

## SECTOR ASSESSMENT (SUMMARY): ENERGY (POWER)

### 1. Sector Performance, Problems and Opportunities

1. Bangladesh's gross domestic product (GDP) is expected to grow at 6.1% in 2015,<sup>1</sup> and 6.5% in 2016 due to improvements in national macro-economic factors and expansion of installed power and gas supply capacity. Power shortages have constrained economic growth in Bangladesh and the cost of power outages has been estimated at about 0.5% of GDP.<sup>2</sup> Rapid economic growth over the period from 2002 to 2013 resulted in a sharp increase in electricity demand as the country industrializes and raises living standards.

2. Notable improvements have taken place over the last decade (2003–2013). Electrification rates rose from 35% in fiscal year (FY) 2003 to 62% in FY2013,<sup>3</sup> while transmission and distribution losses have been cut sharply, mainly through investment and better management. The financial performance of most sector companies has also improved because of higher tariffs, better collection, improved financial transparency, and increased metering. The operational performance of the power sector (as measured by parameters such as total generation and gross revenues) has improved steadily since 1995. For instance, capacity addition in Bangladesh in both the public and private sector has more than doubled since 2000. Losses have been steadily reduced since 1995 as a result of sector reforms, an increase focus on distribution, and better commercial performance.

3. The power sector is led by the Power Division, under the Ministry of Power, Energy and Mineral Resources, and regulated by the Bangladesh Energy Regulatory Commission (BERC). The sector is unbundled in generation, transmission and distribution segments. The power generation segment is composed of the Bangladesh Power Development Board (BPDB), the largest single institution, which also serves as the single buyer of all generation, and supplies in bulk to distribution utilities. The Ashuganj Power Station Company, Electricity Generation Company of Bangladesh, North-West Power Generation Company, and Rural Power Company are public sector generation companies. The power transmission segment is owned and managed by the Power Grid Company of Bangladesh, and the power distribution segment by BPDB, Dhaka Power Distribution Company, Dhaka Electric Supply Company, West Zone Power Distribution Company, and the Rural Electrification Board (through rural cooperatives).

4. The energy mix of the country's installed power generating capacity (as of May 2015) was 62.98% natural gas, 21% furnace oil, 7.27% diesel, 2.23% coal, and 2.05% hydro, with 4.46% imported from India. Renewable energy comprises a negligible share but is expected to account for up to 500 megawatts (MW) of installed capacity by 2020 according to the draft National Energy Policy.

5. **Demand–supply gap.** In May 2015, the installed generating capacity was 11,203 MW, with 5,183 MW (46%) from private power plants serving the grid through a range of contracts ranging from long term contracts for gas projects to short-term rental contracts for furnace oil and diesel generators.<sup>4</sup> There is an operating 500 MW interconnection in Bheramara for

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<sup>1</sup> ADB. March 2015. *Asian Development Outlook 2015. Financing Asia's Future Growth*. Manila.

<sup>2</sup> Government of Bangladesh, Ministry of Planning, Planning Commission. 2011. *Sixth Five Year Plan, FY2011–FY2015: Accelerating Growth and Reducing Poverty*. Dhaka.

<sup>3</sup> Bangladesh's fiscal year ends on 30 June; FY2011 refers to the fiscal year ending on 30 June 2011. Data from the Ministry of Power Energy and Mineral Resources.

<sup>4</sup> Rental power is a system that has been initiated and promoted by the government as an immediate measure to cope with the critical shortage of power.

importing power from India. The balance of 6,020 MW (54%) is provided by publicly owned power generation companies.<sup>5</sup> The peak demand recorded in the system is 7,712 MW. The disparity between power supply and demand will continue to increase in view of the continuous growth in demand.<sup>6</sup> In 2014, yearly per capita consumption increased to 321 kilowatt-hours (kWh), from 222 kWh in 2013.

6. **Limited access to power.** Despite its notable progress on the macroeconomic front, Bangladesh's electrification ratio is still low—about 70% of the population in 2015.<sup>7</sup> Improving access to electricity is a key objective of the government's Vision 2021, and achieving this will require significant investment in power transmission and distribution. There are significant regional differences: the western part of the country has traditionally been underserved, with power generation and transmission facilities concentrated in the east.

7. **Single fuel dependence and energy security.** Over 60% of power generating capacity relies on gas as a fuel source. Gas supply shortages have impacted power generation, resulting in power cuts that have reduced economic output. The power system has a low level of reserve capacity and the National Load Despatch Center has expressed concerns about managing the power system. To address the shortages, the government has announced plans to (i) develop plants using dual fuel technology, and domestic and imported coal; (ii) increase international power transfers; and (iii) promote solar and wind energy. It remains uncertain when these options will be implemented, however. Through technical assistance grant (TA) the Asian Development Bank (ADB) is supporting a review of options to improve energy security in Bangladesh.<sup>8</sup>

8. **Dependence on rental power plants.** Rental power plants with short-term contracts use furnace oil, diesel and fuel oil to supply over 2,500 MW of electricity to BPDB at a cost that is several times the average tariff that can be recovered from consumers. This is impacting power sector financials: in 2014, oil and diesel accounted for 18.3% of BPDB's power generation mix, but nearly 40% of BPDB's fuel and power purchase costs.

9. **Environment for investment.** The Ministry of Power, Energy and Mineral Resources (MPEMR) has developed a plan to add 19 gigawatts (GW) of generation capacity during 2014–2021 to meet the growth in demand and expand access to electricity. Private sector investment is planned to for account over 6 GW. Major remaining challenges include improving the enabling business environment, fuel availability, logistics, cost recovery and addressing barriers to mobilization of local long-term financing. Implementing the power sector expansion plan will require significant public sector investment; meeting these targets will necessitate improvements to the enabling environment and implementation support for joint venture and private sector projects.

10. **Governance and planning.** Several public sector entities, including the Power Grid Company of Bangladesh, are listed on the country's stock exchanges. The government, through the Power Division of MPEMR, remains a majority shareholder and supervises the functioning of these entities. The intended corporatization of BPDB is not yet complete. The government has announced significant capacity addition plans to achieve the target of 100% access to

<sup>5</sup> Generation includes 4,126 MW (BPDB); 827 MW (Ashuganj Power Station Company); 368 MW (North-West Power Generation Company); and 77 MW (Rural Power Company).

<sup>6</sup> The disparity is higher, because the nominal power capacity of power generators is reduced by lack of maintenance, poor operation and obsolete equipment.

<sup>7</sup> Information received from Ministry of Power, Energy and Mineral Resources.

<sup>8</sup> ADB. December 2014. *People's Republic of Bangladesh. Study on Energy Security*. Manila.

electricity by 2021. This will require additional planning expertise to make the proposed plants operational and to procure power efficiently.

11. The government prepared the Power System Master Plan 2010, which outlined a target of raising the country's generation capacity to 16,000 MW by 2016, 24,000 MW by 2021 and 40,000 MW by 2030. However, the government is formulating a new Power System Master Plan 2015 to revisit previous optimistic targets, while including new sector developments (e.g., coal and new clean energy capacity).

12. **Renewable energy and energy efficiency.** The government enacted the Sustainable and Renewable Energy Development Authority Act, 2012 to set up a nodal organization for renewable energy and energy efficiency. Bangladesh has a successful off-grid solar program with over 3.6 million solar home systems and 135 MW of solar power capacity in operation. The government is considering solar–diesel hybrids and grid-connected solar power options. There is a focus on replacing old gas plants with combined cycle plants to boost energy efficiency.

13. **Tariffs and regulation.** The Bangladesh Energy Regulatory Commission (BERC), the regulatory agency for the energy sector, was established in 2004, and its functions include ensuring efficient use of electricity, service quality, and tariff determination. It has received assistance from multilateral and bilateral agencies to carry out its mandate. Existing retail electricity tariffs are inadequate; given the proliferation of imported fuels (such as liquefied natural gas, heavy fuel oil, high speed diesel and imported coal), tariffs are expected to increase significantly to cover costs. While carrying out politically sensitive tariff reforms is challenging, retail tariffs have increased since 2009. Important regulations for the gas sector, including tariff regulations, have been published and applied while the electricity transmission tariff regulations are expected to be published in 2015.

14. **Regional power trading.** Countries in South Asia have the potential to interconnect and trade power from hydropower plants, and to share existing excess power capacity, including from natural gas. Bangladesh can benefit from this regional trading potential if political, legal, operational, regulatory and technical issues are addressed in a timely manner.

15. In 2012, Bangladesh and India signed their first cross-border power purchase agreement for 250 MW; in 2013, a competitive tendering process was used to procure 250 MW of power from India. Power flows of 500 MW started in 2013. Extension of an additional 500 MW of interconnection capacity is under way. The potential for additional cross-border transmission capacity and power trade with other South Asian countries, such as hydropower electricity from Bhutan and Nepal, is being explored, including joint ventures to develop additional generation capacity with Indian power utilities.

## 2. Government's Sector Strategy

16. To address Bangladesh's constrained economic growth and widespread poverty, the power sector development framework identifies the need to establish an adequate, reliable power supply and to increase access to power. The government has set the goal of providing electricity to all citizens by 2021.

17. To achieve this target and address emerging power sector challenges, significant investments in generation, transmission, and distribution are required. The government has estimated the need for \$40 billion of investment by 2030. This volume of investment must be anchored in significant regulatory and governance reforms to overcome sector challenges,

including fuel mix diversification, as planned in the Power System Master Plan 2010 for long-term energy security in Bangladesh.

18. Gas consumption will continue to increase, especially for electricity production, despite declining gas reserves. New commercially viable reserves are being developed, while the importation of liquefied natural gas could help fill the growing gap, including cross-border natural gas trading with Myanmar. In addition, cross-border power trading in the South Asian region with India is expected to increase, including potential power purchases from Nepal and Bhutan.

19. The government has initiated a 500 MW solar power development program, including building a national wind mapping program. In addition, the government is undertaking development programs to repower and improve the efficiency of old power plants.

20. In the medium term, the government's power sector reform road map for 2010–2016 recognizes the need to address structural weaknesses, including empowering BERC to link tariffs and costs, improve corporate governance of sector entities, complete the restructuring of BPDB, unbundle and grant managerial independence to sector entities, streamline the process for private sector investments, and mobilize funds from capital markets for power sector entities. ADB continues to support such initiatives through financing of projects, participation in the local consultative group (comprising various development partners), and through its TA program.

### **3. ADB Sector Experience and Assistance Program**

21. ADB has been a key multilateral development partner in the power and energy sector in Bangladesh. Since 2001, ADB has provided a total of \$4 billion (through 42 loans) in support of gas and power sector development by improving generation, transmission and distribution infrastructure. Ongoing and recently completed power projects include the South Asia Subregional Economic Cooperation (SASEC) Bangladesh–India Electricity Grid Interconnection project (\$112 million) as well as interventions in power generation, transmission and distribution infrastructure (detailed in the Sector Results Framework 2015–2019). Through TA ADB is also supporting the assessment of options to increase capacity and energy security and create institutions for power trading.

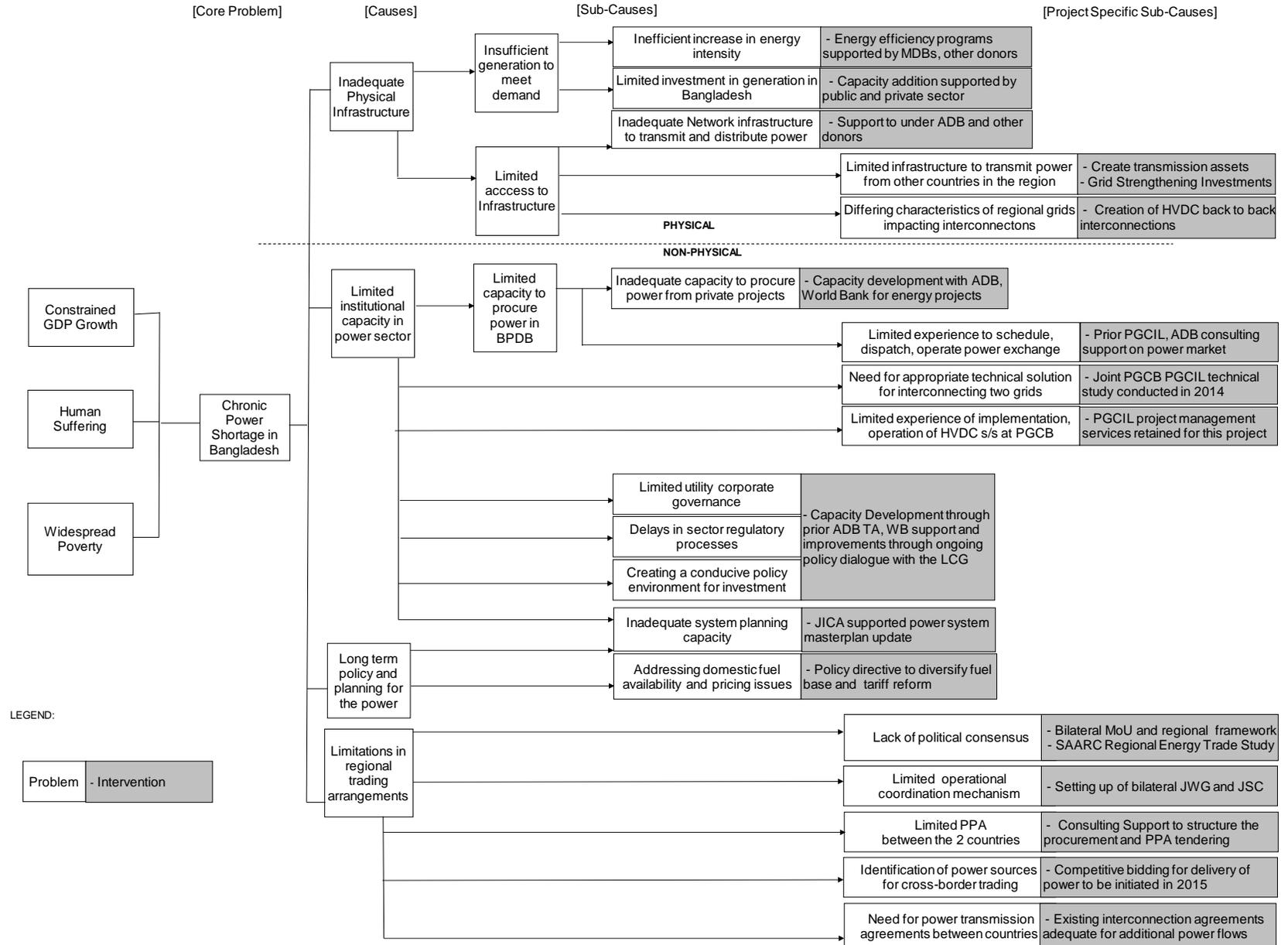
22. The 2009 sector assessment program evaluation for the Bangladesh energy sector noted that the operational, commercial and financial performance of the transmission and distribution entities had improved.<sup>9</sup> Bill collections were better, the number of outages had been reduced, the voltage profile had improved, and cost recovery improved. The sector assessment program evaluation also emphasized the need to promote regional electricity trade with neighboring countries. TA has been provided to the government to conclude the relevant commercial and technical arrangements for the Bangladesh–India Electrical Grid Interconnection Project.

23. The proposed grid interconnections with neighboring countries are expected to address power shortages in the medium term and to open possibilities for additional regional interconnections and trade. Diversification of fuel sources and investments in energy efficiency (especially for generating stations and large consumers) are also government priorities.

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<sup>9</sup> ADB. 2009. *Sector Assessment Program Evaluation: Bangladesh Energy Sector*. Manila.

### SASEC SECOND BANGLADESH-INDIA ELECTRICITY GRID INTERCONNECTION PROJECT - PROBLEM TREE



ADB = Asian Development Bank, BPDB = Bangladesh Power Development Board, HVDC = high voltage direct current, JICA = Japan International Cooperation Agency, JSC = joint steering committee, JWG = joint working group, kV = kilovolt, LCG = Local Consultative Group, MOU = memorandum of understanding, PGCB = Power Grid Company of Bangladesh, PGCIL = Power Grid Corporation of India Limited, PPA = power purchase agreement, SAARC = South Asian Association for Regional Cooperation, TA = technical assistance.

**Sector Results Framework: Power Sector (2015–2019)**

Country Sector Outcome		Country Sector Outputs		ADB Sector Operations	
Outcomes with ADB Contributions	Indicators with Targets and Baseline	Outputs with ADB Contributions	Indicators with Incremental Targets (Baselines Zero)	Planned and Ongoing ADB Interventions	Main Outputs Expected from ADB Contribution
Reliable power supply with expanded access to power	<p><b>By 2018</b> Power generation to increase by additional 9,000 MW over 2011–2017</p> <p>Per capita consumption of electricity increased from 170 kWh in 2010 to 390 kWh in 2018</p> <p>Cross-border power imports to increase from 0 MW in 2010 to over 1,000 MW in 2018</p> <p>Access to electricity increased from 47% of households in 2009 to 70% by 2018</p>	<p>Capacity of energy sector institutions strengthened</p> <p>Additional generation capacity installed</p> <p>Inefficient thermal plants rehabilitated or replaced</p> <p>Cross-border transmission links established</p> <p>Expansion and upgrading of power transmission and distribution networks</p>	<p><b>By 2018</b> Procurement, regulatory, and governance capacities strengthened</p> <p>Additional generation from coal, dual fuel, and other sources installed to meet demand</p> <p>Existing open cycle state-owned power plants converted to combined cycle plants</p> <p>Western border 1,000 MW power transmission interconnection completed</p>	<p><b>Planned Key Activity Areas</b> Continuation of energy sector reforms Construction of key in-country power transmission links Efficiency improvement in thermal plants Support for renewable energy projects Regional power transmission interconnections</p> <p><b>Ongoing Projects</b> Sustainable Power Sector Development Program Power System Expansion and Efficiency Improvement Program (MFF: tranches 1 and 2) Power System Efficiency Improvement Project</p> <p><b>Planned Projects</b> Power System Expansion and Efficiency Improvement Program (MFF: tranche 3) Second Power System Expansion and Efficiency Improvement Program (MFF) SASEC Second Bangladesh–India Electrical Grid Interconnection Project Khulna 750-850 MW LNG-Based Power Plant Project Grid Interconnection Project for Electricity (up to 2000 MW) Rural Hybrid Power Systems Project (50 MW) Grid Connected Solar PV Plants 200 MW</p>	<p><b>Planned Key Activity Areas</b> Support for sector reforms, governance and pricing</p> <p>Implementation of power generation infrastructure (gas, coal, solar) including conversion of peaking power plants to combined cycle power plants</p> <p>Implementation of power transmission and distribution infrastructure: 400kV/ 230kV/ 135/ 33/11 kV-level power transmission and distribution lines, including substations and border interconnections</p>

ADB = Asian Development Bank, kV = kilovolt; kWh = kilowatthour, LNG = liquefied natural gas, MFF = multitranche financing facility, MW = megawatt, PV = photovoltaic, SASEC = South Asian Subregion Economic Cooperation.