



# Completion Report

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Project Number: 42378-015  
Loan Number: 2966  
August 2020

## Bangladesh: Power System Expansion and Efficiency Improvement Investment Program (Tranche 1)

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Asian Development Bank



## CURRENCY EQUIVALENTS

	Currency unit	–	Taka (Tk)	
			<b>At Appraisal</b>	<b>At Project Completion</b>
			31 October 2012	31 March 2020
Tk1.00	=	\$0.01231		\$0.01196
\$1.00	=	Tk81.23		Tk83.63

## ABBREVIATIONS

ADB	–	Asian Development Bank
APFS	–	audited project financial statement
BPDB	–	Bangladesh Power Development Board
CCPP	–	combined cycle power plant
CO <sub>2</sub>	–	carbon dioxide
DMF	–	design and monitoring framework
DPP	–	development project proposal
EIA	–	environmental impact assessment
EIB	–	European Investment Bank
EIRR	–	economic internal rate of return
EMP	–	environmental management plan
FIRR	–	financial internal rate of return
IEE	–	initial environmental examination
IsDB	–	Islamic Development Bank
km	–	kilometer
kV	–	kilovolt
MFF	–	multitranches financing facility
MPEMR	–	Ministry of Power, Energy, and Mineral Resources
MW	–	megawatt
NWPGCL	–	North-West Power Generation Company Limited
OCPP	–	open cycle power plant
PAI	–	project administration instruction
PGCB	–	Power Grid Company of Bangladesh

## NOTES

- (i) The fiscal year (FY) of the Government of Bangladesh ends on 30 June. “FY” before a calendar year denotes the year in which the fiscal year ends, e.g., FY2020 ends on 30 June 2020.
- (ii) In this report, “\$” refers to United States dollars.

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## BASIC DATA

### A. Loan Identification

1.	Country	Bangladesh
2.	Loan number and financing source	2966 (ordinary capital resources)
3.	Project title	Power System Expansion and Efficiency Improvement Investment Program
4.	Borrower	Bangladesh
5.	Executing agencies	North-West Power Generation Company Limited; Bangladesh Power Development Board; Power Grid Company of Bangladesh; and Power Division of the Ministry of Power, Energy and Mineral Resources
6.	Amount of loan	\$185.0 million
7.	Financing modality	Project loan

### B. Loan Data

1.	Appraisal	
	– Date started	7 August 2012
	– Date completed	14 August 2012
2.	Loan negotiations	
	– Date started	7 October 2012
	– Date completed	8 October 2012
3.	Date of Board approval	12 December 2012
4.	Date of loan agreement	3 April 2013
5.	Date of loan effectiveness	
	– In loan agreement	2 July 2013
	– Actual	25 June 2013
	– Number of extensions	0
6.	Project completion date	
	– Appraisal	30 June 2018
	– Actual	31 March 2020
7.	Loan closing date	
	– In loan agreement	31 December 2018
	– Actual	31 December 2018
	– Number of extensions	0
8.	Financial closing date	
	– Actual	23 December 2019
9.	Terms of loan	
	– Interest rate	London interbank offered rate and 0.6% less a credit of 0.2%
	– Maturity (number of years)	20 years
	– Grace period (number of years)	5 years
10.	Terms of relending (if any)	
	– Interest rate	Not applicable
	– Maturity (number of years)	Not applicable
	– Grace period (number of years)	Not applicable
	– Second-step borrower	Not applicable

## 11. Disbursements

## a. Dates

<b>Initial Disbursement</b> 2 Aug 2013	<b>Final Disbursement</b> 5 Sep 2019	<b>Time Interval</b> 73 months
<b>Effective Date</b> 25 Jun 2013	<b>Actual Closing Date</b> 23 Dec 2019	<b>Time Interval</b> 77 months

## b. Amount (\$)

<b>Category</b>	<b>Original Allocation (1)</b>	<b>Increased during Implementation (2)</b>	<b>Canceled during Implementation (3)</b>	<b>Last Revised Allocation (4=1+2-3)</b>	<b>Amount Disbursed (5)</b>	<b>Undisbursed Balance (6 = 4-5)</b>
Power plant	84,120,000	7,551,169	0	91,671,169	91,671,169	0
Transmission lines and substations	74,100,000	8,423,777	0	82,523,777	80,908,462	1,615,315
Consulting services	1,500,000	6,205,054	0	7,705,054	3,928,240	3,776,814
Interest and commitment charges	3,100,000	0	0	3,100,000	3,100,000	0
Unallocated	22,180,000	(22,180,000)	0	0	0	0
<b>Total</b>	<b>185,000,000</b>	<b>0</b>	<b>0</b>	<b>185,000,000</b>	<b>179,607,871</b>	<b>5,392,129</b>

(-) = negative.

## C. Project Data

## 1. Project cost (\$ million)

<b>Cost</b>	<b>Appraisal Estimate</b>	<b>Actual</b>
Foreign exchange cost	348.78	261.48
Local currency cost	51.22	60.79
<b>Total</b>	<b>400.00</b>	<b>322.28</b>

## 2. Financing plan (\$ million)

<b>Cost</b>	<b>Appraisal Estimate</b>	<b>Actual</b>
Implementation cost		
Borrower financed	28.86	137.31
ADB financed	181.90	176.51
Other external financing	183.00	5.36
<b>Total implementation cost</b>	<b>393.76</b>	<b>319.18</b>
Interest during construction costs		
Borrower financed	3.14	0.00
ADB financed	3.10	3.10
Other external financing	0.00	0.00
<b>Total interest during construction cost</b>	<b>6.24</b>	<b>3.10</b>

## 3. Cost breakdown by project component (\$ million)

<b>Component</b>	<b>Appraisal Estimate</b>	<b>Actual</b>
Component 1: Efficiency improvement of power plants	306.00	198.35
Component 2: Transmission system strengthening	85.50	116.05
Component 3: Capacity building	8.50	7.88
<b>Total</b>	<b>400.00</b>	<b>322.28</b>



#### 4. Project schedule

Item	Appraisal Estimate	Actual
Date of contract with consultants for Khulna power plant	Oct 2012	16 Mar 2014
Completion of engineering implementation support	Jun 2017	31 Aug 2017
Khulna conversion EPC contract		
Date of award	Mar 2013	17 Dec 2013
Completion of work	Dec 2016	30 Jun 2017
EPC contract on 132 kV transmission line construction		
Date of award	Jun 2013	15 Sep 2014
Completion of work	Dec 2016	20 Oct 2018
EPC contract on 132 kV substation construction		
Date of award	Jun 2013	18 Sep 2014
Completion of work	Dec 2016	27 Dec 2018
Dates		
First procurement	Oct 2012	21 Apr 2013
Last procurement	Oct 2014	27 Jul 2016
Completion of equipment installation	Dec 2016	27 Dec 2018
Start of operations of Khulna power plant		
Completion of tests and commissioning	Dec 2016	25 Jun 2016
Beginning of start-up	Jan 2017	25 Jun 2016
Other milestones		
Completion of overall project	Jun 2017	31 Mar 2020

EPC = engineering, procurement, and construction; kV = kilovolt.

#### 5. Project performance report rating

Implementation Period	Project Rating
From Jun 2013 to Dec 2019	On track

#### D. Data on Asian Development Bank Missions

Name of Mission	Date	No. of Persons	No. of Person-Days	Specialization of Members
Project consultation mission	23–26 Oct 2011	1	3	a
Project review mission	6–9 Feb 2012	2	6	a, b
Fact-finding mission	7–14 Aug 2012	6	30	a, b, c, d, l, m
Inception mission	27–31 Nov 2013	2	4	b, e
Review mission	8–11 Feb 2015	4	12	b, d, e, f
Review mission	29 Jun–2 Jul 2015	3	9	b, g, h
Review mission	23–31 Oct 2016	2	10	h, i
Review mission	27 Jun–2 Jul 2018	3	9	h, i, j
Project completion review	16–19 Feb 2020	4	16	b, f, h, k

a = principal energy economist, b = energy specialist, c = counsel, d = senior climate change specialist, e = project officer, f = consultant, g = senior procurement officer, h = associate project analyst, i = senior project management specialist, j = environment consultant, k = project analyst, l = energy specialist (BRM), m = director.



## I. PROJECT DESCRIPTION

1. The Asian Development Bank (ADB) approved the multitranche financing facility (MFF) for the Power System Expansion and Efficiency Improvement Investment Program for the People's Republic of Bangladesh in 2012 and provided a \$185 million loan to finance tranche 1 of the MFF. The Islamic Development Bank (IsDB) and the European Investment Bank (EIB) committed loan financing for the project as parallel cofinanciers.<sup>1</sup> The EIB also offered a grant fund for the project, to be administered by ADB.<sup>2</sup>

2. The envisaged impact of the project was to provide Bangladesh with increased access to clean and reliable electricity supply. The expected project outcome was improved efficiency in electricity generation and transmission in Bangladesh. The project had four outputs: (i) increased generation capacity through supply side energy efficiency improvements in four power plants, (ii) increased transmission capacity through construction of three transmission lines, and (iii) enhanced capacity of power sector agencies, and (iv) project management system in place.

3. At the time of project appraisal, the electricity supply reliability of Bangladesh was low and had become a major deterrent to the economic development of the country. By 2011, with more than half of Bangladesh's population without access to electricity, improvements to electricity generation, transmission, and distribution systems were urgently required. During peak hours, up to 30% of the total electricity demand—equivalent to about 2,000 megawatts (MW)—could not be met, resulting in load shedding for up to 5 hours a day. The government planned to improve the situation by investing in power system infrastructure development and energy sector reforms.

## II. DESIGN AND IMPLEMENTATION

### A. Project Design and Formulation

4. The project was formulated in compliance with the National Energy Policy of Bangladesh (as updated in 2005); the Power Sector Reform in Bangladesh;<sup>3</sup> and the government's Vision 2021, which emphasizes the need for energy security and efficiency as well as sustainable operation of the energy utilities in Bangladesh.<sup>4</sup> ADB and other development partners have been assisting the government on identifying investments in the Sixth Five Year Plan, Fiscal Year (FY) 2011–FY2015, which serves as the road map for policy implementation.<sup>5</sup> Consistent with this policy framework, the project undertook improvements in electricity generation efficiency and in the electricity supply network and facilitated power sector reforms by enhancing staff capacity development in corporate governance. Project objectives were also aligned with ADB's country partnership strategy for Bangladesh, 2011–2015, which identified improved access to electricity and energy efficiency as priorities in the power sector.<sup>6</sup>

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<sup>1</sup> The IsDB loan commitment was \$85 million and the EIB loan commitment was \$91 million.

<sup>2</sup> The EIB grant commitment was \$7.0 million.

<sup>3</sup> 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. Para. 4., Government of the People's Republic of Bangladesh, Ministry of Power, Energy and Mineral Resources. *National Energy Policy (Updated in 2005)*. Dhaka., Government of the People's Republic of Bangladesh. 1994. *Power Sector Reforms in Bangladesh*. Dhaka.

<sup>4</sup> Vision 2021 is the manifesto of the government presenting the framework for achieving eight development goals for the country by 2021 (Bangladesh Awami League. 2008. *Election Manifesto of Bangladesh Awami League-2008* Dhaka).

<sup>5</sup> Government of Bangladesh, Ministry of Planning, Planning Commission. 2011. *Sixth Five Year Plan, FY2011–FY2015: Accelerating Growth and Reducing Poverty*. Dhaka (Part 1: Strategic Directions and Policy Framework).

<sup>6</sup> ADB. 2016. *Country Partnership Strategy: Bangladesh, 2016–2020*. Manila.

5. At completion, the project remained relevant with the country's Seventh Five Year Plan, FY2016–FY2020, which identifies efficiency improvement of power plants, transmission network expansion, and sector reform activities as focus areas for the power sector.<sup>7</sup> The government and the executing agencies demonstrated strong ownership of the project. ADB's country partnership strategy for Bangladesh, 2016–2020 has also retained expansion and efficiency improvement of power generation and transmission system as specific interventions in the power sector. Reduction of carbon dioxide (CO<sub>2</sub>) emissions envisaged by the project through efficiency improvement of power plants and reduction of network losses has also been identified by ADB under its Strategy 2030 as a key priority area.<sup>8</sup>

6. Multitranche financing facility was a suitable modality. All basic preconditions for the use of the MFF were in place, including a sound policy framework and road map, a clear investment and financing plan, and an agreement on the treatment of safeguards policies and procedures and a governance framework. The policy framework and road map prevalent during tranche 1 remained valid throughout the MFF; the two subsequent tranches have also been implemented following the same framework. The DMF for tranche 1 had a logical results chain; however, there were some weaknesses in selecting the outcome indicator for transmission losses and identifying appropriate risks for the parallel cofinancing.

7. The MFF was formulated to allow more opportunities and leverage financing by all development partners in Bangladesh. The tranche 1 project validated the appropriateness of this modality by catalyzing investments from two other development agencies: IsDB and the EIB joined up with ADB as parallel cofinanciers, with each undertaking the financing of specific subprojects. The grant funds offered by the EIB for the project were to be administered by ADB.

8. Based on the parallel cofinancing modality, subprojects progressed independently, with minimal interaction between stakeholders and financiers, and using their own procurement policies. Implementation of two subprojects by EIB was found to be less feasible than expected and both had to be dropped from the project scope, and one subproject originally for IsDB financing was implemented with a substantial delay (paras. 11–12). The cancellation of outputs related to EIB cofinancing affected the outcome achievement. The project had also overlooked the risks associated with such independent implementation arrangements during project preparation and fell short of implementing a change in scope to adjust the targets, as appropriate, in time to deliver the respective project outcome (Appendix 1).

## **B. Project Outputs**

### **1. Output 1: Increased Generation Capacity**

9. Output 1 related to converting the following four open cycle power plants (OCPPs) to combined cycle power plants (CCPPs): (i) the 150 MW Khulna OCPP to a 225 MW CCPP using ADB financing, (ii) the 150 MW Sylhet OCPP to a 225 MW CCPP using IsDB financing, (iii) the 100 MW Baghabari OCPP to a 150 MW CCP using EIB financing, and (iv) the 70 MW Shahjibazar OCPP to a 105 MW CCPP also using EIB financing. This results in a total of 235 MW of capacity

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<sup>7</sup> Government of Bangladesh, Ministry of Planning, Planning Commission. 2015. *Seventh Five Year Plan, FY2016–FY2020: Accelerating Growth, Empowering Citizens*. Dhaka.

<sup>8</sup> ADB. 2018. *Strategy 2030: Achieving a Prosperous, Inclusive, Resilient, and Sustainable Asia and the Pacific*. Manila.

added to Bangladesh's power system, and an increase in operating efficiency from about 32% to about 50%.<sup>9</sup>

10. Conversion of the Khulna OCPP to a 225 MW CCPP was completed in June 2017 on time and within budget, adding 75 MW generation capacity and improving its operational efficiency from 32% to 50%, meeting the design and monitoring framework (DMF) targets (Appendix 1). The power plant is not yet connected with natural gas supply because of the shortage of natural gas within the country. Thus, the power plant operates on high-speed diesel, considerably increasing its cost of generation. A new gas pipeline has been constructed in anticipation of adequate gas supply being available by the end of 2020.<sup>10</sup>

11. A disagreement between IsDB and the Bangladesh Power Development Board (BPDB) on selecting the best bidder for the Sylhet power plant conversion delayed commencement of the project by more than 2 years. IsDB withdrew from financing the project and the BPDB financed the project entirely using government funds. The Sylhet power plant achieved project completion after a delay of 3 years in March 2020, but still achieved the expected capacity and efficiency targets envisaged in the DMF. Appendix 7 presents the sequence of events that occurred during the procurement process, leading to the government's decision to provide its own financing.

12. The conversion of the Baghabari and Shahjibazar power plants were canceled, reducing the scope of the project.<sup>11</sup> Among the seven bidders that participated in the bidding process, the lowest evaluated bid for both power plants was 116% higher than the financing made available for the project by the EIB, suggesting a substantial underestimation of project costs and a mistake at the project design stage. After the EIB's disapproval to finance the additional cost because of limitations in available funds for the project, the government refrained from proceeding with the conversion of both power plants. A detailed discussion on the events leading to the withdrawal of the EIB from financing the project is provided in Appendix 7.

13. The delays and the cancellation of subprojects affected the outcome related to output 1 of the project.<sup>12</sup> Only 150 MW of the planned 235 MW of additional generation capacity, representing 64% of the targeted output, could be completed, rendering the outcome only partially achieved.

## 2. Output 2: Increased Transmission Capacity

14. Output 2 related to the (i) construction of the 80 km double-circuit 132-kilovolt (kV) Rangamati–Chandraghona–Khagrachari transmission line, (ii) construction of the 100 km double-circuit 132 kV Mymensingh–Tangail transmission line, (iii) construction of the 50 km double-circuit 132 kV Brahmanbaria–Narsingdi transmission line, (iv) construction of two new 132/33 kV substations, and (v) augmentation of five 132/33 kV substations. This output aimed at removing constraints in operating the high-voltage network in the country, enabling more generation capacity to be dispatched, reducing transmission losses, and improving the reliability of the

<sup>9</sup> When converting an OCPP to a CCPP, a steam turbine recovers part of the energy contained in the exhaust gas from the gas turbine, increasing the generating capacity by about 50% without using additional fuel.

<sup>10</sup> The new pipeline is a 12-kilometer (km) gas distribution line financed under ADB. 2018. *Report and Recommendation of the President to the Board of Directors: Proposed Loan and Administration of Grant to the People's Republic of Bangladesh for the Rupsha 800-Megawatt Combined Cycle Power Plant Project*. Manila. Based on depletion of domestic gas resources, new supply connections were suspended. Upon completion of the Moheshkhali gas terminal to import LNG in 2018, new connections are being provided.

<sup>11</sup> The project did not adhere to requirements stipulated in ADB. 2018. Change in Loan Projects. *Project Administration Instructions*. PAI 5.02. Manila. No change in scope was processed after the outputs were dropped.

<sup>12</sup> No midterm review mission and DMF update took place.

transmission system. The responsibility of delivering this output was assigned to Power Grid Company of Bangladesh (PGCB), mainly using ADB loan financing (para. 30).

15. To meet increased demand for power transmission infrastructure within the same subproject areas, the following were added to the project scope: the (i) construction of two additional transmission lines, (a) the 32 km double-circuit 132 kV Chattak–Sunamganj transmission line and (b) the 30 km double-circuit 132 kV Beanibazar–Sylhet transmission line; (ii) construction of two new substations; and (iii) augmentation of one substation.<sup>13</sup> With the additional scope, a total length of 293 km of 132 kV double-circuit transmission lines was constructed, four new substations were installed, and six existing substations were augmented.

16. Construction of the transmission lines and the substations was completed in December 2018 following a 2-year delay compared to appraisal.<sup>14</sup> Reasons for the delay were (i) the larger scope of work in comparison with the appraised scope; (ii) inadequate project management and technical competence of the transmission line contractor; (iii) relocation of some of the existing transmission lines, causing delays in substation construction work; and (iv) weather in the monsoon period that affected piling works, open foundation construction, and erection of towers. The respective output indicator was achieved with a delay (Appendix 1).

17. The new transmission lines and substations reduced some bottlenecks in the transmission network, facilitated the dispatch of more efficient power plants, and increased the supply capacity of the power system. These outputs contributed to reduction of transmission losses from 2.72% in FY2011 to 2.64% by the end of 2017.<sup>15</sup>

18. The related DMF outcome indicator could have been more precise. The DMF target was defined as a reduction in transmission losses of three lines from 2.72% to 2.50%. First, it is not possible to measure a reduction of losses of a newly constructed transmission line. Second, the report and recommendation of the President for the MFF and the respective loan agreement set transmission losses of the entire Bangladesh power system as target indicators. Heavily dependent on non-project achievements and other external factors, the performance indicator was not ideally chosen but needs to be assumed as the outcome indicator for tranche 1.

### **3. Output 3: Enhanced Capacity of Power Sector Agencies**

19. Output 3 relates to the following key deliverables: (i) provision of consultancy services for the preparation of tranches 2 and 3 of the MFF, (ii) implementation consultants for tranche 1, and (iii) capacity building activities for the executing agencies for better planning and operation of projects supported by the MFF.

20. The provision of consultancy services for preparation of tranche 2 and the respective deliverables was submitted by the government to ADB in November 2013 with a 7-month delay.<sup>16</sup> Tranche 1 was approved by ADB on 12 December 2012, resulting in significant additional investments in the Bangladesh power sector from 2013 to 2019.

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<sup>13</sup> The project did not adhere to requirements stipulated in PAI 5.02 (footnote 12). No change in scope was processed. Retroactive reallocation of loan proceeds was approved by ADB letter on 20 March 2018.

<sup>14</sup> ADB. 2012. *Report and Recommendation of the President to the Board of Directors: Proposed Multitranchise Financing Facility and Administration of Grant to the People's Republic of Bangladesh for the Power System Expansion and Efficiency Improvement Investment Program*. Facility Administration Manual (accessible from the list of linked documents in Appendix 2). Manila.

<sup>15</sup> PGCB. 2018. *Annual Report, 2016–2017*. Dhaka.

<sup>16</sup> The respective target indicator for output 3 only includes submission of tranche 2.

21. By 2016, 463 power sector personnel had been trained on investment planning, operations planning, energy auditing, and monitoring, and 169 had been trained on financial performance, auditing, and governance, exceeding the targets in the DMF. In addition, about 50 officials participated in the foreign capacity building program. By the time the capacity building program was concluded in June 2019, more than 3,000 officials had undergone training under this project output.

22. In addition to the planned scope, PGCB hired a consultancy firm to assist with the implementation of the Aminbazar–Mawa–Mongla 400 kV transmission line project. This is a project implemented through a separate ADB loan. The need for additional technical capacity to manage the implementation of the project was identified by PGCB and resulted in a request by the government for financing of the consulting services from ADB.<sup>17</sup> Accordingly, part of the unallocated loan funds of tranche 1 were allocated to finance a consulting service to support PGCB as a capacity building activity under output 3. Upon project completion, continuation of this consulting service is being supported through a separate ADB-financed project implemented by PGCB.<sup>18</sup>

#### **4. Output 4: Project Management System in Place**

23. Output 4 relates to establishing project management units. This output was achieved in January 2013 with a delay of 3 months after the respective executing agencies obtained approvals from the government. All four project management units assumed full responsibility of their subprojects and supported the implementation of the overall project.

#### **C. Project Costs and Financing**

24. The project cost was estimated at \$400 million, inclusive of \$41 million in taxes and duties, \$42 million in contingencies, and \$6 million in financing charges. Of the project cost, 76.5% was allocated to output 1 (para. 9). Because of the cancellation of the conversion of two of the four power plants (para. 12), the actual implementation cost of the project was reduced from an estimated \$400 million to \$322 million. Appendix 2 provides a comparison of actual project costs against the original estimates.

25. IsDB and the EIB were to cofinance the project on parallel terms with ADB, with each cofinancier being allocated specific subprojects to finance. ADB provided a loan of \$185 million using its ordinary capital resources to finance the Khulna power plant sub-project and the transmission network improvement sub-project. IsDB was to provide a loan of \$85 million for the Sylhet power plant sub-project while the EIB was to provide a loan of \$91 million to finance the Baghabari and Shahjibazar power plant sub-projects. In addition, the EIB had provided a grant of \$7 million for capacity building activities. The government was to provide \$32 million as equity and loan financing to the executing agencies.

26. Appendix 3 Table A3.1 details the financial commitments at inception of the project by each financier for each component. Appendix 3 Table A3.2 states actual contributions. ADB's

<sup>17</sup> The transmission line is an output of 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. Expected completion of the project is June 2020. Agreement on the change in scope was recorded in an aide-mémoire dated 13–16 October 2014. No change in scope was processed according to PAI 5.02 (footnote 12). Post-factum reallocation of funds was approved by letter on 20 March 2018.

<sup>18</sup> ADB. 2015. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the People's Republic of Bangladesh Power System Expansion and Efficiency Improvement Project – Tranche 3*. Manila

share of the project cost increased from 46.3% to 55.7% because of the reduction of the overall project cost, while ADB's contribution remained unchanged. The government's contribution increased from 8.0% to 42.6% because it provided financing for the Sylhet power plant conversion instead of IsDB.

27. The Khulna power plant conversion was financed using ADB's loan supplemented by a government loan and equity. The Sylhet power plant conversion was to be financed through the IsDB loan while the Baghabari and Shahjibazar power plants were to be financed by the EIB loan.

28. Following a disagreement on the bidder selection for the Sylhet power plant conversion, IsDB withdraw its financing commitment and the government decided to proceed with providing capital investments with a debt–equity ratio of 40:60 in lieu of IsDB financing (para. 11).<sup>19</sup>

29. The EIB approved loan financing to convert the Baghabari and Shahjibazar power plants. The bids received for the work were substantially higher than the financing made available for the project by the EIB, with the lowest evaluated bid for the two power plants being €177.1 million (para. 12; and Appendix 7). After the EIB's decision to not finance the difference between the original cost estimates and the received bids, the government decided against proceeding with the two sub-projects.

30. Construction of transmission lines and substations of output 2 was financed through ADB and debt and equity financing of the government, supplemented by PGCB's equity funds. The cost overrun (Appendix 2) was partly because of the additional scope undertaken (para. 15) and financed through an allocation of previously unallocated ADB funds and a corresponding increase in government debt and equity provided through PGCB.

31. Consulting services under output 3 to prepare tranches 2 and 3 of the MFF were financed by the ADB loan. EIB grant funds were used to engage consultants for capacity building of power sector officials. EIB policy did not allow grant funding to procure the project management consultants for the Khulna power plant conversion.<sup>20</sup> Thus, a further \$1.5 million had to be allocated<sup>21</sup> to North-West Power Generation Company Limited (NWPGL) for the Khulna power plant conversion from unallocated funds of ADB.

#### **D. Disbursements**

32. Of the \$185.0 million ADB loan, \$179.6 million (97%) was disbursed at completion of the project. Loan proceeds were to be disbursed over 5 years, with significant expenditure expected during 2014–2016. Contract awards could not be completed in time, delaying construction commencement, and reducing loan withdrawals in 2014. The delays continued throughout implementation, with component 2 being completed 2 years behind schedule (para. 16). Appendix 4 provides a comparison of projected disbursements against the actual cumulative disbursements of loan proceeds, with the last loan disbursements in 2019.<sup>22</sup>

<sup>19</sup> Government of Bangladesh, Ministry of Finance. 2017. *Lending and Relending Terms of Local/Foreign Currency Loans*. Dhaka.

<sup>20</sup> Procurement of consultants for this project required the delegation of administration responsibility of the grant funds from ADB to the executing agency, which was not allowed under EIB grant administration policies.

<sup>21</sup> ADB (South Asia Energy Division). 2014. Request for minor change in scope and reallocation. Memorandum. 3 February(internal).

<sup>22</sup> Disbursements in 2019 correspond to component 2 work completed in 2018.



33. Additionally, because of delays caused by the change in scope (para. 15), output 2 was delayed because of weak performance by the contractor, which required corrective actions and withholding of payments. The issues were resolved within the defect liability period, entitling the contractor to full payment. With financial closure of the loan, undisbursed funds were canceled, resulting in PGCB losing the opportunity to use part of the low-cost loan funds for the project.

34. Details of loan disbursements against the allocations for each expenditure category are presented in the basic data section. The amount of unutilized loan allocations for components 2 and 3 is about \$5.4 million, resulting in an overall loan reduction to \$179.6 million.

## **E. Project Schedule**

35. Project completion was scheduled for 30 June 2018 but occurred on 30 March 2020. The main cause of the delay was late implementation of the Sylhet power plant conversion work, attributed to extensive discussions on procurement matters and the cancellation of IsDB funds. This delay did not influence the timely closure of the ADB loan.

36. A comparison of the planned implementation schedule against actual project implementation is presented in the basic data section. Apart from two canceled power plant conversions and the delayed implementation of the Sylhet power plant conversion, there were no significant differences between the planned and the actual implementation schedules.

37. Construction of transmission lines and substations, financed by ADB, experienced delays at the initial project stages, which were corrected, and work was completed by December 2018, which was in line with the scheduled closing date of the loan. Thus, no loan extensions were required.

## **F. Implementation Arrangements**

38. Project implementation was structured such that there were four executing agencies: NWPGCL; the BPDB; PGCB; and the Power Division of the Ministry of Power, Energy, and Mineral Resources (MPEMR). There was minimal required coordination between different subprojects. This implementation approach ensured that a delay or a cancellation of any subproject would not affect other subprojects.

39. Independent implementation arrangements can generally be beneficial, but in the case of the project, risks associated with such arrangements materialized (paras. 11–12). ADB support and involvement to resolve issues related to subprojects financed by cofinanciers was difficult. Since output and outcome targets of the project defined in the DMF were to be achieved collectively by all subprojects, the lack of control over other subprojects negatively affected the project outcome.

40. EIB policy did not allow ADB to administer EIB grant funds. Therefore, capacity building components were administered by the EIB instead of ADB, as planned (para. 25). Procurement of implementation consultants for the Khulna power plant conversion, originally planned to be financed by EIB grant funding, had to be financed and administered by ADB (para. 31) because EIB policy restricted its grant funding to be used for project implementation activities. Clarity on EIB policy would have avoided the need for such remedial action during implementation. Implementation activities for preparation of tranches 2 and 3 were assigned to the Power Division of the MPEMR during implementation.

## G. Consultant Recruitment and Procurement

41. All consulting services were recruited in accordance with ADB's Guidelines on the Use of Consultants (2010, as amended from time to time). Procurement of consulting services for the Aminbazar–Mawa–Mongla 400 kV transmission line project, which was included in the project scope in 2014, was completed by the end of June 2016. It was targeted to award all contracts (except for the tranche 3 preparation consultancy) by the end of 2012. However, this was unrealistic based on the low level of project readiness observed in terms of necessary government approvals for the project, mobilization of financing from cofinanciers, and finalization of bid documents.

42. All procurement packages financed by ADB under tranche 1 were procured in accordance with ADB's Procurement Guidelines (2010, as amended from time to time). International competitive bidding was used to procure the construction packages. Quality- and cost-based selection and individual consultant selection were used for procurement of consulting services.

43. An engineering, procurement, and construction contract for conversion of the Khulna power plant was awarded to Shanghai Electric Group Co. Ltd. in December 2013. The contract for consulting services for project implementation was awarded to Minconsult Sdn. Bhd. in March 2014. Both contracts were executed successfully, completing the work in 2017.

44. An engineering, procurement and construction (EPC) contract for the construction of the 132 kV transmission lines was awarded to Cobra Instalaciones y Servicios in September 2014. The EPC contract for the 132/33 kV substations was awarded to ABB India Ltd. in September 2014.

45. Delays in implementing the project could be attributed to performance issues of the transmission line contractor, such as weaknesses in project management, accompanied by unfavorable weather conditions (para. 16). Based on discussions between PGCB and ADB, the transmission line contractor was advised to modify the implementation program to suit prevailing weather conditions in the construction area, which helped to expedite the work.

46. The Power Division of the MPEMR implemented the capacity building activities under component 3 using consulting services financed by grant funding from the EIB. No issues were encountered in the procurement of consulting services or in implementing the work.

47. Under ADB financing, 12 individual consultants and 1 consultancy firm were engaged to design and prepare the necessary documents for tranches 2 and 3 of the MFF; reports were submitted by the end of 2015. The procurement of consultants was carried out by the Power Cell of the MPEMR.

48. Availability of unallocated loan funds allowed additional procurement of consultancy services to support PGCB in the construction of the Aminbazar–Mawa–Mongla 400 kV transmission line (para. 22). The contract was awarded to Intec, GOPA-International Energy Consultants in July 2016.<sup>23</sup>

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<sup>23</sup> Since this transmission line project is still being implemented, at project completion, financing for the remaining work of the consultants was transferred to: *ADB. 2015. Report and Recommendation of the President to the Board of Directors: Proposed Loan to the People's Republic of Bangladesh Power System Expansion and Efficiency Improvement Project–Tranche 3*. Manila.

## H. Safeguards

49. Implementation of safeguards was generally satisfactory. Appendix 11 provides a detailed account of safeguards measures identified at project appraisal and the extent these measures were followed-up during project implementation. From the safeguards monitoring reports produced during the project implementation period, it is evident that the project did not come across any safeguards issues significant enough to alter the outcomes of the project nor to cause any delays or opposition against implementation and operation of project assets. Thus, it can be concluded that the project safeguards were well managed by the executing agencies.

## I. Monitoring and Reporting

50. Out of 64 covenants, two covenants were partially complied with and one covenant was not complied with (Appendix 6).

51. The targeted reduction of transmission network loss to 2.5% was not achieved by 2017, only partially achieving the covenant specified in para. 20 of Schedule 5 of the loan agreement (Appendix 6). Failure to achieve the targeted loss level was because of the delay in implementing transmission-related outputs of the project and the overall increase in network demand, which resulted in higher network losses than anticipated. Similarly, since the North-West Zone Power Distribution Company Limited was not made operational by mid-2014, the loan covenants related to regulatory reforms specified in para. 26 of Schedule 5 of the loan agreement (Appendix 6) were also only partially complied with.

52. Para. 18 of Schedule 5 of the loan agreement (Appendix 6) was not complied with. Supply of natural gas to the Khulna power plant has not happened up to now. With the increase in gas supply through importation of LNG (footnote 10), arrangements have been made to provide the power plant with a natural gas supply by the end of 2020. In addition, the executing agencies failed to submit auditors' opinions on the use of loan proceeds and compliance with financial covenants of the loan agreements.

53. The executing agencies were required to submit semiannual safeguards monitoring reports to ADB and keep ADB and the government informed of any unanticipated impacts arising from the project. Safeguards monitoring reports were submitted by the executing agencies to ADB on time, and regular communication the executing agencies had with the ADB ensured issues were promptly reported to ADB, avoiding the escalation of such issues. The semiannual social monitoring reports and environmental monitoring reports submitted by the executing agencies were disclosed on the ADB website.

54. NWPGCL submitted annual audited project financial statements (APFSs) for the Khulna power plant conversion, covering its full implementation period from FY2013 to FY2017. PGCB also submitted annual APFSs during FY2015–FY2019 for the transmission capacity improvement activities. However, APFSs for FY2013 and FY2014 were not prepared and PGCB recorded the transactions corresponding to those 2 FYs in the APFS of FY2015. ADB identified discrepancies in the APFSs and these discrepancies were corrected by the executing agencies by submitting the corresponding reconciliations. In addition, there is no APFS for \$1,324,436.45 and remain unaudited. This amount was used for consulting services to design and prepare the necessary documents for tranche 2 and 3 of the MFF. Power Cell did not keep any disbursement records and deliverables because the recruitment and implementation of the consulting services was managed by the ADB team.

55. ADB fielded regular missions to review the progress of the project, however mainly for ADB financed components. In addition, close coordination between the Bangladesh Resident Mission and the executing agencies was maintained throughout project implementation, enabling regular follow-up on compliance with loan covenants.

### III. EVALUATION OF PERFORMANCE

#### A. Relevance

56. The project design remained relevant with short- to medium-term power sector policies and strategies of the government and ADB policies from appraisal to completion (paras. 4–5). The MFF, as a financing modality, was suitable (para. 7).

57. However, the project design had shortfalls in the following areas: (i) lapses in due diligence such as substantially low-cost estimates (para. 12),<sup>24</sup> time estimates for project implementation (para. 35; and para. 41), and applicable policies for administration of EIB grant funds (para. 40); and (ii) weaknesses in the DMF (para. 8; and para. 18), the failure to update for changes in scope (e.g. a midterm review mission), and the failure to address main design deficiencies during project implementation.

58. Overall, the project helped the Bangladesh power sector achieve significant improvements in supply reliability and efficiency and enhanced the capacity of power sector personnel in alignment with national policy targets and ADB's country partnership strategies for Bangladesh. However, the project design was not robust enough to deliver the targeted outputs and intended outcomes (para. 57) and is therefore rated *less than relevant*.

#### B. Effectiveness

59. The outcome targets were only partially achieved. Two out of four power plants were converted and achieved the efficiency target of 50%. Two power plant conversions, planned to be cofinanced by the EIB, were canceled (para. 12), leaving their efficiency levels at 32%. Transmission lines were successfully constructed, but the achieved transmission loss level of 2.64% did not reach the national target loss reduction (i.e., from 2.72% to 2.50%) (paras. 17–18). Out of 6 output targets, 5 were exceeded or achieved and 1 was partially achieved due to the dropping of EIB-financed outputs.

60. The project adhered to environmental and social safeguards policies. Impacts were mostly related to transmission line construction and were minimized by utilizing paddy fields and unused land for the line routes. No complaints were received from any affected parties.

61. Because of partial achievement of the project outputs and outcomes intended by the original project design, the project is rated *less than effective*.<sup>25</sup>

#### C. Efficiency

62. Project outputs were achieved either at the estimated or a lower cost. Overall, the project's anticipated benefits are being realized satisfactorily, despite the delays in implementing project

<sup>24</sup> The significantly high bid price received on the canceled power plant conversion projects (Appendix 7) could have been foreseen during technical due diligence at project appraisal.

<sup>25</sup> The overall outcome achievement of the project is less than 80% (on a weighted basis, according to the relative financial cost of the various components at appraisal).

activities. An economic reevaluation was undertaken for the project (Appendix 8), following the same approach adopted at appraisal. Costs and benefits pertaining to power plant conversions and transmission system improvements were assessed separately as well as together to derive the economic internal rate of return (EIRR) of each main component of the project as well as for the overall project.

63. The reevaluated EIRR of the overall project was 33.1%, which was higher than the applicable hurdle rate of 12.0%.<sup>26</sup> Because of the cancellation of two power plant conversion projects and loss reductions achieved through the transmission system improvements being lower than anticipated, the reevaluated overall EIRR was lower than the EIRR of 56.6% expected at project appraisal. With the conservative benefit estimates done in the economic reevaluation, the resultant EIRR derived can be considered evidence of an efficient investment. In addition to being economically efficient, based on the sensitivity analysis undertaken as part of the economic reevaluation, the project was found to be economically robust, yielding reasonably high returns even under adverse conditions.

64. However, there were limitations to the process efficiency in implementing the project, resulting in two cofinanciers withdrawing their loan financing for the project and loan funds allocated by ADB also being underutilized (para. 34). There were substantial procurement delays with the cofinanced power plant conversion projects (Appendix 7). Considering the substantially high economic efficiency of the project and the lower process efficiency, the overall efficiency of the project is rated *efficient*.

#### **D. Sustainability**

65. **Financial sustainability.** Based on the financial analysis conducted upon project completion, the financial internal rate of return (FIRR) of the project was reevaluated at 6.3% (Appendix 9). In comparison with the reassessed weighted average cost of capital of 2.1%, the project FIRR was considerably higher, indicating the project's financial sustainability. Because of the higher tariffs offered to power plants to compensate for higher fuel prices, the FIRR was reevaluated even higher than the FIRR of 4.0% estimated at project appraisal.

66. The sensitivity analysis undertaken as part of the financial analysis showed that the expected financial returns were unlikely to vary much under adverse variations of project financial parameters such as tariffs payable for additional generation and the lower utilization of the converted power plants because of a shortage of natural gas.

67. **Institutional sustainability.** The two executing agencies of the investment components of the project (NWPGCL and PGCB) were adequately resourced and had enough institutional capacity to sustain the project. The financial sustainability of these executing agencies was analyzed (Appendix 10). Both entities were found to be performing satisfactorily and their outlook was also assessed to be stable. These entities are experienced operators of power generation and transmission assets, and their institutional sustainability also ensures sustainable operation of the project assets, given the availability of robust operating practices and arrangements within the institutions to maintain the new assets. The required operational budgets for the executing agencies are provided through a regulatory process, which has been adequate to cover all

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<sup>26</sup> The reevaluated EIRR of the power plant conversion component is 41.2% and that of the transmission system improvement component is 5.6%. Relatively higher costs and benefits of the first component have resulted in a higher overall EIRR of the project, diminishing the impact of the second component.

expenses and result in a net profit (Appendix 10). Therefore, financing future operations can be assumed sustainable, even under unforeseen adverse conditions.

68. **Environmental and social sustainability.** Environmental and social impacts during construction were minimal and no adverse impacts are anticipated in the long term. No indigenous peoples were affected by the project. None of the project activities were affected by social or environmental protests and the general public was supportive of the investments in this project.

69. Considering its financial, institutional, environmental, and social sustainability, the project is rated *likely sustainable*.

#### **E. Development Impact**

70. The outputs and outcomes delivered by the project contributed toward the envisaged project impact of increased access to cleaner and reliable electricity supply in Bangladesh (Appendix 1). Despite not achieving the project output and outcome targets in full, the increase in generation capacity and efficiency contributed to more reliable and cleaner electricity supply, which would be further enhanced with the use of natural gas. The extended transmission network helped in increasing access to clean energy generation. These positive impacts on the power sector coupled with the significance of the power sector for the country's economic development, created an overall positive development impact on the country. The project also contributed to ADB's Strategy 2030 operational priorities.<sup>27</sup>

71. Furthermore, as the project only involved efficiency improvement, loss reduction, and capacity building outputs, no negative impacts attributable to the project are expected. Had the other two power plant conversion projects also been implemented as originally planned, the development impact would have been significantly higher. However, based on the extent the impact indicators were achieved, the development impact of the project is rated *satisfactory*.

#### **F. Performance of the Borrower and the Executing Agencies**

72. The performance of the borrower and the executing agencies is rated *satisfactory*. The borrower achieved loan effectiveness ahead of time. All executing agencies demonstrated strong ownership of the responsibilities assigned to them, ensuring compliance with loan covenants, following procurement and safeguard guidelines, and substantially achieving the time targets. No impact on project implementation arising from delays or lack of counterpart funding and staff assignments was observed.

73. Most of the delays were the result of administrative and procedural constraints applicable for public corporates. The necessity to strictly follow the approved development project proposals (DPPs) and the need for revision of the DPPs for any change in project implementation allowed little flexibility for the executing agencies in resolving unforeseen issues, especially those requiring additional time and budget. However, the borrower supported the executing agencies by approving essential DPP revisions to keep the project focused on achieving the output and outcome targets.

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<sup>27</sup> Strategy 2030 OP 3.1.3: low-carbon infrastructure assets established (2 CCPPs, 5 transmission lines, and 10 substations); and OP 6.1.1: government officials with increased capacity to design, implement, monitor, and evaluate relevant measures (632 officials).

74. When IsDB withdrew its financial commitment to the project, the borrower financed the Sylhet power plant conversion on its own, indicating its determination to achieve the project outputs. When high bid prices, suggesting inadequacy of feasibility assessments, prevented progression of the conversion works of the Baghabari and Shahjibazar power plants, BPDB showed little interest in pursuing the project.

75. Both NWPGL and PGCB approached ADB when faced with significant issues deterring project progress to seek intervention and rectify the issues.

### **G. Performance of Cofinanciers**

76. IsDB withdrew financing based on a disagreement on contractor selection for the Sylhet power plant conversion (para. 11) and the EIB canceled financing of the Baghabari and Shahjibazar power plant conversions upon receiving substantially high bids (para. 12). The contribution of the two cofinanciers was relatively small in comparison with the expectations at appraisal. A detailed description of the events is provided in Appendix 7.

77. EIB grant funding significantly contributed to successful completion of capacity development activities under output 3. The policy restriction of the EIB to assign administration of grant funds to ADB prevented timely engagement of the project implementing consultants.

### **H. Performance of the Asian Development Bank**

78. Performance of ADB is rated *less than satisfactory*. Three missions for processing the project, one inception mission, and four review missions during implementation of the project were undertaken. ADB established and maintained effective communication with each project implementation unit. The ADB project team made multiple visits to the project sites and held regular discussions with the executing agencies and contractors, providing timely feedback on queries and requests, and providing guidance on ADB policies and procedures applicable to the project.

79. On request by the government and the executing agencies, ADB reallocated necessary funds to support smooth and effective progression of the project. However, ADB's performance lagged in the following areas: (i) the project design flaws were attributable to ADB; (ii) the opportunity was missed to update the DMF during a midterm review mission (para. 61), when the likelihood of target non-achievement was evident; and (iii) scope changes were not processed according to ADB's project implementation guidelines, preventing achievement of a better project rating (para. 12; para. 15; and para. 22),<sup>28</sup> and safeguards due diligence studies corresponding to the change in scope (para. 15; and appendix 11. ) were not conducted.<sup>29</sup>

80. Qualified opinion of the auditor and concerns noted by the management letter were not pursued in a timely manner, resulting in unverified reconciliations at project closure.

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<sup>28</sup> ADB. 2018. Change in Loan Projects. *Project Administration Instructions*. PAI 5.02. Manila.

<sup>29</sup> Updated resettlement plans, EIAs or any other records of due diligence studies covering the extended scope conducted by the executing agencies in compliance with ADB safeguards policies are not available.

## I. Overall Assessment

<b>Overall Ratings</b>	
<b>Criteria</b>	<b>Rating</b>
Relevance	Less than relevant
Effectiveness	Less than effective
Efficiency	Efficient
Sustainability	Likely sustainable
<b>Overall Assessment</b>	Less than successful
Development impact	Satisfactory
Borrower and executing agencies	Satisfactory
Performance of ADB	Less than satisfactory

ADB = Asian Development Bank.

Source: ADB.

## IV. ISSUES, LESSONS, AND RECOMMENDATIONS

### A. Issues and Lessons

81. **Reliance on limited gas supply.** The Khulna Power Plant (para. 10) runs on high-speed diesel as its primary fuel, increasing its generation cost and causing the power plant to be dispatched sparingly. Unless adequate gas supply is ensured, utilization will be significantly reduced, inhibiting the economic justification of the investment. Recent developments in the Bangladesh gas sector will provide gas supply to the power plant by the end of 2020.

82. **Cancellation of cofinancing.** Risks associated with the independence and autonomy of cofinanciers attributed to the parallel cofinancing modality were underestimated. Combined with lack of coordination between stakeholders, this resulted in withdrawal of cofinancing, nonachievement of project outputs and outcomes, and delays. ADB-administered cofinancing could have provided better access and control over the project. Centralized coordination of the overall project could have ensured better use of the strengths of each cofinancier.

83. **Design and monitoring framework design.** The suboptimal formulation of the performance indicator for output 2 made it difficult to successfully achieve the target (para. 18). The project should have avoided setting a target heavily dependent on factors not under control of the project.

84. **Midterm review mission.** A factor substantially affecting the effectiveness rating of the project was the missed opportunity to change and update the DMF during a midterm review mission, together with the lack of adherence to ADB instructions for changes in scope.

85. **Update of safeguard documents.** The executing agencies did not update safeguard documents based on changes of scope (appendix 11). To ensure compliance with ADB and national safeguards policies, resettlement plans and EIAs need timely updating and follow-up by the ADB project team.

86. **Work scope and financing source.** The necessity to change the financing source for the implementation consultants for the Khulna Power Plant conversion underscored the need for inclusion of all essential elements of a subproject under the administration of one financier.

87. **Withholding contractor payments.** Performance deficiencies of contractors may have required withholding of payments by executing agencies. This should have been coordinated



before loan closure to avoid cancellation of allocated loan funding and the need for securing alternative financing to meet contractor payments (para. 33), as observed in component 2.

88. **Financial management.** ADB should have ensured that APFSs and audited entity financial statements were received and uploaded on the ADB database in a timely manner. By periodically checking in with the executing agencies during loan review mission, ADB could have been proactive in pursuing qualified audit opinions and internal control deficiencies highlighted by the management letters. At the project design stage, it was important to incorporate suitable capacity building elements to strengthen financial management capacity and knowledge, and to provide an explanation of ADB guidelines and policies.

## **B. Recommendations**

89. To avoid gas supply issues (para. 81), it is recommended to use financing modalities, which provide better access and control over the entire project, including the critical factors such as supply of fuel. Or, if outputs that are not administered by ADB are cofinanced in parallel and are needed for the ADB-supported project to reach its outcome, they should be recorded in the DMF along with the financier.

90. Any change in project scope must follow requirements stipulated in PAI 5.02, inclusive of conducting due diligence and updating safeguard documents. A midterm review mission should be conducted, providing the opportunity to review and update the DMF. Imminent nonachievements of outputs and outcomes should be addressed to allow for a better effectiveness rating.

91. **Future monitoring.** Project installations are operating as planned. Three of the executing agencies (NWPGCL, BPDB, and PGCB) are monitoring the impact of the project and ensuring that the relevant safeguards and loan covenants are complied with. However, it is necessary to monitor the progress of the supply of gas to the Khulna power plant and to take necessary action if delays emerge.

92. **Covenants.** Except for (i) transferring assets and distribution responsibility of the north-west zone to North-West Zone Power Distribution Company Limited, (ii) ensuring gas supply to the Khulna power plant, and (iii) submitting auditors' opinions on the use of loan proceeds and compliance with financial loan covenants, all covenants were complied with by all parties. Subsequent ADB loans have imposed fuel supply covenants ensuring gas supply to the Khulna area and progressive financial performance and financial management covenants on PGCB. ADB needs to follow-up on the compliance of these covenants through its resident mission in Bangladesh.

93. **Further action or follow-up.** ADB needs to follow up on the assurance provided by the borrower and NWPGCL to make gas supply available to the Khulna power plant.

94. **Timing of the project performance evaluation report.** A project performance evaluation report may be undertaken any time after finalizing this project completion report.

## DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Indicators and Targets	Project Achievements
<b>Impact</b> Increased access to clean and reliable electricity supply in Bangladesh	Electricity supply increased from 26.6 TWh in 2011 to 40.8 TWh by 2020  Reduced CO <sub>2</sub> emissions by 2.8 million tCO <sub>2</sub> per year by 2020 against the baseline of 67.2 million tCO <sub>2</sub> in 2011	Achieved—by the end of FY2019, the electricity supply has increased to 62.0 TWh, exceeding the target set for 2020. <sup>a</sup>  Achieved—CO <sub>2</sub> emissions reduced by 3.8 million tCO <sub>2</sub> per year due to reduction in grid emission factor from 598.5 gCO <sub>2</sub> /kWh baseline level in FY2011 to 544.1 gCO <sub>2</sub> /kWh in FY2019. <sup>b</sup>
<b>Outcome</b> Improved efficiency in electricity generation, and transmission in Bangladesh	Energy efficiency of 4 power plants increased from 32% to 50% by 2017  Transmission losses in 3 transmission lines reduced from 2.72% to 2.5% by 2017	Partially achieved—Energy efficiency of Khulna power plant increased to 50%. <sup>c</sup> Sylhet power plant is assumed to have reached 50% only in 2020. <sup>b</sup> By FY2017, the other 2 power plants have not been converted to combined cycle power plants.  Partially achieved. By the end of 2017, the transmission loss of the Bangladesh power system has only reduced to 2.64% <sup>d</sup> .
<b>Outputs</b> 1. Increased generation capacity  2. Increased transmission capacity  3. Enhanced capacity of power sector agencies  4. Project management system in place	Conversion of power plants in Khulna (150 MW), Baghabari (100 MW), Sylhet (150 MW) and Shahjibazar (70 MW) to add 235 MW capacity by 2017  235 km 132 kV transmission lines and 7 133/33 kV substations constructed (02) or renovated (05) by 2016  Submission of tranche 2 PFR April 2013  50 of power sector personnel (male/female) trained on investment planning, operations planning, energy auditing and monitoring by 2016  20 of power sector personnel (male/female) trained on financial performance, auditing and governance by 2016  Four PMUs of BPDB, NWPGC, PGCB and MOPEMR in place by October 2012	Partially achieved - conversion of Khulna Power Plant was completed in June 2017. Sylhet Power plant was converted only in March 2020. Other 2 power plants remained as open cycle power plants. <sup>b</sup>  Exceeded (with a delay)—293 km of 132 kV transmission lines and 4 substations were constructed while 6 substations were renovated by December 2018. <sup>b</sup>  Achieved (with a delay)—PFR of tranche 2 was submitted in November 2013.  Exceeded—463 power sector personnel have been trained on investment planning, operations planning, energy auditing and monitoring by the end of 2016. <sup>b</sup>  Exceeded—169 power sector personnel have been trained on financial performance, auditing, and governance by the end of 2016. <sup>b</sup>  Achieved (with a delay)—All the PMUs were established subsequent to governmental approval of the DPPs/PPs. <sup>b</sup>

DPP = development project proposal; FY = Financial Year; MOPEMR = Ministry of Power, Energy and Mineral Resources, NWPGCL = North-West Power Generation Company Limited; PFR = Periodic Financing Request; PGCB = Power Grid Company of Bangladesh; PP = Project Proposal

### Sources:

<sup>a</sup> Bangladesh Power Development Board. 2019. *Annual Report 2018-2019*. Dhaka.

<sup>b</sup> Asian Development Bank estimate.

<sup>c</sup> Project Completion Reports prepared by the executing agencies.

<sup>d</sup> Transmission system loss level at the end of 2017 estimated using the average transmission losses reported for FY2017 and FY2018 in PGCB annual reports. PGCB. 2018. *Annual Report 2016-2017*. Dhaka, PGCB, 2019. *Annual Report 2017-2018*. Dhaka)

**PROJECT COST AT APPRAISAL AND ACTUAL**  
(\$ million)

Item	Appraisal Estimate			Actual		
	Foreign Exchange	Local Currency	Total Cost	Foreign Exchange	Local Currency	Total Cost
<b>A. Component 1</b>						
1. Base Costs						
a. Material, equipment, and civil works	223.25	6.76	230.01	170.04	6.04	176.08
b. Engineering design and incidentals	9.51	0.24	9.75	-	5.10	5.10
c. Environment and social mitigation	-	1.17	1.17	-	-	-
d. Consultants	-	-	-	1.77	-	1.77
e. Taxes and Duty	-	28.24	28.24	-	13.79	13.79
2. Contingencies	29.95	1.89	31.84	-	-	-
3. Financing Charges	4.99	-	4.99	1.61	-	1.61
<b>Subtotal (A)</b>	<b>267.70</b>	<b>38.30</b>	<b>306.00</b>	<b>171.65</b>	<b>24.93</b>	<b>198.35</b>
<b>A. Component 2</b>						
1. Base Costs						
a. Material, equipment, and civil works	60.38	-	60.38	79.06	-	79.06
b. Engineering design and incidentals	2.80	-	2.80	-	13.93	13.93
c. Environment and social mitigation	-	-	-	-	0.11	0.11
d. Consultants	-	-	-	-	-	-
e. Taxes and Duty	-	12.92	12.92	-	21.52	21.52
2. Contingencies	8.15	-	8.15	-	-	-
3. Financing Charges	1.25	-	1.25	1.42	-	1.42
<b>Subtotal (B)</b>	<b>72.58</b>	<b>12.92</b>	<b>85.50</b>	<b>80.48</b>	<b>35.57</b>	<b>116.05</b>
<b>A. Component 3</b>						
1. Base Costs						
a. Material, equipment, and civil works	-	-	-	-	-	-
b. Engineering design and incidentals	-	-	-	-	-	-
c. Environment and social mitigation	-	-	-	-	-	-
d. Consultants	8.50	-	8.50	7.52	0.29	7.81
e. Taxes and Duty	-	-	-	-	-	-
2. Contingencies	-	-	-	-	-	-
3. Financing Charges	-	-	-	0.07	-	0.07
<b>Subtotal (C)</b>	<b>8.50</b>	<b>-</b>	<b>8.50</b>	<b>7.59</b>	<b>0.29</b>	<b>7.88</b>
<b>Total (A+B+C)</b>	<b>348.78</b>	<b>51.22</b>	<b>400.00</b>	<b>261.48</b>	<b>60.79</b>	<b>322.28</b>

Source: Asian Development Bank estimates.

## PROJECT COST BY FINANCIER

Table A3.1: Project Cost at Appraisal by Financier

Item	ADB		IsDB		EIB		GoB		Total Cost	
	Amount (\$ mill.)	% of Cost Category	Amount (\$ mill.)	% of Cost Category	Amount (\$ mill.)	% of Cost Category	Amount (\$ mill.)	% of Cost Category	Amount (\$ mill.)	Taxes and Duties
<b>A. Investment Costs</b>										
1. Material, equipment & civil works	156.39	47.2%	72.75	22.0%	76.85	23.2%	25.56	7.7%	<b>331.55</b>	41.16
2. Engineering design & incidentals	6.86	54.7%	2.58	20.6%	2.87	22.9%	0.24	1.9%	<b>12.55</b>	0.00
3. Environment & social mitigation	0.00	0.0%	0.00	0.0%	0.00	0.0%	1.17	100.0%	<b>1.17</b>	0.00
4. Consultants										
a. Project management	0.00	0.0%	0.00	0.0%	3.50	100.0%	0.00	0.0%	<b>3.50</b>	0.00
b. Capacity development	1.50	30.0%	0.00	0.0%	3.50	30.0%	0.00	0.0%	<b>5.00</b>	0.00
Subtotal (A)	<b>164.75</b>	<b>46.4%</b>	<b>75.33</b>	<b>21.3%</b>	<b>86.72</b>	<b>24.5%</b>	<b>26.97</b>	<b>7.6%</b>	<b>353.77</b>	41.16
<b>B. Contingencies (B)</b>	<b>17.15</b>	<b>42.9%</b>	<b>9.67</b>	<b>24.2%</b>	<b>11.28</b>	<b>28.2%</b>	<b>1.89</b>	<b>4.7%</b>	<b>39.99</b>	0.00
<b>C. Financial Charges (C)</b>	<b>3.10</b>	<b>49.7%</b>	<b>0.00</b>	<b>0.0%</b>	<b>0.00</b>	<b>0.0%</b>	<b>3.14</b>	<b>50.3%</b>	<b>6.24</b>	0.00
<b>Total Project Cost (A+B+C)</b>	<b>185.00</b>	<b>46.3%</b>	<b>85.00</b>	<b>21.3%</b>	<b>98.00</b>	<b>24.5%</b>	<b>32.00</b>	<b>8.0%</b>	<b>400.00</b>	41.16
<b>% Total Project Cost</b>	<b>46.2%</b>		<b>21.3%</b>		<b>24.5%</b>		<b>8.0%</b>		<b>100%</b>	

## Notes:

1. Numbers may not sum precisely because of rounding.
2. Only the capital costs of the project are included. Recurrent costs such as operation and maintenance costs, interest costs etc. have not been shown.
3. Project costs by financier, as estimated at appraisal, are presented in accordance with the format specified in ADB's *Loan Disbursement Handbook* (2017).

## Source:

ADB Facility Administration Manual of the Power System Expansion and Efficiency Improvement Investment Program (2012)

Table A3.2: Project Cost at Completion by Financier

Item	ADB		IsDB		EIB		GoB		Total Cost	
	Amount (\$ mill.)	% of Cost Category	Amount (\$ mill.)	% of Cost Category	Amount (\$ mill.)	% of Cost Category	Amount (\$ mill.)	% of Cost Category	Amount (\$ mill.)	Taxes and Duties
<b>A. Investment Costs</b>										
1. Material, equipment & civil works	172.58	60.7%	0.00	0.0%	0.00	0.0%	111.83	39.3%	<b>284.41</b>	35.31
2. Engineering design & incidentals	0.00	0.0%	0.00	0.0%	0.00	0.0%	25.08	100.0%	<b>25.08</b>	0.00
3. Environment & social mitigation	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.11	100.0%	<b>0.11</b>	0.00
4. Consultants										
a. Project management	3.93	100.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	<b>3.93</b>	0.00
b. Capacity development	0.00	0.0%	0.00	0.0%	5.36	94.8%	0.29	5.2%	<b>5.65</b>	0.00
<b>Subtotal (A)</b>	<b>176.51</b>	<b>55.3%</b>	<b>0.00</b>	<b>0.0%</b>	<b>5.36</b>	<b>1.7%</b>	<b>137.31</b>	<b>43.0%</b>	<b>319.18</b>	<b>35.31</b>
<b>B. Contingencies (B)</b>	-		-		-		-		-	
<b>C. Financial Charges (C)</b>	<b>3.10</b>	<b>100.0%</b>	<b>0.00</b>	<b>0.0%</b>	<b>0.00</b>	<b>0.0%</b>	<b>0.00</b>	<b>0.0%</b>	<b>3.10</b>	<b>0.00</b>
<b>Total Project Cost (A+B+C)</b>	<b>179.61</b>	<b>55.7%</b>	<b>0.00</b>	<b>0.0%</b>	<b>5.36</b>	<b>1.7%</b>	<b>137.31</b>	<b>42.6%</b>	<b>322.28</b>	<b>35.31</b>
<b>% Total Project Cost</b>		<b>55.7%</b>		<b>0.0%</b>		<b>1.7%</b>		<b>42.6%</b>		<b>100%</b>

## Notes:

- Numbers may not sum precisely because of rounding.
- Only the capital costs of the project are included. Recurrent costs such as operation and maintenance costs, interest costs etc. have not been shown.
- Project costs by financier, as estimated at appraisal, are presented in accordance with the format specified in ADB's *Loan Disbursement Handbook* (2017).
- Contingency costs have been added to the actual cost category they were utilized for.
- Compensation paid for damaged crop during transmission line construction have been shown as environment and social mitigation cost.
- The difference between total loan disbursements by ADB and the direct payments to contractors by ADB has been assumed as financing costs.
- Cost of the ongoing Sylhet power plant conversion project is estimated based on the final bid price of the selected EPC contractor and comparative costs borne by the EA on engineering design and incidental expenses on Khulna power plant conversion project.

## Sources:

- Contract Monitoring Sheet of Loan 2966 maintained by ADB.
- Final Cancellation and Final Amortization Schedule of Loan 2966 issued by ADB.
- Project Completion Reports prepared and submitted to ADB by NWPGL, PGCB, and Power Division of MPEMR for respective subprojects implemented by each EA.

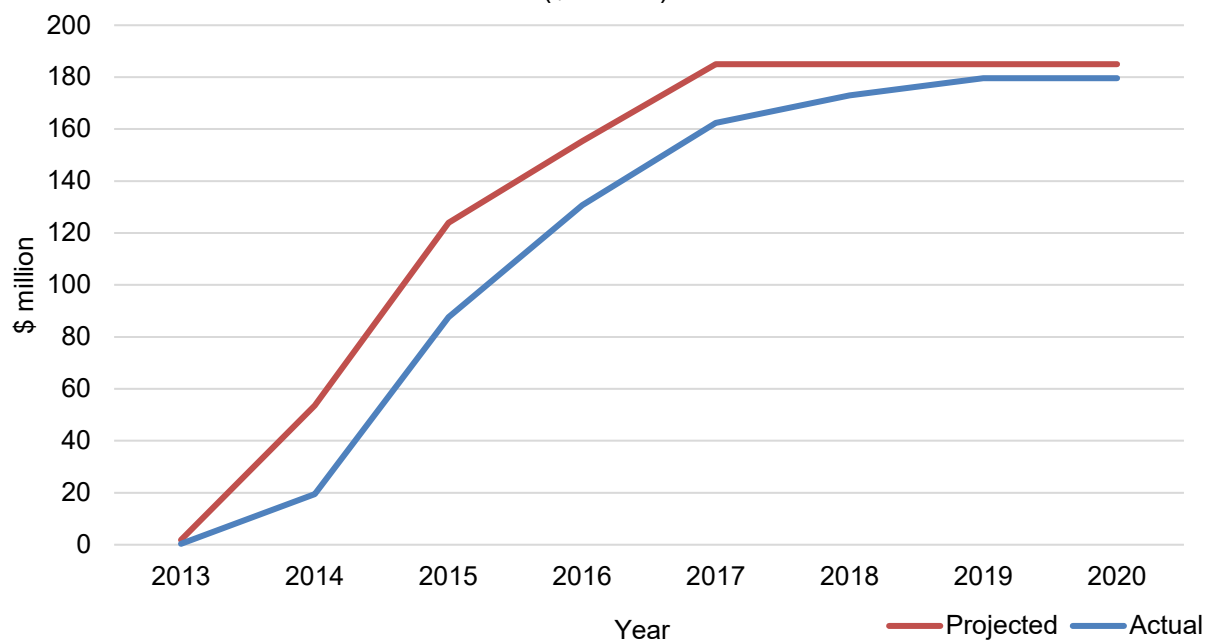
## DISBURSEMENT OF ADB LOAN AND GRANT PROCEEDS

**Table 4.1: Annual and Cumulative Disbursement of ADB Loan Proceeds**  
(\$ million)

Year	Annual Disbursement		Cumulative Disbursement	
	Amount (\$ million)	% of Total	Amount (\$ million)	% of Total
2013	0.35	0.2%	0.35	0.2%
2014	19.16	10.7%	19.51	10.9%
2015	68.13	37.9%	87.64	48.8%
2016	43.03	24.0%	130.68	72.8%
2017	31.76	17.7%	162.44	90.4%
2018	10.60	5.9%	173.03	96.3%
2019	6.57	3.7%	179.61	100.0%
2020	0.00	0.0%	179.61	100.0%
<b>Total</b>	<b>179.61</b>	<b>100.0%</b>		

Source: Asian Development Bank.

**Figure 4.1: Projected and Actual Cumulative Disbursement of ADB Loan Proceeds**  
(\$ million)



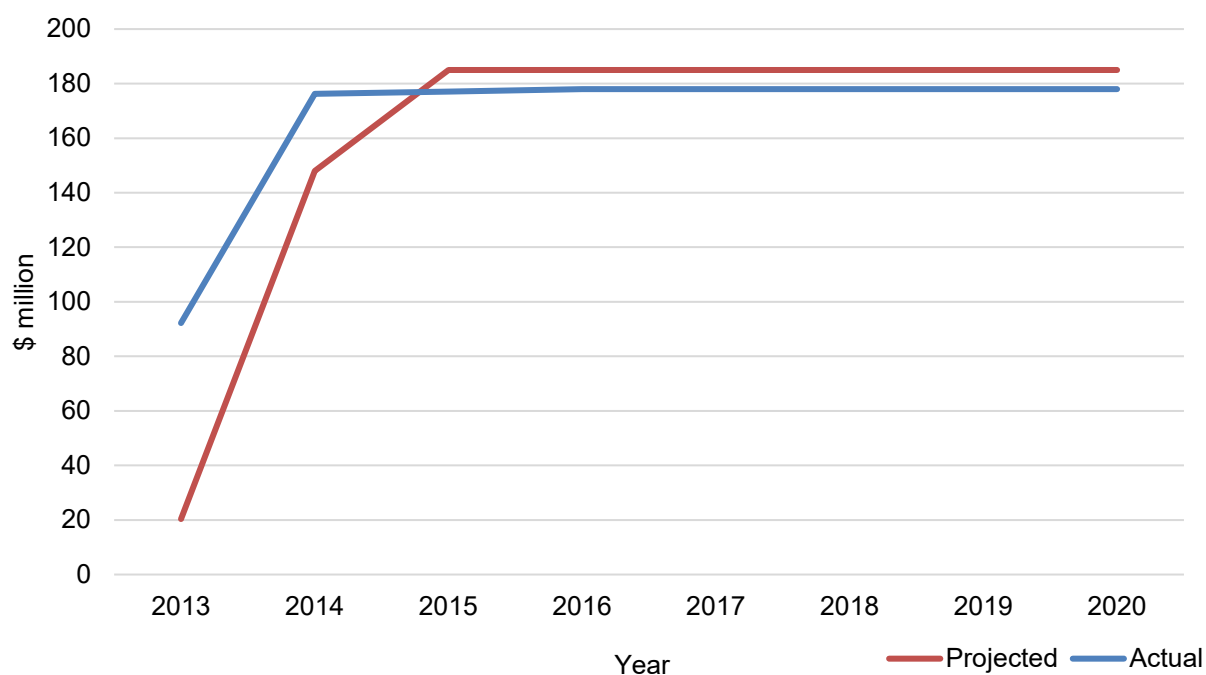
## CONTRACT AWARDS OF ADB LOAN AND GRANT PROCEEDS

**Table 5.1: Annual and Cumulative Contract Awards of ADB Loan Proceeds**  
(\$ million)

Year	Annual Contract Awards		Cumulative Contract Awards	
	Amount (\$ million)	% of Total	Amount (\$ million)	% of Total
2013	92.22	51.8%	92.22	51.8%
2014	83.99	47.2%	176.20	99.0%
2015	0.88	0.5%	177.08	99.5%
2016	0.90	0.5%	177.98	100.0%
2017	0.00	0.0%	177.98	100.0%
2018	0.00	0.0%	177.98	100.0%
2019	0.00	0.0%	177.98	100.0%
2020	0.00	0.0%	177.98	100.0%
<b>Total</b>	<b>177.98</b>	<b>100.0%</b>		

Source: Asian Development Bank.

**Figure 5.1: Projected and Cumulative Contract Awards of ADB Loan Proceeds**  
(\$ million)



### STATUS OF COMPLIANCE WITH LOAN COVENANTS

Covenant	Reference in Loan/Project Agreement	Status of Compliance
The Borrower shall cause the Project to be carried out with due diligence and efficiency and in conformity with sound applicable technical, financial, business, and development practices.	Section 4.01 (a) of the of the loan agreement	Complied with.
In the carrying out of the Project and operation of the Project facilities, the Borrower shall perform, or cause to be performed, all obligations set forth in Schedule 5 to this Loan Agreement and the Project Agreement.	Section 4.01 (b) of the loan agreement	Compliance with each obligation set forth under Schedule 5 of the loan agreement discussed separately.
The Borrower shall make available, or cause to be made available, promptly as needed, and on terms and conditions acceptable to ADB, the funds, facilities, services, land and other resources, as required, in addition to the proceeds of the Loan, for the carrying out of the Project.	Section 4.02 of the loan agreement	Complied with.
In the carrying out of the Project, the Borrower shall cause competent and qualified consultants and contractors, acceptable to ADB, to be employed to an extent and upon terms and conditions satisfactory to the Borrower and ADB.	Section 4.03 (a) of the loan agreement	Complied with.
The Borrower shall cause the Project to be carried out in accordance with plans, design standards, specifications, work schedules and construction methods acceptable to the Borrower and ADB, as applicable. The Borrower shall furnish, or cause to be furnished, to ADB, promptly after their preparation, such plans, design standards, specifications and work schedules, and any material modifications subsequently made therein, in such detail as ADB shall reasonably request.	Section 4.03 (b) of the loan agreement	Complied with.
The Borrower shall ensure that the activities of its departments and agencies with respect to the carrying out of the Project and operation of the Project facilities are conducted and coordinated in accordance with sound administrative policies and procedures.	Section 4.04 of the loan agreement	Complied with.
The Borrower shall enable ADB's representatives to inspect the Project, the Goods and Works, and any relevant records and documents.	Section 4.05 of the loan agreement	Complied with.
The Borrower shall (i) maintain separate accounts and records for the Project; (ii) prepare annual financial statements for the Project in accordance with accounting principles acceptable to ADB; (iii) have such financial statements audited annually by independent auditors whose qualifications, experience and terms of reference are acceptable to ADB, in accordance with international standards for auditing or the national equivalent acceptable to ADB; (iv) as part of each such audit, have the auditors prepare a report (which includes the auditors' opinion on the use of the Loan proceeds and compliance with the financial covenants of this Loan Agreement as well as on the use of the procedures for the imprest account(s) and statement of expenditures) and a management letter (which sets out the deficiencies in the internal control of the Project that were identified in the course of the audit, if any); and (v) furnish to ADB, no later than 6 months after the end of each related fiscal year, copies of such audited financial statements, audit report and management letter, all in the English language, and such other information concerning these documents and the audit thereof as ADB shall from time to time reasonably request.	Section 4.06 (a) of the loan agreement	(i) Complied with. (ii) Complied with. (iii) Complied with.  (iv) Partially complied with (auditors' opinion on the use of the Loan proceeds and compliance with the financial covenants of this Loan Agreement as well as on the use of the procedures for the imprest account(s) was not provided).  (v) Complied with.



Covenant	Reference in Loan/Project Agreement	Status of Compliance
ADB shall disclose the annual audited financial statements for the Project and the opinion of the auditors on the financial statements within 30 days of the date of their receipt by posting them on ADB's website.	Section 4.06 (b) of the loan agreement	Complied with.
The Borrower shall enable ADB, upon ADB's request, to discuss the financial statements for the Project and the Borrower's financial affairs where they relate to the Project with the auditors appointed pursuant to subsection (a)(iii) hereinabove, and shall authorize and require any representative of such auditors to participate in any such discussions requested by ADB. This is provided that such discussions shall be conducted only in the presence of an authorized officer of the Borrower, unless the Borrower shall otherwise agree.	Section 4.06 (c) of the loan agreement	Complied with.
The Borrower shall ensure that any facilities relevant to the Project are operated, maintained and repaired in accordance with sound applicable technical, financial, business, development, operational and maintenance practices.	Section 4.07 of the loan agreement	Complied with.
The Borrower shall take all actions which shall be necessary on its part to enable each Project Executing Agency to perform its obligations under the Project Agreement and shall not take or permit any action which would interfere with the performance of such obligations.	Section 4.08 of the loan agreement	Complied with.
The Borrower shall exercise its rights under the Subsidiary Loan Agreements in such a manner as to protect the interests of the Borrower and ADB and to accomplish the purposes of the Loan.	Section 4.09 (a) of the loan agreement	Complied with.
<p><b>Implementation Arrangements</b></p> <p>The Borrower, NWPGL and PGCB shall ensure that the Project is implemented in accordance with the detailed arrangements set forth in the FAM. Any subsequent change to the FAM shall become effective only after approval of such change by the Borrower and ADB. In the event of any discrepancy between the FAM and this Loan Agreement, the provisions of this Loan Agreement shall prevail. Power Division shall ensure that it establishes a project management unit for the implementation of Part C of the Project. NWPGL and PGCB shall ensure that their project management units have adequate qualified staff to undertake necessary tasks of procurement, construction supervision, inspection and testing of equipment, payments to contractors, monitoring, environmental and social safeguards due diligence and reporting of progress relevant to the components under their responsibility.</p>	Para. 1 of Schedule 5 of the loan agreement	Complied with.
<p><b>Environment</b></p> <p>The Borrower shall ensure, or cause NWPGL or PGCB to ensure, that the preparation, design, construction, implementation, operation and decommissioning of the Project and all Project facilities comply with (a) all applicable laws and regulations of the Borrower relating to environment, health, and safety; (b) the Environmental Safeguards; (c) the EARF; and (d) all measures, and requirements set forth in the respective IEE and EMP, and any corrective or preventative actions set forth in a Safeguards Monitoring Report.</p>	Para. 2 of Schedule 5 of the loan agreement	Complied with.
<p><b>Land acquisition and involuntary resettlement</b></p> <p>The Borrower shall ensure, or cause NWPGL or PGCB to ensure, that all land and all rights-of-way required for the</p>	Para. 3 of Schedule 5 of	Complied with.

Covenant	Reference in Loan/Project Agreement	Status of Compliance
<p>Project, and all Project facilities are made available to the Works contractor in accordance with the schedule agreed under the related Works contract and all land acquisition and resettlement activities are implemented in compliance with (a) all applicable laws and regulations of the Borrower relating to land acquisition and involuntary resettlement; (b) the Involuntary Resettlement Safeguards; (c) the RF; and (d) all measures and requirements set forth in the respective RP, and any corrective or preventative actions set forth in a Safeguards Monitoring Report.</p>	<p>the loan agreement</p>	
<p><b>Land acquisition and involuntary resettlement</b> Without limiting the application of the Involuntary Resettlement Safeguards, the RF or the RP, the Borrower shall ensure, and cause NWPGL or PGCB to ensure, that no physical or economic displacement takes place in connection with the Project until: (a) compensation and other entitlements have been provided to affected people in accordance with the RP; and (b) a comprehensive income and livelihood restoration program has been established in accordance with the RP.</p>	<p>Para. 4 of Schedule 5 of the loan agreement</p>	<p>Complied with.</p>
<p><b>Small ethnic community practices</b> The Borrower shall ensure, or cause NWPGL or PGCB to ensure, that the preparation, design, construction, implementation and operation of the Project and all Project facilities comply with (a) all applicable laws and regulations of the Borrower relating to small ethnic community peoples; (b) the Small Ethnic Community Peoples Safeguards; (c) any small ethnic community peoples planning framework; and (d) all measures and requirements set forth in the respective small ethnic community peoples plan, and any corrective or preventative actions set forth in a Safeguards Monitoring Report.</p>	<p>Para. 5 of Schedule 5 of the loan agreement</p>	<p>Complied with.</p>
<p><b>Human and financial resources to implement safeguard requirements</b> The Borrower shall make available, or cause the Project Executing Agency to make available, necessary budgetary and human resources to fully implement the EMP, the RP and any small ethnic community peoples planning framework.</p>	<p>Para. 6 of Schedule 5 of the loan agreement</p>	<p>Complied with.</p>
<p><b>Safeguards related provisions in bidding documents and work contracts</b> The Borrower shall ensure, or cause the Project Executing Agency to ensure, that all bidding documents and contracts for Works contain provisions that require contractors to: (a) comply with the measures and requirements relevant to the contractor set forth in the IEE, the EMP, the RP and any small ethnic community peoples plan (to the extent they concern impacts on affected people during construction), and any corrective or preventative actions set out in a Safeguards Monitoring Report; (b) make available a budget for all such environmental and social measures; (c) provide the Borrower with a written notice of any unanticipated environmental, resettlement or small ethnic community people's risk or impacts that arise during construction, implementation or operation of the Project that were not considered in the IEE, the EMP, the RP or any small ethnic community peoples plan; (d) adequately record the condition of roads, agricultural land and other infrastructure prior to</p>	<p>Para. 7 of Schedule 5 of the loan agreement</p>	<p>Complied with.</p>

Covenant	Reference in Loan/Project Agreement	Status of Compliance
starting to transport materials and construction; and (e) fully reinstate pathways, other local infrastructure, and agricultural land to at least their pre-project condition upon the completion of construction.		
<p><b>Safeguard monitoring and reporting</b> The Borrower shall do the following, or shall cause NWPGL or PGCB to do the following: (a) submit semiannual Safeguards Monitoring Reports to ADB and disclose relevant information from such reports to affected persons promptly upon submission; (b) if any unanticipated environmental and/or social risks and impacts arise during construction, implementation or operation of the Project that were not considered in the IEE, the EMP or the RP promptly inform ADB of the occurrence of such risks or impacts, with detailed description of the event and proposed corrective action plan; and (c) report any actual or potential breach of compliance with the measures and requirements set forth in the EMP or the RP promptly after becoming aware of the breach.</p>	Para. 8 of Schedule 5 of the loan agreement	Complied with.
<p><b>Prohibited list of investments</b> The Borrower shall ensure, or cause NWPGL or PGCB to ensure, that no proceeds of the Loan are used to finance any activity included in the list of prohibited investment activities provided in Appendix 5 of the SPS.</p>	Para. 9 of Schedule 5 of the loan agreement	Complied with.
<p><b>Labor standards</b> The Borrower shall ensure that all Works contract documents to be prepared under the Project incorporate provisions and budget to the effect that contractors (i) comply with all applicable labor laws and related international treaty obligations of the Borrower and do not employ child labor, as defined under Bangladesh law; (ii) provide safe working conditions for male and female workers; (iii) carry out HIV/AIDS and human trafficking prevention and awareness campaigns in the campsites and corridors of influence; (iv) engage women workers as wage laborers depending on their skill; and (v) provide equal wages for equal work between men and women.</p>	Para. 10 of Schedule 5 of the loan agreement	Complied with.
<p><b>Counterpart support</b> The Borrower shall make available, and ensure that each Project Executing Agency makes available, adequate budgetary allocations of the required counterpart funds in respect of the Project on a timely and regular basis.</p>	Para. 11 of Schedule 5 of the loan agreement	Complied with.
<p><b>Project reviews</b> ADB shall conduct periodic reviews of the progress of the Project as necessary and undertake any necessary midcourse corrections. In addition, ADB shall conduct special reviews as appropriate. The Borrower shall give all possible assistance for carrying out such reviews.</p>	Para. 12 of Schedule 5 of the loan agreement	Complied with.
<p><b>Governance and anticorruption</b> The Borrower and each Project Executing Agency shall (i) comply with ADB's Anticorruption Policy (1998, as amended to date) and acknowledge that ADB reserves the right to investigate directly, or through its agents, any alleged corrupt, fraudulent, collusive or coercive practice relating to the Project; and (ii) cooperate with any such investigation and extend all necessary assistance for satisfactory completion of such investigation.</p>	Para. 13 of Schedule 5 of the loan agreement	Complied with.

Covenant	Reference in Loan/Project Agreement	Status of Compliance
<p><b>Governance and anticorruption</b> Each Project Executing Agency shall ensure that the anticorruption provisions acceptable to ADB are included in all bidding documents and contracts, including 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.</p>	Para. 14 of Schedule 5 of the loan agreement	Complied with.
<p><b>Governance and anticorruption</b> Each Project Executing Agency shall prepare and implement a robust code of conduct, acceptable to ADB, for the staff involved in the Project, ensuring, among others, that the staff members working with the project management unit do not have any conflict of interest with any activities under the Project. The Borrower shall take necessary steps to further ensure that all applicable anticorruption laws of the Borrower which apply to public officers are vigorously enforced.</p>	Para. 15 of Schedule 5 of the loan agreement	Complied with.
<p><b>Governance and anticorruption</b> Each Project Executing Agency shall announce the Project and business opportunities associated with the Project, as relevant, on their website. Such announcements, when dealing with contracts awarded, shall at least disclose: (a) the list of participating bidders, (b) the name of the winning bidder, (c) the amount of the contracts awarded, and (d) the services procured. In addition, each Project Executing Agency shall establish a system of handling complaints, acceptable to ADB, to deal with any complaints received in relation to the contracts, their awards and their administration.</p>	Para. 16 of Schedule 5 of the loan agreement	Complied with.
<p><b>O&amp;M</b> The Borrower shall ensure that each Project Executing Agency shall at all times have sufficient provision for its operation and maintenance cost for assets owned by it. NWPGL shall ensure that its upgraded power plant will be maintained at regular intervals as recommended by manufacturers and shall ensure unhindered operation of the power plant on base load to achieve plant availability of higher than 90% and annual capacity factor exceeding 85%.</p>	Para. 17 of Schedule 5 of the loan agreement	Complied with.
<p><b>Gas Supply</b> The Borrower shall ensure uninterrupted supply of natural gas to Khulna power plant which will be upgraded to combined-cycle operation, to enable the plant to operate as base load capacity.</p>	Para. 18 of Schedule 5 of the loan agreement	Not complied with
<p><b>Khulna Power Purchase Agreement</b> The Borrower shall ensure that the power purchase agreement between NWPGL and Bangladesh Power Development Board is executed by 31 December 2013, covering the open cycle operating period and the subsequent combined cycle operation of the Khulna power plant. The draft agreement shall be provided for ADB review and comments before its Execution.</p>	Para. 19 of Schedule 5 of the loan agreement	Complied with.
<p><b>Transmission interconnection and losses</b> The Borrower shall cause PGCB to ensure that modifications, upgrades, and rearrangements of the evacuation facilities for upgraded Khulna plant are completed by 31 December 2014, to enable the upgraded power plant to be connected to the grid. PGCB shall also ensure that the current transmission losses of 2.7% will be sustained and further reduced to 2.5% by the end of 2017.</p>	Para. 20 of Schedule 5 of the loan agreement	Partially complied with.

Covenant	Reference in Loan/Project Agreement	Status of Compliance
<p><b>Financing and financial management</b> The Borrower shall ensure that its funding agreements with the Project Executing Agencies are implemented according to project schedule, guaranteeing timely completion of project activities. The Borrower shall ensure that all funds which are due to NWPGL under various agreements are made available to the company without any delay.</p>	Para. 21 of Schedule 5 of the loan agreement	Complied with.
<p><b>Financing and financial management</b> The Borrower shall aid NWPGL in (i) developing a computerized accounting information system and in developing its charts of accounts, and (ii) developing business plans in order for them to carry out projections and set targets to improve their financial decision-making process.</p>	Para. 22 of Schedule 5 of the loan agreement	Complied with.
<p><b>Financing and financial management</b> NWPGL shall maintain a self-financing ratio of 10% from 1 April 2015 onwards based on 3-year moving average capital expenditure {calculated by adding the capital expenditure for the previous year, current year and projection for the next year, divided by 3}.</p>	Para. 23 of Schedule 5 of the loan agreement	Complied with.
<p><b>Financing and financial management</b> The Borrower shall ensure that all debts incurred by NWPGL are serviced regularly, and that it maintains a healthy debt service coverage ratio of 1.2 from end of December 2019.</p>	Para. 24 of Schedule 5 of the loan agreement	Complied with.
<p><b>Public awareness</b> NWPGL shall conduct public awareness programs involving relevant stakeholders to highlight activities in the power sector.</p>	Para. 25 of Schedule 5 of the loan agreement	Complied with.
<p><b>Regulatory reform</b> The Borrower shall cause Power Division to continue the implementation of structural and regulatory reforms in the power sector and specifically (i) transfer the assets and operation of distribution networks designed to be served by NWZPDCL from BPDB and make NWZPDCL operational by 30 June 2014, (ii) establish independent entities for BPDB distribution functions, (iii) establish independent entities for BPDB generation facilities and execute power purchase agreements as necessary, and (iv) reconstitute the boards of power sector entities established under the Borrower's Companies Act 1994 in accordance with the principles indicated in earlier loan documents.</p>	Para. 26 of Schedule 5 of the loan agreement	Partially complied with (NWZPDCL was not operationalized by 30 June 2014)
<p>NWPGL and PGCB shall carry out the Project with due diligence and efficiency, and in conformity with sound administrative, financial, engineering, environmental and power sector practices.</p>	Section 2.01 (a) of the project agreement	Complied with.
<p>In the carrying out of the Project and operation of the Project facilities, NWPGL and PGCB shall perform all obligations set forth in the Loan Agreement to the extent that they are applicable to NWPGL and PGCB.</p>	Section 2.01 (b) of the project agreement	Complied with.
<p>NWPGL and PGCB shall make available, promptly as needed, the funds, facilities, services, equipment, and other resources which are required, in addition to the proceeds of the Loan, for the carrying out of the Project.</p>	Section 2.02 of the project agreement	Complied with.
<p>In the carrying out of the Project, NWPGL and PGCB shall employ competent and qualified consultants, acceptable to ADB, to an extent and upon terms and conditions satisfactory to ADB.</p>	Section 2.03 (a) of the project agreement	Complied with.

Covenant	Reference in Loan/Project Agreement	Status of Compliance
Except as ADB may otherwise agree, all Goods, Works and Consulting Services to be financed out of the proceeds of the Loan shall be procured in accordance with the provisions of Schedule 4 to the Loan Agreement. ADB may refuse to finance a contract where Goods, Works or Consulting Services have not been procured under procedures substantially in accordance with those agreed between the Borrower and ADB or where the terms and conditions of the contract are not satisfactory to ADB.	Section 2.03 (b) of the project agreement	Complied with.
NWPGL and PGCB shall carry out the Project in accordance with plans, design standards and specifications acceptable to ADB. NWPGL and PGCB shall furnish, or cause to be furnished, to ADB, promptly after their preparation, such plans, design standards and specifications, and any material modifications subsequently made therein, in such detail as ADB shall reasonably request.	Section 2.04 of the project agreement	Complied with.
NWPGL and PGCB shall take out and maintain with responsible insurers, or make other arrangements satisfactory to ADB, for insurance of the Project facilities to such extent and against such risks and in such amounts as shall be consistent with sound practice. NWPGL and PGCB shall be deemed to have opted for self-insurance in the absence of any specific insurance for the Project.	Section 2.05 (a) of the project agreement	Complied with.
Without limiting the generality of the foregoing, NWPGL and PGCB undertake to insure, or cause to be insured, the Goods to be imported for the Project and to be financed out of the proceeds of the Loan against hazards incident to the acquisition, transportation and delivery thereof to the place of use or installation, and for such insurance any indemnity shall be payable in a currency freely usable to replace or repair such Goods.	Section 2.05 (b) of the project agreement	Complied with.
NWPGL and PGCB shall maintain, or cause to be maintained, records and accounts adequate to identify the items of expenditure financed out of the proceeds of the Loan, to disclose the use thereof in the Project, to record the progress of the Project (including the cost thereof) and to reflect, in accordance with consistently maintained sound accounting principles, their operations and financial condition.	Section 2.06 of the project agreement	Complied with.
ADB, NWPGL and PGCB shall cooperate fully to ensure that the purposes of the Loan will be accomplished.	Section 2.07 (a) of the project agreement	Complied with.
NWPGL and PGCB shall promptly inform ADB of any condition which interferes with, or threatens to interfere with, the progress of the Project, the performance of their obligations under this Project Agreement, the Loan Agreement or the Subsidiary Loan Agreements, or the accomplishment of the purposes of the Loan.	Section 2.07 (b) of the project agreement	Complied with.
ADB, NWPGL and PGCB shall from time to time, at the request of either party, exchange views through their representatives with regard to any matters relating to the Project, NWPGL and PGCB and the Loan.	Section 2.07 (c) of the project agreement	Complied with.
NWPGL and PGCB shall furnish to ADB all such reports and information as ADB shall reasonably request concerning (i) the Loan and the expenditure of the proceeds thereof; (ii) the Goods and Works and Consulting Services financed out of such proceeds; (iii) the Project; (iv) the administration,	Section 2.08 (a) of the project agreement	Complied with.

Covenant	Reference in Loan/Project Agreement	Status of Compliance
operations and financial condition of NWPGL and PGCB; and (v) any other matters relating to the purposes of the Loan.		
Without limiting the generality of the foregoing, NWPGL and PGCB shall furnish to ADB quarterly reports on the execution of the Project and on the operation and management of the Project facilities. Such reports shall be submitted in such form and in such detail and within such a period as ADB shall reasonably request, and shall indicate, among other things, progress made and problems encountered during the quarter under review, steps taken or proposed to be taken to remedy these problems, and proposed program of activities and expected progress during the following quarter.	Section 2.08 (b) of the project agreement	Complied with.
Promptly after physical completion of the Project, but in any event not later than 3 months thereafter or such later date as ADB may agree for this purpose, NWPGL and PGCB shall prepare and furnish to ADB a report, in such form and in such detail as ADB shall reasonably request, on the execution and initial operation of the Project, including its cost, the performance by NWPGL and PGCB of their obligations under this Project Agreement and the accomplishment of the purposes of the Loan.	Section 2.08 (c) of the project agreement	Complied with.
NWPGL and PGCB shall (i) maintain separate accounts and records for the Project; (ii) prepare annual financial statements for the Project in accordance with accounting principles acceptable to ADB; (iii) have such financial statements for the Project audited annually by independent auditors whose qualifications, experience and terms of reference are acceptable to ADB, in accordance with international standards for auditing or the national equivalent acceptable to ADB; (iv) as part of each such audit, have the auditors prepare a report (which includes the auditors' opinion on the use of the Loan proceeds and compliance with the financial covenants of the Loan Agreement as well as on the use of the procedures for the imprest account(s) and statement of expenditures) and a management letter (which sets out the deficiencies in the internal control of the Project that were identified in the course of the audit, if any); and (v) furnish to ADB, no later than 6 months after the close of the fiscal year to which they relate, copies of such audited financial statements, audit report and management letter, all in the English language, and such other information concerning these documents and the audit thereof as ADB shall from time to time reasonably request.	Section 2.09 (a) of the project agreement	(i) Complied with. (ii) Complied with. (iii) Complied with.  (iv) Partially complied with (auditors' opinion on the use of the Loan proceeds and compliance with the financial covenants of this Loan Agreement as well as on the use of the procedures for the imprest account(s) was not provided).  (v) Complied with.
NWPGL and PGCB shall enable ADB, upon ADB's request, to discuss their respective financial statements for the Project and their financial affairs related to the Project from time to time with the auditors, appointed by NWPGL and PGCB pursuant to Section 2.09(a) hereabove, and shall authorize and require any representative of such auditors to participate in any such discussions requested by ADB, provided that any such discussion shall be conducted only in the presence of an authorized officer of NWPGL and PGCB unless NWPGL and PGCB shall otherwise agree.	Section 2.09 (b) of the project agreement	Complied with.
NWPGL and PGCB shall enable ADB's representatives to inspect the Project, the Goods, Works and Consulting Services financed out of the proceeds of the Loan, all other	Section 2.10 of the project agreement	Complied with.

Covenant	Reference in Loan/Project Agreement	Status of Compliance
plants, sites, properties and equipment of NWPGL and PGCB, and any relevant records and documents.		
NWPGL and PGCB shall, promptly as required, take all action within their powers to maintain their corporate existence, to carry on their operations, and to acquire, maintain and renew all rights, properties, powers, privileges and franchises which are necessary in the carrying out of the Project or in the conduct of their business.	Section 2.11 (a) of the project agreement	Complied with.
NWPGL and PGCB shall at all times conduct their business in accordance with sound administrative, financial, environmental and power sector practices, and under the supervision of competent and experienced management and personnel.	Section 2.11 (b) of the project agreement	Complied with.
NWPGL and PGCB shall at all times operate and maintain their sites, equipment and other property, and from time to time, promptly as needed, make all necessary repairs and renewals thereof, all in accordance with sound administrative, financial, engineering, environmental, power sector, and maintenance and operational practices.	Section 2.11 (c) of the project agreement	Complied with.
Except as ADB may otherwise agree, NWPGL and PGCB shall not sell, lease or otherwise dispose of any of their assets which shall be required for the efficient carrying on of their operations or the disposal of which may prejudice their ability to perform satisfactorily any of their obligations under this Project Agreement.	Section 2.12 of the project agreement	Complied with.
Except as ADB may otherwise agree, NWPGL and PGCB shall apply the proceeds of the Loan to the financing of expenditures on the Project in accordance with the provisions of the Loan Agreement and this Project Agreement, and shall ensure that all Goods, Works and Consulting Services financed out of such proceeds are used exclusively in the carrying out of the Project.	Section 2.13 of the project agreement	Complied with.
Except as ADB may otherwise agree, NWPGL and PGCB shall duly perform all of their obligations under their respective Subsidiary Loan Agreements and shall not take, or concur in, any action which would have the effect of assigning, amending, abrogating or waiving any rights or obligations of the parties under the Subsidiary Loan Agreements.	Section 2.14 of the project agreement	Complied with.
NWPGL and PGCB shall promptly notify ADB of any proposal to amend, suspend or repeal any provision of their enabling laws which might affect the Project and shall afford ADB an adequate opportunity to comment on such proposal prior to taking any action thereon.	Section 2.15 of the project agreement	Complied with.



## **PROGRESSION AND STATUS OF CO-FINANCED POWER PLANT CONVERSION PROJECTS**

### **A. Background Information**

1. Tranche 1 of the Multitranche Financing Facility (MFF) Power System Expansion and Efficiency Improvement Investment Program (PSEIIP), approved by the Asian Development Bank in 2012, comprised the following components; (i) conversion of Khulna, Baghabari, Shahjibazar and Sylhet Open Cycle Power Plants (OCPPs) to Combined Cycle Power Plants (CCPPs) (Component 1), (ii) construction of 235 km 132 kV transmission lines and two new 132/33 kV substation, and renovation of five existing 132/33 kV substations (Component 2), and (iii) capacity building of power sector personnel (Component 3).

2. The Project was to be parallelly financed by the Asian Development Bank (ADB), Islamic Development Bank (IsDB) and the European Investment Bank (EIB) with the Government of Bangladesh (GOB) (government) contributing equity.

3. ADB allocated \$185 million from its Ordinary Capital Resources (OCR) to finance the conversion of the 150 MW Khulna OCPP to a 225 MW CCPP implemented by the Northwest Power Generation Company Limited (NWPGL), transmission network expansion work implemented by the Power Grid Company of Bangladesh (PGCB) and some of the capacity building activities. 2. ADB loan for tranche 1 was approved on 28 November 2012, loan agreement was signed on 3 April 2013 and the loan was declared effective on 25 June 2013.

4. The IsDB pledged financing for the conversion of the 150 MW Sylhet OCPP to a 225 MW CCPP, implemented by the Bangladesh Power Development Board (BPDB). The IsDB credit facility for \$85 million was approved on 31 March 2013, signed on 26 February 2014, and declared effective on 02 November 2015.

5. A euro loan equivalent to \$91 million, signed on 18 November 2013, was granted by the EIB to finance the conversion of the 100 MW Baghabari OCPP to a 150 MW CCPP and the 70 MW Shahjibazar OCPPs to a 105 MW CCPP, both to be implemented by BPDB. In addition, EIB offered grant financing of €5.7 million (equivalent to \$7 million) to support project implementation and for capacity building activities implemented by the Power Division of the Ministry of Power, Energy and Mineral Resources (MPEMR). €2.5 million was earmarked for the capacity building activities and the remaining €3.2 million for project implementation support. Grant Agreement for implementation support consultants was signed on 4 June 2015, while Grant Agreement for the capacity building activities was signed in December 2015.

### **B. Implementation Status**

#### **1. Conversion of 150 MW Sylhet OCPP to a 225 MW CCPP**

6. On 5 February 2013, the Executive Committee of the National Economic Council (ECNEC) of the government approved the development project proposal (DPP) to convert the Sylhet power plant to a combined cycle power plant (CCPP) at a cost of Tk7,075.4 million (equivalent to \$112.5

million) that included foreign currency costs of Tk5,353.8 million (equivalent to \$85 million).<sup>30</sup> Envisaged implementation period was from January 2013 to December 2014.

7. General Procurement Notice (GPN) was published by BPDB on 10 April 2013 following IsDB procurement guidelines. Bid documents were approved by IsDB on 15 May 2013. BPDB issued prequalification (PQ) notice on 16 June 2013 that was published in local newspapers on 30 June 2013, with a submission deadline of 10 October 2013. The deadline was subsequently extended to 12 November 2013. Twenty-one prospective bidders submitted proposals for prequalification and the BPDB Board approved evaluation report on 16 April 2014 of qualified proposals from 12 bidders (including 2 conditionally qualified proposals). BPDB sent PQ proposal evaluation report to IsDB on 23 April 2014. After several meetings between IsDB and BPDB and clarifications by bidders on queries raised by BPDB (on IsDB request), IsDB concurred with the report on 8 September 2015. PQ process took over 21 months.

8. BPDB issued bid documents to the 12 prequalified bidders on 14 October 2015 with bid submission date of 15 December 2015. Pre-bid meeting was held on 12 November 2015 and response to bidders' queries was sent to all bidders on 24 November 2015. Bid submission date was extended up to 24 January 2016 through an addendum. A single-stage single-envelope bidding process was followed. Bids were received and opened on 24 January 2016 by BPDB's standing proposal opening committee. Only three prequalified bidders submitted bids. The bidders were (i) China National Electric Engineering Co. Ltd., People's Republic of China (CNEEC), (ii) Consortium of Lakhdhanavi Ltd. Sri Lanka and LTL Projects (Pvt.) Ltd. Sri Lanka (LAKHDHANAVI), and (iii) Shanghai Electric Group Co. Ltd., People's Republic of China (SEGCL).

9. A Standing Proposal Evaluation Committee (PEC) formed by the Power Division of the MPEMR on 24 December 2015 evaluated the bids. EPC bid prices for engineering, procurement and construction (EPC) at bid opening, after discounting and arithmetic corrections by the PEC, the guaranteed combined cycle plant output in kW and the per kW evaluated costs are given in Table 7.1.

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<sup>30</sup> A discrepancy in the estimated local currency (LC) costs between the project appraisal (\$17.4 million) and the subsequently approved DPP (\$27.5 million) observed, which is due to the higher local costs expected to be borne by the executing agencies due to the high interest rate of the subsidiary loan obtained from the government and the exposure to exchange rate variation.

**Table 7.1: Comparison of Bid Prices**

Description	CNEEC	LAKHDHANAVI	SEGCL
Read out EPC bid prices			
FC	\$88,972,962.98	\$71,151,149.75	\$71,268,115.46 €13,207,510.00
LC	0.00	Tk353,048'073.00	Tk229,551,816.53
Discount	0.00	0.00	\$1,400,000.00 €1,200,000.00
EPC bid prices after arithmetic corrections and discount			
FC	\$88,972,962.98	\$71,151,149.75	\$69,868,115.46 €12,007,510.00
LC	0.00	Tk353,048'073.00	Tk229,551,816.53
Equivalent EPC bid prices			
In Tk	Tk6,984,337,593.93	Tk5,938,413,328.38	Tk6,732,101,919.36
In \$	\$88,972,962.98	\$75,648,577.43	\$85,759,260.12
Guaranteed capacity (kW)	215,750	213,450	231,290
Unit price (Tk/kW)	1,108.50	1,086.41	1,026.68
<b>Rank</b>	<b>3<sup>rd</sup> Lowest</b>	<b>2<sup>nd</sup> Lowest</b>	<b>Lowest</b>

10. PEC recommended the award of the contract to the lowest evaluated bidder, SEGCL.<sup>31</sup> BPDB Board approved PEC report on 11 April 2016. BPDB sent the bid evaluation report to IsDB on 18 April 2016.

11. On 27 April 2016, IsDB sent a letter to BPDB requesting for some missing documents and seeking BPDBs comments on feasibility, viability and long-term sustainability of the methodology proposed by SEGCL to generate additional power through overhauling of the GTs. BPDB responded on 4 May 2016, providing translated copies of some documents in Bangla, copy of the missing attachment in support of LAKHDHANAVI and missing calculation sheet in support of SEGCL proposal for generating additional power.

12. IsDB wrote back on 16 May 2016 indicating that allowing SEGCL to offer a GT output exceeding **maximum 142.25 MW of GT output** documented in bid document may be a source of potential unfair advantage given to SEGCL. BPDB wrote back on 25 May 2016 with required enclosures stating that:

*“there is no word **maximum ceiling output** written in the bid document. In the bid document’s (Vol.2. Scope of work, Sub-clause 2.3 (A) page 9), it is clearly mentioned that the required overhauling/modification of existing Sylhet 150 MW GT for restoring the previous performance of net output 142.45 MW and net heat rate of 10.828 kJ/kWh. Present capacity (base load) of 145 MW was mentioned in bid document in order to provide opportunities for more bidder participation in the bidding process.*

<sup>31</sup> In accordance with the bid conditions, the bidder who has offered the lowest unit price (and not the lowest EPC bid price) was determined to be the lowest evaluated bidder.

*In the bid document (Vol.2, Scope of work, clause 2.1.1, page 8), it is clearly mentioned that BPDB requirement for total net power output in the combined cycle mode (base load) = 225 MW +10%.*

*In the pre-bid meeting held on 12 November 2015, all issues including your query written in the present letter were discussed and as per the request of bidders, all information regarding existing Sylhet 150 MW GT, starting from topographical survey report to PAC report, as-built drawings and the performance test report of GT at 50%, 75% and 100% load etc. were furnished to all bidders and sent to IDB on 24 November 2015. In the performance test report, base load (100%) output was (mentioned as) 161.6048 MW (As per Ansaldo test report), which has been provided to all bidders.*

*Since all the documents and necessary information were provided to all bidders for fair bidding, the matter of potential unfair advantage to SEGCL is not logical"*

13. On 2 June 2016, IsDB sent a letter stating that, since SEGCL was the current operator of Sylhet power plant, if the plant is able to generate more than 142.25 MW (as being presently claimed by SEGCL in its current bid), it should have been demonstrated and duly attested at the time of the original Performance Test. IsDB also advised BPDB to ensure that SEGCL does not enjoy any undue advantage to avoid any potential complaints from other bidders that may lead to rebidding. BPDB responded on 8 June 2016 and stood by its position.

14. On 12 June 2016, IsDB sent another letter to BPDB stating:

*"Having reviewed Article 2.3 (A) of the tender document, we were unable to find any reference to GT gross output, which is being imposed by SEGCL to formulate their proposal.*

*To facilitate our review, you are requested to please provide us with a reference to GT Gross Output value in the Tender Document."*

15. In response on 15 June 2016, BPDB detailed the reference GT condition given in Vol 2, Article 2.3 (A) of the Bid Document and also detailed SEGCL's proposal for overhauling the existing GTs backed by details of overhauling by Ansaldo (the manufacturer of the GTs.) that would increase gross output to 153.2 MW. BPDB also mentioned that other two bidders did not propose any overhauling of GTs.

16. IsDB, through emails dated 16 June 2016, 19 June 2016 and 22 June 2016, requested for some bid evaluation related information and documents that were provided by BPDB through letters/emails dated 22 June 2016 and 23 June 2016, respectively.

17. On 29 June 2016, IsDB sent a letter deliberating on their position in favor of using the net power output value of the GT of 142.25 MW as an input to frame bid proposals, and proposed to award the contract to the lowest responsive bidder LAKHDHANAVI who has complied fully with the requirements of the Tender Document (including satisfying post-qualification criteria). On 1 August 2016, BPDB sent response to IsDB, reiterating their position and requesting to reconsider awarding the contract to SEGCL to avert any further delay in implementing the project. On 8 August 2016, IsDB responded, sharing concerns of BPDB regarding delay in completion of procurement process. It was also mentioned in the letter that:

*“As you are well aware, the pre-qualification exercise (took) more than two years to complete owing to BPDB’s insistence to disqualify SEGCL, claiming that SEGCL lacks the requisite Specific Experience of constructing a Steam Turbine Power Plant.”*

18. On the same date, BPDB referred the matter to Power Division for seeking IsDB concurrence through ERD. On 18 August 2016, BPDB sent an email to IsDB requesting for allocating time for a meeting with a government mission. IsDB responded on 22 August 2016 declining to meet government mission. On 7 September 2016, BPDB sent an email attaching a letter to IsDB signed by the Secretary to the BPDB Board, requesting for a meeting. IsDB responded through an email on 9 September 2016, stating that as BPDB failed to agree to IsDB views on using the net power output value of the GT of 142.25MW as an input to frame bid proposals, further meeting will further delay the award of contract.

19. On 21 September 2016, BPDB wrote to Power Division for guidance. On the same date, BPDB sent another letter to Power Division requesting to write to ERD for seeking IsDB concurrence on re-evaluation of bids by a third party (as opined by the Secretary, Power Division, in the monthly Project Steering Committee meeting held on 4 September 2016).

20. On 26 September 2016 and 5 October 2016, BPDB wrote to IsDB stating BPDB’s position on bid evaluation and requesting early settlement of the issue. On 18 October 2016, IsDB responded to these letters reiterating IsDB’s position on the bid submitted by SEGCL. On 6 November 2016, IsDB sent an email to BPDB to explore the possibility of amicably closing the project. On 13 November 2016, IsDB sent another email to BPDB seeking BPDB’s feedback on IsDB’s proposal to amicably closing the project.

21. On 20 Nov 2016, IsDB sent a letter to ERD to initiate the discussion of the Financing Agreements to explore the possibility of cancelling the project financing. ERD responded on 7 March 2017 requesting IsDB to do needful to finalize the cancellation of Financing Agreement and ensure reallocation of its unutilized resources to the project titled Extension and Augmentation of Power Distribution System Project in the West Zone Area.

22. Financing of the Sylhet power plant conversion project was subsequently undertaken by the government.

## **2. Conversion of 100 MW Baghabari OCPP to 150 MW CCPP and 70 MW Shahjibazar OPCC to 105 MW CCPP.**

23. On 2 April 2013, ECNEC approved the DPP for conversion of Baghabari 100 MW OCPP to 150 MW CCPP at a cost of Tk5,137.7 million (equivalent to \$81.6 million) that includes a Tk4,341.5 million (equivalent to \$68.9 million) foreign currency component. Envisaged implementation period was from January 2013 to December 2014. On the same day, ECNEC also approved the DPP for conversion of 70 MW Shahjibazar OCPP to 105 MW CCPP at a cost of Tk3,420.0 million (equivalent to \$54.3 million) that includes a Tk3,074.2 million (equivalent to \$48.8 million) foreign currency component. Envisaged implementation period of the latter was from January 2013 to December 2014.

24. On 15 March 2016, contract for implementation support consultancy was signed with Tractebel Engineering JV, Belgium. Consultants prepared bidding documents for the main (EPC) contracts, which were reviewed and approved by BPDB.

25. The tender for the EPC contract was floated on 19 January 2017 and closed on 7 May 2017. Seven bidders submitted bids for both plants. Five bidders were technically qualified for Baghabari Power Plant conversion project while four bidders were qualified for the Shahjibazar Power Plant conversion project. BPDB submitted Technical Bids Evaluation Report to EIB on 19 July 2017 for concurrence. EIB issued “No objection” on 12 February 2018.

26. Financial Bids of technically qualified bidders were opened on 25 February 2018. BPDB completed evaluation of financial bids, which was approved by BPDB’s Board on 2 April 2018. BPDB submitted the Financial Bid Evaluation Report (FBER) to EIB on 5 April 2018 for concurrence.

27. Bid price of the lowest evaluated bidder for both plants was €177.1 million, that was 116% over the EIB loan amount of €82.0 million. Foreign currency cost estimated at appraisal was \$86.3 million. The significantly high bid prices received can be attributed to the requirement identified by all the bidders for overhauling of the gas turbines, which was not foreseen at the project design stage.

28. The high bid prices were discussed in the Power Division’s Project Steering Committee meeting held on 15 May 2018. It was decided that BPDB should write to EIB for €95.0 million additional funding and extending project period by 2 years. It was also decided that in case of not getting positive response from EIB in due time, these two projects should be declared as closed as these plants are around 18 years old and conversion at such high cost led to marginal financial and economic benefits.

29. Accordingly, BPDB sent a letter to EIB on 31 May 2018 (received by EIB through an email from Project Director (PD) of the project) for additional funding. EIB sent a letter to ERD on 8 June 2018 expressing their inability to provide requested amount due to fund constraints. EIB also referred to the provision of the Finance Contract regarding arranging excess funding. EIB requested for confirmation of availability of excess funding shortly enabling them to give no-objection to the financial bid evaluation report.

30. ERD communicated EIB’s position to the Power Division on 19 June 2018. On 10 July 2018. Power Division sent a letter to ERD to inform EIB about its decision to declare the projects closed due to failure to arrange additional funding.

## ECONOMIC REEVALUATION

### A. General

1. The economic reevaluation was done to assess and validate the economic efficiency of the Tranche 1 project of the Power System Expansion and Efficiency Improvement Investment Program (Project) upon completion. In comparison with the economic evaluation done at project appraisal stage, project scope, costs and likely benefits are more evident, allowing an accurate account of economic returns of the Project. The economic reevaluation follows the same principles and the approach followed at project appraisal, but validates the major assumptions used in the original economic analysis and presents more realistic forecasts on economic performance of the Project based on actual project data on costs and likely benefits. The economic reevaluation was carried out in accordance with ADB's guidelines for economic evaluation of projects.<sup>32</sup>

2. The Project was initiated with the main objective of contributing towards increased access to a clean and reliable electricity supply in Bangladesh. The Project comprised investments on; (1) increasing the capacity of four existing power plants by 235 MW and improving their efficiency by more than 55%; (2) construction of three new 132 kV transmission lines with a combined line length of 230 km, construction of two new 132/33 kV grid substations and augmentation of another five; and (3) providing consultancy support for preparation of future projects for financing, implementation of the power plant conversion projects and improve power sector institutional capacity on planning and operation of projects. During project implementation, conversion of two of the power plants was removed from the project scope and two additional transmission lines and two new substations were constructed, whilst another substation was augmented as additional scope to the Project. The project scope was redefined with the above additions and deletions in undertaking the reevaluation of the Project's economic performance.

3. To compare the efficiency of the project as realized at project completion against the evaluation done at project appraisal, the economic internal rate of return (EIRR) was recalculated. Analyses were performed for a period of 27 years, inclusive of the 7-year project implementation period (2013-2019), and 20 years of post-implementation operating period (2020-2039). All the costs and benefits are stated in constant 2019 United States dollars (\$) using the world price numeraire, instead of using constant 2012 prices denominated in Bangladesh Taka (Tk) based on the domestic price numeraire as done at appraisal. This change of currency basis was adopted for the reevaluation to allow the direct use of actual project expenditure predominantly made in US dollars at their border prices as their economic costs. However, the results of the evaluation are unaffected by the difference in currency basis applied.

### B. Demand Analysis

4. Project investments have originally been appraised with the anticipation of a growth in electricity demand at around 10% per annum over the period from 2012 to 2021. During the period from 2012-2019, Bangladesh recorded an annual electricity demand growth of around 11%. It is expected for this demand growth to sustain for the foreseeable future.

5. Although new power plants are being built in Bangladesh, it is expected that the entire generation capacity available in the country to be utilized to meet the growing demand. Thus, any generation capacity additions and transmission loss reductions, as envisaged by the Project, would not result in surplus power or any wastage in generation or transmission capacity.

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<sup>32</sup> ADB. 2017. *Guidelines for the Economic Analysis of Projects*. Manila.

### C. Economic Costs

6. Economic costs considered in the assessment mainly comprised the upfront capital investments made on the Project over the implementation period and the additional operation and maintenance costs associated with the new generation and transmission assets installed by the Project.

7. **Capital costs.** Expenditure made during the project implementation period, recorded as; ADB loan disbursements, EIB grant funding, the government's counterpart funding and the cost of converting Sylhet Power Plant borne by the government were considered to constitute the overall capital cost of the Project. Expenditure made in Bangladesh Taka (Tk) were converted to US dollars using the annual average Tk/\$ currency exchange rates. Expenditure on traded goods and services, non-traded goods and services and labor were assigned different conversion factors to adjust the actual (financial) costs to represent their economic costs. The taxes and levies, which are transfer payments, were omitted (assigned a shadow rate of 0) to reflect the national perspective.

8. Capital cost of the project was dominated by the tradable goods and services such as imported equipment and material and foreign skilled labor. These costs were denominated in their world market prices thus, were directly used as economic costs. Cost of non-traded goods and material incurred and recorded directly in domestic market prices such as civil works and unskilled labor were adjusted by the standard conversion factor (SCF) of 0.94, which was derived from the shadow exchange rate factor (SERF) of 1.06 used at appraisal. Table 8.1 provides project capital costs in economic terms upon adjusting using the conversion factors.

**Table 8.1: Economic Capital Costs of the Project**  
(\$ million)

Cost Item	Cost
Equipment and material	233.40
Civil works and labor	38.47
Land, environmental, and social mitigation	0.11
Consulting services	9.58
<b>Total cost</b>	<b>281.55</b>

Source: Asian Development Bank estimate.

9. **Operation and maintenance cost.** An additional annual operation and maintenance (O&M) cost equivalent to 1% of the investment was assumed for the two converted power plants.<sup>33</sup> The transmission lines and substations were also assumed to incur an annual O&M cost equivalent to 1% of their capital cost, which is typical for transmission lines.<sup>34</sup> Since the O&M of power plants and transmission assets largely involve imported material, equipment and skilled labor, a SCF of 1 was used to derive the economic cost of the expected O&M expenses.

10. **Additional electricity generation cost.** Owing to the increased capacity, the two power plants are expected to produce additional electricity. However, the additional generation capacity achieved by installing steam turbines is operated using the energy recovered from the gas turbine, which would otherwise be wasted. Thus, there would be no additional energy cost associated with

<sup>33</sup> O&M cost equivalent to 1% of capital cost for the power plants results in a variable O&M cost of 0.25 Tk/kWh for the two power plants, which is only slightly above the actual variable O&M cost of 0.19 Tk/kWh accounted for Sylhet power plant by BPDB (source: BPDB. 2019. *Annual Report 2018/2019*. Dhaka).

<sup>34</sup> Asian Development Bank. 2013. *Cost-benefit analysis for development: A practical guide*. Manila



the two power plants despite producing close to 50% additional energy in comparison with the generation levels observed prior to the conversion.<sup>35</sup> Similarly, the reduction in transmission losses due to the construction of the new transmission lines and substations makes available additional electricity to be supplied to the consumers without a corresponding generation cost.

#### **D. Economic Benefits**

11. Additional electricity supplied to the consumers by increasing the capacity of the two power plants and by reducing network losses by constructing new transmission assets were considered as the economic benefits of the Project. Due to the project, Khulna and Sylhet power plants were able to increase their electricity production approximately by 75 MW each, without consuming any additional fuel. Similarly, the transmission system improvements undertaken by the project resulted in electricity being transferred using the new transmission lines and substations incurring a lower loss than before. When a lower amount of electrical energy is wasted during transmission, the end-use consumers can consume more energy without increasing electricity generation. Thus, both components of the project have resulted in providing consumers with additional electricity to consume, without needing any additional resources such as fuel to produce that electricity.

12. As observed at project appraisal, the benefits of the additional electricity supplied by the project are different for different consumer categories. In the absence of the additional electricity supply by the project, i.e. when the electricity supply is curtailed, the residential consumers are unlikely to use alternative generating sources, resulting in an overall reduction in output or utility of the residential consumers. When the supply curtailments are partly bridged by the additional electricity supplied by the project, the output or the utility of the residential consumers increase. Thus, the project results in incremental outputs by the residential consumers. In contrast, the commercial, agricultural, and other consumer categories are likely to use alternative generation during periods when grid electricity is not available, incurring higher economic costs. Thus, for these consumer groups, the additional electricity supply by the project results in a resource cost saving. For industrial consumers, even a higher cost of unserved energy has been estimated at appraisal, considering the additional economic costs incurred by the industrial sector during supply interruptions. However, unlike for residential consumers, the project does not cause incremental outputs by these consumers, but merely offsets the higher economic costs previously incurred to produce the same outputs.

13. Currently, across the entire power system, 53.3% of the electricity is consumed by domestic consumers, 29.6% by industrial consumers and the rest by commercial, agricultural, and other consumers.<sup>36</sup> The additional energy demand served by the Project is expected to be consumed by the same consumer mix, as curtailment of electricity is generally spread across all consumer categories uniformly.

14. Economic benefits of the electricity supplied by the project resulting in incremental outputs were valued at the consumers' willingness to pay for the additional electricity consumption. On the other hand, the economic cost savings achieved by the project by avoiding alternative generation were used as the economic benefits related to the non-incremental outputs served by the project. The non-traded benefit of additional electricity supply valued at their domestic price levels were converted to world market prices using the standard conversion factor of 0.94.

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<sup>35</sup> The commissioning test report of Khulna power plant confirmed the additional capacity added by the Project to be 78.3 MW in comparison with the original capacity of 167.8 MW.

<sup>36</sup> Bangladesh Power Development Board. 2019. *Annual Report 2018/2019*. Dhaka.

15. For residential consumers, to ascertain their willingness to pay for the additional consumption, the economic reevaluation considered both the current tariffs paid for electricity by the households (mainly consuming less than 75 kWh/month) and also the consumer surplus created by the additional supply.<sup>37</sup> For industrial customers, project benefits were valued at the cost of unplanned outages in industry, following the same 2003 study by the United States Agency for International Development used for project appraisal, which suggests a 28.21 Tk/kWh cost to be used to value energy unserved to the industry, adjusted to 2019 prices.<sup>38</sup> For commercial consumers, project benefits were valued at the resource cost saving of avoiding captive generation, considering their fuel and variable O&M costs. The total project benefit was estimated as the weighted average benefit for all consumer categories using the consumer shares discussed in para. 12.

16. In estimating the additional amount of electricity supplied to consumers, the key technical parameters used at appraisal were used with necessary adjustments as follows: (i) power plant load factor = 70% (same as in appraisal), (ii) plant availability = 92% (same as in appraisal), (iii) auxiliary consumption = 3.9% (same as in appraisal), (iv) transmission loss = 3.15% (revised from 3.3% assumed at appraisal to reflect the present situation), (v) distribution technical loss = 9.12% (reduced from the 13.6% used at appraisal to reflect the present situation) and nontechnical losses = 5.0% (same as appraisal), (vi) annual energy transferred by the transmission lines = 4,100 GWh of energy per year (increased the 3,280 GWh used at appraisal by 25% to reflect the additional scope implemented under component 2), and (vii) reduction of energy loss in the transmission lines = 1.14% (corresponding to the loss reduction of the overall network from 2.72% to 2.64%,<sup>39</sup> adjusted for the proportion of power flows handled by the project transmission lines compared with the overall network power flows) (footnote 36).

17. **Environmental benefit.** The additional electricity supplied to both the industrial and commercial consumer categories were assumed to be offsetting their own generation using standby diesel generators. In addition to avoiding the cost of operating these generators, the additional electricity supply would offset the CO<sub>2</sub> emissions caused by the standby generation. Assuming an emission intensity of 0.97 tons of CO<sub>2</sub>/MWh for diesel generators, and a social cost of \$36.3 for a ton of CO<sub>2</sub> emitted (at 2016 prices, escalated at 2% per year), the economic benefit of avoiding CO<sub>2</sub> emissions were also estimated and included in the project cost benefit analysis.<sup>40</sup>

## E. Economic Internal Rate of Return

18. By using the estimates of economic costs and benefits mentioned above, the economic internal rate of return (EIRR) was recalculated for the Project. Table 8.2 lists the annual costs and benefits of the Project, yielding a re-evaluated project EIRR of 33.6%, well above the hurdle rate of 12.0% used by ADB at the time of project appraisal.<sup>41</sup> When the two investment components of the project were separately assessed, the EIRR of component 1 was reevaluated as 41.2% while the EIRR of component 2 was reevaluated at 5.6%, substantially lower than the originally

<sup>37</sup> Asian Development Bank. 2013. *Cost-benefit Analysis for Development: A Practical Guide*. Manila.

<sup>38</sup> Nexant (USAID-SARI Energy Program). 2003. *Bangladesh: Economic Impact of Poor Power Quality on Industry*. Delhi.

<sup>39</sup> Average transmission loss in FY2017 (i.e. from 1st July 2016 to 30th June 2017) has been reported as 2.67% and the loss in FY 2018 (i.e. from 1st July 2017 to 30th June 2018) has been reported as 2.60%. Thus, the transmission loss level achieved by 31st December 2017 is taken 2.64%, which the average of these two loss levels.

<sup>40</sup> ACIL Allen Consulting for Australian Energy Market Operator (AEMO). 2014. *Emission Factors, Review of Emission Factors for use in the CDEII*. Brisbane, 2017. *Guidelines for the Economic Analysis of Projects*. Manila.

<sup>41</sup> If the environmental benefits are ignored, as done at project appraisal, EIRR reduces to 31.4%.

appraised EIRRs of respectively 64.2% and 16.8%. This reduction in project economic returns could be attributed to the longer implementation period, the cost over-runs and the non-achievement of the expected loss reductions by the transmission lines. Consequently, the re-evaluated EIRR returned lower than the 56.6% estimated at project appraisal, mainly due to the cancellation of the two power plant conversion projects, which were expected to provide substantial economic benefits compared with their costs. Project appraisal had also recognized the likely reduction of EIRR, in the event of delay in project implementation, as was the actual situation with the Project.

**Table 8.2: Economic Cost Benefit Analysis of the Project**  
(\$ million)

Year	Economic Costs			Economic Benefits			Net Benefits		
	Capital	O&M	System Costs	Incremental Outputs	Non-incremental Outputs	Avoided CO <sub>2</sub> Emissions	Without Environmental Benefits	With Environmental Benefits	
2013	0.226	-	-	-	-	-	(0.226)	(0.226)	
2014	19.455	-	-	-	-	-	(19.455)	(19.455)	
2015	69.841	-	-	-	-	-	(69.841)	(69.841)	
2016	43.039	-	-	-	-	-	(43.039)	(43.039)	
2017	34.069	-	-	-	-	-	(34.069)	(34.069)	
2018	70.577	0.992	1.132	8.188	57.332	5.785	(7.181)	(1.397)	
2019	34.966	2.152	1.132	9.166	64.136	6.600	35.052	41.652	
2020	9.381	3.144	2.265	17.471	121.467	12.751	124.149	136.900	
2021	-	3.144	2.265	17.471	121.467	13.006	133.530	146.536	
2022	-	3.144	2.265	17.471	121.467	13.266	133.530	146.796	
2023	-	3.144	2.265	17.471	121.467	13.531	133.530	147.061	
2024	-	3.144	2.265	17.471	121.467	13.802	133.530	147.332	
2025	-	3.144	2.265	17.471	121.467	14.078	133.530	147.608	
2026	-	3.144	2.265	17.471	121.467	14.359	133.530	147.889	
2027	-	3.144	2.265	17.471	121.467	14.647	133.530	148.176	
2028	-	3.144	2.265	17.471	121.467	14.939	133.530	148.469	
2029	-	3.144	2.265	17.471	121.467	15.238	133.530	148.768	
2030	-	3.144	2.265	17.471	121.467	15.543	133.530	149.073	
2031	-	3.144	2.265	17.471	121.467	15.854	133.530	149.384	
2032	-	3.144	2.265	17.471	121.467	16.171	133.530	149.701	
2033	-	3.144	2.265	17.471	121.467	16.494	133.530	150.024	
2034	-	3.144	2.265	17.471	121.467	16.824	133.530	150.354	
2035	-	3.144	2.265	17.471	121.467	17.161	133.530	150.691	
2036	-	3.144	2.265	17.471	121.467	17.504	133.530	151.034	
2037	-	3.144	2.265	17.471	121.467	17.854	133.530	151.384	
2038	-	3.144	2.265	17.471	121.467	18.211	133.530	151.741	
2039	-	3.144	2.265	17.471	121.467	18.575	133.530	152.105	
							<b>EIRR</b>	<b>31.4%</b>	<b>33.6%</b>

( ) = negative, EIRR = economic internal rate of return

Source: Asian Development Bank estimates

## F. Sensitivity Analysis

19. The economic efficiency of the project and the results derived from the economic reevaluation were tested for their sensitivity to adverse changes in project parameters. The sensitivity test parameters used were the (i) reduction in the plant factor of the converted power plants from 70% to 40% due to supply shortage of natural gas or reduction in consumer demand, (ii) increase in operation and maintenance cost of the power plants and the transmission assets from 1% to 2% of the investment cost, (iii) 20% reduction in the value of additional electricity supplied to consumers, (iv) reduction in demand causing the electricity transfers across the transmission network to reduce, and (v) all of the above adverse condition occurring together. Under all these adverse situations, occurring separately as well as together, the project was evaluated to exceed the threshold EIRR of 12%, ensuring the efficiency of the Project in the longer term.

**Table 8.3: Results of the Sensitivity Analysis**

<b>Parameter</b>	<b>Change</b>	<b>EIRR</b>
Base case		33.6%
Reduction of plant factor by	30%	22.5%
Increase in new O&M costs by further	1%	33.1%
Reduction in value of incremental energy by	20%	28.9%
Reduction in electricity demand by	25%	33.2%
Combination of all above		17.8%

## FINANCIAL REEVALUATION

### A. General

1. The financial reevaluation of the Tranche 1 project of the Power System Expansion and Efficiency Improvement Investment Program (Project) was done to reassess and validate the financial sustainability of the Project for the executing agencies, upon project completion. The financial reevaluation was conducted using the guidelines for financial analysis and evaluation of projects of the Asian Development Bank (ADB).<sup>42</sup>

2. Yearly net cashflows generated by the project were estimated, taking the difference between capital, operational and tax outflows against the incremental revenue generated by Project. The financial re-evaluation was done for a period of 27 years covering the 7-year implantation period (2013-2019) and another 20 year of project operating period (2020-2039). All cash inflows and outflows to the project were estimated in their constant 2019 prices in United States dollars (\$) compared with the 2013 constant price levels used at appraisal.

3. The financial reevaluation re-calculated the financial internal rate of return (FIRR) and the financial net present value (FNPV) of the project. The project FIRR was compared against the weighted average cost of capital (WACC) of the project to ascertain whether the investments made on the project yields enough returns to meet the financial commitments made by the implementing agencies in securing financing for the Project. Furthermore, a comparison with the FIRR estimated at project appraisal was done to ascertain the financial impact of the revised scope of the project.

### B. Project Costs

4. **Capital costs.** The larger share of capital investments made on the Project was financed by ADB and disbursed directly in US dollar against the procurement contracts entered into by the executing agencies. In addition to ADB financing, the government, disbursed counterpart funding through the executing agencies mainly to meet the local expenses. To conduct the financial analysis using a common currency, these expenses made in Taka (Tk) were converted to US dollars using the average Tk/\$ currency exchange rate of each year the project expenditures were made. International inflation applicable on costs denominated in US dollar was neglected. Due to the withdrawal of loan financing by EIB, the importation of equipment and material for the Sylhet Power Plant conversion project was made by BPDB using government funds and these US dollar denominated expenses were treated in the same manner as the ADB expenses on the Project.

5. The capacity building activities were not included as a capital investment of the Project. Similarly, the financing charges paid to ADB during project implementation were not considered as the intension of the analysis was to compare the financial returns of the Project with its cost of financing (WACC). On the other hand, the tax expense of the project during the implementation period was considered part of the capital investment. Accordingly, the capital costs considered in the financial re-evaluation included expenditure on turn-key contracts, equipment and material, land and safeguards, and taxes. Table 9.1 shows the annual expenditure made on the project, denominated in constant 2019 US dollars.

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<sup>42</sup> ADB. 2019. *Financial Analysis and Evaluations of Projects*. Manila

**Table 9.1: Project Capital Investments**  
(\$ million)

<b>Cost Item</b>	<b>Cost</b>
Conversion of Khulna Power Plant	104.11
Conversion of Sylhet Power Plant	90.86
Construction of transmission lines and substations	114.63
<b>Total Investment (without Capacity Building and IDC)</b>	<b>309.60</b>

Sources:

1. Contract Monitoring Sheet of Loan 2966 maintained by ADB.
2. Final Cancellation and Final Amortization Schedule of Loan 2966 issued by ADB.
3. Project Completion Reports prepared and submitted to ADB by the executing agencies

6. **Operation and maintenance (O&M) costs.** An incremental annual operation and maintenance (O&M) cost equivalent to 1% of the investment was assumed for the two converted power plants. The transmission lines and substations were also assumed to incur an annual O&M cost equivalent to 1% of their capital costs.

7. **Tax.** A cash outflow corresponding to the increase in taxes payable by the executing agencies due to the increased revenue generated by the Project was included in the cashflow analysis. After providing for depreciation of project assets, a 25% tax by NWPGL and PGCB and a 35% tax by BPDB were assumed to be payable on the incremental earnings.<sup>43</sup>

### C. Project Benefits

8. Financial benefits of the Projects are mainly the increased revenue arising from the additional electricity generated by the two power plants (paid at the rate of 2.75 Tk/kWh) and the additional wheeling charges (paid at the rate of 0.2768 Tk/kW) allowed for PGCB for facilitating the additional electricity transfers.<sup>44</sup>

9. Benefits were assumed to accrue from the year following commissioning of each revenue earning subproject. Accordingly, the revenue increment related to Khulna Power Plant was assumed from 2018, transmission assets from 2019 and Sylhet Power Plant from 2020. An incremental energy transfer of 4,100 GWh was attributed to the investments made on the transmission assets, adjusting the energy transfer estimate made at project appraisal by 25% to reflect the increased scope implemented under component 2.

### D. Financial Internal Rate of Return

10. Net cashflows expected due to the Project were estimated for each year over the assessment period from 2013 to 2039 to calculate the project FIRR. Table 9.2 shows the estimated Project cashflows over the assessment period.

<sup>43</sup> Straight-line depreciation method was used. Power plants were depreciated over 20 years. Transmission assets were

<sup>44</sup> Bangladesh Power Development Board. 2019. *Annual Report 2018/19*. Dhaka, Power Grid Company of Bangladesh. 2018. *Annual Report 2017/18*. Dhaka.

**Table 9.2: Project Cashflow Estimates**  
(\$ million)

Year	Costs			Benefits		Net Cashflow
	Capital costs	Incremental O&M	Tax	Incremental Revenue		
2013	-	-	-	-	-	-
2014	23.043	-	-	-	-	(23.043)
2015	77.694	-	-	-	-	(77.694)
2016	53.062	-	-	-	-	(53.062)
2017	40.954	-	-	-	-	(40.954)
2018	69.365	1.041	1.219	22.242		(49.383)
2019	36.394	2.187	3.369	35.812		(6.139)
2020	9.086	3.096	5.354	35.812		18.276
2021	-	3.096	5.354	35.812		27.362
2022	-	3.096	5.354	35.812		27.362
2023	-	3.096	5.354	35.812		27.362
2024	-	3.096	5.354	35.812		27.362
2025	-	3.096	5.354	35.812		27.362
2026	-	3.096	5.354	35.812		27.362
2027	-	3.096	5.354	35.812		27.362
2028	-	3.096	5.354	35.812		27.362
2029	-	3.096	5.354	35.812		27.362
2030	-	3.096	5.354	35.812		27.362
2031	-	3.096	5.354	35.812		27.362
2032	-	3.096	5.354	35.812		27.362
2033	-	3.096	5.354	35.812		27.362
2034	-	3.096	5.354	35.812		27.362
2035	-	3.096	5.354	35.812		27.362
2036	-	3.096	5.354	35.812		27.362
2037	-	3.096	5.354	35.812		27.362
2038	-	3.096	5.354	35.812		27.362
2039	-	3.096	5.354	35.812		27.362
				<b>FIRR</b>		<b>6.3%</b>

(-) = negative, FIRR = financial internal rate of return.

Source: Asian Development Bank estimates.

## E. Results of Project Financial Re-evaluation

11. From the financial re-evaluation, the Project FIRR has been estimated at 6.3%. This reevaluated FIRR is slightly higher than the FIRR of 4.5% estimated for the overall project at project appraisal. The reason for the increase in FIRR estimate can be attributed to the increase in project benefits expected in the form of increased revenue from incremental energy supplied by the two power plants, which are paid a higher tariff to compensate the higher fuel costs.

12. To ascertain the sustainability of the project in the longer term, the re-evaluated project FIRR was compared against the applicable hurdle rate for the Project. Since the financial re-evaluation was carried out for the entire investment financed collectively by the government and ADB, the applicable hurdle rate is the weighted average cost of capital (WACC) of the Project.

13. Main source of funding for the project was the ADB loan obtained by the government, which was channeled to the respective executing agencies to implement the project. Project equity was sourced from the government, which can be assigned with a cost of equity derived using based on the risk premiums applicable for the country and the energy sector. Accordingly, the cost of equity was estimated at 14.05%. Adjusting for the tax offset effected from the interest



payments, the equity cost was reassessed to be 10.54% whereas the apparent cost of ADB loan was reassessed to 1.2%. For the real term analysis conducted, removing the local and inflationary effects, the WACC of the project was re-estimated at 2.1%. Details of the WACC calculation is presented in Table 9.3.

**Table 9.3: Weighted Average Cost of Capital of the Project**

	<b>ADB Loan</b>	<b>government</b>	<b>Total</b>
A Proportion of financing	55.74%	44.26%	100.00%
B Nominal cost of capital	1.60%	14.05%	
C Tax rate	25.00%	25.00%	
D Nominal cost adjusted by tax, $B \times (1-C)$	1.20%	10.54%	
E Inflation rate	1.80%	5.50%	
F Real cost adjusted by tax, $[(1+D) \div (1+E)] - 1$	-0.59%	4.78%	
G WACC in real terms	0.00%	2.11%	<b>2.1%</b>

14. The reevaluated FIRR of 6.3% exceeds the re-assessed project WACC of 2.1%, implying the project to be a financially sustainable venture.

#### **F. Sensitivity Analysis**

15. A sensitivity analysis was performed to test the robustness of the project against adverse conditions relevant for the Project. The risk of inadequate gas supply forcing the two converted power plants to be under-utilized resulting in a reduction in project revenue was tested by decreasing the plant factor of the power plants from 70% to 40%. The Project FIRR reduced but remained above the WACC of 2.1%. Similarly, other adverse conditions such as the O&M costs increasing from 1% to 2% of the investment cost, increasing the project expenses and tariffs payable for incremental electricity generated and transmitted, resulting in a reduction in project revenue, were also tested and the Project showed resilience against all these adverse conditions. Thus, it can be concluded that the Project is financially sustainable for the executing agencies.

**Table 9.4: Sensitivity Analysis Results**

<b>Parameter</b>	<b>Variation</b>	<b>FIRR</b>
Base case		6.3%
Reduction of power plant load factor by	30%	3.3%
Increase in O&M costs by further	1%	5.4%
Reduction in tariff paid for incremental energy	10%	5.2%
Combination of all above		1.3%

## FINANCIAL SUSTAINABILITY OF THE EXECUTING AGENCIES

### A. North-West Power Generation Company Limited

1. **Financial Performance.** NWPGL was formed, incorporated, and registered in August 2007 under the framework of the Government Power Sector Reforms Policy and the provision of the Companies Act, 1994. 100% shareholding of the company is by the Bangladesh Power Development Board (BPDB), the government owned electricity utility. NWPGL is one of the fastest-growing power companies in Bangladesh, owning and operating seven power plants of total generation capacity of 1,813 MW and another six power plants under various stages of construction. NWPGL's historic financial performance was reviewed using audited financial statements from fiscal year (FY) 2014-2015 to FY2018–2019. Table 10.1 presents the key commercial, financial indicators of the company's financial performance and the ratios derived from the financial data pertaining to each fiscal year.

**Table 10.1: Financial Performance Indicators of NWPGL**

	FY2014-15	FY2015-16	FY2016-17	FY2017-18	FY2018-19
<b>Commercial Indicators</b>					
Electricity sales (GWh)	2,302	2,101	2,729	3,569	5,774
Average revenue per unit sold (Tk/kWh)	9.1	8.8	8.1	9.2	5.2
Average cost per unit sold (Tk/kWh)	8.0	7.9	7.1	7.7	3.9
<b>Financial Indicators (Tk million)</b>					
Revenues	21,017	18,420	22,162	32,704	30,036
Expenses	18,419	16,586	19,343	27,570	22,330
Operating profit	2,598	1,835	2,819	5,134	7,706
Interest expenses	796	754	718	2,052	3,514
Net profit after tax	1,284	824	1,295	1,914	3,271
<b>Financial Ratios</b>					
Operating profit margin (%)	12	10	13	16	26
Debt service coverage ratio (times)	1.9	1.6	2.0	2.0	1.5
Debt to equity ratio (%)	0.6	0.7	0.8	0.8	0.8
Current ratio (times)	2.8	2.2	2.8	2.2	1.6
Self-finance ratio (%)	26	16	16	21	36

Sources: Annual Reports of NWPGL; Financial Analysis linked document of the Report and Recommendation of the President of the Rupsha 800-Megawatt Combined Cycle Power Plant Project; ADB estimates

2. **Profitability.** With the expansion of its generation capacity, annual revenue of NWPGL has been growing rapidly, except for the revenue decrease in FY2015–2016 owing to the temporary closure of two power plants for inspection. As the electricity generation was predominantly natural gas based, which is cheaper than high speed diesel, the cost of generation in FY 2018-2019 was substantially lower. Still, the profitability of the company was not affected as the fuel is a pass-through cost which has little impact on the company's operating margin. As shown in Table 1, the profitability of the company has increased.

3. **Sustainability.** NWPGL has been reliant on borrowing to fund its growing capital expenditures. To ensure financial stability of the company, a requirement to maintain a minimum self-finance ratio (measured as net cash flows from operations divided by 3–year average capital expenditures) of 10% has been specified as financial covenants of the ADB loan. Despite making substantial capital expenditures, as evidenced in Table 1, NWPGL has met this condition up to now. Furthermore, the company has maintained its debt service cover ratio (DSCR) above 1.6,

on track to meet the financial covenant of maintaining a DSCR above 1.2 and from December 2019 and servicing all its debts on time. A financial projection done by ADB in 2017<sup>45</sup> has identified a strong financial outlook for the company, indicating the financial sustainability of the company in the short to medium term.

## B. Power Grid Company Limited

4. **Financial Performance.** The highlights of the historical performance of PGCB from fiscal year (FY) 2014-2015 to FY2018-2019 are in Table 10.2.

**Table 10.2: Financial Performance Indicators of PGCB**

Particulars	FY2014–15	FY2015–16	FY2016–17	FY2017–18	FY2018–19
<b>Commercial Indicators</b>					
Electricity transmitted (GWh)	40,060	46,413	50,846	55,740	64,244
Average revenue per unit (Tk/kWh)	0.228	0.27	0.279	0.275	0.2768
Average cost per unit (Tk/kWh)	0.247	0.233	0.23	0.236	0.219
<b>Financial Indicators (Tk/million)</b>					
Revenue from operations	9,378	12,722	14,368	15,590	17,783
Expenses	7,252	7,771	8,655	9,883	10,796
Operating profit	2,127	4,951	5,714	5,707	6,987
Interest expenses	2,657	3,022	3,061	3,283	3,249
Net profit after tax	416	1,226	1,996	2,180	3,840
<b>Financial Ratios</b>					
Operating profit margin (%)	22.7	38.9	39.8	36.6	39.3
Net profit margin (%)	4.2	9.3	13.5	13.7	21.6
Return on equity (%)	1.4	3.7	5.2	4.8	5.8
Debt-equity ratio	2.2	2.2	2.1	2.2	2.5
Debt service coverage ratio	1.8	0.7	1.6	2.8	3.4

Sources: Annual Reports of PGCB; Financial Analysis linked document of the Report and Recommendation of the President of the Dhaka and Western Zone Transmission Grid Expansion Project; and ADB estimates.

5. **Profitability.** PGCB has had a stable performance reflected by its steady profitability margins due to the regulated tariff offered to compensate its costs. Due to the increase in electricity transfers (energy wheeled), the company has received substantial revenue without a corresponding expense increasing the profit margin in FY2018-2019.

6. **Sustainability.** PGCB has been investing on expanding its network to meet the increasing electricity demand in the country, mainly using debt financing. The current debt–equity ratio of the company is estimated at 2.5. However, during the last four years, which coincided with the large investments, the DSCR improved from 0.7 at the end of FY2016 to an estimated 3.4 at the end of FY2019, mainly because of the tariff increase in FY2016 and the increase in demand served through its network, increasing the operating margin of the company. A financial projection done by ADB in 2018<sup>46</sup> has identified a stable financial performance for the company, with the underlying assumption of regular increase in the wheeling charge paid to the company to cover its costs and investments.

<sup>45</sup> Asian Development Bank. 2017. *Report and Recommendation of the President of the Rupsha 800-Megawatt Combined Cycle Power Plant Project*. Manila.

<sup>46</sup> Asian Development Bank. 2018. *Report and Recommendation of the President of the Dhaka and Western Zone Transmission Grid Expansion Project*. Manila

## PROJECT SAFEGUARDS

1. The project was classified category B for involuntary resettlement, category C for indigenous peoples, category B for environmental, and as having no gender elements.

2. **Involuntary resettlement.** As part of project appraisal, a resettlement and ethnic minority development plan was prepared to ascertain the social impacts of the project. As identified by the resettlement plan, no physical resettlement of people was recorded, and the project impact was limited to crop damage, which was a temporary impact during construction. An estimated 310 hectares of private land was affected temporarily during the construction of transmission lines. The requirements for removal of trees and crops were limited. About \$115,000 was paid as compensation for all crop damages because of the project, inclusive of the additional scope undertaken after the preparation of the resettlement plan.<sup>47</sup> To minimize social impacts as much as possible, alternative line routes were used. Total land acquired for the project was 22 hectares. Use of government land for the construction of new grid substations (e.g., Rangamati and Khagrachari) under component 2 considerably reduced the number of affected people of the project. Proper resettlement procedures and legal provisions were followed when acquiring private land for construction of substations when government-owned land was unavailable.<sup>48</sup>

3. PGCB did not update the resettlement plan to reflect the actual impacts of the project upon completing the detailed design or during the implementation of the project. Furthermore, the resettlement plan has not been updated to reflect the impacts of the additional scope undertaken by PGCB. However, the semiannual social monitoring reports and the project progress and completion reports submitted by the executing agencies confirmed that the project was implemented, inclusive of the additional scope, in compliance with the agreed resettlement plan and without complaints by affected persons.

4. **Indigenous peoples.** The resettlement and ethnic minority development plan prepared at project appraisal assessed the potential impacts on ethnic minorities present in an area one of the transmission lines traverses. During consultation meetings with ethnic minorities of the area, it was confirmed that the transmission line would not affect any land or natural resources culturally significant for them. No resettlement- or ethnic minority-related issues were reported during project implementation.

5. **Environmental safeguards.** At the time of appraising the MFF, ADB prepared an environmental assessment and review framework, capturing all the necessary procedures to be followed during detailed design and implementation of each subproject. In accordance with this framework and the local environmental regulations, initial environmental examinations (IEEs) and environmental impact assessments (EIAs) were carried out for the subprojects. These IEEs and EIAs identified environmental management plans (EMPs) to be followed during project implementation, and EMPs were included as contract conditions to be followed by the contractors.

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<sup>47</sup> 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*. Resettlement Plan (accessible from the list of linked documents in Appendix 2). Manila; and PGCB. 2019. *Project Completion Report of 132 kV Grid Network Development Project in Eastern Region*. Dhaka.

<sup>48</sup> The acquisition of private land followed the legal provisions set out in the Acquisition and Requisition of Immovable Properties Ordinance of 1982 (amended in 1983, 1993, and 1994), which includes confirmation of entitlement and estimation of compensation by the district commissioners. Relevant sections of the ordinance were followed by PGCB in compensating the owners. The project spent about \$3 million for land acquisition.

Environmental studies were carried out by PGCB for the additional scope, and the IEEs and EIAs were approved in April 2017 by local environmental authorities. The semiannual environmental monitoring reports prepared and submitted to ADB by the executing agencies detailed the compliance with the EMP applicable to each subproject as well as the overall safeguards covenants included in the loan and project agreements. As identified through the environmental studies, the project did not have any adverse impacts on any biodiversity hotspots or substantial ecosystems.

6. Route changes in the Chandraghona–Rangamati–Khagrachari transmission line reduced tree-cutting requirements during civil construction and stringing works, considerably reducing environmental impacts and compensation requirements for crops and trees. Removal of large volumes of soil was expected from the Rangamati substation site because of its location on a hill. An alternative location was selected, avoiding the need for soil removal and reducing the environmental impacts as well as the implementation cost.