

PROGRAM SOUNDNESS ASSESSMENT

I. Program Description

1. The proposed result-based Sustainable Energy Access in Eastern Indonesia—Electricity Grid Development Program (Phase 2), is part of a multi-year initiative with a series of inter-related programs and projects with the State Electricity Corporation (Perusahaan Listrik Negara [PLN]) in Eastern Indonesia covering power generation, transmission, and distribution. Phase 1 of the program, approved in 2017,¹ covers Sulawesi and Nusa Tenggara, while the proposed phase 2 covers the remaining regions of Eastern Indonesia, namely Kalimantan, Maluku, and Papua. The program is an important component of PLN's 10-year Electricity Power Supply Business Plan (*Rencana Usaha Penyediaan Tenaga Listrik* [RUPTL]), 2019–2028 covering the entire country of Indonesia.²

2. The program will also support the Government of Indonesia's National Medium-Term Development Plan (*Rencana Pembangunan Jangka Menengah Nasional* [RPJMN]), 2020-24 to stimulate more inclusive growth, with a particular focus on Eastern Indonesia.³ 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.

3. PLN and ADB have agreed on a results-based lending (RBL) program size of \$2,111 million dedicated to the nine provinces across Kalimantan, Maluku, and Papua, of which the proposed loan will finance \$600 million and two grants will finance a total of \$6 million. Table 1 summarises the RBL program scope.

Table 1: Program Scope

Item	Broader PLN Program	Results-Based Lending Program
Outcome	Electricity access in Kalimantan, Maluku, and Papua enhanced	Sustainable, equitable and reliable access to electricity for the population in Kalimantan, Maluku, and Papua enhanced.
Key outputs	(i) Power generation capacity added; (ii) power transmission and distribution systems strengthened and expanded; (iii) increased share of renewable energy	(i) Power distribution network strengthened and expanded; (ii) renewable energy use increased, (iii) institutional capacity strengthened and social monitoring enhanced.
Expenditure size	\$4,964 million	Total: \$2,111 million (including \$1,505 million in EPC costs) PLN: \$1,505 million (71%), including contributions from possible funding partners ADB: \$600 million (28%) + \$6 million (0.3%) poverty reduction and clean energy grants to be administered by ADB ^a
Geographic coverage	All provinces in Kalimantan, Maluku and Papua	All provinces in Kalimantan, Maluku and Papua
Implementation period	January 2020–December 2025	January 2020–December 2025

ADB = Asian Development Bank; EPC = engineering, procurement, construction; PLN = State Electricity Corporation

^a The grants are to be confirmed upon final application approval.

Source: PLN and ADB staff estimates.

¹ ADB. Indonesia. [Electricity Grid Development Program](#).

² PLN. 2019. *Electricity Power Supply Business Plan, 2019–2028*. Jakarta.

³ Government of Indonesia. 2015. *National Medium-term Development Plan, 2015–2019*. Jakarta.

4. The program scope during 2020–2025 covers the (i) strengthening and expansion of the 20 kilovolt (kV) medium- and low-voltage distribution system, (ii) increased use of renewable energy, and (iii) 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 and increase of renewable energy in Kalimantan, Maluku, and Papua, which are to: (i) expand its 20 kV system from 47,639 circuit-kilometres (ckm) in 2018 to 63,692 ckm by 2024; (ii) increase the installed capacity of renewable energy of 40,000 megawatt-hours (MWh) by 2025 and an additional 48,000 MWh by 2025; and (iii) increase the number of customers from 5.22 million in 2018 to 6.77 million by 2024.

5. All work is located within the nine provinces in Kalimantan, Maluku, and Papua in Eastern Indonesia.⁴ The scope of work for the medium- and low-voltage distribution components is in the Program Scope of Work.⁵

II. Program Soundness

1. Relevance and Justification

6. **Justification.** The proposed program focuses on nine provinces in Kalimantan, Maluku, and Papua. The electrification ratios in these provinces are particularly low—households classified as “not electrified” or only “poorly electrified” account for 56% of all households in Papua, 15% in West Papua, 20% in both Maluku and North Maluku, 28%, in Central Kalimantan, 18% in North Kalimantan, and 21% in West Kalimantan.⁶ The proposed program aims to increase access to reliable electricity services in nine provinces 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 nine provinces, Eastern Indonesia.

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 UIWs (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 three-phase conductors and insulators, overhead-mounted distribution transformers of various ratings, and low-voltage aerial-bundled cables with insulated connectors joining service wires connected to households. Connections to individual customers include insulated low-voltage service wires from the nearest pole to revenue meters (prepaid) and line-circuit breakers for protection and isolation. This configuration will help reduce PLN's distribution losses.⁷ The aerial-bundled conductor is designed for easy installation and minimizes illegal

⁴ The nine provinces are West Kalimantan, South Kalimantan, Central Kalimantan, East Kalimantan, North Kalimantan, Maluku, North Maluku, Papua, and West Papua. PLN groups these into five Unit Induk Wilayah (UIW) (regional administrative units) serving nine provinces: (i) North and East Kalimantan (UIW Kaltimra); (ii) South and Central Kalimantan (UIW Kalselteng); West Kalimantan (UIW Kalbar); Maluku and North Maluku (UIW MMU); and Papua and West Papua (UIW PPB).

⁵ Program Scope of Work (accessible from the list of linked documents in Appendix 2 of the Report and Recommendation of the President).

⁶ 2017 data from PLN, provided in October 2018. Poorly electrified households are those who receive intermittent power from small diesel generators and poorly maintained solar plants.

⁷ PLN. 2018. *PLN Statistic 2017*. Jakarta. Distribution losses totaled 6.53% in 2017.

connections and associated non-technical losses, while the pre-paid meters will also help reduce non-technical losses by eliminating human meter reading errors by electronically recharging before electricity is consumed. However, the assessment found that some distribution lines are excessively long with unneeded three-phase conductors installed for single-phase end-customers, which could result in reduced electricity service quality (e.g., through voltage drop, reduced reliability, and increased investment and operational costs). To minimize these technical issues, specific mitigation measures will be addressed in the program action plan (PAP).⁸

8. The proposed program will improve the reliability and capacity of the distribution system, using reliable modern materials. Overall, this is expected to reduce the number of power faults attributed to poor quality construction, old equipment, and substandard voltage. PLN already monitors the system average interruption frequency index. Medium voltage feeder permanent interruptions in the distribution system are expected to improve from 23.29 interruptions per 100 ckm in 2018 to 17.12 interruptions per 100 ckm in 2024. PLN has also implemented a number of renewable energy projects using solar photovoltaic and hydropower and has accumulated significant engineering, operation and maintenance experience. The proposed program will promote the use of clean energy by increasing installed capacity by 85,000 MWh by 2025 (40,000 MWh supported by a grant of \$3 million from the Asian Clean Energy Fund and an additional 48,000 MWh) through power generation from solar photovoltaic, mini and micro-hydro and small biogas plants. With the support of ADB,⁹ PLN established a comprehensive least-cost electrification plan that serves as the basis for future investment planning for rural electrification in Eastern Indonesia. The results and solutions of the least-cost electrification plan will be used during implementation of the proposed program.

9. In summary, PLN's plan to develop the power systems in Kalimantan, Maluku, and Papua 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) promote the use of renewable energy, and (iv) 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. The nine target provinces in Kalimantan, Maluku, and Papua lag in key determinants of wellbeing, such as access to services, human development outcomes, and environmentally sustainable growth. Papua is the poorest and least developed, with 27.76% of the population living below the poverty line of \$33 per person per month.¹⁰ Kalimantan's high provincial gross domestic product per capita masks the poverty in rural remote areas: in many of these subdistricts, a 10%–20% of the population belongs to the poorest quintile, with consumption levels below \$55 per person per month.¹¹ 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 2008–2010.¹²

⁸ Program Action Plan (accessible from the list of linked documents in Appendix 2 of the report and recommendation of the President).

⁹ ADB. 2013. *The Republic of Indonesia for Scaling Up Renewable Energy Access in Eastern Indonesia*. Manila, ADB. 2016. *Achieving Universal Electricity Access in Indonesia*. Manila.

¹⁰ All data are from [Statistics Indonesia](#), [Papua region website](#) and refer to the year 2017.

¹¹ "Poor and near-poor" are used here to indicate the lowest 40% of consumption deciles in Indonesia. [National Team for Acceleration of Poverty Reduction](#).

¹² World Bank. 2012. *Sustainable Energy for All*. Washington, DC.

11. Indonesia's ability to harness and manage sustainable energy sources is a critical prerequisite for the country to continue its growth trajectory. The Government of Indonesia's RPJMN, 2020-24 aims to reduce poverty rates to 5.6%–6.2%, and enhance domestic energy security, including by expanding energy infrastructure and investments, increasing energy efficiency and accessibility, and diversifying the energy mix with new and renewable sources. The proposed RBL program will enhance sustainable, equitable, and reliable access to electricity for the population in nine provinces.

12. **Beneficiaries.** The primary program beneficiaries in Kalimantan, Maluku, and Papua will be the approximately 1.12 million total additional customers, including over 893,000 household customers connected to the distribution grid by 2024.¹³ Children will be able to read and study in the evenings and their environment made healthier with the elimination of kerosene lamps and diesel generator fumes. Community centers, schools and health centers will benefit from electricity, which will provide extended evening hours, cold chain storage for essential drugs and vaccines, proper sterilization of medical instruments, small machines for home enterprises such as packaging and processing of food and non-timber forest products, and refrigeration facilities for food transport and sales. Electricity will enable people to use mobile phones and other digital devices that can be charged and powered, and thereby more effectively communicate, access information, and participate in social life via communication media. 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 and increase the service quality and efficiency of public services (e.g., hospitals, schools, and government offices) in Kalimantan, Maluku, and Papua.

13. **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 country operations business plan, 2018–2020 were presented 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.¹⁴

14. **Gender impacts.** The program mainstreams gender considerations through two disbursement-linked indicators (DLIs). DLI 2 will ensure that poor households headed by women are provided with access to electricity services. A reliable and affordable electricity supply will reduce the time and effort spent by all women (not just female heads of households) to obtain other fuels, collect water, and reduce indoor air pollution, resulting in improved health outcomes. It will also enable women to run income-generating activities from their own homes and to acquire knowledge through radio and television programs. Replacing wood and kerosene stoves with electric stoves will reduce respiratory disease and other health risks for women, and availability of electricity in health centers and at the village midwife's home will especially benefit pregnant women and women giving birth. Communities will be able to pump and store water, and having well-lit streets will deter crime and enhance safety for girls and women. DLI 7 (on consumer education) will have a minimum target of 30% female participation (with incentives to reach 50%) in order to enhance women's understanding of electrical safety and how efficient and productive use of electricity can improve their livelihoods. In addition to these two DLIs, gender mainstreaming is supported by the clean energy component through community training on basic solar photovoltaic maintenance, with a focus on women's involvement.

¹³ There were 5.22 million customers in Kalimantan, Maluku, and Papua in 2018.

¹⁴ ADB. 2019. *Country Operations Business Plan: Indonesia, 2020–2022*. Manila.

2. Adequacy

15. **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 on distribution, and improving PLN's implementation capacity. PLN's planning follows a systematic approach based on detailed calculations of electricity demand and subsequent localized needs for generation, transmission, and distribution investment. 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.

16. **Efficiency and economy.** PLN's systematic planning follows a least-cost approach and considers the private sector for electricity generation where appropriate, such as in most of Java and Sumatra, where plant dispatch order can be clearly established, allowing for straightforward power purchase agreements. 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 from use of latest advanced technologies) and provide customers with a more reliable and higher quality supply. Due to unreliable offtake and high costs, rural or remote areas and peak-load plants are mostly unsuitable for private investment, and PLN will undertake these investments with financing support from the government and its development partners.

17. **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.

18. The program's DLIs and other key performance indicators center on the increased number of customers, poor households provided with PLN electricity, improved reliability, extension of the medium-voltage distribution lines, increased use of renewable energy, improved asset and waste management, and consumer education on safe and productive energy use.

19. **Sustainability.** The outlined RBL program financing plan is realistic if PLN stays on course to achieve the agreed disbursement-linked indicator targets. However, funding from ADB may not be available for disbursement until the indicators are achieved. In this situation, it is expected PLN will have sufficient liquidity to meet its ongoing capital requirements. This is evidenced by their strong track record in accessing the debt capital markets and arranging syndicated bank facilities. The Government of Indonesia will also continue to support PLN's investment programs by providing guarantees on PLN debt, direct equity and tariff subsidies. Therefore, the funding for the broader program is assessed as sustainable and predictable. If the agreed financing from the government or PLN's funding partners is delayed, then PLN has the option to delay capital expenditure to manage cash flow.

3. Financial and Economic Analysis

20. 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 human productivity.

21. In 2014, the government announced electricity tariff reforms and reviewed the subsidy mechanism to facilitate automatic tariff adjustments based on an agreed methodology. Since the introduction of the reforms, tariffs have increased significantly, well above the local average inflation rate of 5.7%. The government has supported PLN by providing guarantees on tranches of its debt, allocating equity to PLN from the state budget, converting debt to equity, and restructuring debt to reduce PLN's debt-servicing costs. In 2015, the government passed regulations that allow PLN to borrow directly from bilateral and multilateral agencies against a sovereign-backed guarantee. These measures enabled PLN to raise the required capital on terms similar to the sovereign to finance its major investment program, which will more than double its generation capacity over the next 10 years.

22. The proposed program, with \$600 million in funding from ADB's ordinary capital resources and \$6 million in funding from two grants, will support PLN in strengthening its power grid in Kalimantan, Maluku, and Papua. Because 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.

23. The program's economic viability is based on a system network approach that assesses the entire Kalimantan, Maluku, and Papua investment program. Investments in generation, transmission, and distribution are expected to add system capacity, increase efficiency and improve the reliability of electricity supply. Economic incremental benefits, therefore, are measured by the product of total incremental sales and the average willingness to pay. In addition to the incremental benefits the program also generates non-incremental benefits as it displaces less efficient forms of energy for customers that connect to the grid, valued at the resource cost saving. The program will also improve the investment climate, lower generation capacity reserve requirements, optimize maintenance costs, increase economic productivity, and improve the health and education opportunities for newly connected regions.

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.

4. Implementation Arrangements

24. **Fiduciary and safeguard functions.** The program will use PLN's fiduciary systems for financial management, procurement, and audit. These systems were assessed to determine their ability to manage fiduciary risks and provide assurance that RBL program funds will be used as intended, with due consideration for economy and efficiency.¹⁸ The assessments found that planning and budgeting improvements are needed, and that further computerization is required for accounting and financial reporting. This will be covered by activities under the PAP (footnote 10). The program will rely on PLN's systems and will exclude high-value contracts in accordance with ADB's RBL policy.¹⁹ PLN has established a well-defined procurement process and has implemented various e-procurement and backend systems. PLN will procure the materials for distribution centrally through limited bidding and framework contracts. The procurement of works and installation services will be carried out by PLN regional units: Unit Induk Wilayah (UIW) (footnote 4), including the Unit Pelaksana Pelayanan Pelanggan (Customer Service Implementation Units) under them. Experience from the ongoing RBL programs in Sumatra and Sulawesi-Nusa Tenggara shows that this procurement process is appropriate for power distribution network development.

25. Weaknesses in safeguard systems have been identified with respect to (i) safeguards screening (of projects in protected and key biodiversity areas), (ii) institutional capacity, (iii) monitoring and reporting, (iv) guidance on environmental mitigation measures, (v) asset and waste management, (vi) consultations, and (vii) written agreements for land use (for distribution transformers). These will be addressed by program actions, including a screening mechanism to ensure that the RBL program excludes activities that would be classified as Category A under ADB's Safeguards Policy Statement (2009). PLN and ADB have agreed on specific risk mitigation measures associated with fiduciary and safeguard functions, and these are included in the PAP.

26. **Monitoring and evaluation.** 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 M&E system is handled and managed by its Corporate Performance Control Unit using its management reporting information system, which is being used for the ongoing RBLs and will also be used to track the progress of the DLIs under the proposed program. Of the eight DLIs, PLN's management reporting information system already monitors DLIs 1, 3, 4 and 5, while other systems are able to monitor DLIs 6. The remaining indicators (DLIs 2 and 7) monitor the gender and social dimensions of the RBL program, and PLN is introducing special procedures to strengthen its information systems at field and central level to report properly on these dimensions for the first time.²⁰ To complement PLN's internal M&E procedures, ADB will engage an independent verification agency to verify information related to DLIs. Independent verification agency reports from the previous two RBL programs are being used to strengthen M&E systems.

¹⁸ Program Fiduciary Systems Assessment (accessible from the list of linked documents in Appendix 2 of the report and recommendation of the President).

¹⁹ ADB. 2013. *Piloting Results-Based Lending for Programs*. Manila. High-value contracts are those with estimated value over \$50 million for works, turnkey and supply, and installation contracts; \$30 million for goods; \$20 million for information technology systems and non-consulting services; and \$15 million for consulting services.

²⁰ Program Monitoring and Evaluation System Assessment (accessible from the list of linked documents in Appendix 2 of the report and recommendation of the President).

27. **Procurement.** The RBL program will rely on PLN's systems and will exclude high-value contracts in accordance with ADB's RBL policy. PLN has established a well-defined and accountable procurement process and has implemented various e-procurement and backend systems. Procurement under the RBL program scope will include materials for distribution lines; works and service contracts for distribution lines; and engineering, procurement, and construction of the small renewable energy systems, and goods and works for in-house wiring. PLN will procure the materials for distribution centrally through limited bidding and framework contracts. The procurement of works and installation services will be carried out by UIW, including the customer service implementation units under them. The procurement for the high-level technology elements, such as remote monitoring and hybridization using energy management systems, will be carried out following PLN's open competitive bidding procedures without limiting the participation of international bidders. Experience from the ongoing RBL programs in Sumatra and Sulawesi-Nusa Tenggara shows that this procurement process is appropriate for power distribution network development. A key lesson from the ongoing RBL programs is the low level of utilization of the contract monitoring application and lack of integration with the contract payment system. The proposed program addresses these through DLI8. Other procurement risks will be addressed through the PAP.

28. **Reviews.** ADB will monitor program implementation through regular loan review missions and a midterm review, as agreed with PLN. Semi-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, adjust DLIs based on implementation experience and performance up to that time.

III. **Managing Risks and Improving Capacity**

The program soundness assessment shows that the program is consistent with the country's RPJMN and well justified in terms of its contribution to PLN's RUPTL, 2019–2028 (footnote 2). It is expected to improve the power subsector and boost broader development efforts in Kalimantan, Maluku, and Papua. PLN and ADB must remain committed to the program's implementation to ensure its success, and continuously monitor and manage the identified risks along with necessary capacity improvement measures included in the PAP.²¹

²¹ Integrated Risk Assessment and Mitigating Measures (accessible from the list of linked documents in Appendix 2 of the report and recommendation of the President).