

SECTOR ASSESSMENT (SUMMARY): ENERGY

Sector Road Map

1. Sector Performance, Problems, and Opportunities

1. Sri Lanka's national grid serves the entire country.¹ In 2016, the peak demand on the national grid was 2,453 megawatts (MW), and 14,148 gigawatt-hours (GWh) of electricity was delivered to the transmission network.² The country's electrical energy requirement grew at an average rate of 4.3% per year over 2000–2014.³ Growth in generation was 7.4% in 2016. Sri Lanka's national electrification ratio has grown from 29.0% in 1990 to 99.3% in 2016 and compares favorably with other South Asian countries. As of 2016, per capita electricity sales were 603 kilowatt-hours (kWh). Sri Lanka's total transmission and distribution losses were reported to be 9.6% of net generation in 2016, lower than the target of 12.0% established for 2015 in the National Energy Policy and Strategies (NEPS)⁴ and by the Public Utilities Commission of Sri Lanka (PUCSL).⁵

2. Installed electricity generating capacity on the grid was 4,018 MW in 2016. In 2008–2014, installed capacity grew at an average 5.8% per year. The primary sources of energy used for electricity generation in 2016 and their respective shares in energy generation were hydropower and other renewables (32.8%), coal (35.7%), and oil (31.5%).⁶ Ceylon Electricity Board (CEB) and Lanka Electricity Company Limited (LECO) are the only two power utilities. CEB is an integrated utility fully owned by the government, engaged in separately licensed activities of generation, transmission, distribution, and supply of electricity. CEB has 2,891 MW of installed generation capacity, with additional thermal generating capacity being procured from independent power producers and nonconventional renewable energy-based capacity from small power producers.⁷ CEB owns and operates the entire transmission network and performs the bulk power purchase and delivery functions. CEB's four distribution entities serve about 91% of all customers in the country. LECO purchases bulk power from CEB and distributes to about 537,000 customers in urban areas in the western coastal belt, representing about 9% of all customers in Sri Lanka in 2016. Private sector participation in the power subsector is limited to power generation, with a total installed capacity of 1,127 MW of oil-fired thermal generation by independent power producers and renewable generation by small power producers.

3. The growth in electricity demand since 1995 was generally met with oil-fired thermal generation and the addition of coal-fired plants over 2011–2014. The share of thermal power in the generation mix increased from 50% in 2006 to 71% in 2012, and declined to 62% in 2014. The Power Sector Policy Directions, 1997 and 2002, which stated that thermal power plants would be built only with private financing, resulted in a proliferation of small and costly oil-fired plants. Implementation of cheaper base-load power plants needed to contain the costs of electricity production was delayed for several decades. Three smaller oil-fired power plants that reached the end of their contract periods have since been retired. The remaining six oil-fired private power

¹ This excludes a few islands off the northern Jaffna peninsula that are served by isolated mini-grids.

² Ceylon Electricity Board. 2017. *Statistical Digest 2016*. Colombo.

³ Government of Sri Lanka, Sri Lanka Sustainable Energy Authority. 2014. *Sri Lanka Energy Balance 2014: An Analysis of the Energy Sector Performance*. Colombo.

⁴ Government of Sri Lanka. 2008. *National Energy Policy and Strategies of Sri Lanka*. Colombo.

⁵ Public Utilities Commission of Sri Lanka. January 2011. *Tariff Decision*. Colombo.

⁶ The year 2016 was a dry year with substantially less rainfall that resulted in a reduction of hydropower generation and a corresponding oil-fired generation increase.

⁷ Nonconventional renewable energy sources include mini hydropower, wind, solar, and biomass, each power plant rated at 10 MW or lower.

plants operating in 2016—with an aggregate capacity of 611 MW—provided 15.3% of the country's energy requirements.

4. Retail tariffs in Sri Lanka do not reflect the cost of supply. In 2011, in its first tariff determination, PUCSL published the total estimated national average cost of electricity supply per kWh sold, equating to Sri Lanka Rupees (SLRs) 14.90, whereas the approved tariffs yielded only SLRs13.68. In 2013, the corresponding approved cost per kWh was SLRs20.35 and the national average price was SLRs18.51. The provisional estimate for 2017 average cost of supply per kWh sold is SLRs19.56 and for average income is SLRs17.43.⁸

5. The continuing disparity between allowed costs and approved prices, and the absence of a credible mechanism to bridge the difference, limits CEB's ability to undertake investments in generation, transmission, and distribution. The low-voltage distribution network requires improvements and expansion to meet the needs of new housing and commercial developments. Overdue investment in the medium-voltage distribution network has caused overloading, lower reliability, and excessive voltage drops at many locations. The growth in demand for power distributed over the medium-voltage network requires a matching investment in the transmission system. Immediate investments in the transmission and distribution network are needed to reduce system losses, ensure the reliability of the entire power system, and encourage private sector investment in nonconventional renewable energy. Sri Lanka's electricity demand profile has a sharp peak in the evening, and the off-peak demand is about 43% of the peak demand. More vigorous demand-side management (DSM) initiatives beyond the mandatory time-of-use tariffs to larger customers need to be implemented to manage this severe disparity between peak and off-peak demand. The day-time demand that was at 60% in 2002 had grown to 80% of night-time peak demand by 2015. This change largely attributed to the growth in the commercial sector and the declining growth in new household customers due to completion of the national electrification, caused the annual load factor to grow to 65% in 2015, against 55% in 2002.

6. Major issues in the power subsector are the: (i) high costs of electricity generation, high electricity prices, and low reliability of supply; (ii) CEB's increasing debt portfolio and discouraging private sector investments; (iii) urgent need to undertake DSM and energy efficiency measures; and (iv) need to streamline and facilitate the development of renewable energy. As a result, electricity supply costs are high, the costs of the main utility (CEB) are not fully recovered through tariffs, and supply reliability is below expectations.

2. Government's Sector Strategy

7. The government aims to ensure sustainable development of energy resources by improving the power supply system to provide access to electricity services to the population. Sri Lanka has a national investment program, including sector investments, that are based on the NEPS. The country's main energy sources are indigenous biomass, imported petroleum products, imported coal, and hydropower. More than half of the country's hydropower potential of 2,000 MW has been developed. Increased penetration of indigenous resources, reduced consumption of fossil fuels, and diversification into cheaper fuels are available options. In the short term, generation costs are expected to remain stable, reflecting lower global oil and coal prices. In the NEPS, the government imposed a moratorium on oil-burning power plants until non-oil sources provide 90% of grid energy. The Puttalam coal power project (900 MW), financed by the People's Republic of China, was completed in 2014, which caused the generation from non-oil sources to

⁸ Public Utilities Commission of Sri Lanka. 2016. *Decision on Bulk Supply Tariffs effective from 1st October 2016*. Colombo.

increase to 83%, for the first time since 1995. In the short and medium term (2017–2025), generation costs are expected to increase, reflecting the suspension of three coal-fired power plants.⁹ To bridge the capacity shortfall the government requested CEB to call for proposals from the private sector to (i) provide 60 MW of diesel generating capacity on a short-term rental basis; and (ii) build a diesel-fired combined cycle power plant of 300 MW by 2020. Additionally, oil-fired independent power producers retired at the end of their term were granted three-year extensions. Accordingly, Sri Lanka's fuel mix in power generation in the year 2022 is most likely to be hydropower and other renewables 46%, coal 28%, and oil 26%.

8. The government established PUCSL in 2002 as a regulator for the energy and water sectors under the Public Utilities Commission of Sri Lanka Act, 2002. Parliament approved the Sri Lanka Electricity Act in March 2009, empowering PUCSL to regulate the electricity supply industry from April 2009. The first licenses to CEB (generation, transmission, and distribution), LECO, and some generating companies were issued in October 2009. In 2011, PUCSL established the tariff methodology and a road map for tariff reforms and rebalancing. Four tariff filings were conducted and tariff determinations announced (January 2011, January 2012, January 2013, and January 2016). In 2012, PUCSL implemented a fuel adjustment charge for most customer categories, outside the tariff methodology. Other regulatory interventions for customer service, supply quality, grid and distribution codes, and disclosure of plans are in progress, but the degree and speed of implementation is slow. DSM regulations were issued in 2016. Distribution performance regulations, the key document that establishes targets for the reliability of electricity supply and the responsibilities of distribution licensees in reaching those targets and to report on reliability and power quality, were enacted in 2016, but as of September 2017 were still not implemented. The economic and technical regulation of the electricity supply industry continues to be weak.

9. CEB converted its generation, transmission, and distribution operations into six functional business units (FBUs)—one for generation, one for transmission, and four for distribution. Financial accounts are required to be segregated to allow each FBU to operate as a profit center. PUCSL commenced regulating each FBU separately, and the licenses issued in 2009 align with the functions of each FBU. CEB's board was expected to delegate day-to-day management and decision-making power to the heads of each FBU to fulfill the FBU's obligations under their licenses. This included decisions on capital and other investments, recruitment of personnel, and incurring revenue expenses to ensure that each FBU achieves its targets as established by PUCSL. The target set by PUCSL for financial independence of FBUs for the end of 2011 is not fully achieved as of September 2017, with FBUs dependent on CEB corporate to allocate funds for investments and operations. Despite regulatory reforms requiring the six licensed entities of CEB to be technically and financially independent, CEB continues to report its financial performance as one corporate entity. Accumulated profits or losses in the bulk supply transactions account maintained by the CEB transmission licensee are not transferred to their responsible parties, electricity customers (in case of changes in fuel prices and hydropower output), or the government (in case of subsidies to the sector pledged at each tariff decision). Such profits in the bulk supply transactions account are not shown as payables in CEB accounts. Losses in the bulk supply transactions account are not shown as receivables from the government in CEB accounts. Tariff reforms need to progress without disruption.

10. In 2007, the government established the Sri Lanka Sustainable Energy Authority with a mandate for (i) energy planning and policy analysis; (ii) development and implementation of policy for renewable energy development; (iii) energy efficiency and conservation, and demand

⁹ Ceylon Electricity Board. 2015. *Long-term Generation Expansion Plan 2015–2035*. Colombo.

management; and (iv) energy fund management. The authority provided an institutional framework to promote renewable energy projects through private investment.

11. **Small Power Producers:** By the end of 2016, 200 small power producers' projects were commissioned: (i) small hydropower: 172 projects, 342 MW; (ii) wind: 15 projects, 128 MW; (iii) biomass: nine projects, 24 MW; and (iv) solar photovoltaic: four projects, 11.0 MW. Three more permits were issued in 2013 for solar photovoltaic projects that will add 30 MW of solar photovoltaic capacity to the grid in 2017.

12. **Rooftop Solar Photovoltaic:** A cumulative capacity of 52 MW across 7,570 customers was connected to the grid on a net metering basis in 2016. From September 2016, the government allowed two additional schemes for rooftop solar photovoltaic systems, where (i) surplus energy from solar photovoltaic systems can be sold to the grid at SLRs22 per kWh for 7 years and at SLRs15 thereafter; and (ii) energy from solar photovoltaic systems can be sold to the grid at SLRs22 per kWh through a separate meter.

13. **Wind Power:** Wind power was offered a feed-in tariff since 1996, but the policy revision in 2007 to enable a cost-reflective, technology-specific feed-in tariff caused a surge in applications and resulted in the private sector investing in 15 wind power plants over 2010–2016, with a total capacity of 128 MW. The government has since decided to discontinue the offer of a feed-in tariff for new wind power plants and called for competitive bids for 20 MW in 2016. The indicative year-one price offered by the lowest bidder was SLRs12.29 per kWh, which compares favorably with the last announced feed-in tariff of SLRs23.93 per kWh in 2012.

3. ADB Sector Experience and Assistance Program

14. In 2014–2016, Asian Development Bank (ADB) energy sector interventions addressed (i) strengthening the transmission infrastructure; (ii) improving the reliability and efficiency of the medium-voltage network; (iii) supporting rural electrification; (iv) improving energy efficiency and renewable energy development; (v) strengthening power system regulation and CEB's internal reforms; and (vi) promoting public–private partnerships (PPP) and greater private sector participation.¹⁰ The Green Power Development and Energy Efficiency Improvement Investment Program includes support for the construction of a 30 MW run-of-river hydropower plant, transmission infrastructure enhancement for the absorption of wind energy, network efficiency improvements, and innovative DSM interventions.¹¹ The 2016 Supporting Electricity Supply Reliability Improvement Project supports hybrid renewable energy systems development, reliability improvement of the medium-voltage network, rural electrification, distribution performance monitoring improvement, and reactive power management.¹² ADB supported the development of the Sri Lanka Renewable Energy Master Plan and the Master Plan for Wind Development in Mannar District, and proposed a business model for PPP in Mannar.¹³

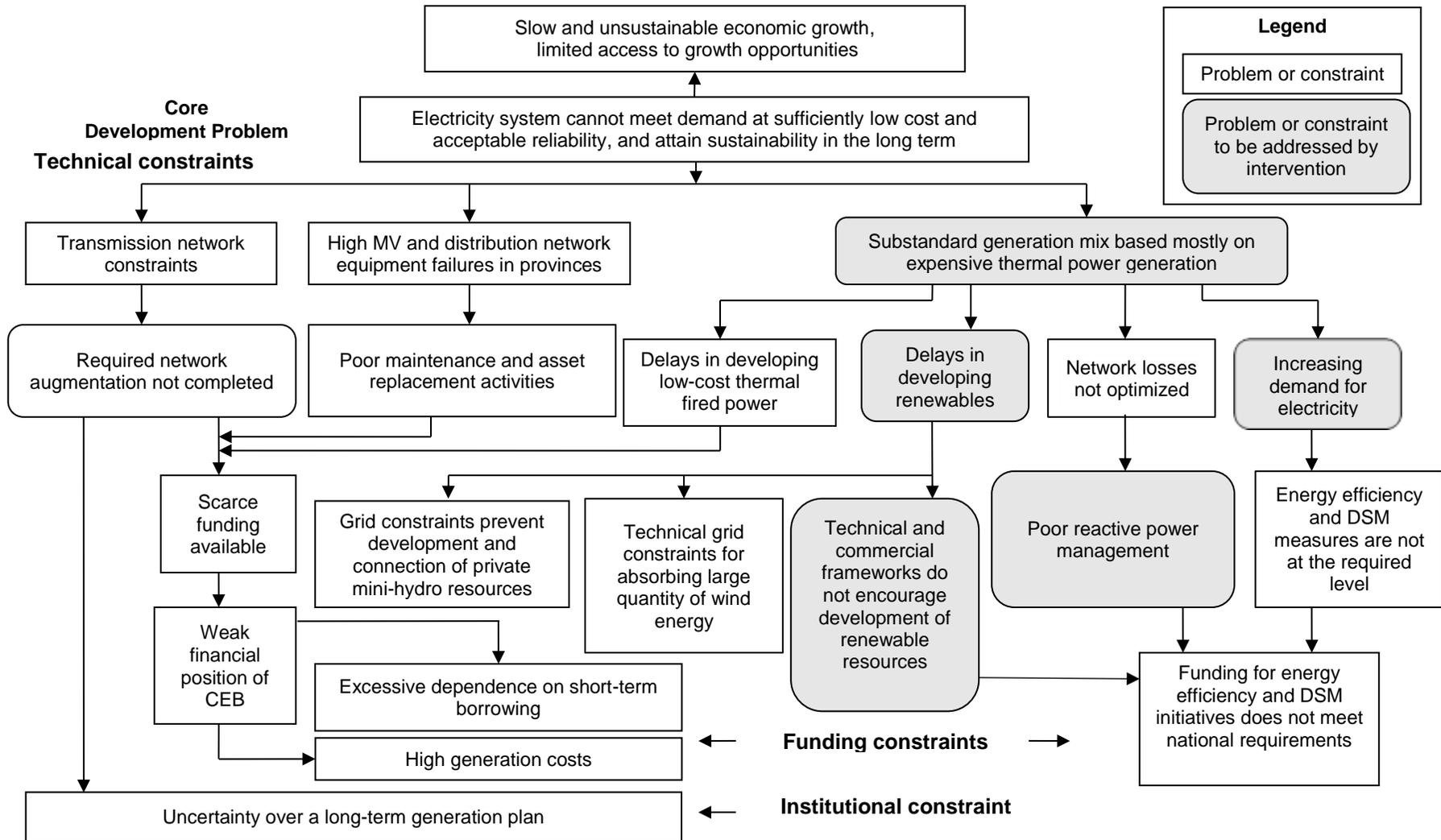
¹⁰ ADB. 2015. *Interim Country Partnership Strategy: Sri Lanka, 2015–2016*. Manila. Extended to 2017 by the enhanced ADB. 2016. *Country Operations Business Plan: Sri Lanka, 2017–2019*. Manila.

¹¹ ADB. 2014. *Report and Recommendation of the President to the Board of Directors: Proposed Multitranche Financing Facility to the Democratic Socialist Republic of Sri Lanka for the Green Power Development and Energy Efficiency Improvement Investment Program*. Manila.

¹² ADB. 2016. *Report and Recommendation of the President to the Board of Directors: Proposed Loan and Administration of Grants to the Democratic Socialist Republic of Sri Lanka for the Supporting Electricity Supply Reliability Improvement Project*. Manila.

¹³ ADB. 2014. *Renewable Energy Master Plan for Sri Lanka, Wind Development Master Plan for Mannar District, and Commercial Arrangements and Bidding Documents for Wind Development in Mannar District*. Consultant's report. Manila (TA 8167-SRI).

Problem Tree for Energy



CEB = Ceylon Electricity Board, MV = medium voltage.