Board of Directors

FOR OFFICIAL USE ONLY
(For consideration by the Board on or about 31 March 2017)

R13-17
7 March 2017

Proposed Loans and Administration of Grant Bangladesh Power System Enhancement and Efficiency Improvement Project (Bangladesh)

1. The Report and Recommendation of the President (RRP: BAN 49423-005) on the proposed loans and administration of a grant to Bangladesh for the Bangladesh Power System Enhancement and Efficiency Improvement Project is circulated herewith.

2. This Report and Recommendation should be read with *Country Operations Business Plan: Bangladesh, 2017–2019*, which was circulated to the Board on 24 October 2016 (DOC.IN.426-16).

For Inquiries: L. George, South Asia Department
(Ext. 5514)
Y. Seo, Office of the General Counsel
(Ext. 4898)

ADB

Report and Recommendation of the President to the Board of Directors

Project Number: 49423-005
March 2017

Proposed Loans and Administration of Grant People's Republic of Bangladesh: Bangladesh Power System Enhancement and Efficiency Improvement Project

Asian Development Bank

CURRENCY EQUIVALENTS

(as of 17 February 2017)

Currency unit	–	taka (Tk)
Tk1.00	=	$0.01277
$1.00	=	Tk78.325

ABBREVIATIONS

ADB	–	Asian Development Bank
BERC	–	Bangladesh Energy Regulatory Commission
BPDB	–	Bangladesh Power Development Board
BREB	–	Bangladesh Rural Electrification Board
DESCO	–	Dhaka Electric Supply Company Limited
EMP	–	environmental management plan
FIRR	–	financial internal rate of return
GW	–	gigawatt
km	–	kilometer
kV	–	kilovolt
OCR	–	ordinary capital resources
O&M	–	operation and maintenance
PAM	–	project administration manual
PBS	–	*palli bidyut samity* (rural electricity cooperative)
PGCB	–	Power Grid Company of Bangladesh Limited
SDR	–	special drawing right
V	–	volt

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 US dollars.

Vice-President	W. Zhang, Operations 1
Director General	H. Kim, South Asia Department (SARD)
Director	P. Wijayatunga, Energy Division, SARD
Team leader	L. George, Energy Specialist, SARD
Team members	M. Ahmed, Associate Project Analyst, SARD
	K. Enomoto, Energy Specialist, SARD
	A. Firoz, Senior Procurement Officer, SARD
	S. Z. Hossain, Senior Public Management Officer, SARD
	Y. Jang, Social Development Specialist, SARD
	M. Santos, Associate Project Analyst, SARD
	N. Selim, Social Development Officer (Gender), SARD
	Y. Seo, Senior Counsel, Office of the General Counsel
	Y. Zhou, Environment Specialist, SARD

CONTENTS

		Page
PROJECT AT A GLANCE		
I.	THE PROPOSAL	1
II.	THE PROJECT	1
	A. Rationale	1
	B. Impact and Outcome	3
	C. Outputs	3
	D. Investment and Financing Plans	4
	E. Implementation Arrangements	5
III.	DUE DILIGENCE	6
	A. Technical	6
	B. Economic and Financial	6
	C. Governance	7
	D. Poverty and Social	8
	E. Safeguards	8
	F. Risks and Mitigating Measures	9
IV.	ASSURANCES AND CONDITIONS	10
V.	RECOMMENDATION	10
APPENDIXES		
1.	Design and Monitoring Framework	11
2.	List of Linked Documents	14

PROJECT AT A GLANCE

1. Basic Data

Project Number: 49423-005

Project Name	Bangladesh Power System Enhancement and Efficiency Improvement Project	**Department /Division**	SARD/SAEN
Country	Bangladesh	**Executing Agency**	Bangladesh Rural Electrification Board (BREB), Dhaka Electric Supply Company Ltd. (DESCO), Power Div-Min of Power, Energy & Mineral Resources, Power Grid Company of Bangladesh, Ltd. (PGCB)
Borrower	Bangladesh		

2. Sector

	Sector	Subsector(s)	ADB Financing ($ million)
✓	**Energy**	Electricity transmission and distribution	606.00
		Energy efficiency and conservation	0.75
		Energy sector development and institutional reform	5.25
		Renewable energy generation - solar	2.50
		Renewable energy generation - wind	1.50
		Total	**616.00**

3. Strategic Agenda

Strategic Agenda	Subcomponents
Inclusive economic growth (IEG)	Pillar 2: Access to economic opportunities, including jobs, made more inclusive
Environmentally sustainable growth (ESG)	Eco-efficiency
	Global and regional transboundary environmental concerns

Climate Change Information

Mitigation ($ million)	11.20
CO_2 reduction (tons per annum)	65,000
Climate Change impact on the Project	High

4. Drivers of Change

Drivers of Change	Components
Governance and capacity development (GCD)	Institutional development
	Organizational development
Partnerships (PAR)	Bilateral institutions (not client government)
	Official cofinancing

Gender Equity and Mainstreaming

Effective gender mainstreaming (EGM)	✓

5. Poverty and SDG Targeting

Geographic Targeting	No
Household Targeting	No
SDG Targeting	Yes
SDG Goals	SDG7

Location Impact

Rural	High
Urban	Medium

6. Risk Categorization: Complex

7. Safeguard Categorization

Environment: B **Involuntary Resettlement:** B **Indigenous Peoples:** C

8. Financing

Modality and Sources	Amount ($ million)
ADB	**616.00**
Sovereign Project loan (Concessional Loan): Ordinary capital resources	16.00
Sovereign Project loan (Regular Loan): Ordinary capital resources	600.00
Cofinancing	**2.00**
Grant - Japan Fund for Poverty Reduction	2.00
Counterpart	**440.70**
Loan - Government	440.70
Total	**1,058.70**

9. Effective Development Cooperation

Use of country procurement systems	Yes
Use of country public financial management systems	Yes

Source: Asian Development Bank

I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on proposed loans to the People's Republic of Bangladesh for the Bangladesh Power System Enhancement and Efficiency Improvement Project.[1] The report also describes the proposed administration of a grant to be provided by the Japan Fund for Poverty Reduction for the Bangladesh Power System Enhancement and Efficiency Improvement 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.

2. The proposed project will enhance the coverage and improve the reliability and efficiency of the transmission and distribution network, to facilitate better utilization of the expanding power generation capacity to meet the growth in electricity demand across the country.[2]

II. THE PROJECT

A. Rationale

3. In 1971, when Bangladesh gained independence, only 3% of its population had access to electricity. By 2015, this had risen to about 72% with per capita electricity consumption reaching 371 kilowatt-hours per annum.[3] The gross domestic product of Bangladesh has been growing at a rate of over 6% consistently during 2005–2015. Meeting the need for reliable and affordable electricity is a challenge for Bangladesh as it seeks to sustain economic growth and consolidate its transition to middle-income country status by 2021.[4] To support inclusive growth and development as well as the creation of more and better jobs, the government has set a target of electricity for all by 2021, and is working across the electricity generation, transmission, and distribution value chain to enhance improved delivery of electricity and meet the expected demand of 19 gigawatts (GW) by 2021.[5]

4. **Increasing power generation capacity.** Expensive liquid fuels, such as diesel and furnace oil, have proliferated particularly since 2009 and contributed about 20% of the power generation in 2015. This increase in capacity contributed to electricity generation capacity crossing 13 GW in 2015 (more than double the installed capacity in 2009) and ended the rolling blackouts in major cities. Between 2007 and 2015, retail electricity tariffs in Bangladesh have increased by about 7.9% annually, but have been inadequate to cover the increased cost of power.[6] In the generation subsector, long-term planning is focused on increasing the installed

---

[1] The design and monitoring framework is in Appendix 1.

[2] The project is included in Asian Development Bank (ADB). 2016. *Country Operations Business Plan: Bangladesh, 2017–2019*. Manila. ADB provided stand-alone small-scale project preparatory technical assistance Bangladesh Power System Enhancement and Efficiency Improvement Project for (TA 9083-BAN), which was approved on 9 March 2016 to support due diligence. This is complemented by due diligence studies under tranche 1 of the ongoing ADB. 2012. *Report and Recommendation of the President to the Board of Directors: Proposed Multitranche Financing Facility and Administration of Grant to the People's Republic of Bangladesh for the Power System Expansion and Efficiency Improvement Investment Program*. Manila (Loan 2966-BAN).

[3] Government of Bangladesh, Ministry of Planning, Planning Commission. 2015. *7th Five Year Plan, FY2016–2020: Accelerating Growth, Empowering Citizens*. Dhaka. This figure includes captive power generation by industries.

[4] Government of Bangladesh, Ministry of Planning, Planning Commission. 2012. *Perspective Plan of Bangladesh, 2010–2021: Making Vision 2021 a Reality.* Dhaka. Bangladesh is ranked 107th in the 2015 Global Competitiveness Index ratings behind most South Asian countries on account of several factors, including infrastructure constraints.

[5] Government of Bangladesh, Ministry of Power, Energy and Mineral Resources. 2011. *Power System Master Plan 2010.* Dhaka. An updated master plan is under preparation and expected to be finalized in 2017.

[6] The Bangladesh Power Development Board (BPDB) purchases all electricity and sells this to distribution utilities, including the Dhaka Electric Supply Company Limited (DESCO) and the Bangladesh Rural Electrification Board

generating capacity, including rehabilitation and efficiency improvement of the existing public sector gas-fueled power plants and the creation of inter-country transmission grid interconnections. Bangladesh is also executing plans to set up imported liquefied natural gas terminals and gas and coal power plants. There are also investments planned in grid-connected and off-grid solar power generation.[7] These measures support scaling up and diversifying generation capacity through a range of financing sources, including through the private sector. This momentum in generation capacity growth is expected to be maintained, with about 7 GW of generation capacity to be installed by 2021. This would reduce dependence on liquid fuel sources and facilitate a transition to a lower cost trajectory for power purchase costs over the medium term.

5. **Strengthening transmission network coverage.** The Power Grid Company of Bangladesh Limited (PGCB) is responsible for the national transmission grid in Bangladesh. The south-west part of Bangladesh is a high-growth-potential region for economic corridor development as well as a location for multiple power plants. There is one existing interconnection crossing the Padma River and connecting the eastern and western regions of Bangladesh at 230 kilovolts (kV). A second high-voltage interconnection across the Padma River between the southwest regions and Dhaka would improve reliability and permit efficient power flows over the national transmission network.

6. **Distribution system improvement in Dhaka.** Dhaka city has been one of the major beneficiaries of the improved power availability since 2010. The Dhaka Electric Supply Company Limited (DESCO) services about half the city and surrounding areas, and has progressively reduced its distribution losses from 27.0% in 2001 to 8.4% in 2015, which places it among the best city-based utilities in South Asia. This has been achieved through a relentless focus on reducing commercial losses and increasing the share of its medium voltage network. DESCO is now focusing on improving its ability to monitor and control its city distribution network and improve the quality of customer service and network utilization.

7. **Enhancement of rural distribution network.** Bangladesh's rural electrification commenced in 1977 with a few rural areas electrified through a program supported by the United States Agency for International Development through the Bangladesh Rural Electrification Board (BREB), the highest rural electrification agency responsible for financing procurement and technical oversight of the *palli bidyut samitis* (PBSs)[8] that are responsible for operation, billing, and collection in rural areas. The rural electrification network, with about 15 million customers, accounts for over 42% of power consumption in the country and is responsible for serving industries, irrigation, and domestic demand in rural areas. Distribution loss levels in rural areas are at about 12.5% in 2016, lower than the 15.0% loss level in 2009, and expected to reduce to about 10.0% by 2021, driven by investments in loss reduction and the recently approved plan to decentralize and manage widespread rural operations at a regional level. Sales are growing at 11% annually, and about 0.5 million new consumers are being connected annually to the rural distribution network. To meet its target of 100% electrification by 2021, the Government of Bangladesh has embarked on a large-scale rural electrification program supported by development partners since 2011. The Japan International

(BREB). The BPDB has not been able to pass on the full cost of liquid fuel power purchase to the distribution sector.

[7] Bangladesh has a successful program for off-grid electrification using solar home systems that has helped improve access to electricity. Projects for large utility-scale grid-connected renewable energy are under consideration.

[8] At the end of fiscal year 2016, there were 77 PBSs or rural electricity cooperatives that purchase power from the BPDB and sell it to retail consumers at 33 kV and lower voltages. They are responsible for maintaining the distribution infrastructure created by BREB.

Cooperation Agency and the World Bank have undertaken upstream high voltage rural electrification projects. The Asian Infrastructure Investment Bank is providing $100 million of financing for downstream last mile customer connections for rural electrification. BREB has sought assistance to enhance the midstream capacity of the rural electrification network as well as rehabilitate and improve sections of the network that are over 20 years old and using wooden distribution poles with low-capacity conductors. These investments are needed to ensure delivery of increasing requirement of power and meet customer demand in an efficient and reliable manner.

8. **Capacity development for sector planning and regulation.** Under the 7th Five Year Plan, over 8,400 circuit kilometers (km) of transmission lines and over 120,000 circuit km of distribution lines are to be constructed and rehabilitated.[9] The government expects that about 90% of the population would be served through the grid by 2020. Capacity development of the sector agencies on medium-term transmission planning, distribution system planning, loss monitoring, and feasibility studies for new generation projects; and to consolidate recent progress on tariff regulations would be needed.

9. The Asian Development Bank (ADB) is a key development partner in the power sector of Bangladesh and has been active in supporting investments in power generation, efficiency improvement, international power interconnections, and improvement of transmission and distribution networks. ADB has supported power generation capacity addition and cross-border connectivity in western Bangladesh. The project is aligned with ADB's country partnership strategy, 2016–2020 for Bangladesh, which highlights the need to strengthen the transmission and distribution network and improve access to electricity.[10]

B. Impact and Outcome

10. The impact will be 100% access to power by 2021 and improved power sector sustainability in Bangladesh by 2030. The project is aligned with the Perspective Plan of Bangladesh, 2010–2021: Making Vision 2021 a Reality,[11] and the Power System Master Plan 2010 (footnote 5). The outcome will be improved access to efficient and reliable electricity supply in Bangladesh. Performance indicators are in Appendix 1.

C. Outputs

11. The outputs of the project are (i) national transmission network in southern Bangladesh, strengthened by PGCB through the construction of a 174 km high-voltage, 400 kV transmission link between southwest Bangladesh and Dhaka; (ii) distribution network improved in DESCO service areas through design and installation of control systems; (iii) distribution network in rural areas of Bangladesh, including the capacity of end-users, improved to support increase in safe, efficient, and productive electricity usage in BREB service areas; and (iv) capacity in power sector agencies enhanced, including on new project design and improved regulatory compliance.[12]

---

[9] Government of Bangladesh, Ministry of Planning, Planning Commission. 2015. *7th Five Year Plan, FY2016–2020: Accelerating Growth, Empowering Citizens*. Dhaka.

[10] ADB. 2016. *Country Partnership Strategy: Bangladesh, 2016–2020*. Manila.

[11] Government of Bangladesh, Ministry of Planning, Planning Commission. 2012. *Perspective Plan of Bangladesh, 2010–2021: Making Vision 2021 a Reality.* Dhaka.

[12] Capacity building and related support (output 4) is proposed to be supported by concessional ordinary capital resources loan as well as grant assistance from the Japan Fund for Poverty Reduction.

D. Investment and Financing Plans

12. The project is estimated to cost $1,058.7 million (Table 1).

Table 1: Project Investment Plan
($ million)

Item			Amount[a]
A.	**Base Cost**[b]		
	1.	National transmission system development by the Power Grid Company of Bangladesh Limited in southern Bangladesh	145.5
	2.	Distribution improvement in Dhaka Electric Supply Company Limited service areas	18.2
	3.	Distribution system upgrade, rehabilitation, extension, and rural electrification in Bangladesh Rural Electrification Board service areas	778.9
	4.	Enhanced capacity of power sector agencies through the Power Division of the Ministry of Power, Energy and Mineral Resources	17.9
	Subtotal (A)		**960.5**
B.	**Contingencies**[c]		**72.6**
C.	**Financing Charges During Implementation**[d]		**25.6**
	Total Cost (A+B+C)		**1,058.7**

[a] In 2016 prices. Includes taxes and duties of $186.6 million to be financed by the government and $4.0 million by the Asian Development Bank.
[b] Based on development project proposals prepared by the sector agencies.
[c] Physical contingencies are estimated at 10% for transmission component, 2% for distribution automation component, 3% for rural distribution component, and 4% for capacity building component. Price contingencies are estimated using the Asian Development Bank's forecast of international and domestic inflation, and include provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate.
[d] Includes interest and commitment charges. Interest during construction for the ordinary capital resources (OCR) loan has been estimated at the 5-year fixed London interbank offered rate (LIBOR) plus a spread of 0.5% and a maturity premium of 0.1%. Commitment charges for the OCR loan are 0.15% per year to be charged on the undisbursed loan amount. Interest during implementation for the concessional OCR loan has been estimated at an interest rate of 2% per year.
Source: Asian Development Bank estimates.

13. The government has requested (i) a regular loan of $600 million, and (ii) a concessional loan in various currencies equivalent to SDR11.6 million ($16 million),[13] both from ADB's ordinary capital resources (OCR) to help finance the project. The regular 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;[14] a commitment charge of 0.15% per year, and such other terms and conditions set forth in the draft regular loan and project agreements. The concessional loan will have a 25-year term, including a grace period of 5 years; an interest rate of 2% per year during the grace period and thereafter; and such other terms and conditions set forth in the concessional loan and project agreements. The Japan Fund for Poverty Reduction will provide grant cofinancing equivalent to $2 million, to be administered by ADB. The Government of Bangladesh will provide counterpart support in the form of remuneration of counterpart staff, contribution to national taxes and duties, civil works, and other in-kind contributions. The financing plan is in Table 2.

[13] SDR0.725 = $1.00 as of 23 October 2016.
[14] The interest includes a maturity premium of 10 basis points. This is based on the loan terms in para. 13 and the government's choice of repayment option and dates.

Table 2: Financing Plan

Source	**Amount** ($ million)	**Share of Total** (%)
Asian Development Bank		
Ordinary capital resources (regular loan)	600.0	56.7
Ordinary capital resources (concessional loan)	16.0	1.5
Japan Fund for Poverty Reduction (grant)	2.0	0.2
Government of Bangladesh	440.7	41.6
Total	**1,058.7**	**100.0**

Source: Asian Development Bank estimates.

14. The project's contribution to climate mitigation is estimated at $16.0 million and for climate adaptation at $7.6 million. Of this, ADB's contribution is about 70% for climate mitigation.

E. Implementation Arrangements

15. The executing agencies for the project are PGCB for output 1; DESCO for output 2; BREB for output 3; and the Power Division of the Ministry of Power, Energy and Mineral Resources for output 4. Goods, equipment, and civil works financed by ADB will be procured in accordance with ADB's Procurement Guidelines (2015, as amended from time to time). ADB-funded consultants will be recruited following ADB's Guidelines on the Use of Consultants (2013, as amended from time to time). Each executing agency has established a project management unit for project preparation, implementation, monitoring, and reporting to ADB and the government. The Power Division of the Ministry of Power, Energy and Mineral Resources will coordinate, through Power Cell, with relevant sector agencies for output 4. The Power Division will also be responsible for the overall coordination of the project.

16. The implementation arrangements are summarized in Table 3 and described in detail in the project administration manual (PAM).[15]

Table 3: Implementation Arrangements

Aspects	**Arrangements**		
Implementation period	July 2016–June 2020		
Estimated completion date	June 2020 (loan closing date will be December 2020)		
Management			
(i) Oversight body	PGCB board, BREB board, DESCO board, and Power Division (Ministry of Power, Energy and Mineral Resources)		
(ii) Executing agencies	PGCB, BREB, DESCO, and Power Division of Ministry of Power, Energy and Mineral Resources		
(iii) Key implementing agencies	PGCB, BREB, DESCO, and Power Cell		
(iv) Implementation unit	Project management units in PGCB, BREB, DESCO, and Power Cell		
Procurement	International competitive bidding, national competitive bidding, and shopping	48 contracts, comprising 39 ICB, 2 NCB, and 7 shopping contracts	$585 million
Consulting services	Quality- and cost-based selection and quality-based selection	12 contracts following quality- and cost-based selection	$21 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, retroactive financing.		
Disbursement	The loan and grant proceeds will be disbursed in accordance with ADB's *Loan Disbursement Handbook* (2015, as amended from time to time) and detailed arrangements agreed between the government and ADB.		

ADB = Asian Development Bank, BREB = Bangladesh Rural Electrification Board, DESCO = Dhaka Electric Supply Company Limited, ICB = international competitive bidding, NCB = national competitive bidding, PGCB = Power Grid Company of Bangladesh Limited.
Source: Asian Development Bank estimates.

[15] Project Administration Manual (accessible from the list of linked documents in Appendix 6).

III. DUE DILIGENCE

A. Technical

17. Technical due diligence was conducted on the project components. The feasibility report for component 1, the transmission line, was prepared for PGCB by an external consultant and independently reviewed. Component 2, the control system for DESCO, would support enhanced distribution system management and improve the reliability of the distribution network. Under the loan, the control system would be procured and implemented with international consulting support. Component 3, comprising the physical investments in rural electrification, was prepared based on feasibility studies undertaken at the PBSs by consultants, and reviewed and aggregated at BREB. The reports were assessed during project preparation through on-ground surveys and reviews. The rural electrification investments identified under the project are part of the government's 7th Five Year Plan (footnote 9). A consulting firm would be appointed to monitor implementation and to support loss reduction and improvement in reliability for BREB. Component 4 covers priority sector studies through Power Division and rural electrification initiatives for productive and safe energy usage and capacity building of utility staff through BREB. Climate change risk assessment is expected to be high as the project area is monsoon-affected, with a possibility of extreme weather events such as floods. The detailed design will review and incorporate elements to address these risks.

B. Economic and Financial

18. The economic analysis was carried out in accordance with ADB's Guidelines for the Economic Analysis of Projects.[16] The gradual decline in the availability of domestic natural gas for the power sector has resulted in an increased dependence on smaller projects with expensive liquid fuel (diesel, furnace oil) from 2007 to 2016. Liquid fuel now contributes 20% of the power generation mix and a disproportionately high share of fuel expenses. The expansion plan for Bangladesh is based on base-load power plants and regional power connections. For the PGCB investment, the economic benefit of the transmission link with southern Bangladesh would be through resource cost savings on power generation and the improved reliability of the transmission network. For DESCO, the economic benefit is derived from improved ability to reduce the number and duration of interruptions through the proposed investment. For BREB, benefits include the reduction of system losses and increased electricity consumption by new and existing consumers.[17]

19. All costs and benefits have been expressed in constant 2016 prices. Capital costs and operation and maintenance (O&M) costs were taken from the financial data, with appropriate adjustments to remove taxes and price contingencies. Components 1, 2, and 3 were economically viable when economic analyses were undertaken, resulting in economic internal rates of return of 14.5% (component 1), 13.6% (component 2), and 26.6% (component 3). The overall project provided an economic internal rate of return of 24.7%. The project is resilient to changes in the parameters, including 10% increase in capital costs, 20% increase in O&M costs, construction delays, cost increases, and combined changes. The analysis demonstrates the economic feasibility of the project.

[16] ADB.1997. *Guidelines for the Economic Analysis of Projects.* Manila.
[17] ADB. 2013. *Cost-Benefit Analysis for Development: A Practical Guide*. Manila (Chapter 8: Appraising Electricity Projects).

20. Financial analysis of the project was carried out in accordance with ADB's Guidelines on the Financial Management and Analysis of Projects.[18] Financial viability was assessed by comparing the incremental costs and benefits of the project over the life of the project. The benefits for PGCB are based on the electricity transported over the transmission assets valued using the tariff set by the Bangladesh Energy Regulatory Commission (BERC) and using the approved transmission tariff methodology.[19] For DESCO, the benefits are from the creation of assets that earn returns for the company as per the BERC's tariff regulations. For BREB, the benefits are from the increased sale of power to both new and existing consumers over the enhanced rural distribution network.

21. Costs used to determine the financial internal rate of return (FIRR) included the capital investment, O&M costs, taxes, and duties to install and operate the project. The estimated weighted average cost of capital is 1.8%. The FIRRs of components 1, 2 and 3 were calculated to be 3.5%, 4.6%, and 5.0%, while the FIRR of the total project was calculated to be 4.7% and exceeds the weighted average cost of capital. The sensitivity of the FIRR to adverse changes in the underlying assumptions was also assessed and the project is considered financially viable.

C. Governance

22. Executing agencies were assessed on ADB's procurement and financial management requirements. PGCB, DESCO and BREB have ongoing ADB and other donor-funded projects. Power Cell, an arm of the Power Division has undertaken recruitment of consultants and supported coordinating capacity building under previous donor-funded projects, including ADB. 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 include provisions specifying the right of ADB to audit and examine the records and accounts of the executing agencies and all contractors, suppliers, consultants, and other service providers as they relate to the project.

23. ADB's Anticorruption Policy (1998, as amended to date) was explained to and discussed with the government, PGCB, BREB, DESCO, and the Power Division of the Ministry of Power, Energy and Mineral Resources. The specific policy requirements and supplementary measures are described in the PAM (footnote 15).

24. The financial management risk is considered substantial and an action plan has been prepared to address this. The BERC and the government made effective the electricity transmission and distribution tariff regulations in June 2016. This establishes a transparent mechanism for the periodic review and reset of tariffs to cover costs and improve the financial sustainability of the PGCB, DESCO, and BREB. PGCB and DESCO are listed on the Dhaka Stock Exchange and their financial parameters are disclosed quarterly. BREB is a semiautonomous body operating under the BREB 2013 Act approved by Parliament. The BREB board has been expanded to bring in additional expertise, and it is undertaking a restructuring by setting up eight zones to manage the decentralization of operations. The project would support enhancing capacity for internal controls, tariff-setting, asset-mapping, and monitoring of ADB-supported investments. All executing agencies have executed similar projects previously and are capable of managing funds flow, disbursement procedures, accounting, and financial

[18] ADB. 2005. *Guidelines on the Financial Management and Analysis of Projects.* Manila.

[19] Government of Bangladesh. Bangladesh Energy Regulatory Commission. 2016. *Bangladesh Electricity Transmission Tariff Regulations.* Dhaka. Tariff regulations were published by BERC in June 2016.

reporting under the project. Counterpart funds and their terms and conditions from the government to the executing agencies have been approved.[20]

D. Poverty and Social

25. Bangladesh is the eighth most populated country in the world with a population of around 160 million. Nearly 47% of the labor force is engaged in agriculture. The rate of poverty reduction has accelerated with extreme poverty declining significantly in both urban and rural areas, with the proportion of rural population living in extreme poverty dropping from 44% in 1992 to 21% in 2010. This can be attributed to more rapid gross domestic product growth, faster rate of urbanization, rising labor productivity and wages, a shift from low-return agricultural labor to nonfarm employment, and growth in export industries.

26. The Perspective Plan of Bangladesh, 2010–2021 (footnote 11) outlines a target of per capita electricity consumption of 600 kilowatt-hours per year by 2021. To achieve this, sufficient electrical power at affordable prices is a key prerequisite and is enunciated in the goal for electricity access. The project, particularly the component on rural electrification, will enhance reliable access to electricity and contribute to economic growth in rural areas. About 875,000 households will benefit from the distribution investments by 2020, with a broad range of individual and household level impacts accruing to women and children. In addition, under the proposed grant, support will be provided to develop new energy-based businesses in rural areas, including those led by women. Support for improved safety and awareness for the efficient use of electricity will target end-users who tend to be mostly women and address their specific concerns. The project will generate jobs for local communities during construction and operation of the physical infrastructure and adopt gender targets to promote women's equitable participation in project related employment opportunities, including in areas such as GIS and asset mapping. The project is classified *effective gender mainstreaming*, given the above interventions.

E. Safeguards

27. The project outputs were assessed for their environmental and social impacts. For the 400 kV transmission line, a total of 865 hectares of land would be temporarily affected under the right-of-way. Social surveys undertaken along the right-of-way showed that no physical displacement was envisaged and the impact was not significant. The economic impact due to the loss of crops and trees would be compensated. The transmission line may cross over 18 households and PGCB has agreed to flexibility in route alignment and positioning of individual towers to reduce the impact on these households. Potential environmental impacts are mostly temporary, predictable, and reversible; and can be mitigated through adherence to national and international standards, design criteria, and implementation of the environmental management plans (EMPs). The transmission towers across the Padma River will be constructed on platforms (associated facilities) provided by the Bangladesh Bridge Authority under an ongoing project and due diligence on the approved environmental impact assessment report found it to be in compliance with ADB's Safeguard Policy Statement (2009). A covenant is included to facilitate verification of the mitigation measures for the platforms. Due diligence has confirmed that the land required for receiving bays at the Aminbazar site is in the possession of PGCB, and no resettlement impacts are expected. The DESCO component would be based in the existing premises of the DESCO building and would have minimal environmental and resettlement impacts.

[20] Executive Committee of the National Economic Council clearance received for PGCB, DESCO, and BREB investments in November 2016.

28. The impact of the rural electrification component is expected to be minor. Rehabilitation of existing 33 kV, 11 kV, and 230-volt (V) lines would require replacement of old infrastructure with new poles, conductors, and insulators. The work would be taken up on road sides and along existing rights-of-way and there could be temporary disruption during installation and rehabilitation. BREB and the PBSs will follow national waste disposal regulations and put in place mechanisms to handle waste, including used oil, wood, ceramic insulators, and conductors. The distribution line extensions at low voltages (230 V and 400 V) would require extensions of not more than 100 meters and would not require displacement of people or impact property, and there is flexibility on the location of new poles. Construction of PBS buildings would be on land owned by PBS. BREB has implemented similar projects with other bilateral and multilateral agencies. The capacity-building component would not cause safeguard impacts.

29. Environment approvals were received for the project components in 2016. Based on social assessments, no indigenous peoples are expected to be affected by the project. Surveys, and consultations conducted for subprojects did not identify any indigenous peoples territories or their natural and cultural resources within the boundaries earmarked for construction of the project components. Based on due diligence, the project is classified *category B* for the environment, *category B* for involuntary resettlement, and *category C* for indigenous people. The project safeguard impacts have been adequately assessed and mitigation measures and entitlement matrix have been developed commensurate to the impacts. Consultations were undertaken at project locations, and views and opinions received taken into consideration. Initial environmental examinations (IEEs) including EMPs and a resettlement plan have been prepared following the Safeguard Policy Statement and Bangladesh regulations. The EMPs and resettlement plan budgets have been approved and are sufficient to ensure the proper implementation of mitigation and monitoring measures. They will be updated as necessary if unanticipated impacts are identified during implementation. The executing agencies will establish a grievance redress mechanism. The executing agencies have the capacity and commitment to manage the social and environmental risks. The safeguard documents are disclosed on the ADB website. The implementation of the EMP and the resettlement plan will be monitored by the executing agencies, and monitoring reports will be submitted to ADB semiannually. In the event of any change during implementation, executing agencies would update the initial environmental examinations, including the EMP and the resettlement plans.

F. Risks and Mitigating Measures

30. Major risks and mitigating measures are summarized in Table 4 and described in detail in the risk assessment and risk management plan.[21] Based on an overall assessment, the benefits and impact from the project outweigh the costs.

Table 4: Summary of Risks and Mitigating Measures

Risks	Mitigating Measures
Non-timely availability of counterpart funds for BREB	Apex government approvals for BREB projects were received in November 2016.
Inadequate increase in wheeling charges for transmission and distribution charges to meet revenue requirements and the servicing of loans	Notification of tariff regulations by the Bangladesh Energy Regulatory Commission in June 2016 allows utilities to file periodically for tariff increases. Financial sustainability of the executing agencies depends on timely tariff revisions following the new regulations. Capacity-building for the implementation of tariff regulations under output 4.
Delays in procurement and contract award given the large number of packages for BREB	The project management unit has experienced staff support on procurement. Master bidding documents were approved and tendering commenced in September 2016. Two teams will be set up for east and west Bangladesh, and capacity of eight zonal offices will be

[21] Risk Assessment and Risk Management Plan (accessible from the list of linked documents in Appendix 17).

Risks	Mitigating Measures
	strengthened for faster decision-making and implementation monitoring.
Delays in construction of associated facilities across the Padma River could delay construction of the 400 kV transmission line	PGCB has recruited an engineering firm to support design and procurement. River crossing foundation to be developed by the Bangladesh Bridge Authority to reduce implementation delays under this Project.
Inadequate internal audit capacity at BREB	Capacity building to be supported under the loan.

BREB = Bangladesh Rural Electrification Board, DESCO = Dhaka Electric Supply Company Limited, PGCB = Power Grid Company of Bangladesh Limited.
Source: Asian Development Bank.

IV. ASSURANCES AND CONDITIONS

31. The government and the executing agencies 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.

32. The government and the executing agencies have agreed with ADB on certain covenants for the project, which are set forth in the loan agreements and project agreement. No withdrawals shall be made from the loan account for expenditures until the respective subsidiary loan agreements between the government and PGCB, BREB, and DESCO, in a form and substance satisfactory to ADB, shall have been duly executed and become legally binding upon the parties in accordance with its terms.

V. RECOMMENDATION

33. I am satisfied that the proposed loans would comply with the Articles of Agreement of the Asian Development Bank (ADB) and recommend that the Board approve

(i) the loan of $600,000,000 to the People's Republic of Bangladesh for the Bangladesh Power System Enhancement and Efficiency Improvement 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; and

(ii) the loan in various currencies equivalent to SDR11,600,000 ($16,000,000)[22] to the People's Republic of Bangladesh for the Bangladesh Power System Enhancement and Efficiency Improvement Project, from ADB's ordinary capital resources, in concessional terms, with an interest charge at the rate of 2% per year during the grace period and 2% per year thereafter; 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

6 March 2017

[22] SDR0.725 = $1.00 as of 23 October 2016.

DESIGN AND MONITORING FRAMEWORK

Impact the Project is Aligned with
100% access to power by 2021 and power sector sustainability improved in Bangladesh by 2030 (Perspective Plan of Bangladesh, 2010–2021: Making Vision 2021 a Reality; and Power System Master Plan 2010)[a]

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks
Outcome Access to efficient and reliable electricity supply in Bangladesh improved	By 2021: **Access indicators** a. About 950,000 new connections, including 875,000 rural households, connected to electricity network and benefiting at least 875,000 women (2016 baseline: 0) **Reliability indicators** b. System average interruption duration index for DESCO-operated part of Dhaka city decreased by at least 25% (2015 baseline: 646 minutes) c. System average interruption duration index for BREB decreased by at least 20% (2015 baseline: 1,990 minutes based on planned interruptions for 11 kV feeders) **Efficiency indicators** d. Transmission losses reduced to 2.5% (2016 baseline: 3.0%) e. Rural distribution losses reduced to 10% (2016 baseline: Losses at 12.5%) f. Tariffs annually reviewed and reset to increasingly cover costs of transmission and distribution utilities as per approved regulations (2016 baseline: Occasional tariff reviews are not based on approved regulations) g. At least 65,000 tons of carbon emissions are avoided every year (2016 baseline: 0)	a. Annual reports of BREB b. Annual reports of DESCO c. Annual reports of BREB d. Annual reports of PGCB e. Annual reports of BREB f. Annual reports of PGCB, DESCO, and BREB g. Annual report of BREB and PSMP	Power generation capacity addition does not proceed as planned resulting in shortages

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks
Outputs 1. National transmission network in southern Bangladesh strengthened	By 2020: 1. About 174 km of 400 kV transmission lines and associated facilities constructed (Baseline: 0)	1. Annual reports of PGCB	Delays in construction of the associated facilities across the Padma River could delay construction of the 400 kV transmission line
2. Distribution network in DESCO service areas improved	2. Distribution automation system in Dhaka city installed (Baseline: None)	2. Annual reports of DESCO	Counterpart funds are not released in a timely manner
3. Distribution network in rural areas of Bangladesh, including the capacity of end-users improved	By 2020: 3a. Over 38,000 km of 33 kV and 11 kV distribution lines and associated facilities rehabilitated (Baseline: 0) 3b. Over 12,000 km of 33 kV and 11 kV distribution lines and associated facilities constructed (Baseline: 0) 3c. 200 people trained on energy-based livelihoods with at least 30% women and 50 small businesses, including 50% led by women entrepreneurs, supported (Baseline: 0) 3d. At least 1,000 end-users (at least 40% women) trained on safe and efficient use of energy (Baseline: 0)	3a–d. Annual reports of BREB and PBSs	
4. Capacity in power sector agencies enhanced	By 2019: 4a. Capital expenditure investment and tariff petitions by transmission and distribution utilities in accordance with approved tariff regulations annually submitted. (Baseline: Occasional filing) 4b. Geographic information system-based mapping for at least two PBSs completed and mapping expanded to eight more PBSs with at least 30% trained women employees in geographic information system and asset	4a. Tariff filing petitions received by the Bangladesh Energy Regulatory Commission 4b. Annual report of BREB and PBSs	

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks
	mapping teams (Baseline: 0) 4c. Detailed engineering reports for four projects completed (Baseline: 0) 4d. Measures to attract more women employees in at least five PBSs in place . (Baseline: 0)	 4c. Review reports from Power Cell 4d. Review reports from BREB and PBSs	

Key Activities with Milestones

1. National transmission network in southern Bangladesh strengthened
1.1 Initiate tendering by March 2017
1.2 Award contract by July 2017
1.3 Complete construction by June 2020

2. Distribution network in DESCO service areas improved
2.1 Initiate tendering by August 2016
2.2 Complete installation by December 2019

3. Distribution network in rural areas of Bangladesh including the capacity of end-users improved
3.1 Initiate tendering by September 2016 for first set of tenders
3.2 Initiate tendering by September 2017 for second set of tenders
3.3 Complete construction for first set of tenders by June 2019
3.4 Complete construction for second set of tenders by June 2020
3.5 Initiate recruitment of monitoring consultants by March 2017
3.6 Carry out activities for capacity building, and the productive and safe usage of electricity; and complete setting of standards by March 2020

4. Capacity in power sector agencies enhanced
4.1 Identify project management unit staffing plan in the Ministry of Power, Energy and Mineral Resources and utilities by August 2016
4.2 Project management unit operational by December 2016
4.3 Recruit consultants for feasibility studies and regulatory support by June 2017
4.4 Initiate periodic filing by transmission and distribution utilities by June 2018
4.5 Complete detailed engineering reports by June 2019
4.6 Complete implementation of gender action plan by December 2019

Inputs
ADB: $600.0 million regular OCR loan and $16.0 million concessional OCR loan
Japan Fund for Poverty Reduction: $2.0 million (grant)
Government of Bangladesh: $440.7 million

Assumptions for Partner Financing
Not applicable

ADB = Asian Development Bank, BREB = Bangladesh Rural Electrification Board, DESCO = Dhaka Electric Supply Company Limited, km = kilometer, kV = kilovolt, OCR = ordinary capital resources, PBSs = *palli bidyut samity* (rural electricity cooperative), PGCB = Power Grid Company of Bangladesh Limited, PSMP = Power System Master Plan.

[a] Government of Bangladesh, Ministry of Planning, Planning Commission. 2012. *Perspective Plan of Bangladesh, 2010–2021: Making Vision 2021 a Reality*. Dhaka; and Government of Bangladesh, Ministry of Power, Energy and Mineral Resources. 2011. *Power System Master Plan 2010*. Dhaka.

Source: Asian Development Bank.

LIST OF LINKED DOCUMENTS

http://www.adb.org/Documents/RRPs/?id=49423-005-3

1. Loan Agreement: Concessional Ordinary Capital Resources
2. Loan Agreement: Regular Ordinary Capital Resources
3. Grant Agreement
4. Project Agreement
5. Sector Assessment (Summary): Energy (Power)
6. Project Administration Manual
7. Contribution to the ADB Results Framework
8. Development Coordination
9. Japan Fund for Poverty Reduction Grant
10. Financial Analysis
11. Economic Analysis
12. Country Economic Indicators
13. Summary Poverty Reduction and Social Strategy
14. Gender Action Plan
15. Initial Environmental Examination
16. Resettlement Plan
17. Risk Assessment and Risk Management Plan

Supplementary Documents

18. Rural Electrification in Bangladesh – Structure, Technical Performance, Achievements, and Areas for Improvement
19. Proposed Improvements to Current Practices for Rural Electrification
20. Climate Risk Assessment and Management Report
21. Financial Analysis and Management Assessment