SECTOR ASSESSMENT (SUMMARY): ENERGY

Sector Road Map

1. Sector Performance, Problems, and Opportunities

1. Sri Lanka has an integrated national grid serving all parts of the country. In 2012, the peak demand on the national grid was 2,146 megawatts (MW); 11,802 gigawatt-hours (GWh) of electricity were delivered to the transmission grid. The country's electricity requirement was growing at an average rate of 6%–8% annually; this trend is expected to continue in the foreseeable future. Sri Lanka's national electrification ratio has grown from 29% in 1990 to 94% in 2012,[1] and compares favorably with other South Asian countries. However, substantial disparities in access to electricity still exist across the provinces, particularly in Northern and Eastern provinces where the conflict, which ended in 2009, severely damaged the distribution network and prevented the development of new rural electrification programs. Electrification in Western and Southern provinces exceeds 97% in all districts. As of 2012, per capita electricity sales were 515 kilowatt-hours (kWh), lower than in India or Pakistan. Transmission and distribution losses in 2012 were 10.67%; low compared with the average of South Asia.

2. Installed power generation capacity on the grid was 3,312 MW in 2012. The average growth in installed capacity has been 5.8% during 2008–2012. Of the total energy provided to the grid in 2012, thermal (oil and coal, 70.7%) and hydropower (28.0%) were the two main sources.[2] Ceylon Electricity Board (CEB) and Lanka Electricity Company (LECO) are the only two power utilities. CEB is an integrated utility fully owned by the government and engaged in generation, transmission, and distribution of electricity. It has 2,214 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. CEB owns and operates the entire transmission network and performs the bulk power purchase and delivery functions. The CEB distribution network serves about 90% of all customers in the country. LECO was established in 1983 as a distribution company. CEB and the government own most of its shares, municipalities and the Urban Development Authority are minority shareholders. LECO purchases bulk power from CEB and distributes it to about 497,700 customers in urban areas in the western costal belt, representing about 8.2% of all customers in Sri Lanka in 2012. Private sector participation in the power subsector is limited to power generation, with a total installed capacity of 1,098 MW of both oil-fired thermal independent power producers and renewable resource-based small power producers.

3. The share of thermal power in the generation mix increased from 50.0% in 2006 to 70.7% in 2012; demand growth generally was met by oil-fired thermal generation and the addition of a coal-fired plant in 2011. The share of thermal power in the generation mix in 2012 was disproportionately high because of monsoon failure resulting in low hydro generation in the country. The Power Sector Policy Directions, 1997 and 2002, which stated that thermal power plants would be built only with private financing, has resulted in a proliferation of small and costly oil-fired plants. Implementation of the cheaper base-load power plants needed to contain the costs of electricity production has been delayed for several decades. The nine oil-fired private power plants operating in 2012 with an aggregate capacity of 784 MW provided 41.6% of the country's energy requirements. The growth in oil-fired plants, the increase in oil prices, and the delayed construction of new hydropower plants have significantly increased the cost of generation. This is likely to change with the completion of the first coal-fired base-load power

[1] Ceylon Electricity Board. 2012. *CEB Statistical Digest Report*. Colombo.
[2] The remaining power generation comes from other renewable sources (wind, solar, biomass).

plant during 2011–2014, and the addition of more nonconventional and renewable resources in the near future.[3] The generation expansion plan specifies the addition of more base-load coal-fired plants to achieve the lowest economic cost of electricity production. The likely addition of renewable energy-based intermittent generation would require backing down the base-load plants during off-peak periods. This is being addressed in the evaluation of the pumped storage option currently being done by CEB.

4. Retail tariffs in Sri Lanka currently do not reflect the cost of supply. In 2011, the Public Utilities Commission of Sri Lanka (PUCSL) published the total estimated national average cost of electricity supply per kWh to be SLRs14.90, whereas the approved tariffs would yield only SLRs13.68. For 2013, the corresponding approved cost per kWh was SLRs20.35 and national average price was SLRs18.51. This continuing disparity between allowed costs and approved prices limits CEB's ability to undertake investments in transmission and distribution. The low-voltage distribution network requires improvements and expansion to meet the needs of new housing and commercial developments, particularly in Northern and Eastern provinces. Overdue investment in the medium-voltage distribution network has caused overloading, poor 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 network and grid substations. Immediate investments in the transmission and distribution network are needed to reduce system losses, ensure reliability of the entire power system, and encourage private sector investment in nonconventional renewable energy. Sri Lanka's power demand profile has a sharp peak in the evening, and the off-peak demand is about 40% of the peak demand. More vigorous demand-side management (DSM) initiatives beyond the mandatory time-of-use tariffs to large customers need to be implemented to manage this severe disparity between peak and off-peak demand.

5. Major issues in the power subsector are (i) high cost and prices, low reliability of supply; (ii) lack of access to electricity for about 6% of households, particularly those in rural areas; (iii) CEB's increasing debt portfolio and discouraging private sector investments; (iv) the urgent need to undertake DSM and energy efficiency measures, and (v) the need to streamline and facilitate the development of renewable energy. As a result, electricity supply costs are comparatively high, the main utility CEB's costs are not fully recovered through tariffs, and supply reliability is below expectations.

2. Government's Sector Strategy

6. The government's 10-year development framework (2006) envisions sustainable development of energy resources, access to and use of energy services enabled for the entire population, and reliable delivery of such services at a competitive price through commercially viable institutions subjected to independent regulation.[4] The framework is based on the government's National Energy Policy and Strategies, 2006 (updated in 2008).[5] The two documents provide a comprehensive sector development road map, including a long-term investment program, policy, and reform measures. The government's development strategies updated in 2010[6] aim to (i) increase supply capacity of the system to 6367 MW by 2020; (ii) increase the share of nonconventional renewable energy sources in grid energy supply from 4.1% in 2007 to 20% by 2020; and (iii) reduce the total technical and commercial losses of the transmission and distribution network from 14.6% in 2009 to 10.0% by 2020.

[3] Nonconventional renewable energy sources include mini hydropower (less than 10 MW capacity), wind, solar, and biomass.
[4] Ministry of Finance and Planning of Sri Lanka. 2006. *Mahinda Chintana: Vision for a New Sri Lanka*. Colombo.
[5] Ministry of Power and Energy of Sri Lanka. 2008. *National Energy Policy and Strategies of Sri Lanka*. Colombo.
[6] Ministry of Finance and Planning of Sri Lanka. 2010. *Mahinda Chintana: Vision for the Future.* Colombo.

7. In the short term, generation costs are expected to continue increasing, reflecting global oil prices. In the medium term, the government aims to lower generation costs by adding three low-cost, coal-fired plants at Puttalam (900 MW), Trincomalee 1 (2x250 MW), Trincomalee 2 (500 MW), and Southern Coal Power Project (300 MW). The government, through the National Energy Policy and Strategies, has imposed a moratorium on oil-burning power plants until non-oil sources provide 90% of grid energy. The first stage of the Puttalam coal power project (300 MW), which is financed by the People's Republic of China, was commissioned in 2011 and the second and third stages of the Puttalam coal power project (600 MW) will be operating in 2014. Trincomalee 1 (500 MW) with target commissioning in 2018 is proposed as a joint venture project between National Thermal Power Corporation of India and CEB.

8. The current financial position of CEB is not impressive. Its accumulated losses until financial year (FY) 2012 were about SLRs199,817 million. Although the operating margin for the first 6 months of FY2013 was 10% due to exceptional rainfall and good hydropower generation in CEB power plants and private power plants, the debt service coverage ratio has always been negative. This indicates that CEB is deeply in debt, where it is required to borrow from external sources, including expensive short-term borrowings, to meet its financial liabilities. Therefore, tariff reforms need to progress without disruption.

9. The government established PUCSL in 2002 as a regulator for the energy and water sectors under the PUCSL 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 2010, PUCSL established the tariff methodology and a road map for tariff reforms and rebalancing. Three tariff filings were conducted and tariff determinations announced. In 2012, PUCSL implemented a fuel adjustment charge for most customer categories, outside the tariff methodology. Other regulatory interventions for customer service (commercial quality), supply quality (technical quality), grid and distribution codes, disclosure of plans, and other are in progress, but the degree and speed of implementation is slow. For DSM initiatives, PUCSL prepared draft DSM regulations in August 2013, they are likely to be issued soon.

10. CEB has 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 segregated to allow each FBU to operate as a profit center. PUCSL has commenced regulating each FBU separately, and licenses issued in 2009 align with the functions of each FBU. The CEB board was expected to delegate day-to-day management and the power to make decisions to fulfill the FBU's obligations under its license to the heads of each FBU. This was to include all financial powers to make capital and other investments, recruit personnel, and incur revenue expenses to the extent required to ensure the FBU achieves its targets as approved by PUCSL. However, the progress of functional unbundling is slow. The target set by PUCSL for financial independence of FBUs for the end of 2011 has not been fully achieved yet, causing FBUs to be dependent on CEB corporate to allocate funds for investments and operations.

11. The country's primary energy sources are indigenous biomass, imported petroleum products, 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 limited options available to Sri Lanka.

12. In October 2007, the government established the Sustainable Energy Authority (SEA) with a mandate for (i) energy planning and policy analysis, (ii) development and implementation of policy for renewable energy development, (iii) energy efficiency, demand management, and

energy conservation, and (iv) energy fund management. SEA has provided an institutional framework to promote development of renewable energy projects through private investment. SEA will play a pivotal role in promoting renewable energy development by helping private investors (i) identify potential projects, (ii) obtain government clearance, (iii) gain access to government subsidies from the Sri Lanka sustainable energy fund managed by SEA, and (iv) enter into power purchase agreements with CEB. The government introduced new technology-specific, tiered tariffs in 2008 to attract more private investment for nonconventional renewable energy projects, moving away from the previous policy of pricing renewable energy at the annually adjusted weighted average avoided costs of thermal energy.

3. ADB Sector Experience and Assistance Program

13. ADB's energy sector strategy in Sri Lanka focuses on (i) renewable energy development, including wind and other clean energy sources; (ii) energy efficiency improvement and system loss reduction; (iii) transmission and distribution system enhancement to remove grid constraints on absorbing additional capacity from renewable energy sources, achieving energy-efficiency and reliability improvements, and expanding energy access for lagging regions; and (iv) creating an enabling environment for clean power development, particularly through public–private partnerships and greater private sector participation.[7]

14. The government introduced the Sri Lanka Electricity Act, 2009, designed to encourage efficiency improvements of CEB by regulating each of its FBUs. Parliament approved the act in March 2009. Subsequently, ADB approved the Clean Energy and Access Improvement Project, designed to support strengthening power system regulation and CEB's internal reforms in addition to investments in physical infrastructure.[8] The Sustainable Power Sector Support Project[9] and the Clean Energy and Network Efficiency Improvement Project[10] expanded ADB power interventions by (i) strengthening transmission infrastructure, (ii) improving reliability and efficiency of medium-voltage network, (iii) supporting rural electrification, (iv) contributing to energy efficiency and renewable energy development, and (v) promoting public–private partnerships.

15. ADB closely coordinates with major development partners, including the Japan International Cooperation Agency and the World Bank, in the power subsector of Sri Lanka. ADB ensures that its support creates synergies and complements ongoing and planned activities of other development partners.

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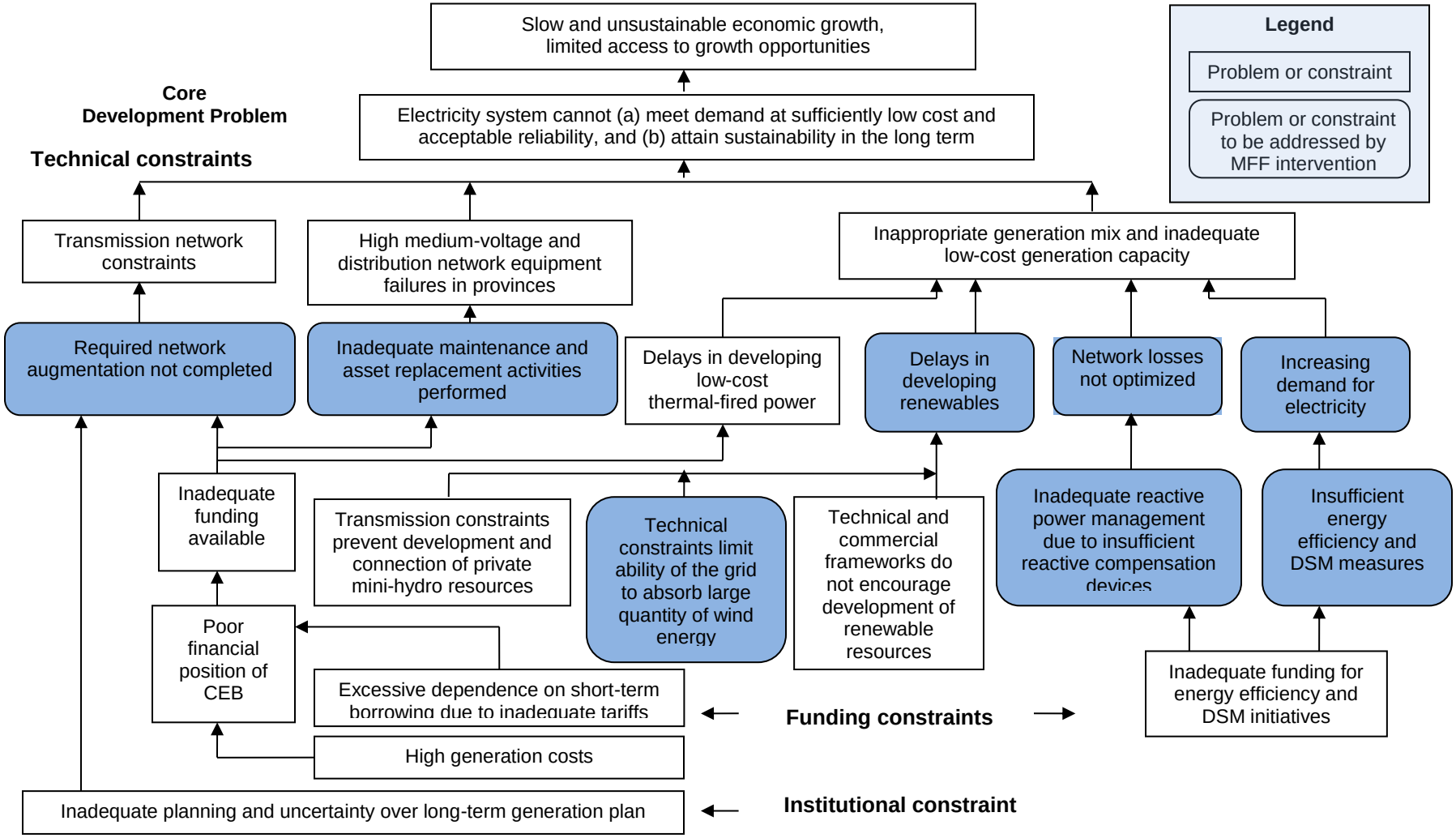
[7] ADB. 2011. *Country Partnership Strategy: Sri Lanka, 2012–2016*. Manila.

[8] ADB. 2009. *Report and Recommendation of the President to the Board of Directors: Proposed Loans, Grant, Administration of Grant, and Technical Assistance Grant to the Democratic Socialist Republic of Sri Lanka for the Clean Energy and Access Improvement Project*. Manila.

[9] ADB. 2011. *Report and Recommendation of the President to the Board of Directors: Proposed Loans and Administration of Technical Assistance Grant to the Democratic Socialist Republic of Sri Lanka for the Sustainable Power Sector Support Project*. Manila.

[10] ADB. 2012. *Report and Recommendation of the President to the Board of Directors: Proposed Loans, Technical Assistance Grant, and Administration of Grant to the Democratic Socialist Republic of Sri Lanka for the Clean Energy and Network Efficiency Improvement Project*. Manila.

Problem Tree for the Energy Sector



CEB = Ceylon Electricity Board, MFF = multitranche financing facility.
Source: Asian Development Bank

Sector Results Framework (Energy, 2012–2016)

Country Sector Outcomes		Country Sector Outputs		ADB Sector Operations	
Outcomes with ADB Contributions	**Indicators with Targets and Baselines**	**Outputs with ADB Contributions**	**Indicators with Incremental Targets**	**Planned and Ongoing ADB Interventions**	**Main Outputs Expected from ADB Interventions**
Improved provision of electricity services through sustainable development and efficient use of energy resources	System supply capacity increased to 6,367 MW by 2020 (baseline 2012: 3,312 MW) Electrification rate increased to 100% access to all by 2016 (baseline 2012: 94%) In-grid energy supply from nonconventional renewable energy sources increased to 20.0% by 2020 (baseline 2012: 6.4%	Power generation, including from renewable energy sources, and transmission and distribution systems expanded, improved, efficiently used, and well-managed	500 MW of nonconventional renewable energy added by 2016 (baseline 2012: 314 MW) System losses reduced to 10.00% by 2020 (baseline 2012: 10.67% Service connection for the poor promoted and an additional 60,000 poor households connected by 2016 Independent regulatory system and multiyear tariff system functioning well by 2014	**Planned key activity areas** Transmission (65% of funds) Distribution (10% of funds) Energy efficiency and renewable energy (25% of funds) **Pipeline projects with estimated amounts** Green Power Development and Energy Efficiency Improvement Investment Program ($300 million and $60 million cofinancing) **Ongoing projects with approved amounts** Clean Energy and Access Improvement Project ($160.0 million loan and $4.2 million grant) supported by three TA projects for a total of $3.8 million Conflict-Affected Region Emergency Project (power component for $13.77 million) Sustainable Power Sector Support Project ($120.00 million loan) supported by capacity development TA for $1.85 million Clean Energy and Network Efficiency Improvement Project ($130.0 million loan and $1.5 million grant) supported by capacity development TA for $0.9 million	**Planned key activity areas** Transmission infrastructure for power evacuation from renewable energy sources (including hydro, wind, and solar) to the grid; construction of a 30 MW hydropower plant; medium-voltage system energy efficiency improvement, technical loss reduction, supply reliability and quality enhancement, DSM **Pipeline projects** 30 MW Moragolla hydropower plant, 369 km transmission and 235 km 33 kV lines constructed, 134.7 GWh/year energy saved, DSM pilots implemented and capacity building provided **Ongoing projects** (i) 194 km of 132 kV transmission lines added to network; (ii) centralized load dispatch operating; (iii) credit support for service connection provided to 60,000 poor households by 2016; (iv) institutional capacity for effective power regulation strengthened; (v) energy consumption by street lighting reduced by 30%. 132 kV line from Kilinochchi to Chunnakam and grid substation at Chunnakam constructed. (i) 173 km of 132 kV transmission lines added to network; (ii) second circuit stringing of 163 km of 220 kV line completed; (iii) 252 km of 33 kV MV and 593 km of LV lines constructed; (iv) 12,190 rural households connected to electricity; (v) 1.3 MW of micro-hydro capacity added to the grid; (vi) energy efficiency labeling laboratories established; (vii) detailed engineering of Moragolla hydropower plant completed; (viii) 241 km of transmission lines and 129 km of 33 kV distribution lines constructed; (ix) 1 MW solar rooftop power generation installed; (x) system stability study and renewable energy development master plan prepared

ADB = Asian Development Bank, DSM = demand-side management, GWh = gigawatt-hour, km = kilometer, kV = kilovolt, LV= low voltage, MW = megawatt, TA = technical assistance.
Sources: ADB. 2011. *Country Partnership Strategy: Sri Lanka, 2012–2016*. Manila; ADB. 2009. *Report and Recommendation of the President to the Board of Directors: Proposed Loans, Grant, Administration of Grant, and Technical Assistance Grant to the Democratic Socialist Republic of Sri Lanka for the Clean Energy and Access Improvement Project*. Manila; ADB. 2010. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the Democratic Socialist Republic of Sri Lanka for the Conflict-Affected Region Emergency Project*. Manila; ADB. 2011. *Report and Recommendation of the President to the Board of Directors: Proposed Loans and Administration of Technical Assistance Grant to the Democratic Socialist Republic of Sri Lanka for the Sustainable Power Sector Support Project*. Manila; and ADB. 2012. *Report and Recommendation of the President to the Board of Directors: Proposed Loans, Technical Assistance Grant, and Administration of Grant to the Democratic Socialist Republic of Sri Lanka for the Clean Energy and Network Efficiency Improvement Project*. Manila.