

## SECTOR ASSESSMENT (SUMMARY): ENERGY

### Sector Road Map

#### 1. Sector Performance, Problems, and Opportunities

1. Development of Indonesia's energy sector is crucial to foster inclusive economic growth and to reduce poverty. Improving access to reliable sources of power in rural areas is critical to help entire communities escape poverty. Improved rural access to affordable and reliable sources of power contributes directly to improved access to technology, off-farm employment, and higher rural incomes.<sup>1</sup>

2. Reliable supply of energy is an essential building block for improving the investment climate in Indonesia. The country is facing regular power outages because of increases in electricity demand accompanied by slow growth in power supply. The Java–Bali power system, which accounts for about 80% of Indonesia's total power consumption, registered an increase in demand of about 50% since 2001 until 2011, but generation capacity only increased by 15%. The reserve margin is thus getting smaller (now placed at 15%), which is well below the international benchmark of 25%. The low reserve margin available with the generation system, transmission bottlenecks and the overloaded distribution network give rise to frequent planned and unplanned outages in the electricity supply.

3. Generation, transmission, and distribution systems are not sufficient to meet overall demand for electricity, contributing to one of the lowest electrification rates in the region. Since 2001 until 2011, electricity sales growth averaged about 7.0% per annum with peak demand growth of about 6.0% per annum, but during the same period the network of the State Electricity Company (PLN)<sup>2</sup> grew by less than half of that rate—the transmission network grew by 3.2% per annum, the distribution network by 1.7% per annum, and new generation capacity by 1.4% per annum. The demand growth trend will continue, and PLN estimates that the sector will need about \$65 billion worth of investment in generation, transmission, and distribution during 2013–2023 to meet power demand and maintain system reliability. This investment would need to be dispersed as follows: \$35 billion for generation excluding independent power producer (IPP), \$16 billion for transmission, and \$14 billion for distribution.

4. An important factor that contributes to the supply problem is a high dependency on oil for power generation. More than 30% of the energy supply is generated using either diesel or fuel oil. As oil is one of the most expensive fuels, the cost of power generation is high. Adding to this burden, Indonesia has been a net importer of oil since 2004. In 2007 and 2008, when global oil prices soared, oil-based generation became too costly and PLN was forced to switch off some of its oil-fired power plants, causing rotating blackouts nationwide.

5. Investment in the sector is discouraged by low tariffs and heavy reliance on government subsidies. The government increased electricity tariffs by 10% in July 2010 and instituted a 3.4%

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<sup>1</sup> A. Balisacan, E. Pernia, and A. Asra. 2002. Revisiting Growth and Poverty Reduction in Indonesia: What do Subnational Data Show? *ERD Working Paper Series*. No. 25. Manila: Asian Development Bank. Quoted in I. Ali and E. Pernia. 2003. Infrastructure and Poverty Reduction – What is the Connection? *ERD Policy Brief Series*. No. 13. Manila: Asian Development Bank. p. 8.

<sup>2</sup> PT (Persero) Perusahaan Listrik Negara (PLN) is the state electricity company heavily subsidized by the government that is responsible for developing and operating the power sector. It has geographical monopoly in power transmission and distribution, and as of 2011, owned along with IPPs 29,000 megawatts (MW) of the total 40,879 MW power generating capacity.

quarterly increase starting 1 January 2013 to reach a total increase of about 13.6% for the year. Tariff will not increase for households and small industries consuming less than 900 watts of electricity. The increase reflects the government's policy to gradually reduce electricity subsidies. Low tariffs remain a key constraint to sector development. In April 2011, the government decided to increase the 2011 subsidy by Rp16.01 trillion because of rising operational costs, thus increasing the total subsidy to Rp56.71 trillion, higher than the Rp40.7 trillion set in the 2011 state budget. The projection for the 2013 subsidy is about Rp105.3 trillion. PLN, which controls transmission, distribution, and, to a large extent, generation, does not have sufficient capital to invest because of low tariffs. Demand-side management is also adversely affected by low tariffs and subsidies. Low prices encourage inefficient use of electricity, including the use of inefficient appliances and equipment.

6. Expansion of coal-fired power plants is forecasted to play a major role in meeting Indonesia's growing power generation requirements. The expanded use of coal will significantly increase the emission of pollutants such as sulfur oxide, nitrous oxide, and particulate matter. Up to 56.5% of the country's annual carbon dioxide (CO<sub>2</sub>) emissions are from the burning of oil, followed by coal (25.0%) and gas (18.5%).<sup>3</sup> In 2004, CO<sub>2</sub> emissions from the energy sector totaled 275.4 million tons, with the largest share (about 40% of the average annual emissions in 2004) deriving from industry. This was followed by the power sector (27%), transportation (23%), and household and commercial use (10%).<sup>4</sup>

7. As a large middle-income country with a growing economy, a critical component of Indonesia's strength moving forward will be its ability to harness and manage sustainable sources of energy. There is considerable scope for expanding the use of renewable energy resources. Indonesia has abundant geothermal, hydropower, and coal resources. The geothermal energy potential is about 28,000 megawatts (MW) located in 257 sites, while the hydropower potential is estimated at 76,000 MW, most of which is located outside Java and Bali and in areas where demand is still low. The government is putting efforts to develop renewable energy and anticipates a mix of public and private investment, including public-private partnerships or the use of guarantees to mobilize commercial cofinancing for the implementation.

8. The legal framework needs to be improved to facilitate exploitation of renewable energy sources. There is no renewable energy law in Indonesia that governs the exploration, development, and advancement of renewable energy resources. However, Ministerial Regulation No 04/2012 provides for feed-in tariff for geothermal and small-scale (below 10 MW) hydro and biomass generation. The government is developing feed-in tariff for small-scale solar and wind generation. Renewable energy projects are capital-intensive, and for geothermal projects, economic viability cannot be conclusively determined until feasibility studies are completed. Policy on renewable energy development, especially on incentives, needs more clarity, and the recently established renewable energy unit in the Ministry of Energy and Mineral Resources needs to take the lead in fostering energy efficiency, encouraging the use of renewable energy, and boosting rural electrification. Moreover, there is currently no independent price regulation as projects in both transmission and distribution are carried out exclusively by PLN. For transmission and distribution projects, the right-of-way remains a concern and it is a common cause of project delays. The new Land Acquisition Act (approved in December 2011, Law No. 2/2012) provides for a process of land acquisition and is expected to shorten the approval period to less than 2 years.

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<sup>3</sup> World Bank. 2007. *Indonesia and Climate Change: Current Status and Policies*. Jakarta.

<sup>4</sup> Ministry of Energy and Mineral Resources. 2005. *Energy statistics 2005*. Jakarta.

## 2. Government's Sector Strategy

9. Indonesia's National Medium-term Development Plan, 2010–2014 (RPJMN)<sup>5</sup> highlights the need for continuous adjustment of the energy mix to improve energy security and sustainable development and revision of current legislation to support increased investment. The government's energy sector strategy is aimed at least-cost expansion and diversification of the power supply. Consistent with its energy diversification objectives, the government is implementing fast-track programs aimed at reducing dependency on oil for power generation by developing coal-fired power plants, increasing generation from geothermal and hydropower, and tapping renewable energy resources. To spur investment, in 2009 a ministerial decree was issued removing the previous price cap for power purchase from IPPs and giving PLN exclusive authority to set IPP prices. The government has also boosted petroleum prices in an effort to foster conservation and energy diversification.

10. The National Electricity Development Plan aims to increase the electrification ratio to 90% by 2020. Bringing electricity to the underserved rural population will use two methods: connecting rural areas to the integrated electricity grid or establishing small-scale off-grid power sources. Currently, the government funds PLN to cover the costs of its public service obligations to meet rural electrification targets. In support of this effort, a new Electricity Law was passed in September 2009 that empowers local authorities to provide electricity to consumers in their region from private companies, effectively bypassing PLN's distribution network. The 2012 national electrification ratio was 72%, up from about 60.80% in 2007. The government also encourages energy efficiency, working with PLN and other bodies to campaign for the use of compact fluorescent lamps and other energy-efficient appliances.

11. Climate change mitigation is one of the government's top priorities, and fostering renewable energy use is a key part of its strategy for meeting its climate change commitments. The government's decision to build coal-fired power plants to address power shortages is a least-cost solution to meeting power supply needs, but it contradicts the nation's climate change mitigation commitments. Clean coal technology is considered a good alternative source of reducing carbon emissions and is only now being considered for some IPP projects.

## 3. ADB Sector Experience and Assistance Program

12. The Asian Development Bank (ADB) has financed 30 projects totaling about \$3.4 billion and 36 technical assistance projects totaling about \$14 million focusing on power generation and transmission. With few exceptions, completed loan projects have made a positive contribution to socioeconomic development and have succeeded in achieving their expected outputs and immediate objectives, including the provision of additional capacity to match load growth, the removal of transmission system constraints, improvements in system efficiency and reliability, and an increase in the use of indigenous energy resources (hydropower and geothermal). Implementation of two energy projects approved in 2002 were significantly delayed because of difficulties in complying with ADB's social and environmental safeguards policies and slow processing of contract awards. However, a project approved in 2010 complied better with the ADB's safeguards policies.<sup>6</sup>

<sup>5</sup> National Development Planning Agency (BAPPENAS). 2010. *Rencana Pembangunan Jangka Menengah Nasional (RPJMN)*. Jakarta.

<sup>6</sup> ADB. 2010. *Report and Recommendation of the President to the Board of Directors: Proposed Loan and Administration of Loan and Grant to the Republic of Indonesia for the Java–Bali Electricity Distribution Performance Improvement Project*. Manila.

13. ADB's support in the energy sector will aim to address key constraints through a combination of support for sector policy and institutional reform, with assistance for innovative and catalytic investment projects aimed at demonstrating approaches to tackling key subsector constraints. A holistic approach will be taken to power sector development, balancing the needs of the nation for increased power supply and increased access to reliable power with the imperative of encouraging energy efficiency, conservation, and use of renewable energy resources. Given the enormity of the investment requirements, private sector participation will be encouraged in all subsectors of ADB support. Close cooperation will be forged between ADB's public and private sector operations in the energy sector. Private sector operations will give preference to the development of projects in geothermal, hydro, and other renewables in under-serviced parts of the country, in line with the government's priority for environmental protection and ADB's Energy Policy.

14. ADB will support energy sector policy reform in the context of assisting the government to meet Indonesia's climate change commitments, through close coordination with other partners engaged in energy sector reform (i.e., the World Bank) and through policy dialogue linked to subsector investment operations. Energy sector reform will figure prominently in a climate change program loan that is to be undertaken in partnership with the Japan International Cooperation Agency, the French Development Agency,<sup>7</sup> and the World Bank. This program will address, among other things, policy and regulatory issues related to promoting energy conservation and the use of clean energy and sustainable natural resource management. Likewise, project loans anticipated in the energy sector (geothermal, transmission, and distribution) will aim to boost private sector participation by encouraging public-private partnerships, including by providing the government assistance to develop a suitable enabling policy and regulatory environment for fostering private participation in the development of clean, efficient, and climate-resilient energy systems.

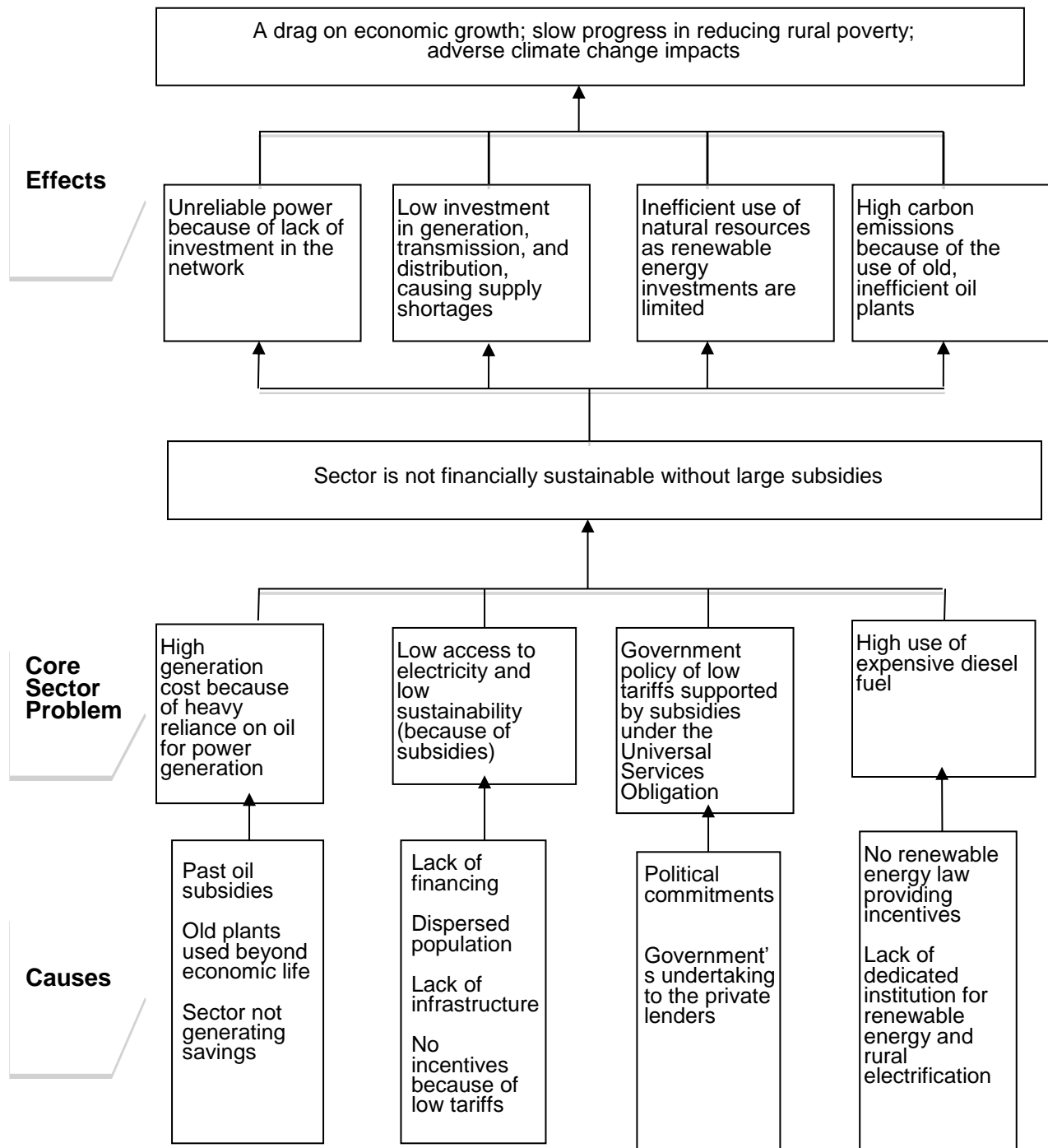
15. ADB will provide project support for long-term investments aimed at fostering greater use of renewable energy resources and encouraging energy conservation. A non-sovereign operation will support development of geothermal-based power generation capacity. ADB, with its access to various funds for climate change mitigation and competency to support investments and pilot new technologies, considers end-use energy efficiency—efficient appliances, efficient lighting, or electric vehicles—a key area for future engagement. ADB will explore options to implement projects in Indonesia to replace the two-stroke Bajaj tricycles. Capacity development support will also be provided to (i) develop a focal institution charged with fostering renewable energy and energy efficiency; (ii) improve conservation incentives; (iii) improve enforcement of national energy standards, energy labeling, and audits; and (iv) support development of renewable energy law.

16. ADB will support improvements in power transmission and distribution in under-serviced parts of the country in ways that boost system efficiency, expand access, cut losses, and foster cross-region and cross-border power trade. ADB will play the role of an honest broker to assist Indonesia and its neighbors to establish appropriate power trading arrangements. Innovative financing approaches, including credit guarantees, could be used to induce private investment in the power transmission system. ADB's support for distribution will cover both rehabilitation for loss reduction and reliability improvement, and new investments to support new connections.

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<sup>7</sup> Agence Française de Développement.

## Problem Tree for the Energy Sector



**Sector Results Framework (Indonesian Energy Sector, 2011–2015)**

Country Sector Outcome		Country Sector Outputs		ADB Sector Operations	
Outcome with ADB Contribution	Indicators with Targets and Baselines	Outputs with ADB Contribution	Indicators with Incremental Targets	Planned and Ongoing ADB Interventions	Main Outputs Expected from ADB Interventions
Improved power supply and more sustainable energy system	<p>Number of population who have access to electricity increases by 10 million new customers connected by 2014</p> <p>Increase in installed capacity of renewable energy Baseline: 1,065 MW (2009) Target: 5,000 MW (2014)</p> <p>Increased electricity generation capacity by an average 3,000 MW per year during 2010–2014 Baseline: 25,303 MW (2008)</p> <p>Increase in electrification ratio Baseline: 72% (2012) Target: 80% (2014)</p>	<p>Power generation improved</p> <p>Transmission network improved</p> <p>Use of renewable energy resource increased</p> <p>Carbon emissions reduced</p>	<p>Additional 145 MW in generation from geothermal Baseline: 0 Target: 5,000 MW from geothermal (2014)</p> <p>Sumatra, Java, and Nusa Tenggara connections are enhanced by 2015</p> <p>145 MW in generation from renewable energy Baseline: 0 Target: 60% (6,250 MW) of additional generation should be from renewable energy (2014)</p> <p>Annual reduction of about 2.32 million tons of CO<sub>2</sub> equivalent in emissions</p>	<p><b>Planned key activity areas:</b></p> <p>Climate Change policy; Feasibility studies and design of Geothermal power plant development Transmission network development; Energy efficiency and climate change; Establishment of revolving funds; Renewable energy policy; Power spectral density in Energy.</p> <p><b>Pipeline projects</b></p> <p>Geothermal and Renewable Development Project Java–Bali Power Transmission Crossing Trans Borneo Power Grid Malaku–Pekan Baru Transmission Line Energy Efficiency and Climate Change Climate Change Program</p>	<p><b>Planned key activity areas</b></p> <p>Build 145 MW geothermal power plant Transmission networks across Sumatra, Java, Bali and Nusa Tenggara to be enhanced</p> <p>Revolving funds to promote private sector participation in greenfield sites to be established</p> <p><b>Pipeline projects</b></p> <p>Reduced losses in the Java–Bali power distribution system</p> <p>Incremental sales resulting from increased distribution capacity</p> <p>Increased access to power by new customer connections</p> <p>Reduced peak demand and increased awareness of energy efficiency</p>

ADB = Asian Development Bank, CO<sub>2</sub> = carbon dioxide, MW = megawatt.  
Source: ADB estimates.