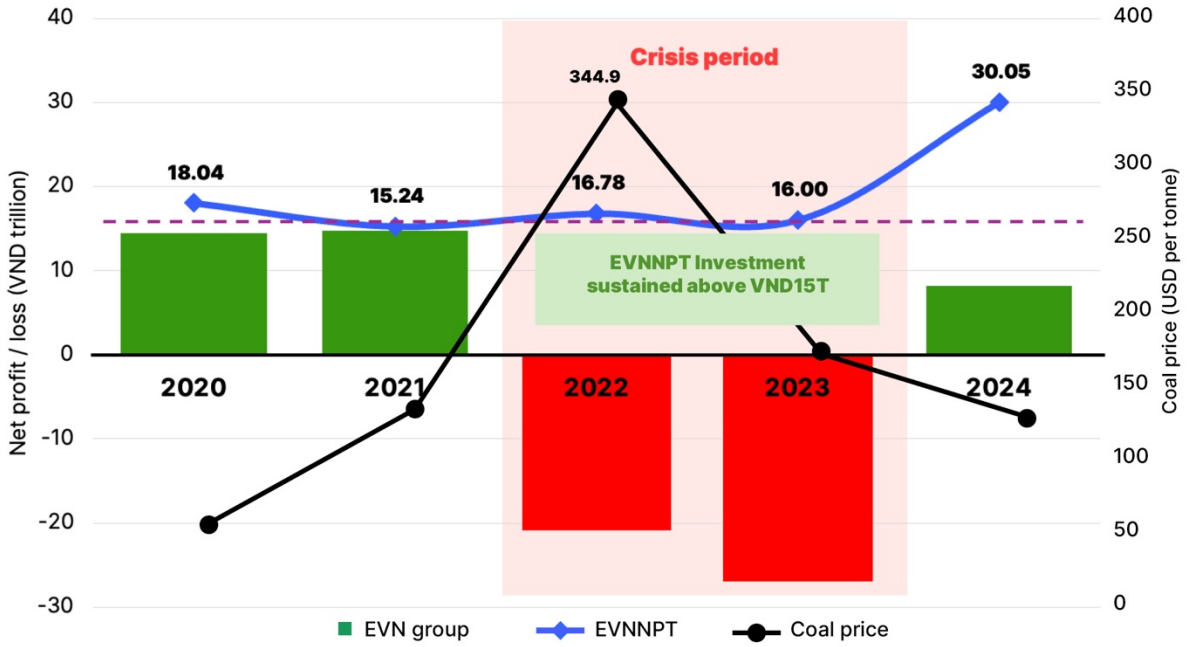
In 2023, the year EVN reported its second consecutive billion-dollar loss, EVNNPT maintained total capital investment of VND15,997 billion[119] (USD660 million), sustaining its transmission expansion program through the crisis without interruption. This was the highest annual investment during the

[114] World Bank. Commodity Markets. 2026.
[115] Vietnam News. Electricity retail price hiked by 3% after four years unchanged. 4 May 2023.
[116] VnExpress. EVN reports $1.5B loss in 2022. 31 March 2023.
[117] VietnamPlus. EVN reports record loss despite electricity price increases (audited report). 14 July 2024.
[118] EVN. Ministry of Industry and Trade announces inspection results of Vietnam Electricity's electricity production and business costs. 10 October 2024.
[119] EVNNPT. Press release: EVNNPT to ensure safe and stable operation of transmission grid in 2024. January 6, 2024

2020–2023 period, while EVN's generation business was in severe financial distress. It included the early works and preparatory investment that enabled the emergency construction of the 500kV Circuit 3 line[120], completed in August 2024.

The following year, with EVN's financial position stabilizing, EVNNPT deployed a record VND30,045 billion in 2024 (USD1.18 billion), nearly double its 2023 level and the highest annual capital investment in the Corporation's history.[121] Despite EVN's financial crisis, the grid continued being built because EVNNPT had its own balance sheet, investment program, and funding identity, separate from the fuel-exposed business that was generating the losses. Additionally, when conditions improved, the ring-fenced platform enabled an immediate and significant acceleration.

Figure 20: EVN group net profit/loss vs. EVNNPT annual capital investment (2020–2024)



Source: IEEFA analysis; EVN annual reports[122]; World Bank, Commodity Markets.

This financial stability resulted from three features of EVNNPT's ring-fenced structure that a fully integrated utility cannot replicate. First, EVNNPT's balance sheet was assessed independently by lenders and DFIs. As its assets, revenues, and liabilities were clearly delineated from EVN's generation business, creditors could evaluate EVNNPT's risk profile on its own merits — a business with no fuel exposure, stable regulated usage, and long-lived fixed assets — rather than inheriting EVN's composite risk rating. Second, EVNNPT's investment program had its own governance and approval processes within the EVN group, which meant that when EVN's executive leadership was

[120] EVN. Infographic: 500kV circuit-3 transmission line. December 12, 2024
[121] EVNNPT. Press release: EVNNPT successfully completes its tasks in 2024. January 8, 2025
[122] EVN. Annual Reports page. 2010-2025

managing the financial crisis in generation, EVNNPT's capital program did not automatically compete for the same constrained resources. Third, regulated transmission charges provided a predictable, legally distinct revenue stream that creditors could identify and separate from the contested retail electricity price that caused EVN's losses.

The contrast with a fully integrated structure is demonstrative. Had transmission remained embedded within EVN, as it is within PLN, every financial assessment of EVN in 2022 and 2023 would have carried the full weight of generation's fuel exposure. Creditors would not have had visibility into a stable, fuel-free infrastructure business within the group. Development finance institutions would have faced EVN's composite credit profile rather than EVNNPT's lower risk one. The result would likely have been slower grid investment, higher financing costs, and a transmission bottleneck.

3.3.4 Did separation cause electricity prices to rise?

Vietnam raised retail electricity prices four times between May 2023 and May 2025: by 3%, 4.5%, 4.8%, and 4.8% again, bringing cumulative growth to more than 17% over two years.[123] Transmission costs did not contribute to these increases. According to EVN and the MOIT, these price hikes resulted from rising generation input costs for coal and liquefied natural gas (LNG), as well as foreign exchange volatility affecting PPAs.

The transmission tariff of VND74–75/kWh in 2023 represented approximately 3.6% of the average retail electricity cost[124] (Figure 19). Raising the transmission tariff by 10% — enough to restore EVNNPT to a small positive margin — would have added less than 0.4% to the consumer price of electricity. Therefore, transmission separation did not cause a single price increase; the upward pressure is attributable to fuel costs and a frozen tariff.

3.3.5 Relevance for Indonesia

Vietnam's experience offers Indonesia three distinct insights. First, EVNNPT's subsidiary structure mirrors the model proposed for PLN: a dedicated corporate entity with its own operational mandate, balance sheet, and management structure, while remaining fully integrated within a state-owned holding group. This institutional clarity — through a named, ring-fenced transmission entity — makes grid investment clear to policymakers, regulators, and financiers, even before full tariff reform is implemented.

The existence of EVNNPT as a named corporate entity provided a vehicle to centralize transmission investment decisions, monitor performance, and sustain high capital deployment through the 2022–

[123] EVN. Vietnam's retail electricity price climbs 4.8%. 10 May 2025.
[124] EVN. Ministry of Industry and Trade announces inspection results of Vietnam Electricity's electricity production and business costs. 10 October 2024.

2023 financial crisis. By contrast, PLN's current regional transmission units lack this corporate-level institutional identity.

Second, Indonesia is better positioned to capture the benefits of transmission ring-fencing than Vietnam was. In Vietnam, transmission tariffs remain below cost recovery, the regulatory framework is still developing, and the 2023 crisis prompted a reactive investment response. Indonesia, by contrast, can establish a ring-fenced transmission subholding within PLN before the generation–grid mismatch becomes acute. This can be accomplished with a clearer regulatory mandate and access to a larger domestic capital market. The opportunity is not only to avoid a crisis like Vietnam's, but also to build the investment capacity demonstrated by EVNNPT in 2023, under planned design rather than in crisis conditions.

Third, Vietnam's reform trajectory shows that institutional separation of transmission does not require market liberalization to deliver value. EVNNPT operates as a regulated state-owned entity, with no competitive market for transmission services and no private ownership of the high-voltage backbone. Yet its subsidiary structure has provided a more coherent basis for grid planning and investment than a fully integrated utility would have allowed. For Indonesia, this suggests that the primary benefit of establishing a PLN transmission subholding lies in institutional clarity and financial ring-fencing, rather than in downstream market reforms.

Vietnam's experience reinforces the argument that ring-fencing transmission within a state-owned holding structure is not merely a risk-mitigation measure; it is what enabled EVNNPT to deploy record investment in the year its parent company lost over a billion dollars.

In Indonesia, a ring-fenced PLN transmission subholding would be able to keep financing, building, and attracting capital regardless of factors affecting generation. Transmission separation can enhance financial resilience and increase the investment capacity required to support grid expansion over the coming decade.

4 Indonesian precedents for transmission corporatization

Indonesia's utility and infrastructure sectors already incorporate several regulatory and institutional arrangements that align with the financial and governance principles typically applied to transmission infrastructure. These precedents suggest that establishing a dedicated transmission entity within PLN would represent an institutional evolution rather than a fundamental restructuring of the electricity sector.

Three aspects of Indonesia's current framework are particularly relevant: the cost-recovery structure embedded in electricity tariffs and subsidies, the use of corporate subholding within PLN, and the broader practice of corporatizing energy network infrastructure in other sectors.

4.1 Gas pipeline infrastructure as a regulated network industry

Indonesia's natural gas pipeline network provides a strong domestic precedent for organizing energy infrastructure as a regulated, open-access network industry. Gas pipelines share several structural characteristics with electricity transmission systems: both are capital-intensive network assets, both function as natural monopolies within defined corridors, and both provide essential infrastructure that supports broader energy markets. Understanding how gas pipelines are regulated in Indonesia is therefore not simply a sectoral comparison, but an illustration of what already exists within the country's regulatory framework.

At the core of this model is the separation between infrastructure and commodity. Pipeline operators do not earn revenues from the sale of gas, but from transportation tariffs paid by network users.[125, 126] These tariffs are regulated by Indonesia's Downstream Oil and Gas Regulatory Agency (BPH Migas) and are designed using a cost-of-service approach.[127] In practice, operators propose a tariff based on the cost of building and operating the pipeline, including capital investment, operations and maintenance (O&M) costs, and a reasonable return on capital. These proposals are reviewed and approved by the regulator to ensure that tariffs are transparent, fair, and allow full cost recovery. This creates a stable and predictable revenue model aligned with long-term infrastructure investment.

Open access is a defining feature of this framework. Pipeline operators are required to provide third-party access, allowing multiple users (shippers) to utilize the same infrastructure under regulated terms.[128] While Perusahaan Gas Negara (PGN) and Pertagas are the dominant operators, other

[125] Government of Indonesia. Peraturan Pemerintah (PP) No. 36 Tahun 2004: Upstream and Downstream Natural Gas Business Activities. 14 October 2004.
[126] Government of Indonesia. Peraturan Pemerintah (PP) No. 30 Tahun 2009: Amendment to PP 36/2004. 24 March 2009.
[127] Badan Pengatur Hilir Minyak dan Gas Bumi. BPH Migas No. 08 Tahun 2013: Penetapan Tarif Pengangkutan Gas Bumi Melalui Pipa. 19 August 2013.
[128] Badan Pengatur Hilir Minyak dan Gas Bumi. Peraturan BPH Migas Nomor 3 Tahun 2024: Pemanfaatan Bersama Fasilitas Pengangkutan Gas Bumi Melalui Pipa. 3 October 2024.

entities, including joint ventures and upstream producers, have also developed pipeline infrastructure for specific projects. Importantly, ownership of pipeline assets does not imply exclusive use. The network operates as a shared platform governed by regulated access arrangements.

A relevant example is PT Transportasi Gas Indonesia (TGI), a joint venture majority-owned by PGN, which operates a cross-border gas pipeline transporting natural gas from Sumatra to Singapore.[129] This demonstrates how regulated transmission infrastructure with defined tariffs and independent revenue streams can support long-term cross-border energy trade — a model that is directly relevant to Indonesia's emerging ambitions in regional electricity interconnection.

The gas sector also illustrates how regulated network businesses can access capital markets while remaining under state control. PGN was publicly listed on the Indonesia Stock Exchange (IDX) in December 2003 as PGAS. Following the 2018 state-owned enterprise holding restructuring,[130] PGN became a subholding of Pertamina, which currently owns approximately 57% of the listed entity, with the remaining shares freely traded and including foreign institutional investors.[131] As a regulated infrastructure operator with predictable, tariff-based revenues, PGN has been able to attract long-term domestic and foreign investors and diversify its funding sources beyond state support and bank lending, while the state retains control through the Pertamina holding structure. This mirrors the minority divestment model that could be applied to a PLN transmission subholding.

This experience is highly relevant for the electricity sector. Although Indonesia's current regulatory framework does not yet enable full power wheeling, the gas sector demonstrates that open-access infrastructure, regulated tariffs, and cost recovery mechanisms are already embedded in Indonesia's energy system. Extending these principles to electricity transmission through a corporatized transmission entity would support more efficient grid utilization, establish a bankable revenue framework, and create opportunities for future development of power wheeling and cross-border electricity trade.

[129] Transgasindo. Operations & Services. 2026.
[130] The Jakarta Post. PGN officially becomes gas subholding company. 30 December 2018.
[131] Pertamina Gas Negara. PGN Annual Report 2024. Page 101. 28 April 2025.

Table 4: Comparison of gas pipeline and electricity transmission models in Indonesia

Aspect	Gas pipelines (Indonesia today)	Electricity transmission (current PLN model)	Electricity transmission (potential PLN transmission model)
Ownership structure	State-controlled (PGN, Pertagas) with JV participation	Fully integrated within PLN	PLN subholding (ring-fenced transmission company)
State control	Maintained through State-owned enterprise ownership and regulation	Full state control via PLN	Maintained via PLN holding structure
Access to network	🔓 Open access (third-party use required)	🔒 Limited / no power wheeling	🔓 Potential shared access (regulated)
Revenue model	💰 Transport tariff (toll fee from shippers)	⚠️ Bundled within PLN system revenue	💰 Regulated transmission tariff (use-of-system charges)
Tariff setting	BPH Migas (regulated, cost-of-service)	Implicit / administratively determined	Transparent regulatory framework (cost-based)
Cost recovery	✅ Full cost recovery + regulated return	⚠️ Partial / not always transparent	✅ Full cost recovery + regulated return
Return profile	📈 Infrastructure-like, stable and predictable	⚠️ Low effective returns (~2–4%)	📈 Improved, predictable infrastructure returns
Regulatory oversight	Dedicated downstream regulator (BPH Migas)	Ministerial / internal oversight	Potential independent or strengthened regulatory role
Capital market access	📊 Proven (PGN IPO, bonds, long-term financing)	🏦 Limited, reliant on PLN balance sheet	Potential access to bonds / equity / blended finance
Investment attractiveness	✅ Generally bankable infrastructure	⚠️ Challenging without state support	✅ Improved bankability and investor clarity
Cross-border role	🌏 Established (e.g. TGI pipeline to Singapore)	❌ Limited	🌏 Potential electricity exports & interconnections

Source: IEEFA analysis. BPH Migas Regulation No. 1/2023 on tariff determination. BPH Migas Regulation No. 3/2024 on third-party access. Government Regulation No. 48/2019. BPH Migas publications. PGN annual reports and IDX listing data.

Indonesia already applies regulated, open-access principles in its gas infrastructure sector. Employing similar principles to electricity transmission would strengthen investment, improve transparency, and strengthen system efficiency, while maintaining state control.

4.2 Cost-recovery framework in Indonesia's electricity tariff system

Indonesia's electricity sector already operates under a regulated cost-recovery framework that balances affordable tariffs with the financial sustainability of the national utility. This arrangement provides an important precedent for financing transmission infrastructure within the existing electricity system.

For several customer groups, electricity tariffs are set below the full cost of supply as part of the government's public service obligation (PSO). Under Law No. 30 of 2009 on Electricity[132] [133], the state is responsible for ensuring the availability of electricity at affordable prices, while PLN acts as the primary implementing entity. To maintain financial viability, the Government of Indonesia compensates PLN for the difference between the regulated electricity tariffs and the allowable BPP plus a regulated margin.

According to PLN's financial disclosures, this margin is currently approximately 7% of the cost of supply.[134] The subsidy calculation mechanism is governed by regulations issued by the Ministry of Finance, including Minister of Finance Regulation No. 20 of 2025[135], which defines the methodology for calculating electricity subsidies and compensation.

In practice, this framework functions as a cost-recovery system with regulated returns, allowing PLN to recoup the costs of providing electricity, including generation, transmission, and distribution, while electricity tariffs remain controlled for affordability reasons. The regulated margin is designed to support PLN's financial sustainability and investment capacity rather than to reflect market-based returns.

Financial projections in the RUPTL 2025–2034 illustrate the investment challenges associated with this structure. The plan identifies several transmission and rural electrification projects that are not commercially viable under current tariff conditions. According to the RUPTL analysis, closing the viability gap for these projects would require additional government support equivalent to approximately IDR240 trillion, either through PMNs or adjustments to the regulated margin. Under these scenarios, project returns could increase to approximately 9%–10%, improving their financial viability.[136]

These projections highlight an important feature of Indonesia's electricity sector: grid expansion already relies on a combination of regulated cost recovery and fiscal support rather than purely

[132] Indonesia. Undang-Undang Nomor 30 Tahun 2009: Ketenagalistrikan. 23 September 2009.
[133] Indonesia. Undang-Undang Nomor 6 Tahun 2023: Penetapan Peraturan Pemerintah Pengganti Undang-Undang Nomor 2 Tahun 2022 tentang Cipta Kerja menjadi Undang-Undang. 31 March 2023.
[134] PLN. Annual Report 2024. Government electric subsidy. Page 233 and 668.
[135] Ministry of Finance. Regulation No. 20 of 2025 on Procedures on Provisioning, Calculations, Payments and Accountability for the. Electricity Subsidy. 11 March 2025.
[136] PLN. Electricity Supply Business Plan (RUPTL 2025-2034). Section VI.2 & 3. 26 May 2025.

commercial investment. Transmission assets are financed through a mix of regulated cost recovery, PMNs, and cross-subsidies from the broader PLN balance sheet. However, since these flows are bundled within PLN's consolidated accounts, they are largely invisible to investors.

A ring-fenced transmission entity would not require new regulation. The cost-plus-margin framework, the BPP methodology, and the PMN mechanism would all continue to apply. The only change would be in transparency. Transmission costs, revenues, asset base, and regulated return would be disclosed on a stand-alone basis, producing the auditable financial information that domestic and international capital markets require to price long-tenor infrastructure debt and equity. Therefore, establishing a dedicated transmission entity would not fundamentally alter the regulation governing transmission infrastructure. Instead, it would make transmission costs more transparent by separating grid investments and operations from other components of PLN's electricity supply system.

4.3 Corporate structuring within the PLN group

Another important precedent for the proposed PLN transmission company is the existing corporate structure within PLN. The company operates through multiple subholdings and subsidiaries that manage different segments of the electricity sector while remaining under the ownership and strategic direction of the PLN holding company.[137, 138] This demonstrates that functional separation within a state-owned utility can be implemented without compromising state control or system integration.

In 2022, PLN completed a major corporate restructuring that formalized a holding and sub-holding architecture.[139] Four sub-holdings were established: two generation companies, PLN Indonesia Power and PLN Nusantara Power, with a consolidated capacity of over 39GW, are among the largest power companies in Southeast Asia; PLN Energi Primer Indonesia manages the primary energy supply chain, including coal, diesel, gas, and biomass procurement and logistics; and PLN Icon Plus provides services beyond electricity, including broadband and electric vehicle (EV) charging infrastructure. These sub-holdings sit alongside longer-established entities such as PLN Batam, which operates as a regional, ring-fenced utility serving the Batam Free Trade Zone with its own tariff-setting mechanism approved by MEMR and without reliance on government subsidies and compensation, resulting in a distinct financial and operational framework compared to PLN.[140, 141]

Each of these entities maintains its own financial accounts and operational management while remaining fully integrated within the PLN corporate group. PLN Indonesia Power and PLN Nusantara Power have also established second-tier subsidiaries, including PLN Nusantara Renewables, which

[137] PLN. Company Profile 2025. September 2025.
[138] PLN. Annual Report 2024. Page 129
[139] PLN. Annual Report 2024. Page 110
[140] PLN Batam. PLN Batam Siap Laksanakan Kebijakan Tarif Listrik dari Pemerintah, Sediakan Listrik Andal dan Berkeadilan. 28 June 2025.
[141] MEMR. Kementerian ESDM Sesuaikan Tarif Listrik PLN Batam bagi Pelanggan Mampu, Pemerintah, dan KSO. 27 June 2025.

develops utility-scale renewable projects, such as the 145MW Cirata floating solar plant, through joint ventures with private and foreign partners.[142] PLN Nusantara Renewables also adopts a project-based structure through the establishment of dedicated project companies (SPVs), including PT Nusantara Sembcorp Solar Energi (NSSE) for the 50MW solar project supporting the Nusantara development. [143] Additional projects, including the planned Karangkates floating solar project, are expected to follow a similar SPV-based development and financing approach.

This structure demonstrates that functional separation within a state-owned holding company is already an established practice in Indonesia's electricity sector. Corporate subholdings and subsidiaries allow specific functions to be managed more efficiently while maintaining state ownership and system integration. Government and industry commentary has further framed the 2022 restructuring as a step towards potential capital markets participation by PLN sub-holdings, including the possibility of minority equity divestment once these entities reach commercial readiness.[144]

This framing is directly relevant to the transmission question: the institutional framework for a sub-holding with a distinct mandate, ring-fenced accounts, and access to external financing already exists within PLN. A PLN transmission company could adopt a similar model. Transmission assets and operations could be consolidated under a dedicated subholding responsible for grid development, operation, and maintenance, while remaining under the ownership and oversight of the PLN holding company and the Government of Indonesia.

The key difference from existing generation sub-holdings is that transmission is a natural monopoly subject to cost-of-service regulation. This makes it well-suited to a regulated utility financing model, which supports long-tenor infrastructure debt and enables participation from pension funds, insurance companies, and other long-horizon investors, both domestically and internationally.

PLN's existing use of sub-holdings and project-level entities demonstrates that ring-fencing, partnership-based financing, and function-specific management are already embedded within the group — making the establishment of a dedicated transmission company a natural extension of current practice rather than a structural departure.

[142] PLN Nusantara Renewables. Cirata Floating Solar Power Plant portfolio.
[143] PLN Nusantara Renewables. Portfolio.
[144] The Jakarta Post. Analysis: PLN restructuring paves way for subsidiary privatization. 5 October 2022.

5 Implications

Establishing a separate PLN transmission company would have implications that extend beyond financing mechanisms. It would influence how grid investment is planned and financed, how system operations are governed and priced, how private investors interact with the electricity system, and how Indonesia manages the legal and institutional framework of the power sector.

The previous chapters described the rationale and possible structure of a corporatized transmission entity within PLN. This chapter focuses on the practical implications of such an arrangement, examining how a dedicated transmission company could affect PLN's investment capacity, operational transparency, private sector participation, cross-border electricity trade, and regulatory governance.

The discussion does not assume a fundamental restructuring of Indonesia's electricity market. Instead, it considers how corporate separation and regulatory clarity within the existing vertically integrated framework could strengthen the development and operation of Indonesia's transmission system.

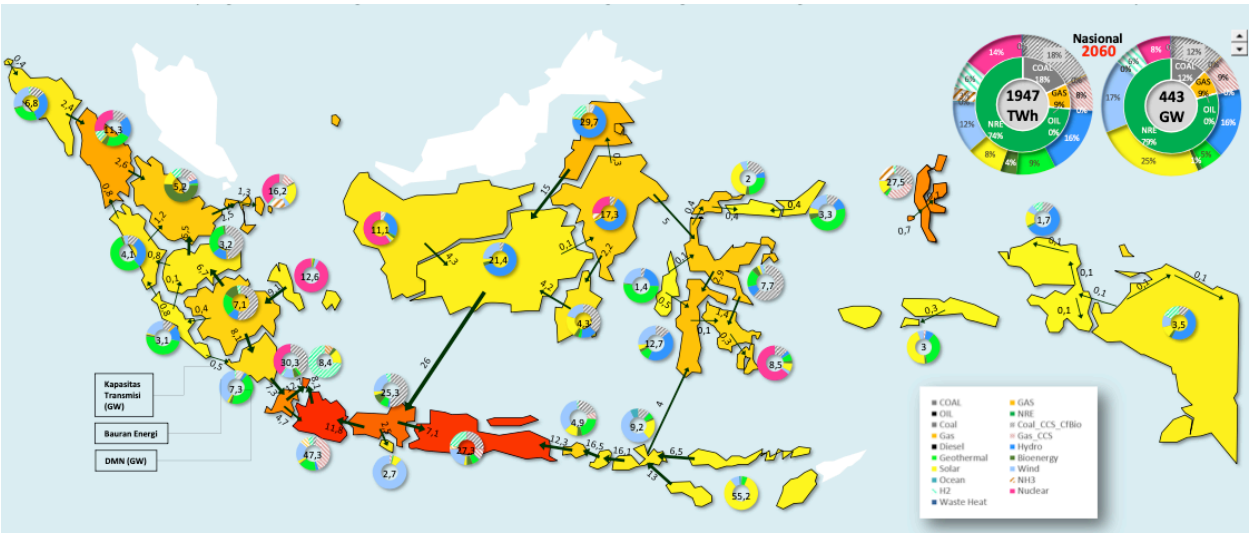
5.1 Implications for PLN's role and investment capacity

PLN faces sustained and growing transmission investment requirements over the coming decades. Pressure to modernize, interconnect, and expand the grid is evident from both the demand and supply sides of the electricity system.

On the demand side, electrification of transport and industry, the emergence of large electricity consumers such as data centers, and overall rising electricity consumption are increasing the need for transmission capacity, redundancy, and reliability.

On the supply side, the scale and geographic dispersion of renewable energy development require a grid that is more extensive, flexible, and resilient than the historically centralized system dependent on fossil fuel generation.

Figure 21: Energy flow across provinces in Indonesia in 2060



Source: RUKN[145].

A separate transmission company would change how PLN responds to this challenge. Instead of relying primarily on government budget allocations, periodic multilateral lending, or project-specific export credit financing, transmission development could evolve into a continuous infrastructure investment program supported by multiple financing channels.

This does not eliminate the role of public or development finance. Instead, it reduces reliance on funding sources that are episodic, slow to mobilize, or constrained by fiscal cycles.

For PLN as a corporate group, this structure could also reduce internal competition for capital. Transmission investment would no longer compete directly with generation development, fuel procurement, or distribution expansion within a single balance sheet. PLN's central role would shift towards system planning, integration, and reliability oversight, while the transmission company would become the primary vehicle for mobilizing and deploying long-term capital for grid infrastructure, based on projects identified and approved under the RUPTL.

This dynamic is relevant in the context of Danantara's existing engagement with PLN. In December 2025, Danantara signed a Head of Agreement (HOA) with PLN to explore investment in renewable generation projects through PLN's renewable subsidiaries.[146] The agreement focuses on generation, while the transmission network required to connect and deliver output from new renewable capacity is not included. Generation investment that outpaces grid development risks producing capacity that cannot be fully dispatched, reducing returns for both PLN and Danantara. Establishing a ring-fenced PLN transmission company would allow transmission investment to be planned, financed, and

[145] MEMR. *Rencana Umum Ketenagalistrikan Nasional* (RUKN). Page 248. 5 March 2025.
[146] PLN. Danantara Indonesia and PLN Explore New Renewable Energy Investment Opportunities. 23 December 2025.

assessed on the same basis as the generation investments already under consideration. This would ensure coordinated system development and financial coherence.

5.2 Legal, institutional, and implementation considerations

Indonesia's electricity sector operates under a constitutional and statutory framework that treats electricity as a vital public service and a sector of strategic national importance. The principal statute, Law No. 30 of 2009 on Electricity[147, 148], establishes power supply for public welfare as a state responsibility carried out under government control. While the law recognizes generation, transmission, distribution, and sales as distinct business activities, it allows these undertakings to be conducted either in an integrated manner or through separate business entities, subject to licensing and regulatory oversight.

This legal structure has been further clarified by Constitutional Court Decision No. 39/PUU-XXI/2023[149], which invalidated the concept of mandatory "unbundling" of electricity supply businesses. The Court reaffirmed that electricity, as an essential public service, must not be fragmented in a way that weakens state control or undermines public accountability. This ruling has raised concerns among labor unions and other stakeholders, particularly where unbundling is associated with privatization, market liberalization, or reduced employment security.

It is therefore essential to distinguish between unbundling in the constitutional sense and the type of corporate and financial partitioning proposed in this report. The Constitutional Court decision does not prohibit internal corporate structuring within a state-owned enterprise, nor does it prevent the establishment of wholly or majority state-owned subholdings or subsidiaries to perform specific functions. Rather, it discourages the fragmentation of electricity services in a way that would undermine the state's ability to control and deliver electricity as a public good.

[147] Indonesia. Undang-Undang Nomor 30 Tahun 2009: Ketenagalistrikan. 23 September 2009.
[148] Indonesia. Undang-Undang Nomor 6 Tahun 2023: Penetapan Peraturan Pemerintah Pengganti Undang-Undang Nomor 2 Tahun 2022 tentang Cipta Kerja menjadi Undang-Undang. 31 March 2023.
[149] Constitutional Court of the Republic of Indonesia. Summary of decision for case number 39/PUU-XXI/2023.

Table 5: Corporate ring-fencing of transmission differs from market unbundling

Feature	Market Unbundling	Corporate Ring-Fencing within PLN (Proposed Model)
Ownership of assets	Often involves privatization or separate ownership	Assets remain under PLN and state ownership
Market structure	Introduces competition in electricity supply and network access	PLN remains vertically integrated holding company
Regulatory objective	Create competitive electricity markets	Improve transparency, financing, and operational accountability
Transmission operation	Independent transmission operators separate from utilities	Transmission company remains part of PLN group
Constitutional implications in Indonesia	May conflict with Constitutional Court interpretation of electricity as a public service	Consistent with existing PLN subholding structure
Existing companies	Not implemented	PLN Nusantara Power, PLN Indonesia Power, PLN Batam

Source: IEEFA analysis.

This distinction is already reflected in practice. PLN currently operates through multiple subholdings with separate legal identities, balance sheets, and operational mandates, including generation entities (PLN Nusantara Power and PLN Indonesia Power) and regional utilities (PLN Batam), without being considered constitutionally challenging. These arrangements demonstrate that functional and financial separation within a state-owned holding structure is compatible with the Electricity Law if ownership, control, and public service obligations remain with the state.

Within this legal context, the establishment of a separate PLN transmission company should be understood as corporate ring-fencing rather than unbundling. Transmission assets would remain under full or majority state ownership, and the transmission business would continue to operate under an Electricity Supply Business License for Public Interest (IUPTLU), subject to ministerial supervision, tariff approval, and PSOs. Transmission would remain a regulated natural monopoly, and no competitive market for transmission services would be introduced.

A further practical consideration arising from such separation is transfer pricing. A dedicated transmission company would require PLN's generation and supply businesses to pay regulated charges for use of the transmission network. In operational terms, this represents an evolution of existing internal cost allocation practices rather than a fundamental change. Internal transfers and accounting allocations already occur within the PLN group. Separation would make these transfers explicit, standardized, and subject to regulatory scrutiny.

Transparent transfer pricing protocols serve several purposes. They strengthen financial discipline by making grid usage costs visible rather than implicitly cross-subsidized. They support tariff determination by clearly linking transmission revenues to costs and investment needs. They also

establish procedures that would be necessary should limited third-party or cross-border access to the transmission system be introduced in the future, ensuring that PLN entities and external users are treated on a consistent and non-discriminatory basis.

Electricity tariffs in Indonesia are ultimately determined through a process involving parliamentary approval. Consequently, tariff adjustments are shaped by broader fiscal and social considerations, particularly when electricity tariffs remain below cost-recovery levels and require government subsidies.

There are also clear boundaries to this reform. Establishing a separate transmission company does not imply placing PLN in competition with private transmission developers, nor does it require broad private ownership of grid assets. Indonesia's policy framework continues to assign primary responsibility for transmission development to PLN, with only limited and clearly defined roles for private participation, subject to government approval. The proposed model operates within these parameters, strengthening internal accountability without altering the public monopoly nature of transmission infrastructure.

From an implementation perspective, the key challenges are regulatory and administrative rather than constitutional. These include defining licensing arrangements for the transmission entity, establishing tariff methodologies, setting internal transfer pricing rules, and ensuring continuity of service and employment conditions. Addressing these issues through ministerial regulation and phased implementation would be critical to maintain stakeholder confidence, particularly among PLN employees and labor unions.

In this context, transmission separation does not weaken the position of electricity as a public good. Instead, it can strengthen state stewardship by improving transparency, accountability, and the grid's financial sustainability, while remaining consistent with the Electricity Law and the Constitutional Court's reaffirmation of state responsibility for essential electricity infrastructure.

5.3 Transparent transmission tariffs and cost recovery

A corporatized transmission entity could also improve transparency in how the costs of grid operations and services are calculated and recovered. Under a vertically integrated utility structure, transmission-related costs are often embedded in the broader electricity supply system and are not always identifiable as distinct components.

A dedicated transmission company within PLN would allow these expenses to be defined more explicitly through regulated transmission tariffs, calculated using a transparent methodology that reflects grid infrastructure and system operation components.

Table 6: Typical components of regulated transmission charges shows the typical components included in regulated transmission charges. Defining these elements through a published tariff

methodology would improve transparency of the transmission cost structure for regulators, policymakers, and electricity system participants.

Such tariff methodologies are typically overseen and approved by regulators to ensure that network operators recover costs while maintaining efficiency and reliability. For Indonesia, establishing a clearer framework for transmission tariffs would align infrastructure investment, system operation requirements, and cost recovery mechanisms. Increased transparency could improve long-term grid planning and expansion and provide policymakers and investors with confidence that transmission infrastructure is financed on a predictable and accountable basis.

Table 6: Typical components of regulated transmission charges

Component	Purpose
Capital investment	Construction of transmission lines, substations, and associated grid infrastructure
Depreciation of assets	Recovery of capital costs over the economic life of transmission infrastructure
Return on capital deployed	Regulated return on invested capital to support long-term infrastructure financing
Operations and maintenance (O&M)	Day-to-day operation of transmission assets, system control centers, and network management
Capital maintenance and asset replacement	Refurbishment and replacement of aging transmission equipment to maintain reliability
System and ancillary services	Frequency regulation, voltage support, power quality management, and system balancing
Transmission losses and technical system costs	Compensation for energy losses occurring within the transmission network
Administrative and regulatory costs	Corporate management, planning, regulatory compliance, and system operation administration
Taxes and statutory charges	Applicable taxes, license fees, and regulatory levies associated with network operation

Source: IEEFA analysis.

5.4 Implications for private investment and grid access

Indonesia's renewable energy ambitions rely significantly on private sector participation in generation development. IPPs, infrastructure investors, and large corporate electricity consumers are increasingly interested in renewable energy projects in the country. However, these investments depend on predictable access to the transmission network.

Clear rules governing transmission access, connection procedures, and cost allocation are essential for reducing uncertainty for project developers. When these rules are unclear, renewable energy projects face higher development risks and longer lead times.

A dedicated transmission entity within PLN could improve transparency in transmission pricing and network access arrangements. While such a structure would not automatically introduce open access or power wheeling, it would establish the institutional conditions necessary for evaluating such mechanisms in the long term.

A related policy approach has been explored in the study "Accelerating Renewables Investment in Indonesia: Shared Use of the Transmission Network", published by IEEFA, IESR, and RE100.[150] This analysis examines how shared use of Indonesia's transmission network could allow renewable energy developers and corporate electricity consumers to transact electricity through PLN's grid under regulated transmission tariffs via a PLN subholding. Such arrangements could mobilize private investment in renewable energy while generating additional revenue streams for PLN through transmission charges.

In this context, transmission reform supports private investment not by liberalizing the electricity market, but by reducing structural barriers that currently limit participation in renewable energy development.

5.4.1 Electricity exports and cross-border interconnection

Indonesia is increasingly positioning electricity exports as part of its broader energy and economic strategy, particularly in relation to neighboring markets such as Singapore and Malaysia. These initiatives are closely linked to the development of large-scale renewable energy resources in Indonesia and to rising regional demand for low-carbon electricity. Active commercial negotiations with Singapore have accelerated this agenda. The June 2025 MOU on renewable electricity exports[151] and Danantara's April 2026 confirmation of its interest in a USD30 billion cross-border solar and transmission project[152], suggest that this is no longer a long-term ambition but an active investment opportunity that requires transmission infrastructure in the near term.

Electricity export is fundamentally a transmission-led activity. Unlike domestic generation projects, export schemes depend on long-term transmission assets, including subsea interconnectors and cross-border lines, whose costs and revenues must be clearly defined over multiple decades. Under an integrated utility structure, these assets are difficult to isolate financially. Their capital requirements compete with domestic grid investments, and their economics are obscured by bundled generation, retail, and subsidy mechanisms.

A separate PLN transmission company would directly address this constraint. Export-related transmission assets could be treated explicitly as regulated infrastructure projects, with tariffs designed to recover the full cost of building, operating, and maintaining cross-border transmission lines. This ensures that such infrastructure is financed on its own merits and that domestic

[150] IEEFA, IESR, and RE100. Accelerating Renewables Investment in Indonesia: Shared Use of the Transmission Network. 29 April 2025.
[151] Antara News. Indonesia agrees to supply clean electricity to Singapore. 13 June 2025.
[152] The Jakarta Post. Danantara eyes $30b solar project on power exports to Singapore. 26 April 2026.

consumers are not subsidizing exports. It also provides a clearly defined vehicle through which Danantara can deploy capital into regulated cross-border infrastructure under the transparent governance arrangements that long-term investment mandates require.

Transmission separation also enables open or shared access to export interconnectors. Rather than linking export capacity to a single generator or bilateral arrangement, regulated access rules allow multiple qualifying generators to utilize the same transmission corridor, subject to system constraints and approved tariff rules. This promotes competition on the supply side, improves price discovery, and strengthens Indonesia's credibility as a long-term export partner. The absence of such a framework has already caused material delays: none of the solar export projects commissioned under the 2023 Indonesia–Singapore MOUs[153] had broken ground as of early 2026. Indonesia's five-year export permit cap[154, 155] creates a tenor mismatch with lender requirements for 20 to 25 years of regulatory certainty, rendering such projects effectively unfinanceable.[156] While resolving the permit framework requires a separate regulatory process, a ring-fenced transmission company could provide the stable, long-term infrastructure counterparty that any viable export financing structure will ultimately require.

In this way, a separate transmission company would enhance Indonesia's position in electricity export negotiations. It would provide importing countries and financiers with clarity on cost recovery, governance, and access arrangements, while preserving national control over strategic infrastructure.

5.4.2 Regional integration and the ASEAN Power Grid

Transmission separation also aligns Indonesia with the long-term vision of the ASEAN Power Grid (APG), which seeks to interconnect national power systems across Southeast Asia to improve energy security, enable renewable energy trade, and lower system costs. Recent APG developments emphasize the importance of strong national transmission institutions as a prerequisite for effective regional integration.[157]

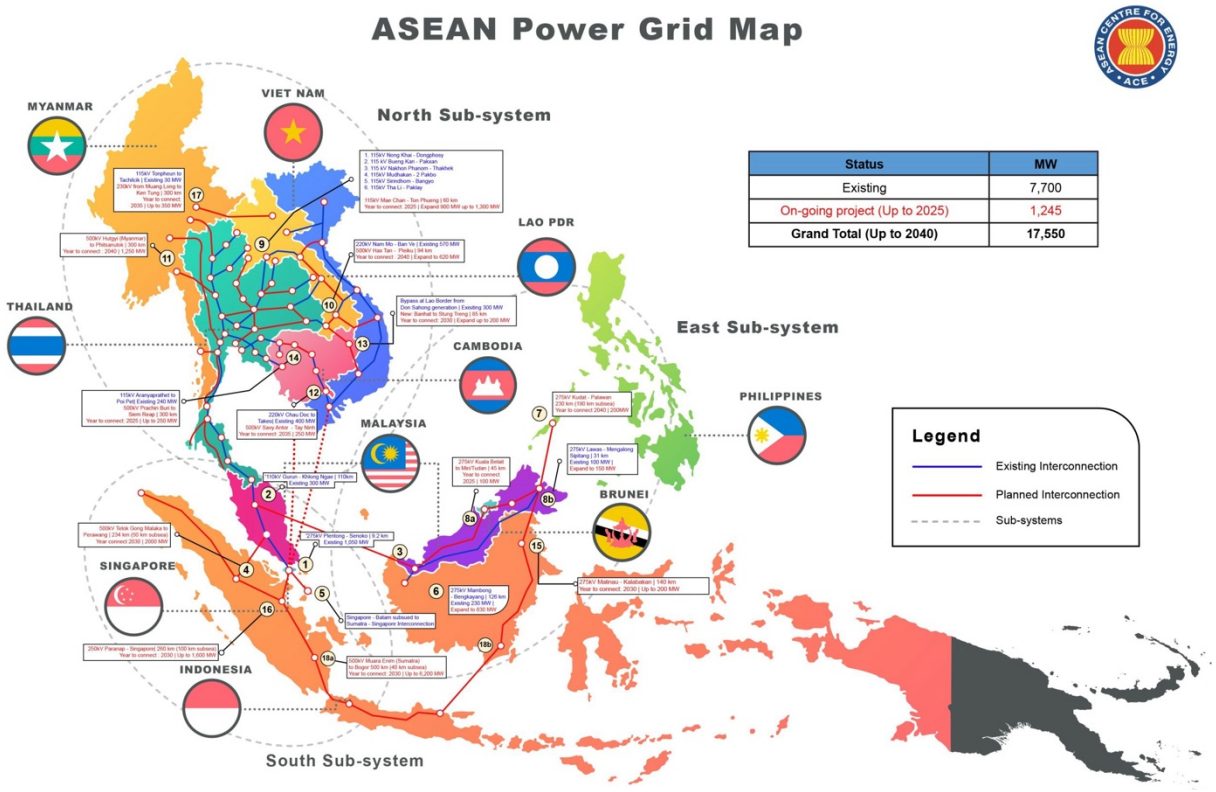
A key step supporting this vision is the ASEAN Power Grid Financing Initiative, supported by the ADB and the World Bank Group.[158] This initiative aims to mobilize large-scale, long-term financing for cross-border transmission projects by improving coordination between governments, utilities, and financiers.

A dedicated PLN transmission company would be well-positioned to participate in this framework. With regulated tariffs, transparent cost recovery, and a clear institutional mandate, the transmission

[153] MEMR. Indonesia-Singapura Jalin Kerja Sama Energi Rendah Karbon dan Interkoneksi Listrik Lintas Batas. 8 September 2023.
[154] Government of Indonesia. Peraturan Pemerintah (PP) No. 42 Tahun 2012: Jual Beli Tenaga Listrik Lintas Negara. 12 March 2012.
[155] MEMR. PermMen ESDM Nomor 5 Tahun 2025: Pedoman Perjanjian Jual Beli Tenaga Listrik dari Pembangkit Tenaga Listrik yang Memanfaatkan Sumber Energi Terbarukan. 4 March 2025.
[156] The Strait Times. 'Should have started by now': Indonesia's plan to export solar energy to Singapore hits a snag. 10 March 2026.
[157] ASEAN Centre for Energy. ASEAN Power Grid Updates 2025. 25 November 2025.
[158] ASEAN. ADB and World Bank Group Launch the ASEAN Power Grid Financing Initiative. 15 October 2025.

entity could engage directly with multilateral financing platforms and regional planning processes. This improves Indonesia's ability to translate policy commitments into bankable projects within the APG framework.

Figure 22: ASEAN Power Grid Map



Source: ASEAN Centre for Energy[159].

More broadly, regional grid integration requires compatibility in how transmission assets are planned, regulated, and financed. By aligning its domestic transmission infrastructure with international standards, Indonesia would strengthen its credibility as a regional partner and reduce risks in cross-border project development.

In this context, transmission separation is not only a domestic reform. It is a strategic step that enables Indonesia to participate more effectively in regional electricity trade and leverage financing initiatives for infrastructure that serves both national and ASEAN objectives.

[159] ASEAN Centre for Energy. ASEAN Power Grid Interconnections Project Profiles. 26 September 2024.

6 Conclusion and policy recommendations

Indonesia's electricity transmission network is a central pillar of the country's economic development and energy transition. Rising electricity demand, rapid electrification, large-scale renewable energy deployment, and emerging opportunities for cross-border electricity trade all depend on sustained, long-term investment in the grid. The scale of this investment challenge is substantial, persistent, and structural. It cannot be met reliably through annual budget allocations, periodic development bank loans, or internal cross-subsidies alone.

From an economic perspective, transmission is well-suited to long-term infrastructure financing. It is capital-intensive, long-lived, and characterized by stable, predictable usage with dependable cash flows. International experience shows that when transmission is treated as a regulated infrastructure business, it can attract lower-cost capital from diverse financiers and investors, extend financing tenors, and reduce overall system costs. The economic benefits extend beyond the power sector by enabling industrial growth, improving reliability, and lowering the cost of integrating new generation.

India's experience with PGCIL demonstrates how a corporatized, financially focused transmission operator can achieve self-financing for capital investment. A well-regulated tariff specifically addressing transmission finance and operations facilitates capital raising and also generates material dividends for the Government of India. This approach aligns with the mandate established under Indonesia's Law 19 of 2003 on state-owned enterprises, and reflects the objectives underlying Law 1 of 2025, which established Danantara as an investment management institution for the Government of Indonesia.

This report finds that Indonesia's current institutional arrangement obscures these economic characteristics. Transmission investment competes internally with generation and supply activities that face different risks and policy objectives. As a result, the grid is effectively financed as a residual function rather than as core infrastructure. This increases financing costs, constrains investment, and risks turning the transmission network into a bottleneck for economic growth and renewable energy deployment.

In Vietnam, the government recognized the foundational role of the transmission system in the electricity sector and established the ring-fenced EVNNPT transmission entity. This approach enabled EVNNPT to continue expanding and improving transmission operations. Notably, it also insulated and protected this vital service from the adverse impacts of the 2023 energy and economic crisis.

Creating a distinct PLN transmission subholding, through corporate separation and financial ring-fencing within a wholly or majority state-owned structure, directly addresses this misalignment. By isolating transmission assets, costs, and revenues, the grid becomes financeable on its own merits. Regulated tariffs can support cost recovery and reasonable returns, enabling access to long-term debt, refinancing, and portfolio-based funding approaches that are difficult to deploy within an integrated utility.

The economic benefits of this approach extend beyond domestic grid development. Transparent transmission pricing and governance would support electricity exports, where subsea and cross-border lines require clear cost recovery and long-term investment certainty. It would also align Indonesia more closely with regional initiatives such as the ASEAN Power Grid, which increasingly depend on credible national transmission institutions to mobilize large-scale financing.

Importantly, this reform does not require privatization, market liberalization, or a departure from Indonesia's constitutional framework. Transmission remains a regulated natural monopoly under state control. The change lies in how investment is financed, costs are recovered, and accountability is structured. In this sense, transmission separation is a financial and institutional optimization rather than a structural overhaul of the electricity sector.

6.1 Policy recommendations

1. **Treat transmission as infrastructure, not a residual cost.** Recognizing the grid as a stand-alone infrastructure business allows Indonesia to optimize financing costs and scale investment more efficiently.

2. **Ring-fence transmission assets and cash flows.** Corporate separation through establishing a subholding within PLN clarifies investment needs, supports tariff-based cost recovery, and improves creditworthiness without changing public ownership.

3. **Use regulated tariffs to unlock long-term capital.** Transparent transmission tariffs enable refinancing, bond issuance, and portfolio-based financing that can reduce or even eliminate reliance on state budgets.

4. **Align grid investment with renewable energy deployment.** Clear transmission planning and financing are essential to support Indonesia's ambitious solar and broader renewable energy targets.

5. **Enable electricity exports through infrastructure economics.** Separating transmission allows export-related lines to be financed on their own merits, reducing cross-subsidies and improving project bankability.

6. **Build incrementally, not disruptively.** Initial steps can focus on asset ring-fencing, internal transfer pricing, and tariff transparency, with institutional separation phased in over time.

7. **Preserve public control while improving performance.** Transmission separation strengthens state stewardship by making costs, responsibilities, and investment decisions more transparent. It improves financial governance in the transmission sector, unlocking fiscal sustainability and the potential for self-financing.

8. **Consider listing the PLN transmission entity on the stock exchange**. Listing a separate transmission entity provides clarity on governance, operations, and financial viability, enabling more capital to crowd in and the development of domestic capital markets.

9. **Adopt a strategic approach to transmission management and capital mobilization.** A more structured financing model could enable PLN to deliver its strategic mandate to the Indonesian economy by expanding and improving electricity services without burdening the state budget.

7 Appendix A: India Central Electricity Regulatory Commission (CERC) tariff setting and adjustment mechanism

Power Grid Corporation of India Limited (PGCIL) is regulated by the Central Electricity Regulatory Commission (CERC), an independent regulatory body organized under the Government of India.[160] It functions as a quasi-judicial law body under the Electricity Act of 2003[161], with a five-member tribunal headed by experts in technical, legal and financial fields, along with an ex-officio member from the Central Electricity Authority, the government's leading body on electricity sector planning and operational matters.[162] It is supported by professional research staff that analyzes market-based and sector-based developments to inform decisions.

CERC's objective is to create conditions that ensure robust electricity sector operations while supporting investment in the sector's growth at cost-effective pricing. It does not seek to minimize utility earnings or suppress costs below market levels.

Tariff proposals are submitted as "cases" to the commission for approval. The CERC adheres strictly to the definitions of tariff components provided under the Electricity Act. The commission reviews costs and claims for reasonableness and on the basis of what is needed to meet service performance obligations.

Tariff provisions are set in five-year increments. The current CERC tariff provisions went into effect on 1 April 2024 and run through 31 March 2029.[163]

7.1 Approved annual cost formulation

Transmission tariffs are based on the actual cost incurred by PGCIL in developing, building, operating, maintaining, and recovering the capital invested in a given transmission line project. Costs include land rights acquisition, physical system assets such as substations, towers, and conductors, ancillary facilities needed to operate and maintain the line, initial spare parts, the cost to insure the facilities, and any legal, accounting, financial, or permitting costs. From these elements, an annual cost of operation is calculated, which comprises five primary components:

- Depreciation
- Interest expense on debt used to finance the project
- Return on equity contributed to the project

[160] Central Electricity Regulatory Commission. Main website page. Accessed 29 April 2026.
[161] Government of India. Electricity Act 2003 (No. 36 of 2003). 26 May 2003.
[162] Central Electricity Regulatory Authority. Organizational Structure as of May 25, 2025. Accessed 14 April 2026.
[163] Central Electricity Regulatory Authority. CERC (Terms and Conditions of Tariff) Regulations, 2024-2029. 1 April 2024. This appendix will refer to the provisions of these now current regulations.

- Fixed operation and maintenance expenses
- Interest expense on working capital

Annual costs are projected for a five-year period, which forms the term of the approved tariff. The nature of each component is stringently defined under the Electricity Act. Judges review the costs for reasonableness based on implementation conditions, but within the bounds of the legal definitions.

Depreciation is set at 90% of the final total cost to build and commission the transmission line project, amortized at an accelerated rate over the first 15 years of operations and then at a lower rate for the remainder. This is typically set at 35 years for major transmission infrastructure. A 10% residual value of assets is prescribed.[164]

Interest expense. A notional debt-equity financial structure is applied to each transmission investment project. Given that return on equity (ROE) is a component of the tariff and the return rates are higher than debt interest rates, equity contributions are capped at 30% of the total project cost. Debt interest rates are assessed at either the actual rate, if debt is arranged on a project basis, or on a weighted-average cost of corporate debt if capital is allocated from PGCIL's balance sheet to a project. As observed in PGCIL's financial reports, interest rates in the last two financial years for the company's long-term debt range between 6.94% and 7.65%.[165]

Return on equity is set by the CERC at a fixed rate each fiscal year based on an assessment of PGCIL's market position on the Bombay Stock Exchange (BSE) and National Stock Exchange (NSE). Since PGCIL is one of the components of the BSE Sensex, the top 30 listed companies index, the market cost of capital is readily determined. The tariff regulation factors in delivering a net, post-tax rate of return to PGCIL. In FY2026, the net equity rate of return is 15%.[166] From a tariff-setting perspective, if the goal is to deliver a return net of taxes, then that return must be grossed-up. As such, the full rate of return included in the annual transmission cost calculation is 18%.

If the equity percentage in the transmission line exceeds 30%, the CERC disallows the equity rate of return on the equity in excess and instead treats it the same as debt, assigning the debt interest rate for cost recovery.[167]

Fixed operation and maintenance charges cover recurring costs such as insurance, labor allocation, spare parts, and routine maintenance inputs.

PGCIL incurs **working capital costs** based on the difference between accounts payable and accounts receivable related to the operation of the subject transmission line. Billings and arrears are

[164] CERC. CERC (Terms and Conditions of Tariff) Regulations, 2024-2029. 1 April 2024. Chapter 8, Paragraph 33 (3).
[165] ICRA. Power Grid Corporation of India Limited: Ratings reaffirmed. 18 December 2025. Annexure 1.
[166] CERC. CERC (Terms and Conditions of Tariff) Regulations, 2024-2029. 1 April 2024. Chapter 8, Paragraph 30 (3).
[167] CERC. CERC (Terms and Conditions of Tariff) Regulations, 2024-2029. 1 April 2024. Chapter 5, Paragraph 18.

calculated based on the commercial terms of PGCIL's transmission service agreement with line customers.

Tariff rate determination

The above steps result in an annual total fixed cost for the transmission asset on a per-MW served basis. Typically, customers contract for a specific capacity at a point of connection, and PGCIL ensures that capacity is available for use. The customer pays a fixed charge for a month for that access. Some charges, however, are assessed to customers on a usage basis, which would then require a per-kWh figure. To define that rate, the projected line's usage volume is factored in. A combination of line ratings, nodal flow, and operational performance reliability determines the rate.

Transfer capacity is based on maximum line loss rates, a combination of agreed practical technical limitations, and expected operational standards. Line losses are determined by whether the line is alternating current (AC) or high-voltage direct current (HVDC), the circuit conductor line length, and expected temperature and line load operating conditions. While CERC does not set explicit loss limits, they have established rules on how technical losses are shared among system users.[168]

Line availability standards, a factor of operational performance standards, are set by the regulator. CERC expects PGCIL to maintain a line availability rate of 98% for AC systems. HVDC systems must maintain an availability of 95% for cost recovery and 97.5% or higher to qualify for the incentive. Tariff design provides for incentives and penalties on the rate based on operational performance. Should the performance fall below the applicable threshold — 98% for AC and 95% for HVDC systems — the tariff is reduced by the proportion by which the deficiency falls below those levels. If availability is above target, the PGCIL receives a bonus in proportion to the percentage it exceeds the required level, up to a maximum level of 99.75%.[169]

These penalties or incentives are applied to the applicable fixed charge per month for contracted capacity (the primary means of cost recovery) or to the usage charge per kWh (in specific contracted point-to-point cases).

7.2 Tariff true-ups

Given that transmission system assets are long-lived and the regulator-approved tariff is in place for only five years, PGCIL must approach the CERC again at the end of each five-year period to set a new tariff. At the time of the new petition, however, PGCIL may also apply for a true-up of the previous five-yearly tariff, based on actual expenses incurred.

[168] Central Electricity Regulatory Commission. CERC (Sharing of Inter-State Transmission Charges and Losses) Regulations, 2020 (as amended). 1 July 2020.
[169] CERC. CERC (Terms and Conditions of Tariff) Regulations, 2024-2029. April 1, 2024. Chapter 11, Paragraph 67. Chapter 12, Paragraph 72.

This is perhaps the most important aspect of the Indian national tariff design philosophy: the fundamental principle is to keep the investment whole for its operating life. If economic developments change the cost of operations during the five-year tariff period, regulators offset the loss by incorporating those costs into the new five-year tariff. It should be noted that regulators, based on historic data, may also reduce costs if they are significantly below original assumptions. This keeps the tariff balanced for both provider and purchaser.

7.3 Summary

Transmission tariff design in India ensures that full costs are factored into the establishment of a tariff rate for services. Those costs are periodically adjusted to reflect actual market costs and conditions, with the goal of maintaining service reliability and covering full investment costs. Both the tariff establishment and periodic true-ups create low risk and high predictability for PGCIL, allowing it to raise large amounts of investment capital consistently at low cost.

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