

PROGRAM SOUNDNESS ASSESSMENT

A. Program Description

1. The proposed results-based Sustainable Energy Access in Eastern Indonesia—Electricity Grid Development Program with funding from the ordinary capital resources (\$600 million) of the Asian Development Bank (ADB) will support the State Electricity Corporation (*Perusahaan Listrik Negara* [PLN]) in implementing its Sulawesi and Nusa Tenggara (SNT) power development program. The program is an important component of PLN's 10-year Electricity Power Supply Business Plan (*Rencana Usaha Penyediaan Tenaga Listrik* [RUPTL]), 2017–2026 covering the entire country of Indonesia.¹ The RUPTL includes a 5-year electricity development plan with specific targets for 2017–2021.

2. The program will also support the Government of Indonesia's National Medium-Term Development Plan (*Rencana Pembangunan Jangka Menengah Nasional* [RPJMN]), 2015–2019 to enhance domestic energy security. Measures to achieve this include expanding energy infrastructure and investments, increasing energy efficiency and accessibility, diversifying the energy mix with new and renewable energy sources, reducing greenhouse gas emissions, and increasing private participation. Overall, the RPJMN aims to increase the national electrification ratio from 84%² in 2014³ to 97% by 2019.⁴

3. PLN and ADB have agreed on a RBL program size of \$1,830 million dedicated to SNT, of which \$600 million will be financed by the proposed loan. Table 1 summarises the RBL program scope and size to support PLN's grid development program in SNT.

Table 1: Program Scope

Item	Broader PLN Program	Results-Based Lending Program
Outcome	Enhanced energy security	Enhanced access to more reliable electricity services for residential, commercial, and industrial customers
Key outputs	Transmission backbone system developed and distribution system strengthened and expanded	Distribution system strengthened and expanded; innovation and institutional capacity enhanced
Expenditure size	\$5,057 million (including \$3,385.1 million for base costs)	\$1,830 million (including \$1,214.5 million for base costs), of which: ADB: \$600 million (32.8%); PLN and others (67.2%)
Geographic coverage	Sulawesi and Nusa Tenggara	Sulawesi and Nusa Tenggara
Implementation period	2017–2021	2017–2021

ADB = Asian Development Bank, PLN = State Electricity Corporation (*Perusahaan Listrik Negara*).

Sources: ADB and PLN estimates.

4. The program scope during 2017–2021 covers (i) the strengthening and expansion of the medium- (20 kilovolt [kV]) and low-voltage distribution system, and (ii) the improvement of PLN's operational management and implementation arrangements. The key activity provides for the expansion and reinforcement of the medium- and low-voltage distribution networks. The 2017–2026 RUPTL provides PLN's targets in SNT, which are to: (i) expand its 20 kV

¹ PLN. *Electricity Power Supply Business Plan, 2015–2024, 2016–2025. Five-Year Electricity Development Plan, 2015–2019, 2017–2021*. Jakarta.

² PLN Management Report Information System (*Sistem Informasi Laporan Manajemen* [SILM]).

³ In December 2014, the electrification ratio in Eastern Indonesia was 74.24%.

⁴ Electrification ratios are 97% in Malaysia, 100% in Singapore, 96% in Thailand, and 98% in Viet Nam.

system from 47,256 circuit-kilometers in 2016 to 76,430 circuit-kilometers in 2021; (ii) increase the installed capacity of distribution transformer units to 10,191 MVA by 2021 (2016 baseline: 4,298 MVA); (iii) increase the number of customers from 5.62 million in 2016 to 7.62 million in 2021; and (iv) increase electricity sales from 11.3 terawatt-hours in 2016 to 22.0 terawatt-hours in 2021.

5. All work is located within the eight provinces of SNT in Eastern Indonesia.⁵ The scope of work for the medium- and low-voltage distribution components is in the Program Scope of Work.⁶

B. Program Soundness

1. Relevance and Justification

6. **Justification.** The electrification ratios in some provinces of Eastern Indonesia are disproportionately low—74% in West Sulawesi, 67% in Southeast Sulawesi, 68% in West Nusa Tenggara, 59% in East Nusa Tenggara, and 44% in Papua. The eight provinces in SNT account for around 10% of the country's population, but around 17% of the population without electricity.⁷ The proposed Sustainable Energy Access in Eastern Indonesia—Electricity Grid Development Program aims to increase access to reliable electricity services in Eastern Indonesia by strengthening and expanding electricity distribution networks to connect businesses and households. This will broaden livelihood and education opportunities, spur economic growth, and contribute to reducing poverty and enhancing the quality of life in Eastern Indonesia. The program will complement a proposed sector loan for small- to medium-sized natural gas-fired power stations to deliver more sustainable energy services to communities across Eastern Indonesia.⁸

7. **Technical design.** The 20 kV and low-voltage component of the work will extend the existing distribution system to connect additional customers currently without access to electricity. The technical designs prepared by PLN's technical experts under the direction of the *wilayahs* (regional offices) generally follow PLN's distribution construction standards. The overall distribution design is simple and straightforward, and generally follows international practice. The overhead distribution lines follow the route of public roads, with poles installed along road reserves or private land. When private land is used for the installation of distribution transformers, PLN regulations require written agreements with the landowner. The configuration includes concrete poles, 20 kV insulators and three-phase conductors, overhead mounted 20 kV and low-voltage distribution transformers of various ratings, and low-voltage aerial-bundled conductors with insulated connectors joining service conductors. The aerial-bundled conductor is designed efficiently, is easy to erect, and minimizes illegal connections and associated non-technical losses. Overall distribution losses are expected to decrease from 13% in 2015 to less than 10% in 2021. Connections to individual customers include an insulated single-phase, low-voltage service from the nearest pole, plus a tariff meter (either prepaid or billed) and a miniature circuit breaker for protection and isolation.

8. The proposed works will improve the reliability and capacity of the distribution system using reliable modern materials. Overall, this is expected to reduce the number of faults attributed

⁵ The eight provinces are North Sulawesi, Central Sulawesi, Gorontalo, South Sulawesi, Southeast Sulawesi, West Sulawesi, West Nusa Tenggara, and East Nusa Tenggara. PLN groups these into four *wilayahs*: Sulutenggo (North and Central Sulawesi, and Gorontalo), Sulsebar (South, Southeast, and West Sulawesi), and West and East Nusa Tenggara.

⁶ Program Scope of Work (accessible from the list of linked documents in Appendix 2).

⁷ Recalculated from 2013 data in ADB. 2016. *Achieving Universal Electricity Access in Indonesia*. Manila.

⁸ ADB. 2016. *Concept Paper: Eastern Indonesia Sustainable Energy Access Sector Project*. Manila.

to poor quality construction, old equipment, and substandard voltage. PLN already monitors the system average interruption duration index and system average interruption frequency index, international indicators used to measure the duration and frequency of faults. The duration index value is expected to improve from 1,131 minutes per customer in 2015 to 1,098 minutes per customer in 2020. Similarly, the frequency index value will improve from 27.02 events per customer in 2015 to 26.2 events per customer in 2020.

9. In summary, PLN's plan to develop the SNT power system is strongly justified and operationally viable, and can be expected to (i) expand access to electricity services for households and businesses, (ii) improve the quality and reliability of services, (iii) address peak load requirements, (iv) increase energy sales, and (v) improve customer service delivery. These conclusions underpin the results areas, key actions to be taken, and performance indicators for the sector overall and this program in particular.

10. **Poverty reduction.** Economic growth has played a role in reducing poverty by creating employment opportunities and increasing public expenditure on health, education, and infrastructure. Using its official definition of the national poverty line as Rp 330,776 (\$22.59) per month, the government estimates that 11.2% of Indonesians are living in poverty.⁹ While this is a remarkable decrease from 23.40% in 1999, this still represents 28.5 million people. The many millions of households at or near the poverty line are particularly vulnerable to economic or natural shocks, and it is estimated that more than a quarter of all Indonesians moved into or out of poverty at least once during 2008–2010.¹⁰

11. Under the president and his executive team, Indonesia aims to achieve an 8% growth rate by 2019. Achieving this target will largely depend on the government's ability to improve the energy sector's performance. Having transitioned from a net energy exporter to a significant energy importer, the country has been unable to put in place an appropriate policy framework to adapt to this reality until recently. Early in 2015, the government removed gasoline subsidies and enacted a nearly 30% increase in the price of diesel. It has also removed power tariff subsidies and put in place automatic price adjustment for all but a few categories of consumers.

12. The national poverty reduction strategy incorporated in the RPJMN, 2015–2019 identifies insufficient investment in infrastructure, including in the energy sector, as a critical constraint on economic growth, as infrastructure has been the primary factor driving poverty reduction. The plan also highlights expanding electricity access to all Indonesians and increasing annual per capita consumption from 800 kilowatt-hours to 1,200 kilowatt-hours, along with bolstering domestic energy security by increasing investment in the subsector, expanding gas production, increasing the utilization of renewable energy, and scaling up energy efficiency.

13. **Beneficiaries.** The primary program beneficiaries in SNT will be the approximately 1.3 million new residential customers connected to the distribution grid by 2020.¹¹ Children will be able to read and study at home in the evenings, and the health of their environment will be improved due to the elimination of kerosene lamps and open fires. Through mobile phones and other digital devices that can be charged and powered, people will be able to communicate better, access information, and participate in social life via communication media. Village schools and health centers will also benefit from a connection to electricity, especially from the ability to use refrigeration to store vaccines and other health supplies, and lighting for gloomy schoolrooms and

⁹ Central Bureau of Statistics (*Badan Pusat Statistik*). September 2015.

¹⁰ World Bank. 2012. *Sustainable Energy for All*. Washington, DC.

¹¹ There were 5.23 million residential customers in SNT in 2016.

health posts. The program will also expand electricity access to small and medium-sized businesses, including those relating to tourism, fisheries, and agro-industry, which can contribute to substantial job growth in Eastern Indonesia. The program will further provide economic opportunities for large industries as well as increasing the service quality and efficiency of public services (e.g., hospitals, schools, and government offices) in SNT.

14. **Stakeholder support.** PLN consults frequently and extensively with government and regional authorities regarding all of its activities. PLN's and ADB's plans for the proposed RBL program and further possible loans under the draft country operations business plan, 2017–2019 were presented during a workshop in June 2016 to key energy-sector government stakeholders, including the Ministry of Finance, National Development Planning Agency, Ministry of Energy and Mineral Resources, and Ministry of State-Owned Enterprises, and were strongly supported by all parties.

15. **Gender impacts.** Although expanding and strengthening the electricity grid has no gender-specific actions, women will benefit substantially from the program. A reliable and affordable supply of electricity in the household will reduce the amount of time and energy that women spend to obtain other fuels. Women will also be able to run income-generating activities such as sewing and food processing from their own homes. Replacing polluting wood and kerosene stoves with electric stoves will reduce respiratory disease and other health risks for women. Well-lit communities, schoolrooms, toilets, and streets will deter crime and reduce incidences of violence against girls and women. Electricity supplies in health centers and at the village midwife's home will especially benefit pregnant women and women giving birth. Electricity will also facilitate access to water supplies by making it easier for households to pump¹² and store water, thus alleviating the women's traditional burden of carrying water.

2. Adequacy

16. **Effectiveness.** In line with the RPJMN, 2015–2019, the government aims to expand electrification coverage by increasing investments in the energy sector. The program will support this by strengthening and expanding the power grid in Eastern Indonesia, focusing distribution, and improving PLN's implementation capacity. PLN's planning follows a systematic approach based on detailed calculations of electricity demand and subsequent localized investment needs in generation, transmission, and distribution. These calculations were carried out in line with internationally accepted good practice. The identified investments are thus required, correspond with the planned results, and are likely to achieve the expected program results.

17. **Efficiency and economy.** PLN's systematic planning follows a least-cost approach and considers the private sector for electricity generation where adequate. The component-specific investment needs projected for the program are based on a conventional technical design of medium- and low-voltage works, which PLN deems will best use the available funds and achieve the expected results in the most cost-effective way. The distribution design, involving mostly overhead construction with some underground works in specific urban areas, generally follows standard international practice, and is expected to reduce overall distribution losses (efficiency gains) and provide customers with a more reliable and higher quality supply. As expected, rural or remote areas and peak-load plants are mostly unsuitable for private investment, and PLN undertakes these investments with financing support from the government and its development partners.

¹² Existing water pumps are typically diesel-driven; electricity will provide a cheaper and more efficient alternative.

18. **Adequacy.** PLN projected the engineering, procurement, and construction costs based on detailed calculations of electricity demand and the resulting distribution requirements as expressed in the technical design. ADB calculated the additional cost items required to make the program fully operational (i.e., land acquisition, permits, consultants, project management, and overhead) based on best estimates and experience from previous ADB operations in Indonesia. The allocation of resources for the RBL program as a whole and its components was calculated to match the funding required to generate the expected results. PLN's implementation capacity is adequate, and the absorption of funds is unlikely to become a challenge.

19. The program's disbursement-linked indicators (DLIs) and other key performance indicators center on the increased number of customers, higher energy sales to households, improved reliability, an increased number of transformers,¹³ extension of the medium-voltage network, implementation of pilot smart grid projects, installation of digital prepaid meters, improved asset and waste management, and greater efficiency in completing implementation contracts.

20. **Sustainability.** The outlined RBL program financing plan is expected to be predictable for the initial funding provided by PLN and the development partners, although if PLN fails to meet the agreed DLIs, ADB funding would not be available until the conditions for disbursement are met. PLN is expected to generate the required internal resources and cash flows as per the financing plan, which includes equity investments from the government.¹⁴ Since 88% of these resources are included in the financing plan, the funding appears both sustainable and predictable. However, the "Other" category is to be derived from potential financing from various unspecified development partners, adding some uncertainty to the program's sustainability. These financing sources should be established, and contingency plans for the project's implementation developed if or as required.

3. Financial and Economic Analysis

21. Enabling access to electricity is a core responsibility of the government, which provides low-income groups with subsidies to make the provision of electricity financially viable. PLN occupies a strategically important position as the sole vertically integrated electric utility, considering its dominance in generation, transmission, and distribution. Access to reliable electricity improves economic opportunities, provides health and education benefits, and therefore spurs the productivity of a country's human capital.

22. In 2014, the government announced new regulations on electricity tariffs and subsidies to allow PLN to raise tariffs automatically based on certain parameters. However, subsidies will be maintained for lower income groups. Since January 2015, PLN declared electricity price increases for various tariff classes and several monthly tariff adjustments. Over the last 3 years, tariff increases have averaged 12.7%, significantly higher than the local average inflation rate of 5.7%. The government has supported PLN by making capital investments through guarantees, converting debt to equity, and restructuring its debt. The 2016 state budget provides for an almost \$2 billion equity injection for PLN. It is also piloting a new subsidy setting approach that will rely on performance and incentivize PLN to operate more efficiently in order to capture additional savings. In 2015, the government passed regulations that allow PLN to borrow directly from bilateral and multilateral agencies against a sovereign-backed guarantee. These measures will

¹³ PLN's key performance indicator is based on total transformer capacity. However, this RBL program focuses on the number of transformers to avoid extended low-voltage lines and keep distribution losses low.

¹⁴ Program Expenditure and Financing Assessment (accessible from the list of linked documents in Appendix 2).

enable PLN to meet its financial covenants and enter into significant debt to finance its major investment program, which will more than double its generation capacity over the next 10 years.

23. The proposed program, with \$600 million in funding from ADB's ordinary capital resources, will support PLN in implementing its SNT power development program. Since ADB supports the program through the RBL modality, transactions or payments related to any specific funding source need not be identified. Likewise, funds will be managed based on PLN's financial management system and ordinary procedures for budget preparation, funds release, execution, and accountability. Program accounting and reporting procedures and responsibilities will follow PLN's ordinary approach for program implementation. A private firm will audit PLN's annual consolidated financial statements in accordance with the Standards on Auditing established by the Indonesian Institute of Certified Public Accountants.¹⁵ The external auditor will prepare a separate program disclosure to certify the actual program expenditure¹⁶ and procurement eligibility computation.¹⁷ PLN will submit the annual audited financial statements and program disclosure to ADB within 1 month of approval by the relevant authority. PLN publishes its consolidated financial statements and the independent auditor's report in its annual report.

24. The program's economic viability is evaluated using a system approach that evaluates the entire SNT program, as the benefits depend on interlinked investments in generation, transmission, and distribution. Following ADB's Guidelines for the Economic Analysis of Projects, the economic costs and benefits that accrue from the project are compared in "with-" and "without-project" scenarios over the project's lifetime (25 years of operations from the completion of construction).¹⁸ Investments in generation, transmission, and distribution are expected to increase electricity sales to new and existing customers. An economic internal rate of return (EIRR) can be calculated assuming that the number of customers increases by 5.6% each year according to PLN's plan, and considering standard fuel and operation and maintenance costs for each type of generation plant, based on PLN's specific fuel costs and the typical capacity factors of each type of plant. The evaluated benefits are the increased electricity consumption of new and existing residential, business, industrial, and public customers.

25. Some of the program's positive impacts, such as a more reliable power supply, improved investment climate, increased economic opportunities, and health and education benefits for newly connected households, have not been considered in this calculation due to methodological difficulties. Similarly, the benefits of reduced transmission and distribution losses, lower generation capacity reserve requirements resulting from increased grid interconnections, lower maintenance costs, and longer lifecycles due to more stable grid power are not quantified due to data limitations. Therefore, this calculation underestimates the total benefits, and the actual EIRR will be higher than the one calculated here.

26. Following this approach, the economic analysis of the program yields an EIRR of 14.6% per year, which exceeds the hurdle rate of 9.0% and confirms the program's economic viability. The result is robust. The sensitivity analysis shows that a $\pm 10\%$ variation of the most sensitive variables will still result in EIRRs well above the 9.0% hurdle rate.¹⁹

¹⁵ ADB and PLN will agree on the detailed financial reporting and external audit requirements for the program during loan negotiations; these will be documented in the program implementation document.

¹⁶ The amount of program expenditures for the previous year(s), for the current year, and cumulatively.

¹⁷ The net procurement from ADB member countries is at least equal to the value of ADB disbursements.

¹⁸ ADB. 1997. *Guidelines for the Economic Analysis of Projects*. Manila.

¹⁹ A -10% variation in willingness to pay yields an EIRR of 13.43%, a shadow exchange rate of 1.3 instead of 1.15 yields an EIRR of 12.96%, and a +10% variation in capital expenditure (without any variation in benefits, like in the case of cost overrun) yields an EIRR of 13.21%.

4. Implementation Arrangements

27. **Fiduciary and safeguard functions.** The program will be implemented using PLN's financial management systems as a basis for central and regional budgeting, accounting, internal control, financial reporting, and auditing. The program will use PLN's standard procurement systems for international and national competitive bidding methods for the supply of goods and installation of works. PLN and ADB will agree on specific risk mitigation measures associated with fiduciary and safeguard functions. PLN and ADB must agree on any modification of these measures, which will be reflected in the program action plan (PAP).

28. **Monitoring and evaluation.** Monitoring the achievement of results and compliance with fiduciary and safeguard requirements is a critical component of the program. The program will rely on PLN's existing financial and statistics systems, supplemented by special reports as specified in the DLI protocols. Actions essential to the program's monitoring and evaluation (M&E) functions will be included in the DLIs and PAP. PLN plans to enhance and strengthen its M&E system by, for example, (i) tracking the needs-based power subsector development plan, and (ii) reviewing the protocols used to verify indicators. PLN's Corporate Performance Control Unit currently manages M&E functions by gathering and processing statistics received from all PLN divisions throughout the country; it also coordinates the preparation of PLN's annual statistics. This unit is proposed as one of the focal counterparts responsible for monitoring progress toward achieving the DLIs, as well as any other special reporting requirements associated with the program.

29. **Reviews.** ADB will monitor program implementation through regular technical and financial review missions and a midterm review, as agreed with PLN. Annual reviews will assess and verify the achievement of DLIs; this will be the basis for fund disbursements. A midterm review mission will be conducted after the second year of the program, coinciding with the annual review mission. The midterm mission will review and, if necessary, revise DLIs based on implementation experience and performance up to that time.

C. Managing Risks and Improving Capacity

30. The soundness assessment shows that the program is well justified in terms of its contribution to PLN's RUPTL, 2017–2026 and achieving the goals of the RPJMN, 2015–2019, as well as its expected impact in SNT by improving the power subsector and boosting overall economic development, as measured by the DLIs. PLN must remain committed to the program's implementation to ensure its success.

31. The overall procurement risk is moderate. One risk involves procurement and market capacity. The significant increase in investment in distribution and transmission during implementation may strain the capacity of PLN and the supply markets. Another risk is that large-scale procurements must include suitable safeguards against fraud and corruption. PLN has taken several important initiatives to curb corruption within the organization and has significantly strengthened internal controls. To strengthen PLN's oversight and detection mechanism further, the PAP includes a procurement monitoring framework and spending profile for the program.

32. The key to managing procurement risk in this and subsequent RBL programs with PLN is to monitor all procurement at the corporate level. PLN's procurement guidelines require it to introduce a procurement monitoring system, including a procurement spending analysis. If this is implemented for the program, both PLN and ADB can adequately manage procurement risks and

take corrective action if and when necessary. ADB and PLN have agreed on a procurement monitoring framework.²⁰

²⁰ Procurement Monitoring Framework (accessible from the list of linked documents in Appendix 2).