



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

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Project Number: 51137-003  
October 2019

## Proposed Loan and Administration of Grant and Loan People's Republic of Bangladesh: Dhaka and Western Zone Transmission Grid Expansion Project

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Asian Development Bank

## **CURRENCY EQUIVALENTS**

(as of 24 September 2019)

Currency unit	–	taka (Tk)
Tk1.00	=	\$0.0118
\$1.00	=	Tk84.49

## **ABBREVIATIONS**

ADB	–	Asian Development Bank
AIIB	–	Asian Infrastructure Investment Bank
BERC	–	Bangladesh Energy Regulatory Commission
CRVA	–	climate risk vulnerability assessment
ERP	–	enterprise resource planning
GIS	–	gas-insulated substation
IEE	–	initial environmental examination
O&M	–	operation and maintenance
PAM	–	project administration manual
PGCB	–	Power Grid Company of Bangladesh Limited
PRC	–	People's Republic of China
PRC Fund	–	People's Republic of China Poverty Reduction and Regional Cooperation Fund

## **WEIGHTS AND MEASURES**

GWh	–	gigawatt-hour
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., FY2019 ends on 30 June 2019.
- (ii) In this report, "\$" refers to United States dollars.

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## PROJECT AT A GLANCE

1. Basic Data		Project Number: 51137-003	
Project Name	Dhaka and Western Zone Transmission Grid Expansion Project	Department/Division	SARD/SAEN
Country	Bangladesh	Executing Agency	Power Grid Company of Bangladesh, Ltd. (PGCB)
Borrower	Bangladesh		
Country Economic Indicators	<a href="https://www.adb.org/Documents/LinkedDocs/?id=51137-003-CEI">https://www.adb.org/Documents/LinkedDocs/?id=51137-003-CEI</a>		
Portfolio at a Glance	<a href="https://www.adb.org/Documents/LinkedDocs/?id=51137-003-PortAtaGlance">https://www.adb.org/Documents/LinkedDocs/?id=51137-003-PortAtaGlance</a>		
2. Sector	Subsector(s)	ADB Financing (\$ million)	
✓ Energy	Electricity transmission and distribution		300.00
		Total	300.00
3. Operational Priorities		Climate Change Information	
✓ Accelerating progress in gender equality		CO <sub>2</sub> reduction (tons per annum)	455,785
✓ Tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability		Climate Change impact on the Project	Medium
✓ Making cities more livable			
✓ Strengthening governance and institutional capacity		ADB Financing	
✓ Fostering regional cooperation and integration		Adaptation (\$ million)	70.70
		Mitigation (\$ million)	117.20
		Cofinancing	
		Adaptation (\$ million)	47.10
		Mitigation (\$ million)	80.00
Sustainable Development Goals		Gender Equity and Mainstreaming	
SDG 1.5		Some gender elements (SGE)	✓
SDG 7.1			
SDG 13.a		Poverty Targeting	
		General Intervention on Poverty	✓
4. Risk Categorization:	Complex		
5. Safeguard Categorization	Environment: B Involuntary Resettlement: A Indigenous Peoples: C		
6. Financing			
Modality and Sources		Amount (\$ million)	
ADB		300.00	
Sovereign Project (Regular Loan): Ordinary capital resources		300.00	
Cofinancing		200.75	
Asian Infrastructure Investment Bank - Project loan (Partial ADB Administration)		200.00	
People's Republic of China Poverty Reduction and Regional Cooperation Fund - Project grant (Full ADB Administration)		0.75	
Counterpart		249.25	
Government		249.25	
Total		750.00	
Currency of ADB Financing: Euro			





## 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 Dhaka and Western Zone Transmission Grid Expansion Project. The report also describes (i) the proposed administration of a grant to be provided by the People's Republic of China (PRC) Poverty Reduction and Regional Cooperation Fund (PRC Fund), and (ii) the proposed partial administration of a loan to be provided by the Asian Infrastructure Investment Bank (AIIB) for the 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 grant and the loan.

2. The project will contribute to the goal of the Government of Bangladesh to achieve electricity for all by 2021.<sup>1</sup> It will improve the reliability and efficiency of the electricity supply in the Greater Dhaka and western zone of Bangladesh by expanding the national transmission grid system and strengthening the capacity of the Power Grid Company of Bangladesh Limited (PGCB).<sup>2</sup> The project will also expand regional power connectivity in western Bangladesh. Specifically, it will support (i) the construction of 40 kilometers (km) of transmission lines and 4,450 megavolt-amperes (MVA) of substations in Greater Dhaka; (ii) the construction of 368 km of transmission lines, 3,070 MVA of substations, and 20 bay extensions in the western zone; and (iii) the establishment of an enterprise resource planning (ERP) system and a drone inspection center to strengthen PGCB's capacity in asset management and operation and maintenance (O&M).

## II. THE PROJECT

### A. Rationale

3. **Economic development.** Prudent macroeconomic management helped Bangladesh achieve average annual GDP growth of 6.5% during fiscal year (FY) 2009 to FY2018.<sup>3</sup> Bangladesh reached lower-middle-income country status in FY2015, and gross national income per capita has risen steadily from \$1,316 in FY2015 to \$1,751 in FY2018.<sup>4</sup> The structure of the Bangladesh economy is gradually shifting from agriculture to manufacturing and services. Poverty rate has been halved from 2000 to 2016, and the country has met many of the Millennium Development Goal targets.<sup>5</sup> Building on these achievements, the government has set new priority targets to (i) accelerate annual economic growth to 8.0% by 2021; (ii) create jobs and support rural development and inclusive growth to reduce poverty; (iii) reduce poverty rate to 18.6% by 2020, from 24.8% in 2015 below the national poverty line, and reduce extreme poverty rate to 8.9% by 2020,

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<sup>1</sup> Government of Bangladesh, Ministry of Planning, Planning Commission. 2012. *Perspective Plan of Bangladesh, 2010–2021: Making Vision 2021 a Reality*. Dhaka.

<sup>2</sup> Greater Dhaka covers a metropolitan area of Dhaka Division and suburban townships including Gazipur, Narayanganj, Savar, Tarabo and Tongi. Western zone of Bangladesh comprises of the divisions of Rangpur, Rajshahi, Gopalganji, Khulna, and Barishal.

<sup>3</sup> Government of Bangladesh, Bureau of Statistics. <http://www.bbs.gov.bd/> (accessed 15 January 2019).

<sup>4</sup> Footnote 3, and World Bank. Data: World Bank Country and Lending Groups. <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups> (accessed 8 March 2019). A country is classified as lower-middle-income if its gross national income per capita averages \$996–\$3,895, and as upper-middle-income if it averages \$3,896–\$12,055.

<sup>5</sup> The national poverty line is set to the threshold of a minimum intake of 2,122 kilocalorie per person per day of food, and the extreme poverty line is set to the threshold of living on less than \$1.90 per person per day (2011 Purchasing Power Parity).

from 12.9% in 2015 below the extreme poverty line (footnote 5); and (iv) reduce environmental degradation and reduce vulnerability to climate change.<sup>6</sup>

4. Despite its economic success, Bangladesh faces major challenges in maintaining growth trends and reducing poverty because of infrastructure deficiencies in the energy sector and elsewhere. To address these deficiencies, the government is prioritizing the provision of modern, reliable, and affordable energy services to those who lack access.<sup>7</sup>

5. **Power generation and access.** The energy sector has seen considerable progress in increasing generation capacity to meet the growing demand for electricity. Daily load shedding dropped significantly from 2,264 gigawatt-hours in FY2007 to 32 gigawatt-hours in FY2018. However, the sector is still characterized by recurring power supply shortages in the face of ever-rising demand in a growing economy. In FY2017, the estimated peak power demand in Bangladesh was 12,644 megawatts (MW). However, the utilities in the electricity industry served only 9,479 MW of this demand. While commercial and industrial consumers met a significant amount of the remaining demand with captive generation, a portion of power demand was curtailed through load shedding.<sup>8</sup> The government forecast in 2016 that planned and ongoing power generation projects would generate additional power exceeding 13,300 MW by 2020 and 19,900 MW by 2025.<sup>9</sup> With the government's effort to expand electrification, the country achieved 91% electricity access in FY2018, although about 15 million people out of 163.7 million population in Bangladesh still lack access to electricity.

6. **Power transmission.** The power transmission system is solely owned and operated by PGCB. Investments to strengthen the power network and measures taken to reduce nontechnical losses have resulted in a decline in overall system losses. However, interruptions (i.e., customers lose access to electrical grid) resulting from transmission system issues throughout the transmission network increased from 15 interruptions in FY2017 to 60 interruptions in FY2018, with the cumulative duration of outages increasing from almost 20 hours to 80 hours (footnote 8). Because of weakness in power system control and operation, system frequency and voltage fluctuate beyond established standards, which causes excessive wear-and-tear on electrical equipment and interrupts the power supply. As the economy grows and the power grid becomes more congested, upgrading and expanding the transmission network will be crucial.

7. **Regional power connectivity.** The power transmission grid is connected with India's grid and Bangladesh imports 1,000 MW of power from India through a high voltage direct current substation at Bheramara in the western zone. However, this power flows into the national power grid via a 400-kilovolt (kV) to 230 kV transmission line without directly dispatching the power to local consumers in the western zone. To ensure that power interconnection operates at its full capacity and that imported power is utilized across western Bangladesh, the transmission system within the western zone needs to be strengthened.

8. **Energy sector governance.** PGCB is a state-owned enterprise incorporated as a public limited company in 1996 under the Companies Act, 1994. The Bangladesh Power Development Board (BPDB), a wholly government-owned entity, owns 76.25% of the share capital of PGCB,

<sup>6</sup> Government of Bangladesh, Planning Commission. 2015. *Seventh Five Year Plan FY2016–FY2020: Accelerating Growth, Empowering Citizens*. Dhaka.

<sup>7</sup> World Bank. Data: Access to electricity (% of population). <https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS> (accessed 15 January 2019).

<sup>8</sup> Bangladesh Power Development Board. 2018. *Annual Report 2017–2018*. Dhaka.

<sup>9</sup> Government of Bangladesh, Ministry of Power, Energy and Mineral Resources. 2016. [Power System Master Plan 2016](#). Dhaka.

with the balance held by various institutions and individual shareholders. PGCB has been listed in the Dhaka Stock Exchange and Chattogram Stock Exchange since 2006. The authorized capital at the time of establishment was Tk10 billion.

9. Despite substantial improvements in operational and financial performance, weak financial management capacity within PGCB and low-cost recovery tariffs in the past have impaired its financial health. From FY2011 to FY2018, PGCB saw revenues increase because of increased electricity sales. However, its after-tax profit margin shrank from FY2011 to FY2014, mainly because of delayed and/or insufficient increases in transmission tariffs. PGCB had a negative after-tax profit margin of Tk29 million in FY2015. In September 2015, the government increased the transmission tariff from 0.229 Tk/kWh to 0.279 Tk/kWh and PGCB realized a net profit from FY2016 to FY2018. However, given the need for increased investments in the transmission system, PGCB's return on net fixed assets is declining in the absence of regular transmission tariff adjustments. Furthermore, while it has prioritized transmission system expansion, PGCB needs to concentrate more on O&M to reduce transmission losses and ensure the reliability and quality of the power supply.

10. **Government programs.** To sustain the country's economic growth momentum, the government has prepared the Power System Master Plan (footnote 9) to increase power-generation capacity, as well as improve and extend the power transmission and distribution network, with the aim of achieving universal access to electricity by 2021. Furthermore, Bangladesh's Seventh Five Year Plan (footnote 6) envisages an integrated development strategy for the Greater Dhaka area and western zone encompassing Dhaka, Khulna, and Barishal, which are economic growth centers. Energy reforms have led to the unbundling of the power supply industry, resulting in (i) a reduction in overall system losses from more than 30% of generation in the 1990s to 13%–15% of generation; (ii) the establishment of the Bangladesh Energy Regulatory Commission (BERC) in 2004; and (iii) approval of an electricity transmission tariff fixation methodology in 2015 by the government.

11. **Asian Development Bank assistance to the sector.** Since the mid-1990s and in collaboration with development partners, the Asian Development Bank (ADB) has been providing extensive support for energy sector reforms in Bangladesh and the sustainable development of the sector, including support for the creation of PGCB. This support has resulted in significant improvements in the operational and financial performance of the sector. As part of its strategy for the sector, ADB has supported the corporatization and commercialization of energy entities as well as the expansion and upgrading of the power system as part of a least-cost expansion plan. ADB has been a key financier of PGCB's fast-expanding transmission investments.<sup>10</sup> ADB and the Ministry of Power, Energy and Mineral Resources are co-chairs of the Local Consultative Group for the sector, which enhances the effectiveness of ADB assistance. The group facilitates energy project cofinancing among development partners, conducts policy dialogue on addressing grid code application issues, develops the financing strategy for PGCB, and works on building PGCB's asset registry. ADB is now turning its focus towards improving PGCB's financial

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<sup>10</sup> ADB assistance includes the following: ADB. 2007. [\*Report and Recommendation of the President to the Board of Directors: Proposed Loan to the People's Republic of Bangladesh for Sustainable Power Sector Development Program\*](#). Manila; ADB. 2010. [\*Report and Recommendation of the President to the Board of Directors: Proposed Loan to the People's Republic of Bangladesh for Bangladesh–India Electrical Grid Interconnection Project\*](#). Manila; ADB. 2017. [\*Report and Recommendation of the President to the Board of Directors: Proposed Loan for Bangladesh Power System Enhancement and Efficiency Improvement Project\*](#). Manila; and ADB. 2018. [\*Report and Recommendation of the President to the Board of Directors: Proposed Loan and Administration of Grants to the People's Republic of Bangladesh for Southwest Transmission Grid Expansion Project\*](#). Manila.

management and financial sustainability. This includes staffing finance positions in the company with qualified personnel, addressing issues related to the fixed-asset registry, and seeking timely tariff adjustments through regular tariff filing. ADB's country partnership strategy for Bangladesh, 2016–2020 highlights ADB's support for easing infrastructure constraints in key sectors like the energy sector.<sup>11</sup> With increasing demand for a reliable and high-quality power supply, not only does PGCB need to invest in new transmission infrastructure but it also needs to improve its O&M practices, which directly impact the reliability and quality of the power supply. ADB's continued engagement in the energy sector, particularly at PGCB, will help address these issues.

**12. Lessons learned.** ADB's experience in transmission system projects in South Asia have shown that the success and sustainability of projects hinge on (i) advanced planning and detailed project preparation; (ii) strong capacity of the executing agencies in project preparation, procurement, land acquisition and resettlement, and project implementation; and (iii) incorporating O&M requirements at the early stage of project design and implementation. The project team will incorporate these lessons in the implementation of the proposed project.

**13. Value added by ADB assistance.** ADB will add value by developing capacity and introducing high-level technology applications at PGCB. In the Southwest Transmission Grid Expansion Project approved in 2018, ADB assisted PGCB in using high-temperature low-sag conductors and developing a detailed, time-bound action plan to implement an enterprise resource planning (ERP) system.<sup>12</sup> ADB will help equip PGCB's workforce with technical skills along with new and advanced technologies to modernize and maintain the power transmission infrastructure. As a continuation of this effort, the project will finance the use of high-temperature low-sag conductors to improve reliability and efficiency of electricity supply and the implementation of the ERP system to improve PGCB's information flow, financial capacity, and optimization of corporate operations. In addition, the proposed PRC Fund grant will pilot a drone inspection center to support high-level technology application and digitize PGCB's operations, which will improve O&M efficiency and enhance system reliability. The proposed project complements the activities of development partners in Bangladesh. Further details are in the development coordination and financial management assessment.<sup>13</sup>

**14. Alignment with ADB's priorities (including Strategy 2030).** The project is aligned with ADB's country partnership strategy for Bangladesh, 2016–2020, which maps out ADB's support for government efforts to expand power generation capacity, improve the efficiency of transmission and distribution networks, and expand regional interconnections (footnote 11). The project supports five operational priorities of ADB's Strategy 2030: (i) accelerating progress in gender equality by encouraging PGCB to employ women and supporting women's capacity development at the drone inspection center and within PGCB's finance division; (ii) tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability by supporting the climate- and disaster-resilient design of high-temperature low-sag conductors and indoor gas-insulated substations (GIS);<sup>14</sup> (iii) making cities more livable by

<sup>11</sup> ADB. 2016. [Country Partnership Strategy: Bangladesh, 2016–2020](#). Manila.

<sup>12</sup> ADB. 2018. [People's Republic of Bangladesh: Southwest Transmission Grid Expansion Project](#). Manila.

<sup>13</sup> Development Coordination and Financial Management Assessment (accessible from the list of linked documents in Appendix 2).

<sup>14</sup> The project will utilize aluminum conductor composite core cable (a type of high-temperature low-sag conductors). 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. Gas insulated substation can be enclosed in a building with environmental control for more climate proofing, including effective

transmitting more power and more reliable power to cities; (iv) strengthening governance and institutional capacity by introducing an ERP system to strengthen financial management at PGCB; and (v) fostering regional cooperation and integration by strengthening the transmission network in the Bheramara area, which will enhance power trade between India and Bangladesh.

## B. Impact and Outcome

15. The project is aligned with the following impact: national target of electricity for all achieved by 2021 (footnote 1). The project will have the following outcome: reliability and efficiency of electricity supply in the Greater Dhaka and western zone of Bangladesh improved.<sup>15</sup>

## C. Outputs

16. **Output 1: Transmission system in Greater Dhaka expanded.** The project will support the construction and commissioning of (i) 22 km of 400 kV transmission lines; (ii) 9 km of 230 kV transmission lines; (iii) 9 km of 132 kV underground cabling; and (iv) 3 indoor GIS substations with a total capacity of 4,450 MVA in Greater Dhaka.

17. **Output 2: Transmission system in western zone expanded.** The project will support the construction and commissioning of (i) 135 km of 230 kV transmission lines; (ii) 233 km of 132 kV transmission lines; and (iii) 12 GIS substations with a total capacity of 3,070 MVA and 20 bay extensions in nine existing substations. The subprojects to construct transmission lines and substations in the Kaliganj, Kushtia, Maheshpur, and Meherpur areas will enhance regional integration by extending connectivity into western Bangladesh via the existing 230 kV Ishward–Khulna transmission line. The latter is connected to the Bheramara substation, which receives power imported from India.

18. **Output 3: Institutional capacity of Power Grid Company of Bangladesh Limited strengthened.** The project will enhance PGCB's financial management capacity by (i) supporting the installation and operation of an ERP system to assist PGCB in optimally managing its capital-intensive assets; and (ii) establishing a drone inspection center within the O&M Department of PGCB to improve operation efficiency by reducing inspection time and enhancing workspace safety.<sup>16</sup> This project also aims to promote gender equality at PGCB by employing women in at least 20% of technical positions at the drone inspection center, and training about 80 PGCB staff (at least 20% women) in operating drones and the ERP system. These activities with gender-related elements will complement ongoing activities under the Southwest Transmission Grid Expansion Project categorized as having *some gender elements*.

## D. Summary Cost Estimates and Financing Plan

19. The project is estimated to cost \$750 million (Table 1).

20. Detailed cost estimates by expenditure category and by financier are included in the project administration manual (PAM).<sup>17</sup>

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cooling for transformers, resistance to extreme weather events and shielding from lightning, in the areas which are vulnerable to the impacts of climate change.

<sup>15</sup> The design and monitoring framework is in Appendix 1.

<sup>16</sup> Drones can be operated remotely to monitor transmission lines. This means that PGCB personnel do not need to climb heights or enter into dangerous or hazardous areas. This also allows PGCB to avoid unnecessary system shutdowns when inspecting transmission lines.

<sup>17</sup> Project Administration Manual (accessible from the list of linked documents in Appendix 2).



**Table 1: Summary Cost Estimates**  
(\$ million)

Item	Amount <sup>a</sup>
<b>A. Base Cost<sup>b</sup></b>	
1. Transmission system expansion in Greater Dhaka	272.7
2. Transmission system expansion in western zone	353.3
3. Institutional capacity strengthening of Power Grid Company of Bangladesh Limited	8.4
<b>Subtotal (A)</b>	<b>634.4</b>
<b>B. Contingencies<sup>c</sup></b>	<b>67.0</b>
<b>C. Financial Charges During Implementation<sup>d</sup></b>	<b>48.6</b>
<b>Total (A+B+C)</b>	<b>750.0</b>

<sup>a</sup> Includes taxes and duties of \$147.44 million to be financed by the government by cash contribution. In addition, taxes on consulting services and capacity development financed under the People's Republic of China Poverty Reduction and Regional Cooperation Fund (PRC Fund) will be charged to the PRC Fund.

<sup>b</sup> In mid-2019 prices as of April 2019.

<sup>c</sup> Physical contingencies computed at 4.5% for base cost. Price contingencies computed at average of 1.5% on foreign exchange costs and 6.1% on local currency costs; This also 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 for the ordinary capital resources loan and Asian Infrastructure Investment Bank loan has been computed at the government's relending rate of 4% per year. Interest during construction for the government loan has been computed at the relending rate of 3% per year. The commitment charge for the Asian Development Bank ordinary capital resources loan is 0.15% per year. For the Asian Infrastructure Investment Bank loan, the commitment charge is 0.25% per year, which will be charged on the undisbursed loan amount.

Sources: Asian Development Bank, Asian Infrastructure Investment Bank, and Power Grid Company of Bangladesh Limited estimates.

21. The government has requested a loan of €271.838 million (\$300 million equivalent) from ADB's ordinary capital resources to help finance the project.<sup>18</sup> 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 0.10% per year.

22. The government has also requested (i) a loan not exceeding \$200 million from the AIIB to help finance the project; and (ii) a grant not exceeding \$750,000 from the PRC Fund.

23. The summary financing plan is in Table 2. ADB will finance the expenditures in relation to (i) procuring the engineering, procurement, and construction; (ii) installing the ERP system; and (iii) a consulting firm for ERP system design and implementation and a consultant for monitoring the social impacts of the project. The government and PGCB will partially finance the civil works components. The PRC Fund will finance the procurement of a drone platform for the drone inspection center at PGCB and a consultant for drone regulation development. AIIB will provide cofinancing for three agreed specific packages, i.e., Package 5, 7 and 8 under outputs 1 and 2. ADB will fully administer the PRC Fund grant and will partially administer the AIIB loan for environmental and social services, financial management services and procurement service. The government and 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, such as land acquisition and resettlement expenses.

<sup>18</sup> \$1.00 = €0.906125 as of 9 September 2019.

24. Climate mitigation is estimated to cost \$197.2 million and climate adaptation is estimated to cost \$117.8 million. ADB will finance 59.4% (\$117.2 million) of mitigation costs and 60.0% (\$70.7 million) of adaptation costs. AIIB will finance 40.6% (\$80.0 million) of mitigation costs and 40.0% (\$47.1 million) of adaptation costs. Further details are in the climate change assessment.<sup>19</sup>

**Table 2: Summary Financing Plan**

Source	Amount (\$ million)	Share of Total (%)
Asian Development Bank		
Ordinary capital resources (regular loan)	300.00	40.0
Asian Infrastructure Investment Bank (loan) <sup>a</sup>	200.00	26.7
People's Republic of China Poverty Reduction and Regional Cooperation Fund (grant) <sup>b</sup>	0.75	0.1
Government and Power Grid Company of Bangladesh Limited <sup>c</sup>	249.25	33.2
<b>Total</b>	<b>750.00</b>	<b>100.0</b>

<sup>a</sup> Partially administered by the Asian Development Bank.

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

<sup>c</sup> The government will provide contributions to cover (i) taxes and duties; (ii) a portion of civil works; (iii) land acquisition and resettlement; (iv) a portion of contingencies; and (v) a portion of interest during construction.

Sources: Asian Development Bank and Asian Infrastructure Investment Bank.

## E. Implementation Arrangements

25. To ensure the efficiency and effectiveness of project implementation, the government has requested that ADB administer the AIIB loan for procurement service. PGCB is the executing agency of the project. The proceeds of the ADB loan will be re-lent to PGCB under a subsidiary loan agreement, with terms and conditions acceptable to ADB. ADB's Safeguard Policy Statement (2009) applies to all ADB- and non-ADB-financed components under the project. PGCB will procure goods, equipment, civil works, and consultants financed by ADB, AIIB, and the PRC Fund in accordance with ADB's Procurement Policy (2017, as amended from time to time) and Procurement Regulations for ADB Borrowers (2017, as amended from time to time). ADB will review and partially administer procurement packages financed by the AIIB loan per the ADB–AIIB cofinancing agreement. Advance contracting is allowed. Universal procurement applies to the project. In accordance with the prevailing law of Bangladesh, bidders may be excluded from participating in procurement under the project if they are from countries with which Bangladesh prohibits commercial relations, provided that ADB is satisfied that such exclusion does not preclude effective competition in relation to such procurement. PGCB has established a project management unit for project preparation, implementation, monitoring, and reporting to ADB and the government.

26. The implementation arrangements are summarized in Table 3 and described in detail in the PAM (footnote 17).

**Table 3: Implementation Arrangements**

Aspects	Arrangements
Implementation period	November 2019–June 2024
Estimated completion date	30 June 2024
Estimated loan and grant closing date	31 December 2024
Management	
(i) Oversight body	Power Division of the Ministry of Power, Energy and Mineral Resources (chair)

<sup>19</sup> Climate Change Assessment (accessible from the list of linked documents in Appendix 2).

Aspects	Arrangements		
	Representatives of the Ministry of Finance, Ministry of Planning Commission, Bangladesh Power Development Board, and PGCB (members)		
(ii) Executing agency	PGCB		
(iii) Implementation unit	Project management unit at PGCB		
Procurement	OCB (international advertisement)	6 contracts (ADB)	\$263,390,000
		3 contracts (AIIB)	\$188,780,000
		1 goods contract (PRC Fund)	\$650,000
Consulting services	QCBS, FTP	31 person-months	\$640,000
	Biodata	10 person-months	\$108,500
Retroactive financing and/or advance contracting	Eligible contract packages and eligible expenditures agreed between ADB and the executing agency may be considered for advance contracting and retroactive financing. Retroactive financing will be up to 20% of the loan proceeds to finance expenditures incurred prior to loan effectiveness but not earlier than 12 months from the effective date of the legal agreement.		
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, AIIB = Asian Infrastructure Investment Bank, FTP = full technical proposal, OCB = open competitive bidding, PGCB = Power Grid Company of Bangladesh Limited, PRC Fund = People's Republic of China Poverty Reduction and Regional Cooperation Fund, QCBS = quality- and cost-based selection.

Sources: ADB, AIIB and PGCB.

### III. DUE DILIGENCE

#### A. Technical

27. The project consists of building new transmission lines (both underground and overhead), new substations (both indoor and outdoor), capacity enhancement of existing substations, and modifications to existing substations. ADB, AIIB, and the transaction technical assistance consultants reviewed the project list presented by PGCB for compliance with best practices in transmission planning and projects. PGCB finalized the list of transmission lines and substations that are proposed in the project against the forecast power demand of each division. The voltage levels, technology, and equipment proposed under the project are compatible with PGCB's existing standards and practices. PGCB will adhere to international standards in specifying, testing, and commissioning the equipment procured under the project. To address issues related to climate change such as flooding and heat dissipation, PGCB incorporated high-temperature low-sag conductors and GIS in the project design. Both technologies have been used in Bangladesh in the past, and PGCB has the know-how to incorporate these technologies.

#### B. Economic and Financial

28. The project team carried out an economic analysis of the project in accordance with ADB's Guidelines for the Economic Analysis of Projects.<sup>20</sup> BPDB is developing additional power generation capacity to meet increasing demand for power. However, if no sufficient transmission and distribution infrastructure is available to evacuate the generated electricity to consumers, incremental demand will have to be curtailed. In the "with-project" scenario, electricity can flow to scattered areas and will be used to meet any unserved power demand through expanded transmission networks. In the "without-project" scenario, loss of economic activities occurs in the absence of a reliable power supply.

<sup>20</sup> ADB. 2017. [Guidelines for the Economic Analysis of Projects](#). Manila.



29. The economic analysis measured the costs and benefits of the project in constant 2019 prices, and confirmed that the project is economically viable. The overall economic internal rate of return for the project is 21.1% and its economic net present value is Tk70.843 billion. Removing environmental benefits, the overall economic internal rate of return for the project is 19.3% and its economic net present value is Tk58.101 billion. The economic analysis examined the project's sensitivity to adverse changes such as an increase in capital costs, a delay in commissioning, and a decrease in fuel prices. The analysis determined that the project remains economically viable in the face of such changes.

30. The project team carried out a financial analysis of the project in accordance with ADB's Handbook for Borrowers on the Financial Management and Analysis of Projects.<sup>21</sup> The financial analysis measured all financial costs and benefits in constant 2019 prices. The analysis assessed the project's financial viability by comparing incremental costs with incremental benefits over the life of the project. Incremental revenue for outputs 1 and 2 were based on incremental electricity transmitted over the project assets. The incremental electricity wheeled was valued at the estimated tariff to be set by BERC under the approved transmission tariff methodology.<sup>22</sup> The estimated weighted average cost of capital of the project is 1.80%. The analysis determined the financial internal rate of return of the investments to be 6.81%, which exceeds the weighted average cost of capital. The analysis measured the sensitivity of the financial internal rate of return to adverse changes in underlying assumptions and determined the project to be financially viable.

### C. Governance

31. ADB assessed the executing agency, PGCB, against ADB's procurement and financial management requirements. PGCB has significant experience in implementing projects financed by ADB, and is conversant with ADB's procurement processes and regulations. Procurement risk is rated *low*. The financial management risk is rated *substantial* (footnote 13). The project team proposed mitigation measures in the financial management assessment.<sup>23</sup> In terms of funding policy, PGCB has not committed to exit from concessional loans from development partners and the government since the commercial financial market for infrastructure projects is not mature yet in Bangladesh. To meet its significant investment requirements, PGCB should develop a financing plan to tap both domestic and international financial markets. Consistent with its commitment to good governance, accountability, and transparency, ADB reserves the right to investigate, directly or through its agents, any alleged corrupt, fraudulent, collusive, or coercive practices relating to the project. Procurement contracts financed by ADB are subject to prior ADB review and must include provisions specifying the right of ADB to audit and examine the records and accounts of the executing agency and all contractors, suppliers, consultants, and other service providers as they relate to the project.

32. PGCB has prepared an action plan to address the substantial financial management risk. The government and the BERC published and made effective electricity transmission and distribution tariff regulations in June 2016. These regulations established a transparent mechanism to periodically review and reset transmission tariffs to recover transmission costs and improve PGCB's financial sustainability. PGCB has executed similar projects before and is capable of managing the fund flow, disbursement procedures, accounting, and financial reporting under the project. Mitigation measures to be taken to address key financial management risks include the appointment of additional staff in the finance, accounting, and internal audit departments of PGCB. The project will support auditors of PGCB to issue qualified audit opinions

<sup>21</sup> ADB. 2005. [Financial Management and Analysis of Projects](#). Manila.

<sup>22</sup> A wheeling charge is a transmission system usage fee.

<sup>23</sup> Financial Management Assessment (accessible from the list of linked documents in Appendix 2).

on financial statements for all entities operated by PGCB. Based on these opinions, PGCB will come up with a time-bound action plan to improve its audit function, including compilation of a fixed-asset registry; strengthening the internal audit department (including the appointment of a general manager); and implementing the ERP that will be financed under the project to address risks posed by the existing manual accounting system.

33. ERP is an integrated information technology system that will help strengthen PGCB's capabilities to manage its assets. The ERP system will standardize PGCB's business processes to improve transparency and improve PGCB's internal controls, creating greater accountability and governance within PGCB.

34. ADB's Anticorruption Policy (1998, as amended to date) was explained to and discussed with the government and PGCB. The specific policy requirements and supplementary measures are described in the PAM. The project team conducted integrity due diligence and did not identify significant or potentially significant integrity risks.

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

35. Out of a population of 163.7 million in 2018, 21.8% of the population lived below the national poverty line, a decline from 31.5% in 2010. 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 have underpinned the decline in poverty. Access to a reliable supply of electricity is an important input to economic growth and poverty reduction.

36. The major benefit of the project will be improved access to electricity and improved delivery of reliable power to support sustained economic growth and reduce poverty. Improved access to a reliable electricity supply will promote business expansion and create employment opportunities for local communities, including the poor and socially disadvantaged. The project will also generate jobs for local communities during construction as a direct benefit. Furthermore, the capacity development program under output 3 of the project will improve human resources development in the energy sector.

37. The project is categorized as having *some gender elements*. Under output 3, the project will directly support women's employment and capacity development in PGCB's finance division and in the drone inspection center. PGCB will ensure compliance with national labor laws, with no child labor employed. The contractors will educate workers through a PGCB training program on the prevention of sexually transmitted infections, including HIV. With ADB's support, gender training is envisaged for the executing agency and its contractors to prevent issues related to sexual harassment, exploitation, and abuse.

#### **E. Safeguards**

38. In compliance with ADB's Safeguard Policy Statement, the project's safeguard categories are as follows.<sup>24</sup>

39. **Environment (category B).** The project is *category B*. It is a transmission system expansion project that will not pass through any ecologically sensitive area and will not cause

<sup>24</sup> ADB. Safeguard Categories. <https://www.adb.org/site/safeguards/safeguard-categories>.

significant adverse environmental impacts that are irreversible, diverse, or unprecedented.<sup>25</sup> PGCB prepared an initial environmental examination (IEE) in accordance with ADB's Safeguard Policy Statement and government legislation. PGCB and the project team conducted meaningful consultations, with project information disclosed locally and on ADB's website. The IEE includes an environmental management plan for outputs 1 and 2. The project team disclosed the IEE on the ADB website on 12 July 2019. PGCB is committed to implementing the environmental management plan under the IEE, and this plan will be sufficient to mitigate potential environmental impacts. PGCB and ADB agreed to closely monitor environmental impacts during project implementation and for PGCB to submit environmental monitoring reports to ADB semiannually.

40. **Climate change.** The climate change impact of the project is categorized *medium*. The project team conducted a climate risk vulnerability assessment (CRVA) and incorporated its results into the project design.<sup>26</sup> The project's use of indoor GIS will be its main contribution to climate change adaptation. In addition, the project contributes to climate mitigation by using high-efficiency transmission lines. Details are in the CRVA (footnote 26) and climate change assessment (footnote 19).

41. **Involuntary resettlement (category A).** PGCB carefully designed the substations and transmission line alignments to minimize land acquisition and involuntary resettlement. The overhead transmission lines have temporary impacts for crops, and permanent impacts for trees and land under four tower legs. Underground lines will follow rights-of-way of existing roads to avoid creating resettlement impacts. PGCB estimated that the transmission lines will economically affect 870 households with a population of 3,828 persons. The project will require about 79.6 acres of land acquisition for new substations and existing bay extension; this will affect 281 households and 1,221 people. No physical displacement is required under the project but several households will be significantly affected by losing 10% of their productive assets because of land acquisition. PGCB prepared a resettlement plan in accordance with ADB's Safeguard Policy Statement and national regulations. PGCB will implement the resettlement plan to ensure that (i) affected persons, including informal settlers, are compensated for lost assets prior to displacement and at replacement cost; (ii) rehabilitation and restoration programs are in place for those whose livelihood will be affected; (iii) meaningful consultations and timely information disclosure occur; (iv) the standard of living of affected persons is improved to at least national minimum standards; and (v) a three-tier grievance redress mechanism is established. If the project scope changes, PGCB will update the resettlement plan accordingly. The project team disclosed the resettlement plan on the ADB website on 15 July 2019. PGCB agreed to closely monitor land acquisition and resettlement during project implementation. PGCB has an environmental and social unit with staff in charge of resettlement plan implementation. PGCB has implemented several ADB projects and has adequate institutional capacity and experience to implement the resettlement plan. PGCB will hire an external monitor to carry out external monitoring and to verify the implementation status of the resettlement plan. PGCB will submit monitoring reports to ADB semiannually.

42. **Indigenous peoples (category C).** The project does not affect the dignity, human rights, livelihood systems, or culture and territories of indigenous peoples.<sup>27</sup> Project due diligence

<sup>25</sup> A corrective action plan is included in the environmental audits of existing substations, which defines time-bound remedial actions of any noncompliance as per ADB's Safeguard Policy Statement 2009.

<sup>26</sup> Climate Risk Vulnerability Assessment (accessible from the list of linked documents in Appendix 2).

<sup>27</sup> Indigenous peoples is referred as Tribes, Minor Races, Ethnic Sects and Communities Peoples in Bangladesh.

confirmed that no indigenous peoples, as defined by ADB's Safeguard Policy Statement, were found within the project area.

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

43. Significant risks and mitigating measures are summarized in Table 4 and described in detail in the risk assessment and risk management plan.<sup>28</sup>

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

<b>Risks</b>	<b>Mitigation Measures</b>
Charges for transmission services have not been adjusted since 2015.	PGCB is covenanted under the ongoing Bangladesh Power System Enhancement and Efficiency Improvement Project <sup>a</sup> to file tariff revisions to the BERC on a regular basis. Under the project, PGCB is required by the Power Division to file tariff revisions once a year. ADB will monitor compliance on a regular basis.
PGCB has limited financial management capacity.	PGCB implements the ERP system under the project.

ADB = Asian Development Bank, BERC = Bangladesh Energy Regulatory Commission, ERP = enterprise resource planning, 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.

Source: Asian Development Bank estimates.

## IV. ASSURANCES AND CONDITIONS

44. 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 project administration manual and loan documents.

45. 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.

## V. RECOMMENDATION

46. 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 €271,838,000 to the People's Republic of Bangladesh for the Dhaka and Western Zone 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

7 October 2019

<sup>28</sup> Risk Assessment and Risk Management Plan (accessible from the list of linked documents in Appendix 2).

## DESIGN AND MONITORING FRAMEWORK

Impacts the Project is Aligned with			
National target of electricity for all achieved by 2021 (Perspective Plan of Bangladesh, 2010–2021: Making Vision 2021 a Reality) <sup>a</sup>			
Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks
<b>Outcome:</b> Reliability and efficiency of electricity supply in Greater Dhaka and western zone of Bangladesh improved	<b>By 2025:</b> a. Occurrence of power outages reduced to not more than 15 annually (2018 baseline: 60)  b. Transmission loss reduced to 2.5% (2018 baseline: 2.76%)  c. Carbon dioxide emissions reduced by 455,785 tons per year as a result of reduced transmission losses (2018 baseline: 0) (RFI A)	a–b. Annual reports of PGCB   c. PGCB's environment monitoring reports	Delay in the completion of planned power generation investments could limit utilization of the transmission network.
<b>Outputs</b>  1. Transmission system in Greater Dhaka expanded	<b>By 2024:</b> 1a. 22 km of 400 kV lines constructed and commissioned, comprising (i) an 18 km line from Kaliganj (Gazipur) to Purbachal; and (ii) two LILo lines with a total length of 4 km at Kaliganj (Gazipur) substation (2018 baseline: 0) (RFI B)  1b. 9.0 km of 230 kV lines constructed and commissioned, comprising (i) a 5.0 km underground cable and a 0.5 km overhead river crossing cable extension of the Purbachal–Purbachal 2 line; and (ii) a 3.5 km LILo section at Kaliganj (Gazipur) substation (2018 baseline: 0) (RFI B)  1c. 9 km of 132 kV cable from Rampura to Basundhara constructed and commissioned (2018 baseline: 0) (RFI B)  1d. Three indoor GIS substations with a capacity of 4,450 MVA constructed and commissioned at Kaliganj (400/230 kV), Purbachal (400/230 kV) and Purbachal-2 (230/132 kV) (2018 baseline: 0)	1a-1d. Annual reports of PGCB	Price increases in goods and services exceed projections and contingency, resulting in cost overrun and project implementation delays.  Extreme weather conditions could delay completion of civil works.
2. Transmission system in western zone expanded	<b>By 2024:</b> 2a. 135 km of 230 kV lines constructed and commissioned, comprising (i) a 62 km line from Satkhir to Rupsha; (ii) a 46.5 km line from Purbasadipur to	2a-2d. Annual reports of PGCB	

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks
	<p>Domar; (iii) a 25 km line from Gopalganj (North) to Shibchar; and (iv) two LILO connections with a total length of 1.5 km at Bhola and Rupsha substations (2018 baseline: 0) (RFI B)</p> <p>2b. 233 km of 132 kV lines constructed and commissioned, comprising (i) a 35 km line from Domar to Hatibandha; (ii) a 28 km line from Kaliganj to Maheshpur; (iii) a 33 km line from Satkhir to Manirampur; (iv) a 48 km line from Kushtia to Meherpur; (v) a 49.5 km line from Bagerhat to Pirojpur-Bhandaria; (vi) a 32.5 km line from Niyamatpur to Patnitala; and (vii) five LILO connections with a total length of 7.0 km at Rupsha, Bhanga, Jhalokathi, and Phultola substations (2018 baseline: 0) (RFI B)</p> <p>2c. Two GIS substations with a total capacity of 1,230 MVA constructed and commissioned at Bhola (230/33 kV) and Rupsha (230/132/33 kV), and two bay extensions constructed and commissioned at the existing AIS substation at Satkhira (2018 baseline: 0)</p> <p>2d. (i) Ten 132/33 kV substations constructed and commissioned, comprising GIS substations with a total capacity of 1,840 MVA at Bhanga, Domar, Hatibandha, Jhalokathi, Maheshpur, Monirampur, Meherpur, Phultola, Shibchar and Pirojpur; and (ii) four GIS bay extensions constructed and commissioned at the existing Purbasadipur substation plus 16 AIS bay extensions constructed and commissioned at existing substations in Kaliganj, Satkhira, Kushtia, Bagerhat, Bhandaria, Gopalganj, Niyamatpur, and Patnitala (2018 baseline: 0)</p>		
3. Institutional capacity of PGCB strengthened	<p><b>By 2024:</b></p> <p>3a. ERP system installed and operational (2018 baseline: NA)</p> <p>3b. Drone inspection center established within the Operation and Maintenance</p>	3a. ERP system-generated reports	

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks
	<p>Department of PGCB (2018 baseline: NA)</p> <p>3c. At least 20% of technical staff employed in the drone inspection center are women (2018 baseline: NA)</p> <p>3d. At least 80 PGCB staff (at least 20% women) reported increased knowledge and skills in operating drones and the ERP system (2018 baseline: NA)<sup>b</sup></p>	<p>3b-3c. Annual reports of PGCB</p> <p>3d. Pre- and post-training assessment</p>	

### Key Activities with Milestones

#### 1. Transmission system in Greater Dhaka expanded

- 1.1 Publish tenders, award contracts by September 2020.
- 1.2 Complete construction and commission transmission network by September 2022.

#### 2. Transmission system in western zone expanded

- 2.1 Publish tenders and award contracts by March 2021.
- 2.2 Complete construction and commission transmission network by March 2023.

#### 3. Institutional capacity of PGCB strengthened

- 3.1 Publish tender, award contract and install the ERP system by December 2023.
- 3.2 Publish tender, award contract and establish the drone inspection center by December 2021.
- 3.3 Prepare operations manual and recruit staff for the drone inspection center by December 2021.
- 3.4 Conduct staff training for drone operations by June 2022 and for the ERP system operations by June 2024.

### Inputs

ADB: \$300.00 million (regular OCR loan)  
 AIIB: \$200.00 million (loan)  
 People's Republic of China Poverty Reduction and Regional Cooperation Fund: \$0.75 million (grant)  
 Government: \$249.25 million

### Assumptions for Partner Financing

Not applicable.

ADB = Asian Development Bank, AIIB = Asian Infrastructure and Investment Bank, AIS = air-insulated substation, ERP = enterprise resource planning, GIS = gas-insulated substation, km = kilometer, kV = kilovolt, LILO = line-in line-out, MVA = megavolt-ampere, NA = not applicable, OCR = ordinary capital resources, PGCB = Power Grid Company of Bangladesh Limited, RFI = results framework indicator.

<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> The gender-related elements in the design and monitoring framework are steps toward institutionalizing gender practices at PGCB. They will complement ongoing activities under ADB 2018 [People's Republic of Bangladesh: Southwest Transmission Grid Expansion Project](#). Manila. The project is categorized as *some gender elements*.

### Contribution to the ADB Results Framework:

RFI A: Greenhouse gas emission reduction (tCO<sub>2</sub> equivalent/year). Target: 455,785 tCO<sub>2</sub> equivalent/year.

RFI B: Transmission lines installed or upgraded. Target: 408 km.

Source: Asian Development Bank estimates.

### **LIST OF LINKED DOCUMENTS**

<http://www.adb.org/Documents/RRPs/?id=51137-003-3>

1. Loan Agreement
2. Grant Agreement
3. Project Agreement
4. Sector Assessment (Summary): Energy (Electricity Transmission and Distribution)
5. Project Administration Manual
6. Contribution to the ADB Results Framework
7. Development Coordination
8. Financial Analysis
9. Economic Analysis
10. Country Economic Indicators
11. Summary Poverty Reduction and Social Strategy
12. Risk Assessment and Risk Management Plan
13. Climate Change Assessment
14. Initial Environmental Examination
15. Resettlement Plan

#### **Supplementary Documents**

16. Climate Risk Vulnerability Assessment
17. Financial Management Assessment