

SECTOR ASSESSMENT (SUMMARY): ENERGY

1. Sector Performance, Problems, and Opportunities

1. Indonesia is striving hard to increase its annual economic growth rates from the current rate of 5.0%. In line with this goal, it expects to expand its electricity generation capacity from approximately 52 gigawatts (GW) to 79 GW by 2019, and to 130 GW by 2026, as envisioned in the government's new Electricity Power Supply Business Plan (RUPTL), 2017–2026.¹ Electricity demand is expected to increase from 224,862 gigawatt-hours (GWh) to 275,516 GWh by 2019, and to 482,973 GWh by 2026. At the same time, Indonesia is transitioning from an energy exporter that subsidizes domestic energy prices to a country that must import a significant amount of its energy needs at global market prices. It is also seeking to replace its prime exports—bulk commodities—with manufacturing products and services. Recognizing that its economic growth goals will depend on the country's ability to harness sufficient sustainable energy sources, the government launched various energy reforms during 2014–2016, which are expected to accelerate during 2017–2019.

2. **Primary energy.** In 2015, Indonesia's total primary energy supply reached 1,642 million barrels of oil equivalent. The majority came from oil (33%), followed by coal (22%), biomass (19%), natural gas (17%), biofuel (6%), hydropower (2%), and geothermal (1%).² Indonesia enjoys an abundance of nearly every form of energy. Estimates put its coal resources at 126.6 billion tons, proven oil resources at 3.6 billion barrels, and proven natural gas reserves at 98 trillion cubic feet (footnote 2). The country boasts the world's largest potential geothermal energy resources, at 29.5 GW; hydropower potential of 75 GW; solar potential of 532.6 GW; biomass and biogas potential of 32.6 GW; and wind potential of 113.5 GW.³ Nearly every energy subsector is facing constraints. Oil drove economic growth for many years, but slowing domestic production and rising demand made the country a net importer in 2004. Indonesia is still a net exporter of gas but could become a net importer by 2019. This is because of high export obligations, a history of subsidizing fossil fuels, an uncertain regulatory framework that discourages private sector investment, and the high cost of infrastructure for connecting production to consumption centers. Expansion plans of the State Electricity Corporation (PLN) highlight increased reliance on coal in the future, which is expected to lead to a sharp rise in greenhouse gas emissions.

3. Efforts to scale up renewable energy use have been constrained by inefficient sector policies, implementation challenges, lack of capacity, environmental issues, permitting delays, and a history of low energy pricing. Despite studies indicating a potential for achieving energy savings of 10%–35% in several economic subsectors, consumers rarely adopt energy efficiency measures because of low energy pricing, and insufficient and poorly enforced energy conservation guidelines. This is expected to change as a result of extensive electricity and fuel pricing reforms, which the government introduced in 2014–2015 and which could make conservation measures more viable. Meanwhile, roughly 23 million people, or about 9% of the nation's population, still have no access to electricity.

4. **Sector structure.** Overarching goals and policies for the energy sector are set by the government's national energy council, Dewan Energi Nasional. The Ministry of Energy and

¹ Government of Indonesia, State Electricity Corporation (PLN). 2017. *Electricity Power Supply Business Plan (RUPTL 2017–2026)*. Jakarta.

² Government of Indonesia, Ministry of Energy and Mineral Resources. 2016. *Handbook of Energy & Economic Statistics of Indonesia*. Jakarta.

³ Government of Indonesia, Ministry of Energy and Mineral Resources. 2016. *Mainstreaming Renewable Energy and Energy Conservation*. Presentation to SIEP Policy Coordination Team Kick-off Workshop. Jakarta (3 August).

Mineral Resources is the primary government body responsible for regulating and governing Indonesia's energy sector. Among the additional government agencies that could become involved in a given energy project are the Ministry of Finance (MOF), the National Development Planning Agency (BAPPENAS), the Ministry of State-Owned Enterprises, and the Ministry of Environment and Forestry. Local governments play a large role in project implementation, mostly through permitting and land acquisition processes that often lead to unpredictable project delays. State-owned enterprises are charged with achieving state-mandated energy goals, which subjects many of these enterprises to the influence of multiple government ministries, such as MOF and the Ministry of State-Owned Enterprises. PLN, the only state-owned power utility company in Indonesia, is the major provider of all public electricity infrastructure in the country and is responsible for the generation, transmission, distribution, and retail sale of electricity. Other key state-owned enterprises in the energy sector include Pertamina, Perusahaan Gas Negara, Geo Dipa Energi, and Pertamina Geothermal Energy.

5. **Power generation.** As of November 2016, Indonesia's total power generation capacity (including captive and off-grid generation) was approximately 51.9 GW, of which 39.9 GW was owned by PLN and the rest procured by PLN from contracted independent power producers. Annual electricity production through November was 224,862 GWh. Most of this production was from coal (54.6%), followed by natural gas (26.0%), hydropower (7.8%), fuel oil (6.5%), geothermal (4.3%), and other sources (0.8%) (footnote 1). The islands of Bali, Java, and Madura together account for about 34 GW (64%) and 165,700 GWh (71%). The next largest system is on the island of Sumatra, followed by Kalimantan and Sulawesi. The rest of PLN's generating capacity is spread across 600 isolated systems in areas where electricity demand tends to be low but rising. The government introduced a series of fast-track generation programs in 2015 aimed at having PLN and private sector participants bring 42.5 GW of generation on line by 2019.⁴ Coal-fired power dominates these plans, but geothermal, hydropower, and other renewables are also included.

6. **Transmission and distribution.** PLN owns and operates 44,217 circuit-kilometers of transmission lines and 101,796 megavolt-ampere of transformer capacity, spread across eight networks and 600 isolated grids. Plans to extend Indonesia's transmission network by 2020 will depend on reducing bottlenecks, identifying financing, and obtaining the approvals for rights of way and substations. The distribution network has begun to deteriorate, and regular overloading and unreliable supply now affect several high-density areas. Financing needs for the country's transmission and distribution systems are estimated at \$9.2 billion for Sumatra (2016–2020), \$14.9 billion for Java–Bali (2016–2020), and \$6.2 billion for Eastern Indonesia (2016–2020).

7. **Pricing and subsidies.** The government provides a subsidy to PLN to compensate for the company's inability to recover its costs through the consumer tariffs set by the government. The government is currently transitioning to an economic regulation for PLN with a focus on improving financial and operational performance. During 2014–2015, the new administration embarked on reform by removing subsidies on gasoline, raising diesel prices, and removing power tariff subsidies for industrial, commercial and large residential households, while instituting an automatic price adjustment for all but a few electricity consumer categories. The electricity subsidy for the remaining households is being phased out during 2017, except for the poorest households, as classified in the government's integrated social safety net database. As of July 2017, the electricity tariff for unsubsidized households was Rp1,467.28 (\$0.11)/kWh.

⁴ This amount represents the additional generation targeted by three successive fast-track programs. The most ambitious of these, launched in 2015, aims to add 35 GW of power by 2019.

8. **State Electricity Corporation's financial capacity.** Because PLN is state-owned and a monopoly, the government is closely involved in its budgeting and capital expenditure planning, and in coordinating generation fuel supply. The government has also supported PLN by making capital investments through guarantees, converting debt to equity, and restructuring its debt. These arrangements are unlikely to meet the energy sector's medium-term financial demands under the accelerated generation programs. PLN estimates that it will need \$41 billion during 2016–2019 to deliver its planned expansion of generation, transmission, substations, and distribution. This is in addition to an estimated need for \$43.2 billion in investment under the programs by the private sector, and far exceeds PLN's capital expenditures up to now.

2. Government's Sector Strategy

9. Indonesia's broad development goals are outlined in its long-term national development plan for 2005–2025.⁵ This plan is divided into four 5-year phases, each with a medium-term national development plan. Long-term goals for energy, in particular, are outlined in the 2014 National Energy Policy, which emphasizes resource diversification, environmental sustainability, and maximized use of domestic resources.⁶ The policy targets an energy mix by 2025 of oil (25%), gas (22%), coal (30%), and new and renewable energy (23%). In June 2015, the Ministry of Energy and Mineral Resources announced a nearer-term target of 19% renewable energy by 2019.⁷ Long-term goals for the electricity sector are contained within the government's National Electricity Plan. The current plan covers the period 2012–2031, and a new draft electricity plan for the period of 2015–2034 was submitted to Parliament. Specific investment plans for the sector are outlined in PLN's RUPTL, 2017–2026.

10. The National Medium-Term Development Plan (RPJMN), 2015–2019 aims to increase the country's installed capacity for electricity generation to 86 GW, boost annual per capita electricity consumption to 1,200 kWh, and raise the national electrification ratio to 96.6%.⁸ Reforms initiated during 2014–2015 aimed to (i) improve sector governance, and expand energy production through greater private sector investment and more effective public sector investment; (ii) increase the country's reliance on domestic gas; (iii) expand renewable energy generation and energy efficiency investments; and (iv) expand access to modern energy for all Indonesians. A particular focus of the strategy will be on reaching remote areas of the archipelago, especially the eastern regions, where energy access rates are lowest and where renewable energy options are often the most economically viable. Sustained, comprehensive efforts are now needed to translate these goals into tangible outcomes in the medium term.

3. ADB Sector Experience and Assistance Program

11. Since 1970, the Asian Development Bank (ADB) has financed 23 projects and programs with total lending of \$3.91 billion for Indonesia's energy sector. With few exceptions, completed loan projects have delivered their expected outputs and achieved their immediate objectives. ADB investments during 1999–2016 include eight approved loans totaling \$2.1 billion for (i) the Power Sector Restructuring Program (\$380 million), (ii) the Renewable Energy Development Sector Program (\$161 million), (iii) the Power Transmission Improvement Sector Project (\$140 million), (iv) the Java–Bali Electricity Distribution Performance Improvement Project (\$50 million), (v) the

⁵ Government of Indonesia. 2005. *National Long Term Development Plan (RPJPN 2005–2025)*. Jakarta.

⁶ Government of Indonesia. 2014. *National Energy Policy (KEN 2014–2050)*. Jakarta.

⁷ Increased renewables will help the government achieve its emission reduction targets as stipulated in Indonesia's Nationally Determined Contribution to the Paris Agreement of 2015; however, these targets have not been clearly linked to other energy sector targets, such as the RUPTL and National Electricity Plan.

⁸ Government of Indonesia. 2015. *Medium Term Development Plan (RPJMN 2015–2019)*. Jakarta.

West Kalimantan Power Grid Strengthening Project (\$49.5 million), (vi) the Java–Bali 500-Kilovolt Power Transmission Crossing (\$224 million), (vii) the Sustainable and Inclusive Energy Program (\$500 million), and (viii) the Electricity Grid Strengthening–Sumatra Program (\$600 million).⁹

12. Since 2010, ADB has been actively supporting the government in its energy reform efforts through a range of technical assistance activities focused on (i) reduction of subsidies in favor of cost-reflective tariffs for fuels and electricity; (ii) price incentives for geothermal, wind, and solar energy; (iii) energy efficiency-related policies and programs, including support for energy service companies and appliance standards; (iv) gas sector reform; (v) least-cost electrification planning to support the national electrification program; and (vi) piloting of carbon capture and storage. In 2014, ADB prepared a White Paper on the Energy Sector to highlight key constraints and directions for possible reform. It served as an important input for the new government's own reform agenda enshrined in the RPJMN for 2015–2019.

13. The government is seeking greater financing for energy infrastructure development during 2016–2019. Under a direct lending modality with a sovereign-backed guarantee, multilateral and bilateral lenders can lend directly to state-owned companies in the energy sector without going through MOF. This aims to speed up financing for projects. PLN is working closely with ADB to implement a series of results-based lending programs to strengthen the electricity grid in various parts of the country. Meanwhile, ADB's more traditional policy-based lending to the government and its nonsovereign lending to the private sector for financing of projects would also continue.¹⁰

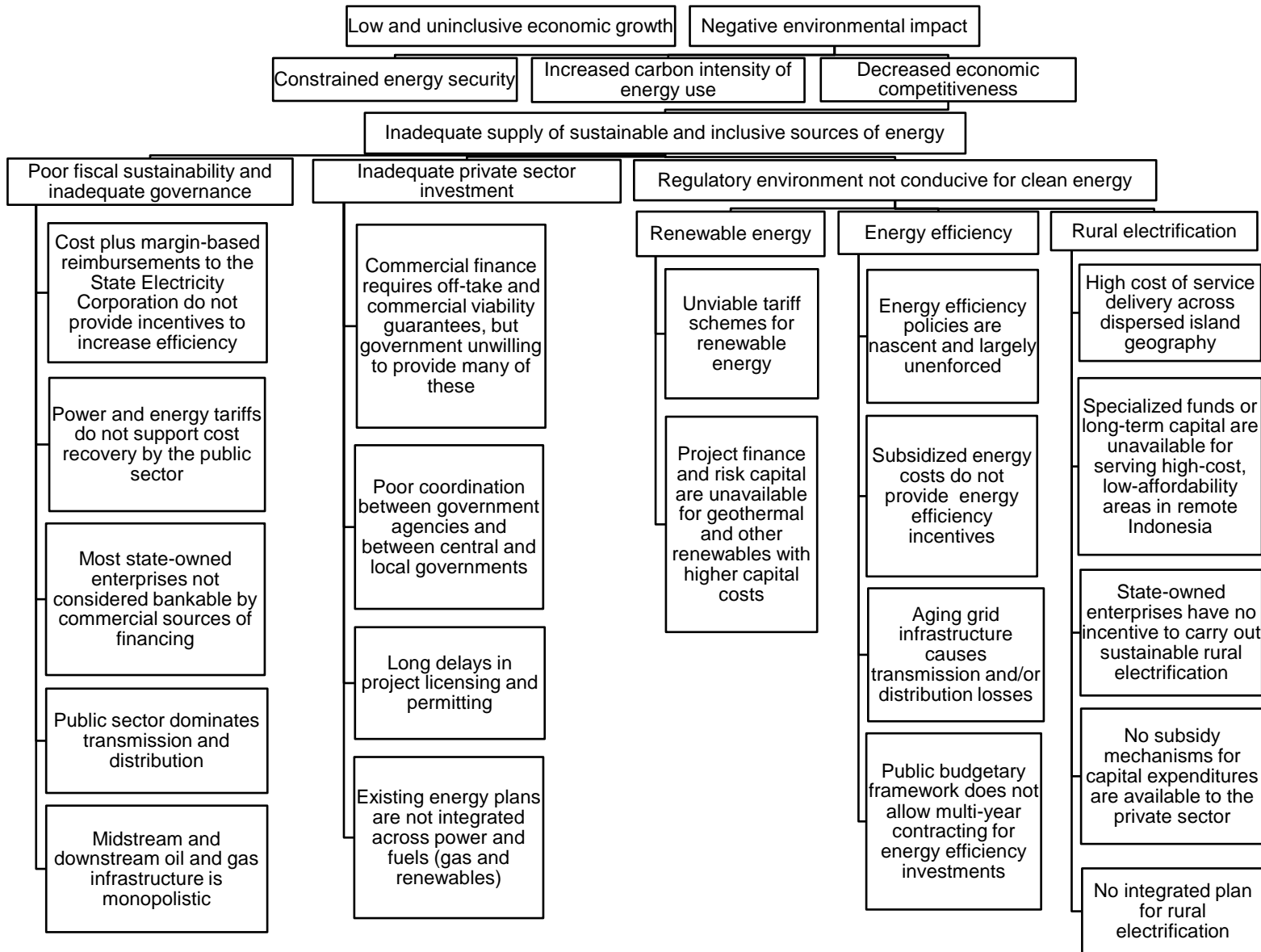
14. Overall, ADB's energy sector plans in Indonesia are designed to support the improvement of infrastructure services, which is one of three strategic pillars in its country partnership strategy, 2016–2019 for Indonesia.¹¹ ADB's engagement in the sector will continue to be centered on three areas: (i) knowledge and awareness; (ii) improved policy and mainstreaming of best practices; and (iii) the financing of energy infrastructure, primarily for grid extension and gas-fired power generation. ADB's policy support will focus on helping the government develop an updated Energy Sector White Paper in preparation for the next RPJMN (2020–2024), in addition to targeted assistance to expand energy efficiency, carbon capture and storage, and access to electricity. ADB's private sector operations will support liquefied natural gas production in eastern Indonesia, de-risking of geothermal exploration and development, and gas-to-power projects. Given the synergies between sector policies and project outcomes, ADB's energy sector strategy, as elaborated in the country partnership strategy, aims to deploy policy-based lending, project financing, and results-based lending in a mutually reinforcing way.

⁹ ADB. 1999. *Report and Recommendation of the President to the Board of Directors (RRP): Proposed Loans to the Republic of Indonesia for the Power Sector Restructuring Program*. Manila; ADB. 2002. *RRP: Proposed Loan to the Republic of Indonesia for the Renewable Energy Development Sector Project*. Manila; ADB. 2002. *RRP: Proposed Loan to the Republic of Indonesia for the Power Transmission Improvement Sector Project*. Manila; ADB. 2010. *RRP: Proposed Loan and Administration of Loan and Grant to the Republic of Indonesia for the Java–Bali Electricity Distribution Performance Improvement Project*. Manila; ADB. 2013. *RRP: Proposed Loan and Administration of Loan and Grant to the Republic of Indonesia for the West Kalimantan Power Grid Strengthening Project*. Manila; ADB. 2013. *RRP: Proposed Loans to the Republic of Indonesia for the Java–Bali 500-Kilovolt Power Transmission Crossing*. Manila; ADB. 2015. *RRP: Proposed Programmatic Approach and Policy-Based Loans for Subprogram 1 to the Republic of Indonesia for Sustainable and Inclusive Energy Program*. Manila; ADB. 2015. *RRP: Proposed Results-Based Loan to Perusahaan Listrik Negara for Electricity Grid Strengthening—Sumatra Program (Guaranteed by the Republic of Indonesia)*. Manila.

¹⁰ The bulk of the capacity expansion is to be undertaken by the private sector.

¹¹ ADB. 2016. *Country Partnership Strategy: Indonesia, 2016–2019*. Manila.

PROBLEM TREE FOR THE ENERGY SECTOR



EFFECTS

CAUSES