



# Report and Recommendation of the President to the Board of Directors

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Project Number: 51137-001  
July 2018

## Proposed Loan and Administration of Grants People's Republic of Bangladesh: Southwest Transmission Grid Expansion Project

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Asian Development Bank

## **CURRENCY EQUIVALENTS**

(as of 12 June 2018)

Currency unit	–	taka (Tk)
Tk1.00	=	\$0.0119281
\$1.00	=	Tk83.83

## **ABBREVIATIONS**

ADB	–	Asian Development Bank
BERC	–	Bangladesh Energy Regulatory Commission
EAKPF	–	Republic of Korea e-Asia and Knowledge Partnership Fund
IEE	–	initial environmental examination
JFJCM	–	Japan Fund for the Joint Crediting Mechanism
PAM	–	project administration manual
PGCB	–	Power Grid Company of Bangladesh Limited
ROW	–	right-of-way

## **WEIGHTS AND MEASURES**

km	–	kilometer
kV	–	kilovolt
MVA	–	megavolt-ampere
MW	–	megawatt

## **NOTES**

- (i) The fiscal year (FY) of the Government of Bangladesh and its agencies ends on 30 June. "FY" before a calendar year denotes the year in which the fiscal year ends, e.g., FY2016 ends on 30 June 2016.
- (ii) In this report, "\$" refers to United States dollars.

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## PROJECT AT A GLANCE

<b>1. Basic Data</b>		<b>Project Number:</b> 51137-001	
<b>Project Name</b>	Southwest Transmission Grid Expansion Project	<b>Department /Division</b>	SARD/SAEN
<b>Country Borrower</b>	Bangladesh	<b>Executing Agency</b>	Power Grid Company of Bangladesh, Ltd. (PGCB)
<b>2. Sector</b>	<b>Subsector(s)</b>	<b>ADB Financing (\$ million)</b>	
✓ <b>Energy</b>	Electricity transmission and distribution		350.00
		<b>Total</b>	<b>350.00</b>
<b>3. Strategic Agenda</b>	<b>Subcomponents</b>	<b>Climate Change Information</b>	
Inclusive economic growth (IEG)	Pillar 1: Economic opportunities, including jobs, created and expanded	CO <sub>2</sub> reduction (tons per annum)	174,595
Environmentally sustainable growth (ESG)	Eco-efficiency Global and regional transboundary environmental concerns	Climate Change impact on the Project	Low
		<b>ADB Financing</b>	
		Mitigation (\$ million)	86.00
		<b>Cofinancing</b>	
		Mitigation (\$ million)	7.00
<b>4. Drivers of Change</b>	<b>Components</b>	<b>Gender Equity and Mainstreaming</b>	
Governance and capacity development (GCD)	Institutional development	Some gender elements (SGE)	✓
Knowledge solutions (KNS)	Public financial governance		
Partnerships (PAR)	Application and use of new knowledge solutions in key operational areas International finance institutions (IFI) Official cofinancing		
<b>5. Poverty and SDG Targeting</b>		<b>Location Impact</b>	
Geographic Targeting	No	Rural	Medium
Household Targeting	No	Urban	High
SDG Targeting	Yes		
SDG Goals	SDG7, SDG9, SDG13		
<b>6. Risk Categorization:</b>	Complex		
<b>7. Safeguard Categorization</b>	<b>Environment: B Involuntary Resettlement: A Indigenous Peoples: C</b>		
<b>8. Financing</b>			
<b>Modality and Sources</b>		<b>Amount (\$ million)</b>	
<b>ADB</b>		<b>350.00</b>	
Sovereign Project (Regular Loan): Ordinary capital resources		350.00	
<b>Cofinancing</b>		<b>7.50</b>	
Japan Fund for the Joint Crediting Mechanism - Project grant (Full ADB Administration)		7.00	
Republic of Korea e-Asia and Knowledge Partnership Fund - Project grant (Full ADB Administration)		0.50	
<b>Counterpart</b>		<b>174.50</b>	
Government		174.50	
<b>Total</b>		<b>532.00</b>	

## I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed loan to the People's Republic of Bangladesh for the Southwest Transmission Grid Expansion Project. The report also describes (i) the proposed administration of a grant to be provided by the Japan Fund for the Joint Crediting Mechanism (JFJCM); and (ii) the proposed administration of a grant to be provided by the Republic of Korea e-Asia and Knowledge Partnership Fund (EAKPF) for the Southwest Transmission Grid Expansion Project, and if the Board approves the proposed loan, I, acting under the authority delegated to me by the Board, approve the administration of the grants.

2. The project will improve the operational performance of the power sector and contribute to the Government of Bangladesh's target to achieve electricity for all by 2021 through (i) constructing (a) a 400/132-kilovolt (kV) substation at Gopalganj; (b) a 230 kV transmission line in the southern zone, from Barisal to Faridpur; and (c) a 400 kV transmission line in the western zone, from Bogra to Rohanpur; and (ii) implementing a capacity development program in the electric utility industry to promote socially and gender inclusive growth. The project will use state-of-the-art conductors with higher power transmission capacity and lower energy loss in both the 230 kV and 400 kV transmission lines.

## II. THE PROJECT

### A. Rationale

3. Bangladesh has sustained an average annual economic growth rate of 6.5% since 2007, despite the 2008–2009 global financial crisis.<sup>1</sup> Bangladesh is now evolving into a middle-income country<sup>2</sup> since its gross domestic product per capita has risen steadily from \$1,110 in 2014 to \$1,544 in 2017. The structure of the Bangladesh economy is gradually shifting from agriculture to manufacturing and services. Poverty has been halved since 2000, and many of the Millennium Development Goal targets have been met. Building on these achievements, the government has set new priority targets to (i) accelerate the annual economic growth to 7.5% to move to middle-income status by 2021; (ii) create jobs and support rural development to engender inclusive growth and poverty reduction; (iii) reduce poverty from 24.8% in 2015 to 18.6% in 2020, and extreme poverty from 12.9% in 2015 to about 8.9% in 2020; and (iv) reduce environmental degradation and climate change vulnerabilities.<sup>3</sup>

4. Despite its economic success, the country faces major challenges in its effort to maintain the growth trend and move closer to upper middle-income status because of infrastructure deficiencies. Addressing infrastructure deficiencies is therefore a top priority of the government. A major challenge is to provide modern and affordable energy services to those who lack access. Inadequate energy could result in loss of productivity and competitiveness and become a constraint to faster growth and greater investment in the short to medium term. To mitigate this constraint and sustain the country's economic momentum, the government has prepared the Power System Master Plan<sup>4</sup> to increase power generation capacity, as well as improve and extend the power

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<sup>1</sup> Bangladesh Bureau of Statistics. <http://www.bbs.gov.bd/> (accessed 1 March 2018).

<sup>2</sup> ADBI. 2017. *Working Paper Series: Middle-Class Composition and Growth in Middle-Income Countries*. Tokyo. <https://www.adb.org/sites/default/files/publication/325056/adbi-wp753.pdf>. A country is classified as lower middle-income if its gross domestic product per capita is between \$2,250 and \$7,500, as upper middle-income if it is between \$7,500 and \$14,500.

<sup>3</sup> Government of Bangladesh, Planning Commission. 2015. *Seventh Five Year Plan FY2016–FY2020: Accelerating Growth, Empowering Citizens*. Dhaka.

<sup>4</sup> Government of Bangladesh; Ministry of Power, Energy and Mineral Resources. 2016. *Power System Master Plan 2016*. Dhaka.

transmission and distribution network, with the aim of achieving universal access to electricity by 2021.

5. The power sector in Bangladesh is characterized by recurring shortages of electricity-generating capacity in the face of ever-rising demand in a growing economy. In fiscal year (FY) 2015, per capita electricity consumption was 310 kilowatt-hours. This figure was lower than most other countries in South Asia, indicating that power sector infrastructure facilities require significant capacity additions. In FY2017, peak demand was estimated at 10,400 megawatts (MW) while available generation capacity was 9,479 MW. A significant amount of demand was met by supply from captive generation and load shedding.<sup>5</sup> Existing generation capacity gradually retires and needs to be replaced, while net peak demand has continued to increase; it is forecasted to exceed 13,300 MW by 2020 and 19,900 MW by 2025. Further, the national electricity access in FY2017 masks a stark urban–rural disparity, with access to electricity at over 90% in urban areas and only 40% in rural areas. Also, despite substantial improvement in operational and financial performance, weak financial management capacities of the sector entities and below cost-recovery power tariffs continue to impair the financial health of the sector entities.

6. Bangladesh’s power generation expansion plan intends to provide the required generation capacity to meet the increasing demand and the government’s electrification goals, including delivering services to those not connected to grid electricity (footnote 4). Further, Bangladesh’s Seventh Five Year Plan (footnote 3) envisages an integrated development strategy for the southwest region encompassing Dhaka, Khulna, and Barisal. The power sector will play a critical role in realizing the government’s vision for promoting economic and industrial growth in the southwest region.

7. The past sector progress comprises (i) creating an enabling business environment for the private sector, (ii) implementing power transmission interconnection with India, (iii) increasing clean energy investment in wind and solar, and (iv) strengthening the transmission network to accommodate expected additional power generation capacity. The sector reform actions so far have contributed to considerable achievements, including the following: (i) the establishment in 2004 of Bangladesh Energy Regulatory Commission (BERC), and (ii) the approval in 2016 of an electricity transmission tariff fixation methodology. There are still areas for further improvement and capacity building, such as financial management and corporate governance in power utilities.

8. Despite improved efficiency from power sector reforms, transmission challenges remain. Investments in network strengthening and measures to reduce nontechnical losses have resulted in a significant decline of overall system losses from over 30% of generation in the 1990s to 13%–15% of generation at present. The number of interruptions because of transmission system issues, however, increased from two incidents in FY2016 to 15 incidents in FY2017, with the cumulative duration of outages more than doubling from almost 17 hours to 39 hours. Investments in the transmission network are needed to reduce the number of interruptions and further reduction of system losses. Therefore, addressing deficiencies in the transmission network remains a top priority of the government. Investments in transmission infrastructure will also be essential to help Bangladesh (i) achieve its goal of achieving energy security (in line with Sustainable Development Goal 7),<sup>6</sup> (ii) accelerate its economic growth, (iii) improve living standards of its population, (iv) create meaningful jobs, and (v) attain upper middle-income status. A highly skilled workforce is required to modernize power infrastructure with advanced technologies. Utilities have not been

<sup>5</sup> BPDB. 2018. *Annual Report 2016–2017*. Dhaka. Bangladesh Power Development Board estimates that load shedding at peak times in FY2017 was about 250 MW.

<sup>6</sup> Sustainable Development Goal 7 is to ensure access to affordable, reliable, sustainable, and modern energy for all.

successful in enhancing the capacity of current employees or acquiring new employees with the needed skills to operate the power system effectively and efficiently.

9. To address the issues in para. 5, the government has formulated a strategy and set targets for the power sector, as stipulated in Vision 2021<sup>7</sup> and the Seventh Five Year Plan (footnote 3). These include, among others, (i) increasing generation capacity by 23,000 MW, (ii) reducing combined transmission and distribution losses from 13% to 9% of generation, and (iii) providing uninterrupted power supply to industries, all by 2020. The project is also aligned with the Energy Policy<sup>8</sup> of the Asian Development Bank (ADB) and the priorities of ADB's country partnership strategy for Bangladesh, 2016–2020.<sup>9</sup>

10. Inadequate transmission lines and substation transformer capacities in southern and western regions are the main contributors to transmission bottlenecks. In tandem with increased power generation capacity, investments in the transmission network are required to address transmission bottlenecks for the evacuation of bulk power from power stations to major load centers such as Greater Dhaka, Chittagong, and the southwest economic corridor. At the same time, construction of new transmission lines has become more challenging because of the high population density and limited rights-of-way (ROWs).

11. **Value added by ADB assistance.** The proposed Southwest Transmission Grid Expansion Project builds upon ADB's strong and sustained work in the power sector of Bangladesh and embraces ADB's sector knowledge and synergistic approach in developing all energy subsectors. Complementing the investment in the recently-approved Rupsha 800-Megawatt Combined Cycle Power Plant in the southwest region,<sup>10</sup> the proposed project will focus on addressing continuing deficiencies in the transmission system and will enhance power transfer capacity to the load centers of the southern and western zones. The project will use advanced efficient conductor technology as a cost-effective solution to allow more power transfer at lower energy loss in the new transmission lines. The project will minimize the ROW requirements and mitigate potential safeguard issues.<sup>11</sup> Further, the project will initiate a capacity development program focusing on new technologies and trends in power systems, with an emphasis on gender and social inclusion, which will help the long-term sustainability of the Bangladeshi power sector. The project will also support further sector reforms by strengthening financial management capacity and governance structure of the power utilities while accelerating transmission tariff approvals by BERC.

## B. Impact and Outcome

12. The project is aligned with the following impacts: (i) national target of electricity for all achieved by 2021 (footnote 7), and (ii) combined transmission and distribution losses reduced from 13% to 9% of generation, and uninterrupted power supply provided to industries by 2020 (footnote

<sup>7</sup> Government of Bangladesh, Ministry of Planning, Planning Commission. 2012. *Perspective Plan of Bangladesh, 2010–2021: Making Vision 2021 a Reality*. Dhaka.

<sup>8</sup> ADB. 2009. *Energy Policy*. Manila.

<sup>9</sup> ADB. 2016. *Country Partnership Strategy: Bangladesh, 2016–2020*. Manila.

<sup>10</sup> Some recent investments include the following: ADB. [Bangladesh: Sustainable Power Sector Development Program](#); ADB. [Bangladesh: Bangladesh–India Electrical Grid Interconnection Project](#); ADB. [Bangladesh: Natural Gas Infrastructure and Efficiency Improvement Project](#); ADB. [Bangladesh: Bangladesh Power System Enhancement and Efficiency Improvement Project](#); and ADB. [Bangladesh: Rupsha 800-Megawatt Combined Cycle Power Plant Project](#).

<sup>11</sup> Compared to aluminum conductor steel-reinforced conductor, transmission capacity of the proposed advanced efficient conductor is increased by two times and line losses are typically 25% less. These advantages can reduce ROW requirements by limiting blowout clearance for new transmission corridors.



4). The project will have the following outcome: capacity of electricity supply in Bangladesh increased.<sup>12</sup>

### C. Outputs

13. **Output 1: New substation at Gopalganj installed.** The project will construct and commission the Gopalganj (North) 400/132 kV substation comprising three 325 megavolt-ampere (MVA) transformers.

14. **Output 2: Transmission network in southern Bangladesh expanded.** The project will expand the network by (i) constructing and commissioning a 126-kilometer (km) Barisal (North)–Gopalganj (North)–Faridpur 230 kV double-circuit line,<sup>13</sup> (ii) constructing and commissioning two 230 kV bay extensions at the existing Barisal (North) substation and augmenting the existing Faridpur 132/33 kV substation with four 132 kV bays; five 230 kV bays; and 230/132 kV, 2x250 MVA transformers; and (iii) augmenting the Gopalganj (North) substation with 400/230 kV, 2x750 MVA transformers.

15. **Output 3: Transmission network in western Bangladesh expanded.** The project will expand the network by constructing and commissioning (i) a new 104 km Bogra (West)–Rohanpur 400 kV double-circuit line; (ii) a new 400/230 kV, 2x750 MVA Bogra (West) substation; (iii) a new 400/132 kV, 2x325 MVA Rohanpur substation; (iv) a new 26 km Chapainawabganj–Rohanpur 132 kV double-circuit transmission line; (v) two 132 kV bay extensions at the existing Chapainawabganj substation; and (vi) an 11 km line-in, line-out connection from the Barapukuria-Bogra (South) 230 kV transmission line to the Bogra (West) substation, and a 1 km line-in, line-out connection from the Chowdala–Niamatpur 132 kV transmission line to the Rohanpur substation.

16. **Output 4: Socially inclusive capacity in the electric utility industry enhanced.** The project will enhance capacity, particularly emphasizing inclusive development and gender equality, through a university program relevant to the energy sector, supporting (i) 50 university students, of which at least 40% are women; and (ii) 30 staff from Power Grid Company of Bangladesh Limited (PGCB), of which at least 30% are women.

### D. Summary Cost Estimates and Financing Plan

17. The project is estimated to cost \$532 million (Table 1).

18. The government has requested a regular loan of \$350 million from ADB's ordinary capital resources to help finance the project. The loan will have a 25-year term, including a grace period of 5 years, an annual interest rate determined in accordance with ADB's London interbank offered rate (LIBOR)-based lending facility; a commitment charge of 0.15% per year; and such other terms and conditions set forth in the draft loan agreement. Based on the straight-line method, the average maturity is 15.25 years, and the maturity premium payable to ADB is of 0.10% per annum.

<sup>12</sup> The design and monitoring framework is in Appendix 1.

<sup>13</sup> The project will utilize aluminum conductor composite core cable (a type of high-temperature, low-sag conductor) in the transmission lines under outputs 2 and 3. Such energy-efficient cables have less resistance and higher capacity, reducing transmission losses and carbon dioxide emissions compared with conventional cables that are currently used in Bangladesh.

**Table 1: Summary Cost Estimates**

(\$ million)

Item	Amount <sup>a</sup>
<b>A. Base Cost<sup>b</sup></b>	
1. New substation at Gopalganj installed	75.9
2. Transmission network in southern Bangladesh expanded	140.0
3. Transmission network in western Bangladesh expanded	218.9
4. Socially inclusive capacity in the electric utility industry enhanced	0.5
<b>Subtotal (A)</b>	<b>435.2</b>
<b>B. Contingencies<sup>c</sup></b>	<b>50.1</b>
<b>C. Financial Charges During Implementation<sup>d</sup></b>	<b>46.7</b>
<b>Total (A+B+C)</b>	<b>532.0</b>

Note: Numbers may not sum precisely because of rounding.

<sup>a</sup> Includes taxes and duties of \$89.3 million to be financed by the government by cash contribution. In addition, minor taxes on consulting services and capacity development financed under the Republic of Korea e-Asia and Knowledge Partnership Fund will also be charged to the fund.

<sup>b</sup> In end-2017 prices as of February 2018.

<sup>c</sup> Physical contingencies computed at 5% of base costs. Price contingencies computed at an average of 1.5% for foreign exchange costs and 6.0% for local currency costs; includes provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate.

<sup>d</sup> Includes interest and commitment charge. Interest during construction has been computed at the government's onlending rate. Commitment charges for the ordinary capital resources loan are 0.15% per year to be charged on the undisbursed loan amount.

Source: Asian Development Bank estimates.

19. The government has also requested: (i) a grant not exceeding \$7.0 million from the JFJCM, and (ii) a grant not exceeding \$0.5 million from the EAKPF to help finance the project. Both grants will be administered by ADB. The JFJCM will help meet the incremental cost for adopting energy efficient conductors under output 2. The grant from the JFJCM will be front-loaded to finance the equipment. The grant from the EAKPF will finance output 4 for capacity development and related consulting services.

20. The summary financing plan is in Table 2. ADB will finance the expenditures in relation to civil works, materials and equipment, goods and installation, and consulting services for project management, physical implementation, and contingencies. Counterpart funding will be provided by the government to finance taxes and duties, and other in-kind contributions.

**Table 2: Summary Financing Plan**

Source	Amount (\$ million)	Share of Total (%)
Asian Development Bank		
Ordinary capital resources (regular loan)	350.0	65.8
Japan Fund for the Joint Crediting Mechanism (grant) <sup>a</sup>	7.0	1.3
Republic of Korea e-Asia and Knowledge Partnership Fund (grant) <sup>a</sup>	0.5	0.1
Government	174.5	32.8
<b>Total</b>	<b>532.0</b>	<b>100.0</b>

<sup>a</sup> Administered by the Asian Development Bank.

Source: Asian Development Bank estimates.

21. Climate mitigation is estimated to cost \$93 million. ADB will finance 92.4% (\$86 million) while JFJCM grant will finance the rest. The application of efficient conductors under the project will contribute to climate mitigation. Details are in the project administration manual (PAM).<sup>14</sup>

<sup>14</sup> Project Administration Manual (accessible from the list of linked documents in Appendix 2).

## E. Implementation Arrangements

22. All procurement of goods, works, and nonconsulting and consulting services will be undertaken in accordance with the ADB Procurement Policy (2017, as amended from time to time) and ADB's Procurement Regulations for ADB Borrowers (2017, as amended from time to time). ADB will allow advance contracting. The executing agency, PGCB, has established a project management unit for project preparation, implementation, monitoring, and reporting to ADB and the government. PGCB will provide counterpart support in the form of remuneration of counterpart staff, taxes and duties to be paid on imported goods and equipment, civil works, and other in-kind contributions.

23. The implementation arrangements are summarized in Table 3 and described in detail in the PAM (footnote 14).

**Table 3: Implementation Arrangements**

Aspects	Arrangements		
Implementation period	July 2018–June 2023		
Estimated completion date	30 June 2023		
Estimated loan and grants closing date	31 December 2023		
Management			
(i) Oversight body	Power Division of the Ministry of Power, Energy and Mineral Resources (chair) PGCB board (member)		
(ii) Executing agency	PGCB		
(iii) Implementation unit	Project management unit in PGCB		
Procurement	International competitive bidding	5 contracts	\$320.00 million
Consulting services	Quality- and cost-based selection	78 person-months	\$1.25 million
	Individual consultants selection	16 person-months	\$0.05 million
Retroactive financing and/or advance contracting	Eligible contract packages and eligible expenditures agreed between ADB and the borrower may be considered for advance contracting and retroactive financing.		
Disbursement	The loan and grant proceeds will be disbursed following ADB's <i>Loan Disbursement Handbook</i> (2017, as amended from time to time) and detailed arrangements agreed between the government and ADB.		

ADB = Asian Development Bank, PGCB = Power Grid Company of Bangladesh Limited.

Source: ADB estimates.

## III. DUE DILIGENCE

### A. Technical

24. The development project proposals containing all the project components were assessed during project preparation through field surveys and reviews. The components identified under the project are part of the government's Power System Master Plan 2016 (footnote 4) and will be implemented as part of the Seventh Five Year Plan (footnote 3). An assessment rated the project's climate change impact as low since the project adopts a range of control measures, including using high-temperature, low-sag conductors and tower foundation leveling to address the relevant climate risks. Details are in the PAM (footnote 14).

## B. Economic and Financial

25. The economic analysis was carried out in accordance with ADB's Guidelines for the Economic Analysis of Projects.<sup>15</sup> A period of rapid economic development is expected in Bangladesh from 2018 to 2020, and a considerable increase in electricity demand is forecasted to match this economic growth. With this project, the primary economic benefit of the transmission network in southern and western Bangladesh will be the additional power supplied to consumers from the current and newly established power generation facilities; these consumers would be otherwise unserved. Further, the use of efficient conductors will reduce transmission loss.

26. In the economic analysis, all costs and benefits were expressed in constant 2017 prices. Capital costs and operation and maintenance costs were taken from the financial data, with appropriate adjustments exclusive of taxes and price contingencies. Components 1, 2, and 3 (leading to outputs 1, 2, and 3) were assessed to be economically viable when economic analyses of individual outputs were undertaken, resulting in economic internal rates of return of 17.6% for components 1 and 2 and 16.7% for component 3. The overall project economic internal rate of return is estimated to be 17.4%. The project's economic returns are resilient to adverse changes in input parameters, including a 10% increase in capital costs and operation and maintenance costs, a 1-year delay in construction, and a 10% decrease in fuel price. The analysis demonstrates the economic feasibility of the project.

27. The financial analysis of the project was carried out in accordance with ADB's Guidelines on the Financial Management and Analysis of Projects.<sup>16</sup> All financial costs and benefits were expressed in constant 2017 prices. Financial viability was assessed by comparing the incremental costs and benefits of the project over the project lifetime. The incremental benefits for outputs 1–3 were based on the incremental electricity transferred under the project assets valued at the transmission services tariff set by BERC under the approved transmission tariff methodology.<sup>17</sup>

28. An asset-based revenue model following the tariff regulation was used to determine the financial internal rate of return of the project. The weighted average cost of capital of the project is estimated to be 1.90%. The project's financial internal rate of return was assessed to be 3.46%. The project's sensitivity to adverse changes in the underlying assumptions was assessed and the analysis demonstrated that the project's financial viability is robust.

## C. Governance

29. PGCB is a public limited company incorporated in 1996 under the Companies Act, 1994. Bangladesh Power Development Board, a wholly government-owned entity, owns 76.25% of the share capital of PGCB. PGCB has the responsibility to own, operate, and expand the national power grid. It has been the executing agency for several ADB-financed projects since its establishment, and it has adequate capacity and experience to undertake the proposed project. It has capabilities in public procurement and knowledge of ADB's procurement processes.

30. The financial management risk of PGCB is rated *substantial*, and PGCB has prepared an action plan to address this risk. Considering the volume of operations and future development plans, PGCB needs to strengthen its finance function, including by (i) appointing key personnel to its finance division, (ii) retaining adequate and qualified staff in its accounting department, and

<sup>15</sup> ADB. 2017. *Guidelines for the Economic Analysis of Projects*. Manila.

<sup>16</sup> ADB. 2005. *Guidelines on the Financial Management and Analysis of Projects*. Manila.

<sup>17</sup> A loan covenant regarding tariff adjustment has been included in the loan agreement. The adjustment of transmission wheeling charges was done in 2015.

(iii) developing an action plan to establish an enterprise resource planning system that replaces its current system of manually carrying out information reporting and fixed asset recording. PGCB has agreed to undertake all these actions.

31. ADB's Anticorruption Policy (1998, as amended to date) was explained to and discussed with the government and PGCB. ADB has completed integrity due diligence on PGCB and identified no significant integrity risk to the project.<sup>18</sup> The specific policy requirements and supplementary measures are described in the PAM (footnote 14).

#### **D. Poverty, Social, and Gender**

32. Bangladesh is the eighth most populated country in the world, with a population of about 162 million in 2017. About 64% of the population lives in rural areas and nearly 41% of the labor force is engaged in agriculture.<sup>19</sup> Extreme poverty has declined considerably in rural areas: the proportion of rural population living in extreme poverty dropped from 34.3% in 2000 to 12.9% in 2015.<sup>20</sup> The main drivers of this decline in poverty are faster economic growth, increasing urbanization, rising labor productivity and wages, a shift from low-return agricultural labor to nonfarm employment, and growth in export industries.

33. **Poverty and social.** The major benefit of the project is enhanced energy security and additional electricity supply that will promote business expansion and create employment opportunities for local communities, including poor and socially disadvantaged people, during the operational phase. The project will also generate jobs for local communities during construction as a direct benefit. Further, through a capacity development program funded by the proposed EAKPF grant, human resources development in the energy sector will be improved.

34. **Gender.** The project is categorized as having some gender elements. Under the proposed EAKPF grant, the project will support about 50 students in universities and 30 professionals in PGCB to continue their education. Among the beneficiaries, 40% of the students and 30% of the professionals will be women. This will directly support women's access to higher education opportunities. Further, this component will increase women's participation in the energy sector and encourage socially inclusive capacity in the electric utility industry.

#### **E. Safeguards**

35. In compliance with ADB's Safeguard Policy Statement (2009), the project's safeguard categories are as follows.<sup>21</sup>

36. **Environment (category B).** The project will not pass through any ecologically sensitive areas and will not bring significant adverse environmental impacts. An initial environmental examination (IEE) has been prepared in accordance with the Safeguard Policy Statement. The IEE and environmental management plan propose mitigation measures to minimize effluent, noise, and waste from the project that may impact the environment, health, and safety. PGCB will disclose any updates to the IEE resulting from some changes in project scope. The project will utilize aluminum conductor composite core cable in the transmission lines under outputs 2 and 3 as an advanced technology to reduce greenhouse gas emissions by 174,595 tons of carbon dioxide-

<sup>18</sup> ADB. 2003. *Enhancing the Asian Development Bank's Role in Combating Money Laundering and the Financing of Terrorism*. Manila.

<sup>19</sup> World Bank. <https://data.worldbank.org/country/bangladesh> (accessed 1 March 2018).

<sup>20</sup> World Bank. PovcalNet. <http://iresearch.worldbank.org/PovcalNet/povOnDemand.aspx> (accessed 15 March 2018).

<sup>21</sup> ADB. Safeguard Categories. <https://www.adb.org/site/safeguards/safeguard-categories>.

equivalent per year. The project has been assessed for its risk and vulnerability to climate change impacts, and design measures have been integrated to minimize these risks. The draft IEE report was prepared from the technical due diligence and fact-finding mission. PGCB has implemented several ADB projects and has adequate institutional capacity and experience to manage the environmental risks through its project management unit. PGCB is committed to implementing the environmental management plan and submitting environmental monitoring reports on a regular basis to ADB.

37. **Involuntary resettlement (category A).** The substations and transmission line alignments have been carefully designed to minimize land acquisition and involuntary resettlement. The three substations require acquisition of approximately 40 hectares of land, and 266 households with 1,183 persons may be affected by the land acquisition. PGCB has identified 138 households with 552 persons who are expected to be significantly affected. The impacts of the 268 km of transmission lines are mostly temporary, but some are permanent on the land along the ROW. According to the transmission lines route survey done by PGCB based on the preliminary design, approximately 919 households comprising 3,676 persons may be affected by the ROW, and among them 77 households comprising 308 persons who own 89 structures may need relocation. PGCB will try to avoid residential structures during implementation as much as possible to minimize the impacts. PGCB has undertaken site visits, surveys, and necessary due diligence, and disseminated relevant safeguard information during consultations and surveys. The resettlement plan was prepared in compliance with the relevant Government of Bangladesh regulations and ADB's Safeguard Policy Statement and was disclosed on ADB's website on 16 April 2018. Mitigation measures and budgetary provisions are in place to provide compensation at replacement cost commensurate to the impacts, and to restore livelihoods. PGCB has an environmental and social unit and is experienced in implementing ADB projects. PGCB will engage a nongovernment organization to implement the resettlement plan and retain an external monitor to verify monitoring information for the project. The monitoring reports will be submitted by PGCB to ADB semiannually.

38. **Indigenous peoples (category C).** ADB and PGCB have conducted relevant due diligence and confirmed that no indigenous peoples, as defined by the Safeguard Policy Statement, were found within the project area.

## F. Summary of Risk Assessment and Risk Management Plan

39. Significant risks and mitigating measures are summarized in Table 4 and described in detail in the risk assessment and risk management plan.<sup>22</sup>

**Table 4: Summary of Risks and Mitigating Measures**

<b>Risks</b>	<b>Mitigation Measures</b>
Wheeling charges for transmission services do not increase adequately to meet PGCB projects' revenue requirements	Notification of tariff regulations issued by BERC in June 2016 allow utilities to file periodically for tariff increases to cover costs. Covenants in the ongoing loans <sup>a</sup> require PGCB to regularly file tariff revisions and ADB to continuously monitor compliance.
PGCB is exposed to the exchange rate risk on foreign currency-denominated borrowings	ADB will maintain regular dialogue with Ministry of Power, Energy and Mineral Resources and BERC to ensure timely tariff revisions following the issuance of new tariff regulations; foreign exchange variation can be recovered through such regular adjustment of wheeling charges.
Limited financial management capacity of PGCB	Relevant covenants and conditions have been included in the loan agreement to ensure that the key positions in the finance department of PGCB are filled and sufficient qualified staff are recruited.

<sup>22</sup> Risk Assessment and Risk Management Plan (accessible from the list of linked documents in Appendix 2).

Risks	Mitigation Measures
Delay in government approval of power generation investments could limit the utilization of the transmission network	The government has given assurance of its timely approval of power generation investments.
Price increases of goods and services beyond contingency could cause delays and budget overruns	Adequate contingencies are budgeted in the project financing plan to account for any unforeseen factors.

ADB = Asian Development Bank, BERC = Bangladesh Energy Regulation Committee, PGCB = Power Grid Company of Bangladesh Limited.

<sup>a</sup> ADB. 2017. Report and Recommendation of the President to the Board of Directors: *Proposed Loans and Administration of Grant to the People's Republic of Bangladesh for the Bangladesh Power System Enhancement and Efficiency Improvement Project*. Manila (Loans 3522-BAN and 3523-BAN).

Source: ADB.

#### IV. ASSURANCES AND CONDITIONS

40. The government and PGCB have assured ADB that implementation of the project shall conform to all applicable ADB policies, including those concerning anticorruption measures, safeguards, gender, procurement, consulting services, and disbursement as described in detail in the PAM and loan documents.

41. The government and PGCB have agreed with ADB on certain covenants for the project, which are set forth in the draft loan agreement and project agreement, including those related to improvement of the financial management capacity of PGCB, timely review of tariff adjustment applications by BERC, and safeguard issues.

42. No withdrawals shall be made from the loan and grant accounts for expenditures until (i) the subsidiary financing agreement between the government and PGCB, in form and substance satisfactory to ADB, shall have been duly executed and become legally binding upon the parties in accordance with their terms; and (ii) the recruitment of qualified executive director of finance, general manager of finance, and deputy general manager of project finance shall have been advertised and the submission of applications shall have been closed.

#### V. RECOMMENDATION

43. I am satisfied that the proposed loan would comply with the Articles of Agreement of the Asian Development Bank (ADB) and recommend that the Board approve the loan of \$350,000,000 to the People's Republic of Bangladesh for the Southwest Transmission Grid Expansion Project, from ADB's ordinary capital resources, in regular terms, with interest to be determined in accordance with ADB's London interbank offered rate (LIBOR)-based lending facility; for a term of 25 years, including a grace period of 5 years; and such other terms and conditions as are substantially in accordance with those set forth in the draft loan and project agreements presented to the Board.

Takehiko Nakao  
President

5 July 2018

## DESIGN AND MONITORING FRAMEWORK

<b>Impacts the Project is Aligned with</b>			
<p>National target of electricity for all achieved by 2021 (Perspective Plan of Bangladesh, 2010–2021: Making Vision 2021 a Reality)<sup>a</sup></p> <p>Combined transmission and distribution losses reduced from 13% to 9% of generation, and uninterrupted power supply provided to industries by 2020 (Power System Master Plan 2016)<sup>b</sup></p>			
<b>Results Chain</b>	<b>Performance Indicators with Targets and Baselines</b>	<b>Data Sources and Reporting</b>	<b>Risks</b>
<p><b>Outcome</b></p> <p>Capacity of electricity supply in Bangladesh increased</p>	<p><b>By 2024:</b></p> <p>a. Power delivery capacity of southern and western grid increased to 14,135 MVA (2017 baseline: 9,000 MVA)</p> <p>b. Transmission loss reduced to 2.5% (2017 baseline: 2.7%)</p> <p>c. Carbon dioxide emissions reduced by 174,595 tons per year from transmission loss reduction (2017 baseline: 0)</p>	<p>a–c. Annual reports of PGCB</p>	<p>Delay in government approval of power generation investments could limit the utilization of the transmission network.</p>
<p><b>Outputs</b></p> <p>1. New substation at Gopalganj installed</p> <p>2. Transmission network in southern Bangladesh expanded</p> <p>3. Transmission network in western Bangladesh expanded</p>	<p><b>By 2020:</b></p> <p>1. Gopalganj (North) 400/132 kV substation with capacity of 3x325 MVA constructed and commissioned (2017 baseline: 0)</p> <p><b>By 2023:</b></p> <p>2a. 126 km Barisal (North)–Gopalganj (North)–Faridpur 230 kV double-circuit line constructed and commissioned (2017 baseline: 0)</p> <p>2b. Two 230 kV bay extensions at existing Barisal (North) substation constructed and commissioned, and the existing Faridpur 132/33 kV substation augmented with four 132 kV bays; five 230 kV bays; and 230/132 kV, 2x250 MVA transformers (2017 baseline: 0)</p> <p>2c. Gopalganj (North) substation augmented with 400/230 kV, 2x750 MVA transformers (2017 baseline: 0)</p> <p><b>By 2023:</b></p> <p>3a. New 104 km Bogra (West)–Rohanpur 400 kV double-circuit line constructed and commissioned (2017 baseline: 0)</p>	<p>1–4. Annual reports of PGCB</p>	<p>Price increases of goods and services beyond contingency could cause delays and budget overruns.</p>



Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting	Risks
4. Socially inclusive capacity in the electric utility industry enhanced	<p>3b. New Bogra (West) substation constructed and commissioned with 400/230 kV, 2x750 MVA transformers, nine 400 kV bays, and eleven 230 kV bays (2017 baseline: 0)</p> <p>3c. New Rohanpur substation constructed and commissioned with 400/132 kV, 2x325 MVA transformers; five 400 kV bays; and nine 132 kV bays (2017 baseline: 0)</p> <p>3d. New 26 km Chapainawabganj–Rohanpur 132 kV double-circuit transmission line constructed and commissioned (2017 baseline: 0)</p> <p>3e. Two 132 kV bay extensions at existing Chapainawabganj substation constructed and commissioned (2017 baseline: 0)</p> <p>3f. 11 km line-in, line-out connection from Barapukuria–Bogra (South) 230 kV transmission line to Bogra (West) substation, and 1 km line-in, line-out connection from Chowdala–Niamatpur 132 kV transmission line to Rohanpur substation constructed and commissioned (2017 baseline: 0)</p> <p><b>By 2023:</b></p> <p>4a. 50 university students (of which at least 40% are women) completed a university program relevant to energy sector (2017 baseline: 0)</p> <p>4b. 30 PGCB staff (of which at least 30% are women) completed a university program relevant to energy sector (2017 baseline: 0)</p>		

<p><b>Key Activities with Milestones</b></p> <p><b>1. New substation at Gopalganj installed</b></p> <p>1.1 Tender published by October 2017</p> <p>1.2 Contract awarded by 30 August 2018</p> <p>1.3 Construction started by October 2018</p> <p>1.4 Construction completed by 31 July 2020</p> <p><b>2. Transmission network in southern Bangladesh expanded</b></p> <p>2.1 First set of tenders published by May 2018</p> <p>2.2 Second set of tenders published by October 2018</p> <p>2.3 Contract award of first set of tenders by November 2018</p> <p>2.4 Contract award of second set of tenders by March 2019</p> <p>2.5 Construction of first set of tenders started by January 2019</p> <p>2.6 Construction of second set of tenders started by May 2019</p> <p>2.7 Construction of first set of tenders completed by December 2020</p> <p>2.8 Construction of second set of tenders completed by September 2021</p> <p><b>3. Transmission network in western Bangladesh expanded</b></p> <p>3.1 First set of tenders published by August 2018</p> <p>3.2 Second set of tenders published by August 2019</p> <p>3.3 Contract award of first set of tenders by December 2018</p> <p>3.4 Contract award of second set of tenders by December 2019</p> <p>3.5 Construction for first set of tenders started by March 2019</p> <p>3.6 Construction for second set of tenders started by March 2020</p> <p>3.7 Construction for first set of tenders completed by February 2022</p> <p>3.8 Construction for second set of tenders completed by February 2023</p> <p><b>4. Socially inclusive capacity in the electric utility industry enhanced</b></p> <p>4.1 Partnership agreement initiated by September 2018</p> <p>4.2 Scholarships established in selected universities by December 2018</p> <p>4.3 First scholarships awarded by June 2019</p> <p>4.4 Program completed by 30 June 2023</p>
<p><b>Inputs</b></p> <p>ADB: \$350.0 million (regular OCR loan)</p> <p>Japan Fund for the Joint Crediting Mechanism: \$7.0 million (grant)</p> <p>Republic of Korea e-Asia and Knowledge Partnership Fund: \$0.5 million (grant)</p> <p>Government: \$174.5 million</p>
<p><b>Assumptions for Partner Financing</b></p> <p>Not Applicable</p>

ADB = Asian Development Bank, km = kilometer, kV = kilovolt, MVA = megavolt-ampere, OCR = ordinary capital resources, PGCB = Power Grid Company of Bangladesh Limited.

<sup>a</sup> Government of Bangladesh, Ministry of Planning, Planning Commission. 2012. *Perspective Plan of Bangladesh, 2010–2021: Making Vision 2021 a Reality*. Dhaka.

<sup>b</sup> Government of Bangladesh; Ministry of Power, Energy and Mineral Resources. 2016. *Power System Master Plan 2016*. Dhaka.

Source: ADB.

### LIST OF LINKED DOCUMENTS

<http://www.adb.org/Documents/RRPs/?id=51137-001-3>

1. Loan Agreement
2. Grant Agreement: Japan Fund for the Joint Crediting Mechanism
3. Grant Agreement: Republic of Korea e-Asia and Knowledge Partnership Fund
4. Project Agreement
5. Sector Assessment (Summary): Energy (Electricity Transmission and Distribution)
6. Project Administration Manual
7. Contribution to the ADB Results Framework
8. Development Coordination
9. Financial Analysis
10. Economic Analysis
11. Country Economic Indicators
12. Summary Poverty Reduction and Social Strategy
13. Risk Assessment and Risk Management Plan
14. Initial Environmental Examination
15. Resettlement Plan

#### **Supplementary Document**

16. Financial Management Assessment