



# Completion Report

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Project Numbers: 36107-013 and 36107-023  
Loan Numbers: 2332, 2333, and 2334  
September 2016

## Bangladesh: Sustainable Power Sector Development Program

This document is being disclosed to the public in accordance with ADB's Public Communications Policy 2011.

Asian Development Bank

## CURRENCY EQUIVALENTS

Currency Unit		–	Taka (Tk)
		<b>At Appraisal</b>	<b>At Project Completion</b>
		(21 August 2006)	(30 June 2015)
Tk1.00	=	\$0.0171	\$0.0129
\$1.00	=	Tk58.40	Tk77.80

## ABBREVIATIONS

ADB	–	Asian Development Bank
ADF	–	Asian Development Fund
APSC	–	Ashuganj Power Station Company Limited
BERC	–	Bangladesh Energy Regulatory Commission
BPDB	–	Bangladesh Power Development Board
DESA	–	Dhaka Electric Supply Authority
DESCO	–	Dhaka Electric Supply Company
DPDC	–	Dhaka Power Distribution Company
EGCB	–	Electricity Generation Company of Bangladesh Limited
EIRR	–	economic internal rate of return
EPC	–	engineering, procurement, and construction
FIRR	–	financial internal rate of return
LIBOR	–	London interbank offered rate
MPC	–	Meghnaghat Power Company Limited
MPEMR	–	Ministry of Power, Energy and Mineral Resources
NWPGC	–	Northwest Power Generation Company Limited
NWZPDC	–	North-West Zone Power Distribution Company Limited
OCR	–	Ordinary Capital Resources
PBS	–	<i>pally biddut samity</i> (rural power cooperative)
PGCB	–	Power Grid Company of Bangladesh Limited
PIO	–	project implementation office
PPA	–	power purchase agreement
REB	–	Rural Electrification Board
RPC	–	Rural Power Company Limited
SDR	–	Special Drawing Rights
TA	–	technical assistance
WACC	–	weighted average cost of capital
WZPDC	–	West Zone Power Distribution Company Limited

## WEIGHTS AND MEASURES

dBA	–	decibel
km	–	kilometer (1,000 meters)
kV	–	kilovolt (1,000 volts)
kVA	–	kilovolt-ampere (1,000 volt-amperes)
kW	–	kilowatt (1,000 watts)
kWh	–	kilowatt-hour (1,000 watt-hours)
MVA	–	megavolt-ampere (1,000,000 volt-amperes)

MW	–	megawatt (1,000,000 watts)
ppm	–	parts per million
spm	–	suspended particulate matter

## NOTES

- (i) The fiscal year (FY) of the government ends on 30 June. “FY” before a calendar year denotes the year in which the fiscal year ends; e.g., FY2016 ends on 30 June 2016.
- (ii) In this report, “\$” refers to the US dollar.

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## BASIC DATA

### A. Loan Identification

1.	Country	Bangladesh
2.	Loan Numbers	2332, 2333, 2334
3.	Program Title	Sustainable Power Sector Development Program
4.	Borrower	Bangladesh
5.	Executing Agencies	
	Loan 2332	Bangladesh Power Development Board (BPDB)/ Northwest Power Generation Company Limited (NWPGC) Power Grid Company of Bangladesh Limited (PGCB) Dhaka Power Distribution Company Limited (DPDC) Dhaka Electric Supply Company Limited (DESCO)
	Loan 2333	Power Division of the Ministry of Power, Energy and Mineral Resources (MPEMR)
	Loan 2334	Ministry of Finance Power Division of MPEMR
6.	Amount of Loan	
	- Loan 2332	\$400.00 million
	- Loan 2333	SDR3.371 million (\$5.00 million equivalent)
	- Loan 2334	SDR40.45 million (\$60.00 million equivalent)
7.	Program Completion Report Number	BAN 1594

### B. Loan Data

1.	Appraisal	
	– Date Started	19 July 2006
	– Date Completed	3 August 2006
2.	Loan Negotiations	
	– Date Started	26 September 2006
	– Date Completed	28 September 2006
3.	Date of Board Approval	26 June 2007
4.	Date of Loan Agreement	28 June 2007
5.	Date of Loan Effectiveness	
	– In Loan Agreement	26 September 2007
	– Actual	24 September 2007
	– Number of Extensions	0
6.	Closing Date	
	Loan 2332	
	– In Loan Agreement	30 June 2010
	– Actual	22 October 2014
	– Number of Extensions	3
	Loan 2333	
	– In Loan Agreement	30 June 2010
	– Actual	15 April 2014
	– Number of Extensions	2

Loan 2334	
– In Loan Agreement	30 June 2008
– Actual	16 June 2008
– Number of Extensions	0

7. Terms of Loan

Loan 2332	
– Interest Rate	London interbank offered rate (LIBOR) plus 0.60% per year
– Commitment Charges	0.75% per year on unwithdrawn amount
– Maturity (number of years)	25
– Grace Period (number of years)	5

Loan 2333	
– Interest Rate	1% per annum during grace period and 1.5% per annum thereafter
– Maturity (number of years)	32
– Grace Period (number of years)	8

Loan 2334	
– Interest Rate	1% per annum during grace period and 1.5% per annum thereafter
– Maturity (number of years)	24
– Grace Period (number of years)	8

8. Terms of Relending (if any)

Loan 2332	
– Interest Rate	5.5%
– Maturity (number of years)	20
– Grace Period (number of years)	5

9. Disbursements

Loan 2332

a.	<u>Dates</u>		
	<b>Initial Disbursement</b>	<b>Final Disbursement</b>	<b>Time Interval</b>
	2 June 2008	2 October 2014	81 months
	<b>Effective Date</b>	<b>Original Closing Date</b>	<b>Time Interval</b>
	24 September 2007	30 June 2010	33 months

## b. Amount (\$ equivalent)

<b>Category or Subloan</b>	<b>Original Allocation</b>	<b>Partial Cancellation</b>	<b>Last Revised Allocation</b>	<b>Amount Disbursed</b>	<b>Undisbursed Balance<sup>a</sup></b>
1. Power stations and connecting transmission lines - Part A	123,010,000	0	133,100,000	131,897,922	1,202,078
2. Transmission lines and substations and other materials - Part B	87,470,000	0	124,200,000	121,274,122	2,925,878
3. Distribution lines and other materials - Part C	42,050,000	0	27,000,000	26,360,342	639,658
4. Distribution lines, substations and other materials - Part D	83,040,000	0	74,000,000	72,518,473	1,481,527
5. Consulting services - Part A and B	1,990,000	0	2,880,000	2,112,395	767,605
6. Interest and commitment charge	38,820,000	0	38,820,000	14,858,902	23,961,098
7. Unallocated	23,620,000	0	0	0	0
<b>Total</b>	<b>400,000,000</b>	<b>0</b>	<b>400,000,000</b>	<b>369,022,156</b>	<b>30,977,844<sup>a</sup></b>

<sup>a</sup>The undisbursed balance of \$30,977,844 was cancelled when the loan account was closed on 22 October 2014.

## Loan 2333

a.	<b>Dates</b>		
	<b>Initial Disbursement</b>	<b>Final Disbursement</b>	<b>Time Interval</b>
	15 January 2013	18 February 2014	13 months
	<b>Effective Date</b>	<b>Original Closing Date</b>	<b>Time Interval</b>
	24 September 2007	30 June 2010	33 months

## b. Amount (\$ equivalent)

<b>Category or Subloan</b>	<b>Original Allocation</b>	<b>Partial<sup>a</sup> Cancellation</b>	<b>Last Revised Allocation</b>	<b>Amount Disbursed</b>	<b>Undisbursed Balance<sup>b</sup></b>
1. Equipment	499,852		1,606,981	1,506,857	100,124
2. Training fellowship and consulting services	3,899,436		2,184,193	2,110,510	73,683
3. Interest charge	60,813		63,527	5,119	58,408
4. Unallocated	539,899		0	0	0
<b>Total</b>	<b>5,000,000</b>	<b>1,298,012</b>	<b>3,854,701</b>	<b>3,622,486</b>	<b>232,215</b>

<sup>a</sup> SDR 845,781.00 (\$1,298,012 equivalent) was cancelled on 13 December 2013.

<sup>b</sup> The undisbursed balance of \$232,215 was cancelled at loan account closing.

## Loan 2334

## a. Dates

<b>Initial Disbursement</b>	<b>Final Disbursement</b>	<b>Time Interval</b>
25 September 2007	16 June 2008	8 months, 21 days
<b>Effective Date</b>	<b>Original Closing Date</b>	<b>Time Interval</b>
24 September 2007	30 June 2008	9 months, 6 days

## b. Amount (\$)

<b>Category or Sub loan</b>	<b>Original Allocation</b>	<b>Partial Cancellation</b>	<b>Last Revised Allocation</b>	<b>Amount Disbursed</b>	<b>Undisbursed Balance</b>
First tranche	31,305,469	0	0	31,305,469	0
Second tranche	32,691,690	0	0	32,691,690	0
<b>Total</b>	<b>63,997,159</b>	<b>0</b>	<b>0</b>	<b>63,997,159</b>	<b>0</b>

10. Local Costs (Financed)
- Amount (\$) 0.0
  - Percent of Local Costs 0.0
  - Percent of Total Cost 0.0

**C. Program and Project Data**

## 1. Project Cost (\$ million)

<b>Cost</b>	<b>Appraisal Estimate</b>	<b>Actual</b>
Foreign Exchange Cost	405.0	605.1
Local Currency Cost	274.9	223.4
<b>Total</b>	<b>679.9</b>	<b>828.5</b>



## 2. Financing Plan (\$ million)

Cost	Appraisal Estimate	Actual
<b>Implementation Costs</b>		
Borrower Financed	274.9	379.4
ADB Financed (OCR)	400.0	369.0
ADB Financed (ADF)	5.0	3.6
Other External Financing (KfW)	0.0	37.6
Domestic Borrowing	0.0	0.0
Self Financing by Executing Agencies	0.0	38.9
<b>Total</b>	<b>679.9</b>	<b>828.5</b>
<b>IDC Costs</b>		
Borrower Financed	19.7	70.3
ADB Financed	38.9	15.0
Other External Financing (KfW)	0.0	0.0
<b>Total</b>	<b>58.6</b>	<b>85.3</b>

ADB = Asian Development Bank, ADF = Asian Development Fund, OCR = ordinary capital resources.

## 3. Cost Breakdown by Project Component (\$ million)

Component	Appraisal Estimate			Actual		
	Foreign	Local	Total	Foreign	Local	Total
<b>A. Base Cost</b>						
Part A. BPDB (NWPGC)/Generation	124.2	35.6	159.8	279.9	45.5	325.4
Part B. PGCB/Transmission	88.3	38.4	126.6	126.7	41.6	168.3
Part C. DPDC/Distribution	42.1	14.9	56.9	63.9	12.0	76.0
Part D. DESCO/Distribution	83.0	22.6	105.7	72.6	3.6	76.2
Part E. MPEMR/Capacity building	4.4	3.4	7.8	3.6	1.4	5.0
<b>Subtotal (A)</b>	<b>342.0</b>	<b>114.9</b>	<b>456.9</b>	<b>546.7</b>	<b>104.1</b>	<b>650.8</b>
<b>B. Taxes and Duties</b>	<b>0.0</b>	<b>113.9</b>	<b>113.9</b>	<b>0.0</b>	<b>92.5</b>	<b>92.5</b>
<b>C. Contingencies</b>	<b>24.2</b>	<b>26.3</b>	<b>50.5</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
<b>D. Interest during Construction</b>	<b>38.9</b>	<b>19.7</b>	<b>58.5</b>	<b>58.4</b>	<b>26.9</b>	<b>85.3</b>
<b>Total</b>	<b>405.0</b>	<b>274.8</b>	<b>679.9</b>	<b>605.1</b>	<b>223.4</b>	<b>828.5</b>

BPDB = Bangladesh Power Development Board, DESCO = Dhaka Electric Supply Company Limited, DPDC = Dhaka Power Distribution Company Limited, MPEMR = Ministry of Power, Energy and Mineral Resources, NWPGC = Northwest Power Generation Company Limited, PGCB = Power Grid Company of Bangladesh Limited.

## 4. Project Schedule

Item	Appraisal Estimate	Actual
<b>Date of Contract with Consultants</b>		
BPDB/NWPGC Component	September 2007	30 June 2008
PGCB Component	September 2007	31 January 2008 and 14 July 2008
MPEMR Component	January 2008	21 November 2012

**Completion of Engineering Design**

BPDB/NWPGC Component	June 2008	January– September 2011
PGCB Component	September 2007– November 2008	February 2008– May 2011
DPDC Component	March 2008	October 2008– January 2010
DESCO Component	October 2007– February 2008	February 2010

**Civil Works and/or Turnkey Contracts**

BPDB/NWPGC Component	March 2008	12 October 2010– 20 June 2011
PGCB Component	June 2007– March 2008	10 April 2008– 12 October 2012
DPDC Component	December 2007– January 2008	12 July 2009– 15 September 2009
DESCO Component	July–September 2008	17 September 2009– 22 December 2010

**Equipment and Supplies**

DESCO Component	June 2007	12 May 2008–30 December 2010
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**Start of Operations**

Completion of Tests and  
Commissioning

BPDB/NWPGC Component	September 2009	22 November 2012– 3 September 2013
PGCB Component	June–December 2009	15 October 2010– 30 December 2014
DPDC Component	April–December 2009	21 March 2011– 3 December 2014
DESCO Component	December 2008– December 2009	23 February 2013– 30 June 2013

BPDB = Bangladesh Power Development Board, DESCO = Dhaka Electric Supply Company Limited, DPDC = Dhaka Power Distribution Company Limited, MPEMR = Ministry of Power, Energy and Mineral Resources, NWPGC = Northwest Power Generation Company Limited, and PGCB = Power Grid Company of Bangladesh Limited.

## 5. Program and Project Performance Report Ratings

Implementation Period	Ratings	
	Development Objectives	Implementation Progress
24 September 2007–31 December 2007	Satisfactory	Satisfactory
1 January 2008–31 December 2008	Satisfactory	Satisfactory
1 January 2009–31 December 2009	Satisfactory	Satisfactory
1 January 2010–31 December 2010	Satisfactory	Satisfactory
1 January 2011–31 December 2011	Satisfactory	Satisfactory

1 January 2012–31 December 2012	Satisfactory	Satisfactory
1 January 2013–31 December 2013	Satisfactory	Satisfactory
1 January 2014–22 October 2014	Satisfactory	Satisfactory

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

<b>Name of Mission</b>	<b>Date</b>	<b>No. of Persons</b>	<b>No. of Person-Days</b>	<b>Specialization of Members</b>
Appraisal	19 Jul–3 Aug 2006	10	160	a,b,c,d
Inception	25 Jul–2 Aug 2007	3	27	a,b,c
Program Review 1	15–19 Jun 2008	2	10	a,b
Program Review 2	3–7 May 2009	2	10	a,b
Program Review 3	2–10 Dec 2009	3	27	a,b,f
Project Review 1	25 Jul–12 Aug 2010	1	17	a
Project Review 2	25 Apr–10 May 2011	2	30	e,f
Project Review 3	23 Nov–8 Dec 2011	2	30	e,f
Project Review 4	7–20 May 2012	2	22	e,f
Project Review 5	3–18 Oct 2012	3	36	a,e,f
Project Review 6	22 Aug–8 Sep 2013	3	51	a,e,f
Project Review 7	3–29 May 2014	26	78	c,e,f
Project Completion Review	24 Jan–3 Feb 2016	2	9	b,f

a = mission leader, energy specialist; b = senior project officer; c = principal country program specialist; d = senior economist; e = project officer/project implementation officer; f = project analyst; and No. = number.

## I. PROGRAM AND PROJECT DESCRIPTION

1. Bangladesh has made great progress in its economic and social development over the past decade, but nearly half the population remains poor. Per-capita gross domestic product (GDP) was just \$445 in fiscal 2005, and one third of households has access to electricity. Bangladesh has been suffering from unreliable power because of insufficient generation capacity, an inadequate transmission grid, and unbalanced distribution facilities. The power sector is also challenged with low institutional capability, limited domestic resources, a centralized government management policy, and low employee commitment. In September 1994, the Government of Bangladesh proposed reforms to address some of these issues. Sector management and corporate governance were to be improved, competition was to be introduced, and public-private partnerships facilitated. Development partners were to support the reforms.

2. The Asian Development Bank (ADB) supported the government with a series of reform-linked projects<sup>1</sup> that helped unbundle the sector into separate corporate entities: Rural Power Company Limited (RPC), Meghnaghat Power Company Limited (MPC), Power Grid Company of Bangladesh Limited (PGCB), Dhaka Electric Supply Company Limited (DESCO), Ashuganj Power Station Company Limited (APSC), West Zone Power Distribution Company Limited (WZPDC), and Electricity Generation Company Limited (EGCB). Unbundling was intended to improve corporate culture, management, governance, and competition, and to facilitate public-private partnerships in power generation.

3. The Sustainable Power Sector Development Program<sup>2</sup> was part of ADB's Country Strategy and Program 2006-2010 of ADB for Bangladesh. The program's objectives were (i) to support government efforts to reform the power sector through the financial restructuring of Bangladesh Power Development Board (BPDB) and Dhaka Electric Supply Authority (DESA), (ii) to create a new corporate entity for power generation in the west zone, (iii) to prepare the sector for long-term financial sustainability, and (iv) to gradually remove government financial support for the sector.

4. The program comprised three loans: one program loan and two project loans. The program loan of SDR40.45 million (\$60.00 million equivalent), for a term of 25 years, came from ADB's Special Funds resources (specifically, the Asian Development Fund [ADF]). ADB also provided a 25-year term project loan of \$400.00 million from its Ordinary Capital Resources (OCR) to cover the foreign exchange cost of physical works, and a 32-year term loan of SDR3.37 million (\$5.00 million equivalent) from ADF for capacity building. The program cost \$679.90 million equivalent at appraisal. KfW provided the government with parallel grant financing of €31.40 million (\$29 million equivalent) for two procurement packages to support

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<sup>1</sup> ADB. 1995. *Report and Recommendation of the President to the Board of Directors: Proposed Loans to the People's Republic of Bangladesh for the Rural Electrification Project*. Manila; ADB. 1996. *Report and Recommendation of the President to the Board of Directors: Proposed Loans to the People's Republic of Bangladesh for the Ninth Power Project*. Manila; ADB. 1999. *Report and Recommendation of the President to the Board of Directors: Proposed Loans to the People's Republic of Bangladesh for the Dhaka Power System Upgrade Project*. Manila; ADB. 2000. *Report and Recommendation of the President to the Board of Directors: Proposed Loans to Meghnaghat Power Limited for the Meghnaghat Power Project*; ADB. 2001. *Report and Recommendation of the President to the Board of Directors: Proposed Loans to the People's Republic of Bangladesh for the West Zone Power System Development Project*. Manila; and ADB. 2003. *Report and Recommendation of the President to the Board of Directors: Proposed Loans to the People's Republic of Bangladesh for the Power Sector Development Program*. Manila.

<sup>2</sup> ADB. 2007. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the People's Republic of Bangladesh for the Sustainable Power Sector Development Program*. Manila.

DESA (132/33kV grid substations and 132-kV and 33-kV underground cables). The KfW-financed packages were dropped from the ADB loan. Appendix 1 shows the program and project's targets at appraisal and actual achievement at completion.

## **II. EVALUATION OF DESIGN AND IMPLEMENTATION**

### **A. Relevance of Design and Formulation**

5. The program was designed in line with ADB's country partnership strategy,<sup>3</sup> which aimed to reduce poverty by (i) accelerating economic growth, (ii) improving the lives of the poor through efficient energy sector growth and better access for the poor to the benefits of growth, and (iii) improving and protecting the environment. The program would improve power supply in Dhaka, and in the west of the country, which lagged in generation and transmission capacity.

6. The program's capacity-building component was expected to enhance institutional resources in the power sector. Specifically, the program aimed to improve utility performance and to promote sustainable operations in corporate and financial management, information and communication technology, and long-term system planning. This was to be achieved by (i) training power sector staff at home and abroad, and (ii) equipping training laboratories of sector entities with power plant simulators, testing equipment, and demonstration equipment.

7. Reforms under the program were expected to improve the power sector's financial and operating performance by (i) developing a three-year reform road map and its implementation monitoring system, (ii) updating the power sector master plan for power generation and transmission for 2006–2025, (iii) fully functionalizing the Bangladesh Energy Regulatory Commission (BERC) and finalizing licensing and tariff regulations, (iv) preparing a financial restructuring plan for BPDB and DESA, (v) settling unfunded pension liabilities of newly corporatized entities with budget from the government, (vi) reducing the government's and its autonomous and semiautonomous bodies' outstanding electricity dues to the power sector, (vii) increasing public–private partnership through partial off-loading of PGCB and DESCO shares, and (viii) fully operationalizing newly created corporate entities. The creation of the Northwest Power Generation Company Limited (NWPGC) would further unbundle BPDB's generation system. The program design supported the government's efforts to restructure the power sector, accelerate economic growth, and create jobs.

8. At completion, the program design was found to be sound and relevant to ADB's country partnership strategy and to the government's sector reform objectives.<sup>4</sup>

### **B. Program and Project Outputs**

#### **1. Program Loan**

9. The program achieved the reform objectives envisaged at appraisal. Compliance status against policy conditions is given in Appendix 2. The government approved a three-year road map for power sector reforms (2006–2008) and established a three-tier monitoring and reporting mechanism to oversee reforms.

<sup>3</sup> ADB. 2005. *Country Strategy and Program Update: Bangladesh, 2006–2010*. Manila.

<sup>4</sup> ADB. 2011. *Country Partnership Strategy: Bangladesh, 2011–2015*. Manila.

10. The government approved an organizational chart for BERC in November 2006, and published licensing regulations and electricity generation tariff regulations in the government gazette in September 2006 and April 2008, respectively. The remaining members of BERC were appointed in November 2007.

11. Draft financial restructuring plans for BPDB and DESA were prepared in 2006. The government allocated Tk4.0 billion for FY2008 to settle unfunded pensions and gratuities for WZPDC, APSC, NWZPDC, EGCB, and DPDC. The government also allocated sufficient funds from time to time to pay down the government's and its autonomous and semiautonomous bodies' outstanding dues to the power sector. As of April 2008, the government's outstanding dues were Tk0.93 billion, compared to a requirement of less than Tk1.0 billion. The government's autonomous and semiautonomous bodies' outstanding dues were Tk1.28 billion, compared to a requirement of less than Tk2.5 billion.

12. The boards of directors of DPDC, EGCB, and NWZPDC were reconstituted in October 2006 according to principles and procedures agreed with ADB. Management of DPDC was appointed during April–June 2007, while management of NWZPDC was appointed during August 2007–January 2008.

13. In April 2006, MPEMR approved listing 25% each of PGCB's and DESCO's shares on the stock market. About 22.5% of DESCO shares were listed on the stock market in June 2006, and trading of PGCB shares began in October 2006. As of April 2008, 24.97% of DESCO shares and 23.75% of PGCB shares were traded on the stock market.

## 2. Project Loan

14. The program had four physical components and a capacity building component.<sup>5</sup> In Part A, two 1X150 MW dual-fuel-fired base-load power plants—instead of gas-fired peaking power plants at appraisal—were installed at Sirajganj and Khulna. Dual-fuel-fired plants were chosen because of an acute generation crisis and uncertainty in the availability of gas. Sirajganj plant is operating with gas. Khulna plant is operating with diesel as a gas pipeline built under ADB financing<sup>6</sup> could not be commissioned because of failed attempts to cross the Padma River. With the new plants, additional power became available and load shedding was minimized, particularly in the west.

15. Part B—construction of a 400-kV line from Meghnaghat to Aminbazar—increased transmission capacity by 2,300 MW and installed new substations with associated overhead and underground transmission lines. Part B increased capacity in Dhaka by 600 megavolt-ampere (MVA) at the 132-kV level and 720 MVA at the 33-kV level. The new line and substations made power supply more reliable and flexible. The Meghnaghat–Aminbazar 400-kV line is planned to operate at 230 kV until installation of 400/230-kV substations at each end of the line. Substations proposed to be installed at Old Airport and Dhaka University, however, had

<sup>5</sup> The Program and Project's contribution to ADB's Result Framework is as follows: (i) Greenhouse gas emission was reduced by 0.58 terawatt-hour yearly (equivalent to 383,000 tons of carbon dioxide [CO<sub>2</sub>] emission reduction); (ii) Installed energy generation capacity of 300 MW compared with target of 300 MW; (iii) Transmission lines installed were 230 km compared with target of 218 km; (iv) Distribution lines constructed were 1,126 km compared with target of 1,380 km; and (v) New household connected to electricity were 461,000 by 2015 compared with a target of 230,000 household.

<sup>6</sup> ADB. 2006. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the Government of Bangladesh for the Gas Transmission and Development Project*. Manila.

to be relocated to Agargaon and Satmasjid, respectively, because of land availability constraints. Construction of 132-kV transmission lines and new substations in the western region expanded capacity by 324 MVA and reduced load shedding in the districts of Magura, Chuadanga, Thakurgaon, and Panchagar, which were previously serviced by 33-kV lines.

16. Under Part C, substation capacity was increased by adding (i) 132/33 kV transformers in three 132/33-kV substations, (ii) installing five 33/11-kV new substations, (iii) converting a switching station to a regular 33/11-kV substation, and (iv) upgrading 10 33/11-kV substations. Completion of works expanded capacity of 225 MVA at the 33-kV level and 546 MVA at the 11-kV level, making operations more flexible and creating scope to serve 400,000 existing and new consumers in DPDC's service areas.

17. Under Part D, the existing distribution systems in Mirpur and the Gulshan circles of DESCO were upgraded and expanded through (i) adding six 33/11 kV new substations, (ii) upgrading four 33/11-kV substations, and (iii) expanding the 33-kV, 11-kV, and 0.415-kV underground and overhead distribution system to improve reliability and quality of power supply to existing and new consumers. Part D added (i) 448 MVA of substation capacity; (ii) 626 kilometer (km) of 33-kV and 11-kV underground cables; (iii) 500 km of overhead lines at various voltage levels, with more than 1,000 new distribution transformers; and (iv) 150,000 consumer meters. These changes improved DESCO's operational flexibility and created scope for serving 400,000 existing and connecting 100,000 new consumers in DESCO's service areas.

18. Under Part E, 389 power sector officials were trained abroad and 4,446 power sector officials were trained in Bangladesh on skills to support power sector upgrades. BPDB's training center at Ghorasal was upgraded to include a power plant simulator, associated non-information technology (IT) items, demonstration equipment, testing equipment for solar home systems, and magnetic particle testing equipment.

### **C. Program Costs**

19. At appraisal the project's four physical components and capacity building were estimated to cost \$679.9 million equivalent. The actual cost was \$828.5 million. Details of the final costs are in Appendix 3.

20. Part A exceeded the original cost estimate because (i) the design specifications called for a base-load plant rather than a peak-load plant, leading to NWPGC procuring goods and services that were at least 35% higher than appraisal cost;<sup>7</sup> (ii) a dual-fuel firing system, along with 1 million liters in oil storage for both plants, were needed (\$12.5 million); (iii) additional costs were incurred to install natural gas regulating and metering stations and associated pipelines (\$8.5 million); and (iv) global metal prices had risen. Total cost and foreign currency cost exceeded appraisal cost by about 60% and 104%, respectively. ADB financing for the contracts was, however, limited to \$131.90 million, against a revised allocated amount of \$133.10 million. NWPGC met the additional foreign currency cost by borrowing from the government. The local currency cost was lower than appraisal estimate by 11% as payment of taxes and duties was much lower than the appraisal estimates.

21. For Part B, the actual cost of the Meghnaghat–Aminbazar 400 kV transmission line was 180% higher than the estimate. Contract prices for the 230-kV and 132-kV overhead and

<sup>7</sup> As experienced in case of Siddhirganj Power 2X120 MW plant under Loan 2039-BAN: Power Sector Development Program.

underground transmission lines in Dhaka surpassed estimates by over 100% because of sharp increases in metal prices.

22. Part C encountered a cost overrun of over 40% in contracts particularly financed by KfW because of increases in metal prices.

23. Part D saved substantially on foreign exchange and local costs. DESCO paid less than the contract prices for procurement of goods, particularly for the contracts signed in 2008, because world metal prices declined during the contract period. The local cost was about 67% lower than the estimate.

24. Part E had substantial savings that were cancelled during reallocation in 2013 and at loan closing in 2014.

#### **D. Disbursements**

25. The first tranche of SDR20.23 (\$31.31 million equivalent) of the Program Loan (Loan 2334-BAN) was disbursed on 25 September 2007 upon effectiveness and fulfillment of first tranche release conditions. The second tranche of SDR20.23 million (\$32.69 million equivalent) was disbursed on 16 June 2008. Actual disbursement took less time than imagined at appraisal.<sup>8</sup>

26. Appendix 4 shows original and revised allocations, the actual use of the project loan proceeds (Loan 2332-BAN and 2333-BAN), and the undisbursed loan balances. Disbursements totaled \$369.02 million (92.3% of allocation) from Loan 2332-BAN and \$3.62 million (72.4% of allocation) from Loan 2333. The undisbursed balance of Loan 2332 of \$30.98 million was canceled at loan closing on 22 October 2014. About \$1.30 million equivalent of Loan 2333 was partially cancelled on 13 December 2013 and the undisbursed balance of \$0.23 million equivalent was cancelled at loan closing on 15 April 2014. Annual disbursements by executing agencies and categories from Loan 2332 are in Appendix 5. The initial disbursement under the ADB loan was made on 2 June 2008, and the final disbursement on 2 October 2014. The actual disbursement period of 6 years and 4 months was 3 years and 7 months longer than the appraised period.

27. Disbursements under the KfW grant for three turnkey contracts and a consulting services contract amounted to €30.42 million (\$37.62 million equivalent). Disbursement began on 9 March 2009 and ended on 21 January 2016.

#### **E. Program and Project Schedule**

28. The ADB loans were signed on 28 June 2007 and declared effective on 24 September 2007. The program loan (Loan 2334-BAN [SF]) was closed on 16 June 2008, ahead of closing date of 30 June 2008 planned at appraisal. After three extensions, the project loan (Loan 2332-BAN) was finally closed on 22 October 2014, 4 years and 4 months after the closing date of 30

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<sup>8</sup> Loan proceeds were used to cover foreign exchange costs for eligible items imported by the government. Costs of government imported eligible items during the program period far exceeded the loan proceeds. The government received counterpart fund of Tk4.39 billion from the central bank of Bangladesh against a disbursed amount of about \$64.0 million from the program loan. The government made special budgetary provisions from time to time to settle outstanding dues for electricity supply to the government and government's autonomous and semi-autonomous bodies, as well as to settle unfunded pensions and gratuities for newly corporatized entities.



June 2010 foreseen at appraisal. After two extensions, Loan 2333-BAN (SF) was closed on 15 April 2014, 3 years and 9 months after the closing date of 30 June 2010 planned at appraisal.

29. All executing agencies used advance procurement action, but project completion was delayed substantially for the reasons stated below.

30. Engineering, procurement, and construction (EPC) contracts for the Sirajganj 150-MW power plant and Khulna 150-MW power plant were completed on 22 November 2012 and 3 September 2013 almost 3 years and 4 years after the target date of 31 December 2009.

31. The PGCB portion was expected to be completed by December 2009. PGCB signed two consulting services contracts for design and supervision of the Meghnaghat–Aminbazar 400-kV transmission line and the Aminbazar–Old Airport (Agargaon) underground transmission lines on 31 January 2008 and 14 July 2008, respectively. Four EPC contracts for transmission lines and substations in the west zone were signed during April–July 2008 and the facilities were completed and commissioned in December 2010. The EPC contracts for transmissions lines and substations in Dhaka area were signed from April 2009 to October 2012, and completed and commissioned from October 2012 to December 2014. The main cause of delay was difficulty in getting possession of land for substations in the Dhaka area. A 230/132-kV substation planned at the Old Airport was relocated at Agargaon. 132/33-kV substations at Dhaka University and Dhaka Cantonment were relocated at Satmosjid and at a new site in the same cantonment. Bay extension at Meghnaghat was excluded from ADB financing and subsequently financed by PGCB. Completion for some contracts was 30 December 2014, 5 years after the target date of 31 December 2009.

32. DPDC initiated procurement actions in May 2007 by submitting bidding documents for four EPC contracts in May 2007 and awarded the contracts during July–September 2009 with planned completion dates of January 2010 to March 2011. In all cases, bid processing time was more than one year. Delays in contract completion ranged from 5 to 16 months.

33. As required by KfW, DPDC signed a consulting services contract on 2 February 2009. DPDC signed three EPC contracts for (i) building two new 132/33 kV gas-insulated switchgear (GIS) substations, (ii) upgrading one 132/33 kV air-insulated switchgear (AIS) substation to a GIS substation, (iii) laying 132-kV and 33-kV underground cables, and (iv) constructing a 132-kV overhead transmission line. These EPC contracts received KfW financing in December 2011 and June 2012 and had a completion period of 18 months.

34. DESCO initiated procurement in 2007 and awarded 14 in 2008, 5 in 2009, and 6 in 2010. Five lots received no response even after rebidding. DESCO abandoned further bidding and dropped these from the list with consent of ADB. EPC contracts for six new 33/11-kV substations and four upgraded 33/11-kV substations were signed in September 2009 with an 18-month completion period. Work finished four years late.

35. Part E comprised international consulting services and procurement of training equipment. The contract with the international consulting firm was signed on 21 November 2012. Contracts for training equipment were signed from August 2012 to September 2013. Contracts were delayed because of (i) the need to revising a technical assistance project proposal to ensure counterpart funds, and (ii) inadequate staffing at the project implementation office (PIO).

36. The projected and actual schedules are in Appendix 6. Implementation delays were the result of (i) complications for PGCB in securing land, leading to selection of new sites; (ii) extension of most contracts to complete works for various reasons; and (iv) changes in project scope by NWPGC and DPDC to accommodate works necessary to meet project objectives.

## **F. Implementation Arrangements**

37. BPDB, and subsequently NWPGC,<sup>9</sup> was the executing agency for Part A; PGCB, for Part B; DPDC for Part C; DESCO for Part D; and the Ministry of Power, Energy and Mineral Resources' (MPEMR) Power Division for Part E.

38. BPDB provisionally established a PIO for the power plants at Sirajganj and Khulna in January 2007 and formalized it in September 2007. In January 2008, BPDB established two PIOs: one each for the Sirajganj and Khulna power plants. NWPGC was incorporated on 28 August 2007; the first management was appointed over the period November–December 2008 and other key officials in January 2009. BPDB transferred project implementation to NWPGC in early 2009 and seconded PIO staff to NWPGC.

39. PGCB appointed three project directors for Part B: (i) one for transmission lines and associated substations in the west zone, (ii) one for the Meghnghat–Aminbazar 400-kV transmission line and associated facilities, and (iii) one for Aminbazar–Old Airport 230-kV transmission line and associated 132-kV lines and substations. All three project directors reported to the chief engineer (projects), who was the head of the PIO.

40. DPDC established a PIO to implement project components financed by ADB as well as KfW. The PIO's project director—who was also the director of engineering—was changed twice during implementation.

41. The Power Division designated its Joint Secretary (Development) as Project Director on 12 August 2007, but did not appoint enough staff to manage the PIO.

42. Changes in project director did not significantly impact project implementation.

43. The establishment of PIOs by BPDB/NWPGC, PGCB, DPDC, DESCO, and the Power Division and the availability of responsible officials helped with the smooth execution of their components. Implementation arrangements were adequate to deliver program outputs and achieve the program's purpose.

## **G. Conditions and Covenants**

44. The government and the executing agencies have (i) complied with 23 and partially complied with 9 conditions and covenants stipulated in the Project Loans and Project Agreements, and (ii) complied with all 11 conditions and covenants stipulated in the program loan. Loan covenants and their compliance status are listed in Appendix 7.

45. The needs assessment report under Part E was to be submitted to ADB within 4 months of the loan effective date. This report was submitted after 6 months and required another 6

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<sup>9</sup> BPDB in a board meeting on 30 July 2007 decided to hand over project implementation authority to NWPGC once the NWPGC commenced business.

months to be finalized. The government ensured that women participated in overseas training and fellowship courses.

46. The autonomy and independence of the entities incorporated under the applicable laws has generally been ensured.

47. The newly incorporated entities' boards appointments initially followed the conditions of the loan agreement, but more government officials have since been appointed to the boards.

48. Compliance by NWPGC, PGCB, DPDC, and DESCO with financial covenants during 2011 and 2015 is summarized in Appendix 8. NWPGC complied with the largest number of financial covenants. PGCB complied with all financial covenants, except for its debt-service coverage ratio in 2014 and 2015. DPDC's performance has improved and is likely to meet financial covenants in the near future. DESCO complied with all requirements except for ratio of operating expenses to operating revenue in 2014 and 2015. The main reason for DPDC's and DESCO's noncompliance was thinner margins on distribution. BERC raised BPDB's generation tariff by about 98% in 2011 and 2012, from a weighted average of Tk2.04/kWh in 2007 to Tk4.70/kWh in 2012. At the same time, the retail tariff also rose by about 68%, from a weighted average of Tk3.45/kWh in 2007 to Tk5.75/kWh in 2012 (Appendix 9). BERC took corrective steps in 2015 that helped DPDC and DESCO to recover.

## **H. Consultant Recruitment and Procurement**

### **1. Consultant Recruitment**

49. Consulting services were to assist BPDB in procurement and in supervising construction of the Sirajganj 1X150 MW and Khulna 1X150 MW peaking power plants. BPDB also used advance procurement. NWPGC signed a contract with the selected firm on 30 June 2008. International consultants provided 66 person-months in services to NWPGC, and national consultants provided 74 person-months.

50. Consulting services were provided to assist PGCB in supervising construction of the Meghnaghat–Aminbazar 400-kV overhead transmission line and Aminbazar–Old Airport 230-kV underground transmission line. PGCB use advance procurement. PGCB signed contracts with the same consultant for Meghnaghat–Aminbazar and Aminbazar–Old Airport lines on 31 January 2008 and 14 July 2008, respectively. International consultants provided 37 person-months in consulting services, and national consultants provided 70 person-months.

51. Consulting services were not included in the DPDC scope at appraisal. However, DPDC engaged consultants on 2 February 2009 for 24 months under KfW recommendation and financing. The consultants' contract was extended until 31 December 2015. International consultants provided 67.5 person-months of services, and national consultants provided 91.6 person-months.

52. ADB provided consultants for training under Part E. The Power Division of MPEMR could not use advance procurement, as consultant recruitment depended upon completion of a training needs assessment. This study commenced in early 2008 and after three rounds of submission for ADB comments, ADB received the final report on 2 December 2009. Finalizing the expression of interest (EOI) and terms of reference (TOR) took more than 2 years. ADB received final EOI and TOR on 28 April 2011. MPEMR's Power Division signed a contract with the selected consulting firm on 21 November 2012. International consultants provided 10

person-months of services, and national consultants provided 12 person-months. A national consultant engaged under government finance also provided 38 person-months of services.

53. Consultants under ADB financing were hired according to ADB's *Guidelines on the Use of Consultants* (as amended from time to time).

## **2. Procurement**

54. Goods and services for the project were procured through international competitive bidding, according to ADB's *Procurement Guidelines* (2007, as amended from time to time) and using standard bidding documents. Goods and services under design–build and turnkey contracts were procured through international competitive bidding, following ADB's standard bidding documents for such contracts. Procurement for civil works for borrower-funded projects was done through local competitive bidding following executing agencies' standard bidding procedures. Design–build and turnkey contractors under KfW financing were recruited according to KfW procurement guidelines. Five lots under Part D could not be procured even after rebidding as no bidder qualified. These lots were dropped from ADB financing.

### **I. Performance of Consultants, Contractors, and Suppliers**

55. The performance of suppliers, consultants, and turnkey contractors was generally satisfactory.

56. Under Part A, the EPC contractors for Khulna and Sirajganj power plants performed satisfactorily.

57. Under Part B, 13 turnkey contracts to build overhead and underground transmission lines, substations, and bay extensions were signed with different contractors. Two contracts for 132 kV transmission lines had time overrun of about 6 months. Performance of contractors was satisfactory; delays in completing works were not attributable to contractor performance.

58. Under Part C, performance of four EPC contractors under ADB financing was satisfactory. Under KfW financing, performance of the consultant and all but one EPC contractor was satisfactory. Performance of LTB Leitungsbau, Germany—the EPC contractor for the 132-kV overhead transmission line—was not satisfactory, and the contractor paid liquidated damages for a time overrun.

59. Under Part D, performance of the three EPC contractors for substations and 27 suppliers of goods was satisfactory.

60. The performance of consulting firms hired under Parts A and B was satisfactory. BPDB hired Minconsult of Malaysia to help procurement and construction supervision of the power plants at Sirajganj and Khulna. PGCB engaged KEC of South Korea under two contracts to supervise construction of (i) the Meghaghat–Aminbazar 400 kV transmission line and associated substation upgrades, and (ii) the Aminbazar–Old Airport 230 kV transmission line and associated 132-kV underground transmission lines and substations.

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

61. The borrower showed strong commitment to the program and accorded high priority to reforms. The government ensured sufficient counterpart funds during implementation and timely land acquisition.

62. The borrower and executing agencies ensured timely availability of local currency for contracts. The borrower ensured additional foreign and local funds to cover cost overruns and to ensure timely completion of NWPGC's Khulna and Sirajganj power plants.

63. The borrower initially demonstrated firm commitment to corporatizing BPDB, DESA, and BPDB's northwest distribution, and to incorporating NWPGC. DESA and NWPGC were incorporated. Corporatization of BPDB and the operationalization of NWZPDC have not yet taken place.

64. Frequent changes in staff at the PGCB and DPDC PIOs—particularly in the project director—partly affected project implementation. This problem was not foreseen during appraisal. Otherwise, the performance of all executing agencies was *satisfactory*.

## **K. Performance of the Asian Development Bank and KfW**

65. ADB cooperated well with the borrower and the executing agencies in formulating the program and processing the loan. Given past experience with power sector projects, the 3-year timeframe was unrealistic. A gap of almost a year between project appraisal and approval was not reflected in the schedule. During implementation, ADB staff actively monitored the program and advised the executing agencies on program implementation matters from time to time. Delegation of the project to the Bangladesh Resident Mission promoted good interaction among ADB, the executing agencies, consultants, and contractors. ADB's timely approval of contract awards and disbursements, close monitoring of works, and timely interventions to resolve implementation issues contributed to successful program completion. ADB fielded three program and seven project review missions and interacted regularly with the borrower and the executing agencies. The borrower and the executing agencies appreciated ADB's flexibility in allowing changes in the scope of the program and its willingness to extend loan closing dates. Overall, ADB's performance was *satisfactory*.

66. KfW provided funds to engage a consultant to assist DPDC in implementing the project components. KfW staff actively monitored project implementation and approved contract awards, disbursements, and variations in a timely fashion. In general, KfW's performance was *satisfactory*.

# **III. EVALUATION OF PERFORMANCE**

## **A. Relevance**

67. By financing new generation facilities, expanding transmission capability, and upgrading distribution to ensure larger and more reliable power supply, the program played an important role in developing power infrastructure in Bangladesh, particularly in the energy-starved west and in Dhaka and surrounding areas, the major power consuming center of Bangladesh. The program was also designed to advance the government's reform initiatives to complete ongoing corporatization steps and regulatory measures, and further unbundle BPDB's generation

services. The program was aligned with ADB's country partnership strategy, which envisaged poverty reduction through economic development (footnote 2).

68. The program's development objectives were generally achieved. Expansion of the program's scope, particularly of power stations, was inevitable to ensure adequate generation in the event of a future gas crisis. A larger scope also enhanced impact. As the sixth in a series of reform-linked initiatives in the power sector, the program addressed key sector issues and supported further sector restructuring, including (i) the corporatization of BPDB (not yet achieved); (ii) the corporatization of DESA (operating since 1 July 2008 under the name DPDC); and (iii) further unbundling of BPDB's generation services through the creation of NWPGC. The program also focused on operationalization of BERC to create a proper regulatory framework for the power sector. The program and project were, therefore, *relevant*.

## **B. Effectiveness in Achieving Outcome**

69. The program and project were *effective*, as the outcome envisioned at appraisal was achieved by 2010 except BPDB corporatization within the stipulated timeframe. The main program outcomes were (i) issuance of medium-term road map for power sector reform, (ii) updating of power system master plan by 2007, (iii) development of a capacity building program for the power sector by 2007, (iv) fully staffed BERC and licensing and tariff regulations in place by 2007, (v) corporatization of BPDB and DESA by 2007, (vi) financial self-reliance of power sector by 2010, (vii) fund raising from local capital market by 2006, and (viii) achieving 50% new generation from private sector by 2008.

70. Base load generation capacity of 300 MW added by 2013 against targeted completion in 2009. Transmission capacity augmented to 960 MVA in 2015 against target of 900 MVA by 2009. In 2015, maximum load shedding was 780 MW against 2009 target of 470 MW, but duration of load shedding was only 18 hours against 2,866 hours in 2009. In 2015, PGCB's transmission loss was 2.77% against target of 3.2% in 2009, and distribution loss of DESA/DPDC and DESCO were 8.91% and 8.37% against 2009 target of 20% and 12%, respectively (Appendixes 10 and 11). Over 450,000 new consumers were connected by 2015 by the EAs (DPDC and DESCO), BPDB, WZPDCL, and 4 PBSs against target of 230,000 new consumers by utilizing facilities created under the Project.

71. No major environmental impact was anticipated at the start of the program. Minor environmental issues were promptly addressed during design and implementation. Environmental mitigation measures during construction phase were incorporated in EPC contracts and the executing agencies ensured contractors' compliance.

72. Power stations were required to install burners that produce low levels of nitrogen oxide (NO<sub>x</sub>);<sup>10</sup> noise limits at site boundaries were also included in the specifications. Specification of substations ensured use of transformer oil that is free of polychlorinated biphenyls (PCB). Recorded NO<sub>x</sub> stack emissions were 10.1 parts per million (ppm) at Sirajganj and 12.2 (ppm) at Khulna plants, against a requirement of 30 ppm. Recorded noise levels at the site perimeter were 66.4 decibels (dBA) for the Sirajganj plant and 71 dBA for the Khulna plant, compared to a limit of 70 dBA. The Sirajganj plant met the limit of 100 micrograms per cubic meter (µg/m<sup>3</sup>) for suspended particulate materials (spm). The Khulna plant, which is operating with diesel fuel,

<sup>10</sup> NO<sub>x</sub> is a generic term for the mono-nitrogen oxides NO and NO<sub>2</sub> (nitric oxide and nitrogen dioxide). They are produced from the reaction among nitrogen, oxygen and even hydrocarbons (during combustion), especially at high temperatures. NO<sub>x</sub> gases react to form smog and acid rain as well as being central to the formation of tropospheric ozone.

saw spm measurements of 180  $\mu\text{g}/\text{m}^3$ . Khulna plant is surrounded by number of oil-fired power generation plants; as such, a higher spm value may not be attributed to the project plant only. As a condition of the final environment clearance certificate from the Department of Environment, NWPGC has instituted quarterly environmental monitoring for the Sirajganj plant from 2014, following the plant's upgrade to 225-MW, combined-cycle operations. NWPGC will begin quarterly environmental monitoring after it receives the Department of Environment's final environment clearance for the Khulna plant.

### C. Efficiency in Achieving Outcome and Outputs

73. Insufficient, irregular power was common in the west, given inadequate generating capacity, saturation of the first east–west interconnector, and near saturation of the second interconnector to transfer power from the east zone. The removal of bottlenecks in the backbone transmission system in the west was addressed by ADB under its previous project.<sup>11</sup> Construction of new transmission lines and substations further improved supply in four energy-starved towns and surrounding areas. The plants at Sirajganj and Khulna ensure adequate power at near-standard voltage in the west. Transmission lines around Dhaka reduced transmission loss, and better distribution in Dhaka substantially improved power supply efficiency in Dhaka and the west.

74. The program's financial and economic performance is measured by the financial internal rate of return (FIRR) and the economic internal rate of return (EIRR). Assumptions used in calculating the FIRR and EIRR are in Appendix 12. Table 1 shows the FIRR and EIRR at appraisal and at completion.

**Table 1: Comparison of FIRR and EIRR at Appraisal and at Completion**

Physical Component and Executing Agencies	FIRR (%)		EIRR (%)	
	At Appraisal	At Completion	At Appraisal	At Completion
Part A: NWPGC	6.3	4.6	14.4	38.3
Part B: PGCB	6.1	6.2	42.4	29.7
Part C: DPDC	14.4	10.4	38.2	36.1
Part D: DESCO	9.8	9.0	15.5	24.3

DPDC = Dhaka Power Distribution Company Limited, DESCO = Dhaka Electric Supply Company Limited, EIRR = economic internal rate of return, FIRR = financial internal rate of return, NWPGC = Northwest Power Generation Company Limited, and PGCB = Power Grid Company of Bangladesh Limited.

75. The EIRRs at completion for NWPGC and DESCO were higher at completion than at appraisal because plants are projected to produce more power, resulting in a better capacity factor<sup>12</sup> and lower per-unit fuel cost, and steady consumer connection growth in DESCO areas. The EIRRs of the PGCB and DPDC project components were lower than predicted because of cost overruns and delays to works in Dhaka that affected consumer connections.

<sup>11</sup> ADB. 2001. *Report and Recommendation of the President to the Board of Directors: Proposed Loan and Technical Assistance Grant to the Government of Bangladesh for the West Zone Power System Development Project*. Manila.

<sup>12</sup> The net capacity factor of a power plant is the ratio of its actual output over a period of time, to its potential output if it were possible for it to operate at full nameplate capacity continuously over the same period of time.

76. The program component of the program is rated *efficient* for complying with all requirements of the policy matrix within specified time frame. In spite of delays to project implementation and substantial cost overruns, program facilities have improved operational efficiencies and maintained reasonable EIRR. The project is also considered *efficient*.

#### **D. Preliminary Assessment of Sustainability**

77. The FIRR at completion for NWPGC was less than at appraisal because of the substantial cost overrun and delays. Upgrading to a combined-cycle plant ensured base load operation with a better capacity factor. Despite substantial a cost overrun, the FIRR for the PGCB component is almost equal to that at appraisal because new generation capacity is being better used. The FIRR at completion for DPDC was less than the FIRR at appraisal because of a substantial cost overrun and delays. The FIRR at completion for DESCO was slightly lower than at appraisal because of the longer implementation period. FIRRs for all executing agencies were well above the weighted average cost of capital (WACC). WACC at completion for NGPGC, PGCB, DPDC and DESCO are 2.7%, 2.4%, 2.9% and 1.2%, respectively.

78. Executing agencies' ability to preserve or maintain assets will determine the program's sustainability over time. NWPGC is a new entity and has made quick progress in terms of plant availability and financial sustainability. PGCB has proven its ability to maintain over 99% system availability and has complied with most financial indicators. DPDC begun operating on 1 July 2008 and has been maintaining promising performance. DPDC's taking over of all past debt liabilities and absorption of all employees of DESA has affected its short-term financial sustainability. DESCO's operational performance is exceptional: only 8.37% distribution loss and a collection-import ratio greater than 100% in 2015. DESCO is consistently complying with all financial covenants. The program and project are rated *likely to be sustainable*.

#### **E. Impact**

79. The program and project had *significant* impact on access to electricity, reduction of load shedding and maintaining gross domestic product increase on a sustainable basis. Access to electricity increased to 75% against target of 60% by 2015. The program improved the availability and reliability of power in the west and helped minimize load shedding, particularly during the irrigation season. Additional power generation from power plants built under the program—as well as both private and public plants built in sector—have substantially reduced load shedding, particularly in the west, facilitating industrial and commercial growth and job creation. Historical data on generation capacity, power generation, and load shedding are in Appendix 13. Gross domestic product growth maintained over 6% on a sustainable basis.

80. Expanded clean energy capacity and augmented transmission grid and distribution systems improved efficiency and reliability of service delivery benefiting all categories of power consumers. Reliable power supply to the garment industries and agricultural pumps indirectly benefitted poor women who are working in these sectors. Poor and vulnerable consumers, including hospitals, schools, and other social facilities were benefited from supply reliability. Local labor was directly benefited during implementation of project loan. Indirect benefit to local labor will also occur due to enhanced income generating opportunities resulting from increased access to electricity. Improved governance in the power sector through financial stabilization, corporatization and commercialization resulted in better service to the public and creation of financially viable sector entities. Rationalization of tariff structure helped in reducing subsidy to the sector and freeing up government funds for critical social investments. Introduction of



appropriate lifeline tariff benefited poor consumers. Students were benefitted from longer study hours and access to information technology-based learning.

81. PGCB acquired 10 acres (approximately 4 hectares) of land to build a 400/230-kV substation at Aminbazar and 18 acres (approximately 7 hectares) to build four substations in the west. The acquisition did not affect any indigenous people, wildlife reserves, archaeological sites, religious structures, orchards, or houses. Land owners were compensated for property losses and damage to crops and trees, in line with ADB's *Involuntary Resettlement Policy (1995)*.

#### IV. OVERALL ASSESSMENT AND RECOMMENDATIONS

##### A. Overall Assessment

82. The program and project are rated *successful* on the basis of its relevance, effectiveness, efficiency, and sustainability.

83. The program was implemented as designed with only minor changes in scope to overcome gas supply constraints. Scope changes (construction of a base-load plant instead of a peaking plant) maximized generation capacity. The outcome was mostly achieved by the end of the program. The program has reduced load shedding, improved voltage to some extent, minimized the frequency of disruptions, and enhanced economic activity, particularly in the west. In the process, jobs have been created for many people.

84. The program helped accelerate some crucial sector reforms: (i) corporatizing DESA, and some of BPDB's generation assets; (ii) institutionalizing regular payments by government and its autonomous and semiautonomous bodies' for the electricity it uses; (iii) settling unfunded employee pensions; and (iii) raising funds from the market to reduce dependence on the government for power sector investments.

##### B. Lessons

85. Significant progress was made in unbundling BPDB and DESA and in corporatizing power sector generation, transmission, and distribution. Initiatives need to be strengthened to complete operationalization of NWPDC and corporatization of BPDB's south and central zones. BPDB could be corporatized once its remaining generation and distribution entities have completed the corporatization process.

86. Recent construction of public and private oil-fueled power plants has increased BPDB's operational costs significantly. In response, tariff adjustments raised BPDB's bulk tariff but did not proportionately raise distribution entities' margins. BERC's tariff structure needs to be rationalized to provide an appropriate margin for all power distribution entities and to ensure their financial sustainability.

##### C. Recommendations

###### 1. Program Related

87. **Future Monitoring.** Special biannual or annual reviews should be conducted to ensure fulfillment of conditions related to parent organizations' past debt-service liabilities and the transfer of land ownership to new corporate entities.

88. **Covenants.** Technical and financial covenants—which were mostly complied with—were relevant to ensuring the proper operation and maintenance of program facilities and to improving executing agencies' financial and operational performance. Monitoring should continue. Future power sector loans should consider these covenants, with modifications, if needed.

89. **Further Action or Follow-up.** Increased generation costs have affected BPDB's financial position and incorporated sector entities in the absence of appropriate tariff enhancement. BPDB still depends on low-interest government loans to be financially sustainable. Subsidies to consumers should be transparent, and the government should compensate power sector entities providing those subsidies, as stipulated in the BERC Act of 2003. Follow-up is needed to address this issue in future loans to the sector.

90. **Additional assistance.** The power sector will require large investments to meet rising demand and sustain economic growth. Domestic resource mobilization for development has improved. Support from development partners will still be essential, as will private sector participation. Future ADB assistance to the power sector should incorporate implementation of reforms under this program or other completed and ongoing projects.

91. **Timing of the program performance evaluation report.** The facilities created under the program have yet to attain capacity utilization because of a prolonged implementation period. Power generation and transmission capability have significantly improved. Program evaluation may begin after 2017.

## 2. General

92. ADB should emphasize project readiness and executing agencies' capacity when it establishes timeframes for project implementation, allowing enough time for land acquisition and the procurement based on past experience in the sector.

93. Categorized annual information on actual costs and detailed implementation issues should be collected before PIOs wind down so that future project completion reports (PCRs) can be prepared. Executing agencies should receive proper guidelines on the information ADB requires in PCRs.

## DESIGN AND MONITORING FRAMEWORK

**Table A1.1 Sector Development Program**

Design Summary	Performance Indicators and Targets	Assessment after Completion	Remarks
<b>Impact</b> Increased capacity and reliable power supply for sustained economic growth	<ul style="list-style-type: none"> <li>Access to electricity from present 38% to 60% of national population by 2015</li> </ul>	About 75% of the population now has access to electricity.	The government plans for 100% of the population to have access to electricity by 2021.
	<ul style="list-style-type: none"> <li>No load shedding by 2015</li> </ul>	As of August 2016, there is no load shedding.  In 2015, load shedding ranged from 0 to 778 MW on 61 days for a period of 18 hours, leading to unserved energy of 177 GWh.	Substantial progress in power generation compared to 2007. In 2007, load shedding ranged from 80 MW to 1,354 MW on 364 days for a period of 4,146 hours, leading to unserved energy needs of 2,264 GWh.  Installed generation capacity increased from 5,200 MW in 2007 to over 12,000 MW in 2015. In 2015, recorded peak generation was 8,200 MW.
	<ul style="list-style-type: none"> <li>Gross domestic product increases maintained on a sustainable basis.</li> </ul>	GDP growth maintained over 6% on a sustainable basis.	
<b>Outcome</b> <b>Reforms:</b> Improved power sector sustainability through financial and organizational restructuring	<ul style="list-style-type: none"> <li>Issuance of detailed medium-term road map of power sector reforms.</li> </ul>	The government approved 3-Year Power Sector Reform Road Map (2006–2008) on 13 September 2006.	The road map was updated in 2007 and 2008.
	<ul style="list-style-type: none"> <li>Establishment by 2007 of a long-term planning mechanism for power sector operations based on a detailed sector reform road map, a long-term power system plan, and a sector-wide capacity-building program.</li> </ul>	The government set up a working group to continuously update the Reform Road Map, to develop a long-term Power System Master Plan (PSMP), and to prepare a detailed plan for the medium-term sector-wide Capacity Building Program.	The PSMP was updated in 2010. It is now being updated with funding from JICA.  Some of capacity building actions were included under this program.
	<ul style="list-style-type: none"> <li>Fully staffed BERC and licensing and tariff regulations in place by 2007.</li> </ul>	The government approved the organizational chart and the pay structure for BERC in November 2006, and the service regulations in 2008. In parallel, the government completed appointment of all	BERC is now fully functional and is responsible for setting tariffs for the gas and power sectors. The government still prices oil.

Design Summary	Performance Indicators and Targets	Assessment after Completion	Remarks
		BERC commissioners as of 25 November 2007. The licensing regulations and electricity generation tariff regulations were gazetted on 9 September 2006 and 8 April 2008, respectively.	
	<ul style="list-style-type: none"> <li>Financial self-reliance of power sector entities by 2010.</li> </ul>	PGCB and DESCO became self-reliant before the target date. DPDC will require time to become self-reliant as it has taken over DESA's past debt liabilities. NWPGC began commercial operation from 2013 and has become self-reliant.	
	<ul style="list-style-type: none"> <li>BPDB and DESA converted to corporatized entities by 2007.</li> </ul>	<p>DESA was incorporated as DPDC on 25 October 2005.</p> <p>BPDB has not been incorporated.</p>	BPDB could not be corporatized for resistance from BPDB staff. The government is pursuing corporatization of BPDB's remaining generation and distribution segments.
	<ul style="list-style-type: none"> <li>Initiation of fund raising from local capital market by 2006 for power sector development, and 50% of new generation capacity from private sector.</li> </ul>	Partial offloading of DESCO and PGCB shares has begun, and the private power generation policy was adopted in 2006.	
<b>Clean Energy Power Supply Capacity Expansion and Efficiency Improvements:</b>  Expanded peak generation capacity and reduction of load shedding	<ul style="list-style-type: none"> <li>Additional peak load generating capacity of 300 MW by 2009.</li> <li>Load shedding reduced from 770 MW in 2005 to less than 470 MW in 2009.</li> </ul>	<p>The Sirajganj 150 MW plant was commissioned on 22 November 2012. The Khulna 150 MW plant was commissioned on 24 September 2013.</p> <p>Instead of reduction, there was an increase in load shedding in 2009 to over 1,200 MW. The situation has since significantly improved (Appendix 13).</p>	In 2015, load shedding ranged from 0 MW to 780 MW for 61 days with a duration of 18 hours, compared to load shedding ranged from 7 MW to 770 MW for 287 days with a duration of 1,433 hours in 2005.
Improved power transmission capacity and reduction of transmission system losses	<ul style="list-style-type: none"> <li>Addition of power transmission capacity by 900 MVA by 2009.</li> <li>Transmission system losses</li> </ul>	<p>The program added 960 MVA in transmission capacity.</p> <p>PGCB reduced transmission</p>	In 2015, PGCB's

Design Summary	Performance Indicators and Targets	Assessment after Completion	Remarks
	reduced from 3.4% in 2005 to 3.2% in 2009.	system loss to 3.2% in 2009.	transmission system loss was 2.77%.
Dhaka area distribution system efficiency improvements	<ul style="list-style-type: none"> <li>Reduction of DESCO's distribution losses from 16.7% in 2005 to 12.0% by 2009.</li> </ul>	In 2009, DESCO's distribution loss was 9.79%.	In 2015, DESCO's distribution loss was 8.37%.
	<ul style="list-style-type: none"> <li>Reduction of distribution losses of DESA from 30.0% in 2005 to 20.0% by 2009.</li> </ul>	In 2009, DESA's distribution loss was 18.24%.	In 2015, DESA's distribution loss reduced further to 8.91%.
	<ul style="list-style-type: none"> <li>Improved reliability and quality of power supply for 820,000 existing and 230,000 new consumers.</li> </ul>	<p>Reliability and quality of supply significantly improved. Facilities created would enable DPDC and DESCO to serve over 1.3 million consumers. DPDC and DESCO connected 315,000 new consumers by 2015.</p> <p>More than 146,000 new consumers were connected by BPDB, WZPDC, and REB in the west where PGCB extended 132-kV lines and built 132/33-kV substations under the project.</p> <p>In total, more than 461,000 new consumers are connected.</p>	Facilities created helped in ensuring reduced load shedding and reliability and quality of supply to 820,000 existing consumers
Institutional Development	Capacity	<ul style="list-style-type: none"> <li>Enhanced competitiveness of power sector entities in corporate and financial management, information and communication technology, long-term planning, governance, customer relations and research and development.</li> </ul>	Competitiveness of the sector has substantially enhanced in the specified fields.
<b>Outputs</b>			
<b>Reforms:</b>			
National action plan for power sector reform	<ul style="list-style-type: none"> <li>3-year road map for power sector reforms and implementation of a regular monitoring system by December 2006.</li> </ul>	Road map for power sector reforms was approved on 13 September 2006.	
	<ul style="list-style-type: none"> <li>Power system master plan (PSMP) for generation and transmission for 2006–2025 by December 2006.</li> </ul>	Power system master plan was updated in 2006.	PSMP updated again in 2010 and as of 2016 was undergoing further updates under JICA funding.
	<ul style="list-style-type: none"> <li>Preparation of a technical project proposal for a sector-</li> </ul>	Prepared and under implementation.	

Design Summary	Performance Indicators and Targets	Assessment after Completion	Remarks
	wide capacity development program by December 2006.		
Fully functional legal and regulatory framework	<ul style="list-style-type: none"> <li>Government approval of BERC organizational chart by December 2006.</li> </ul>	The government approved BERC organizational chart in November 2006.	
	<ul style="list-style-type: none"> <li>Gazette notification of licensing regulations by December 2006.</li> <li>Gazette notification of tariff regulations by December 2007.</li> </ul>	Gazette notification of licensing regulations was issued on 9 September 2006. Gazette notification of tariff regulations was issued on 8 April 2008.	
	<ul style="list-style-type: none"> <li>Appointment of BERC's remaining commissioner by December 2007.</li> </ul>	Remaining commissioner was recruited on 25 November 2007.	
Financial restructuring of power sector entities	<ul style="list-style-type: none"> <li>Preparation of a draft financial restructuring plan for BPDB and DESA by December 2006.</li> <li>Government approval of the financial restructuring plan by December 2007.</li> </ul>	A Financial restructuring plan for BPDB and DESA was prepared in March 2006 with assistance from ADB. The plan was endorsed by the National Steering Committee chaired by the Principal Secretary on 6 December 2006.	
	<ul style="list-style-type: none"> <li>Settlement of unfunded pension liabilities for the newly corporatized entities by June 2008.</li> </ul>	In June 2007, MOF allocated Tk2.2 billion in the budget for FY2008 for this purpose.	
	<ul style="list-style-type: none"> <li>Reduction of the government's (and its autonomous and semiautonomous agencies') outstanding electricity dues to less than Tk1.0 billion and Tk2.5 billion, respectively, by December 2007.</li> </ul>	In June 2007, outstanding electricity dues of government and its semiautonomous agencies were Tk0.59 billion and Tk0.87 billion, respectively.	Since then, outstanding electricity dues of government and its semiautonomous agencies were rising and in June 2015 stood at Tk3.87 billion and Tk4.79 billion, respectively.
Continued restructuring of power sector entities	<ul style="list-style-type: none"> <li>Constitution of boards of directors and appointment of managements for the newly corporatized entities by December 2006.</li> </ul>	Constituted board of directors and recruited management for DPDC and NWZPDC.	
Increased public-private partnership	<ul style="list-style-type: none"> <li>Partial off-loading of PGCB and DESCO shares by December 2007.</li> </ul>	22.5% of DESCO shares were listed on the stock market in June 2006 and trading of PGCB shares commenced in October 2006.	
<b>Power Supply Capacity Expansion and Efficiency Improvements:</b>			
Construction of clean natural-gas-fired power plants	<ul style="list-style-type: none"> <li>A 150-MW peaking power</li> </ul>	Sirajganj 150 MW plant was commissioned on 22	Reliability test run conducted during 22

Design Summary	Performance Indicators and Targets	Assessment after Completion	Remarks
	plant to be built in Sirajganj and another 150-MW peaking power plant to be built in Khulna by 2009.	November 2012. The plant was installed with dual-fuel firing provision. It uses natural gas as fuel.	November to 21 December 2012. NWPGC signed power purchase agreement (PPA) with BPDB on 3 April 2013 effective 22 December 2013. It has been upgraded to a 225 MW combined cycle plant with government funding and commissioned on 14 July 2014.
		Khulna 150-MW plant was commissioned on 23 September 2013. This plant was also installed with dual-fuel firing provision.	Reliability test run conducted during 5-23 September 2013. NWPGC signed PPA with BPDB on 4 December 2013 effective 23 September 2013. It is also being upgraded to a 225 MW combined cycle plant with ADB financing and expected to be commissioned in June 2016. <sup>13</sup>
Construction and augmentation of transmission systems	<ul style="list-style-type: none"> <li>A 50-km, 400-kV double-circuit transmission line from Meghnaghat to Aminbazar and associated bay extensions by 2009.</li> </ul>	Physical works of 54-km, 400-kV double-circuit transmission line was completed on 30 June 2013.	Commissioning of the line at the 230-kV level was delayed for non-completion of 230 kV bay expansions at Meghnaghat and Aminbazar. Bay expansions were completed and commissioned in December 2014. The bay expansion at the Aminbazar 230/132-kV substation was completed and commissioned on 4 August 2012.
	<ul style="list-style-type: none"> <li>A 10-km, 230-kV double circuit transmission line from Aminbazar to Old Dhaka Airport and associated substations in Old Dhaka Airport and Dhaka University Areas by 2009.</li> </ul>	One 8-km, 230-kV double-circuit overhead and underground transmission line along with 2X180/300 MVA, 230/132 kV GIS substation and one 80/120 MVA transformer of 132/33 kV GIS substation at Agargaon (instead of Old Airport) was commissioned on 26 October	80/120 MVA 2 <sup>nd</sup> transformer of Agargaon 132/33 kV GIS substation was commissioned on 13 December 2014.  80/120 MVA 2 <sup>nd</sup> transformer of Satmasjid 132/33 kV GIS

<sup>13</sup> ADB. 1995. *Report and Recommendation of the President to the Board of Directors: Proposed Loans to the People's Republic of Bangladesh for the Rural Electrification Project*. Manila.

Design Summary	Performance Indicators and Targets	Assessment after Completion	Remarks
		2013.	substation was commissioned on 2 July 2015.
		<p>Double-circuit 132 kV Agargaon–Satmasjid (instead of Dhaka University) underground transmission line was commissioned on 19 November 2013.</p> <p>Double-circuit 132-kV Agargaon–Dhamalkot (Dhaka Cantonment) underground transmission line was commissioned on 30 October 2013.</p> <p>1X80/120 MVA transformer of Satmasjid 132-kV GIS substation was commissioned on 3 December 2014.</p> <p>Rampura–Ullon 132-kV, double-circuit transmission line commissioned in August 2011.</p> <p>Dhamalkot 132/33 kV, 2X80/120 MVA GIS substation was commissioned on 30 October 2013.</p>	<p>In addition, 11 km, 132/33 kV underground transmission lines were constructed from (i) Agargaon 230/132 kV substation to Cantonment and Satmasjid 132/33 kV substations, and (ii) Rampura 230/132 kV substation to Ullon 132/33 kV substation compared with target of 10 km.</p>
Distribution system upgrade in DESA's area	<ul style="list-style-type: none"> <li>A total of 158 km in three 132-kV single-circuit transmission lines and associated substations in western and northwestern parts of the country by 2009.</li> </ul>	A total of 157-km in three 132 kV transmission lines, and four associated 132/33-kV substations of 2X25/41 MVA capacity each, were commissioned during October–December 2010.	
	<ul style="list-style-type: none"> <li>About 570 MVA of additional distribution capacity to connect about 120,000 new consumers (domestic, commercial, irrigation, industrial, and others) by 2009.</li> </ul>	Over 600 MVA additional distribution capacity to connect over 600,000 new connections built by 2015. Over 135,000 new consumers connected by 2015.	
Distribution system upgrade in DESCO area	<ul style="list-style-type: none"> <li>About 450 MVA of additional distribution capacity to connect about 110,000 new consumers (domestic, commercial, irrigation, industrial, and others) by 2009.</li> </ul>	<p>About 600 MVA substation capacity added in DESCO's Mirpur and Gulshan Zones by 2014.</p> <p>More than 180,000 new consumers connected by 2015.</p>	Distribution lines constructed were 1,126 km compared with target of 1,380 km based on the Project Administration Manual.
Institutional Capacity Development		Details are in Table A1.2	
Activities with Milestones			



Design Summary	Performance Indicators and Targets	Assessment after Completion	Remarks
<b>1. Reforms</b>			
1.1. 3-Year Road Map for Power Sector Reforms approved by September 2006		On 13 September 2006, MPEMR approved 3-Year Road Map for Power Sector Reforms (2006–2008), as agreed between the Government and ADB.	
1.2. BERC organizational chart approved by the government by October 2006		Government approved BERC organizational chart in November 2006 with clearance of the Secretaries Committee on Administrative Developments.	
1.3. Gazette notification of the licensing regulations by September 2006		The licensing regulations were published in the government gazette on 9 September 2006.	
1.4. BERC's submission of draft electricity generation tariff regulations with tariff-setting mechanism to the Energy and Mineral Resources Division of MPEMR by August 2006.		BERC submitted the Electricity Generation Tariff Regulations with the tariff-setting mechanism to the Energy and Mineral Resources Division.	The electricity generation tariff regulations with the tariff-setting mechanism were published in the Bangladesh Government Gazette on 8 April 2008.
1.5. Government approval of Financial Restructuring Plan of BPDB and DESA by December 2007.		A draft Financial Restructuring Plan for BPDB and DESA was prepared in March 2006 with assistance under ADB TA 4379-BAN.	
1.6. Budget allocation of Tk1.8 billion by June 2007 and another Tk1.8 billion by June 2008 to settle unfunded pension and gratuities for the newly corporatized sector entities.		In June 2007, MOF allocated Tk2.2 billion in the budget of FY2008 for payment of pension and gratuities for officials of already corporatized entities. Additional allocation of Tk1.8 billion was made by MOF in April 2008 for payment of pension and gratuities for EGCB and DPDC in the budget of FY2008.	
1.7. Initial offloading of PGCB and DESCO shares in the stock market by December 2007.		Power Division of MPEMR approved offloading of 25% of PGCB and DESCO shares in the stock market in April 2006.	22.5% of DESCO shares were listed on the stock market in June 2006 and trading of PGCB shares commenced in October 2006. As of April 2008, 24.97% of DESCO shares and 23.75% of PGCB shares are being traded on the stock market.

Design Summary	Performance Indicators and Targets	Assessment after Completion	Remarks
<b>2. Power Supply Capacity Expansion and Efficiency Improvements</b>			
2.1. Field surveys for all project components completed by June 2006		Field surveys completed by 2006	
2.2. Completion of land acquisition and resettlement activities by December 2007.		PGCB completed acquisition of land for substations in February 2008.	
2.3. Recruitment of consultants to prepare bidding documents, supervise bids, supervise construction, and commission and test the Sirajganj peaking power plant, Khulna peaking power plant, and 400-kV transmission line by September 2007.		BPDB signed a contract with consultants for Khulna and Sirajganj plants on 30 June 2008.  PGCB signed two contracts with the same firm, one on 31 January 2008 and the other on 14 July 2008.	
2.4. Design, engineering, procurement, and construction starts July 2006. Construction completed by December 2009.		First contract signed on 10 April 2008 and all works completed by 30 December 2014.	
<b>3. Institutional Capacity Development</b>			
3.1. Submission of a technical project proposal for a medium-term, sector-wide capacity building program by the Power Division of MPEMR to the Planning Commission by October 2006.		Technical project proposal sent to Planning Commission in October 2006.	
3.2. Detailed needs assessment completed by October 2007		Draft needs assessment report was submitted to ADB on 3 April 2008 and revised report on 25 September 2008.	Contract with international management consultant specialized in training was signed on 21 November 2011.
3.3. Key training started from January 2008		Key training commenced from January 2013.	
<b>Inputs</b>			
Program Loan	ADB: \$60.0 million equivalent	ADB: \$64.0 million equivalent	

<b>Design Summary</b>	<b>Performance Indicators and Targets</b>	<b>Assessment after Completion</b>	<b>Remarks</b>
	Government: \$123.0 million	Government: \$122.0 million	
Project Loan	ADB: \$405.0 million	ADB: \$372.6 million	
		KfW: \$37.6 million	
	Government: \$274.9 million	Government: \$379.4 million	
		Executing Agencies: \$38.9 million	
<b>Consulting Services</b>			
NWPGC	International: 34 person-months National: 72 person-months	International: 66 person-months National: 74 person-months	
PGCB	International: 38 person-months National: 60 person-months	International: 37 person-months National: 70 person-months	
DPDC (KfW financed)		International: 67.5 person-months National: 91.6 person-months	
Power Division		International: 10 person-months National: 50 person-months	

ADB = Asian Development Bank, BERC = Bangladesh Energy Regulatory Commission, BPDB = Bangladesh Power Development Board, DESA = Dhaka Electric Supply Authority, DESCO = Dhaka Electric Supply Company Limited, DPDC = Dhaka Power Distribution Company, EGCB = Electricity Generation Company of Bangladesh, GDP = gross domestic product, GIS = gas-insulated switchgear, GOB = Government of Bangladesh, JICA = Japan International Cooperation Agency, km = kilometer, kV = kilovolt, MOF = Ministry of Finance, MPEMR = Ministry of Power, Energy and Mineral Resources, MVA = mega-volt ampere, MW = megawatt, NWPGC = North West Zone Power Generation Company Limited, NWZPDC = North West Zone Power Distribution Company Limited, and PGCB = Power Grid Company of Bangladesh Limited.

**Table A1.2: Sector Road Map and Capacity Building**

Objective	Impact	Performance Target	Assessment after Completion
<b>Sector Road Map</b> <ul style="list-style-type: none"> <li>• Bringing the entire country under electricity service by 2020 in phases</li> <li>• Increased private sector participation</li> <li>• Making the power sector financially viable by 2010 with increased efficiency</li> </ul>	<b>Generation</b>		
	• Corporatization of existing power stations under BPDB on an individual or cluster basis	• Completion of study for conversion of BPDB as a holding company by December 2007	Study was completed in August 2008
		• Corporatization of BPDB holding company by June 2008	BPDB has not been incorporated.
	• Development of captive power policy	• Preparation of captive power generation policy by 2006	The government approved captive power generation policy in 2006.
	<b>Transmission</b>		
	• Completion of system metering installation	• Completion of system metering installation by 2007	System metering installation completed in 2007
	<b>Distribution</b>		
	• BPDB distribution segment to be converted into a number of distribution companies	• WZPDC fully functional by 2006	WZPDC became fully functional in late 2006.
		• Corporatization of BPDB's south zone distribution network by 2007	Government approved a corporatization proposal for BPDB's south zone but did not implement it because of resistance from BPDB employees.
		• Corporatization of BPDB's central zone distribution network by 2008	Government approved a corporatization proposal for BPDB's central zone but did not implement it because of resistance from BPDB employees.
	• REB's graduation policy to be implemented for balanced development of all PBSs	• Implementation of REB's graduation policy from 2007	REB's graduation policy was implemented from 2008. Since 2013, REB introduced a policy of subsidizing weak PBSs with surplus funds from others.
	• DESA to be corporatized	• Completion of DESA corporatization by 2007	DPDC was incorporated on 25 October 2005, and began operating by taking over assets from DESA on 1 July 2008. DESA was abolished when DESA Act 1991 was repealed by the parliament in 2008.

Objective	Impact	Performance Target	Assessment after Completion
	<ul style="list-style-type: none"> <li>Completion of asset transfer to corporatized distribution entities.</li> </ul>		Transfer of assets from BPDB to WZPDC and DESA to DPDC completed. Transfer of assets from BPDB to NWZPDC is on hold.
	<b>Sector Regulation</b>		
	<ul style="list-style-type: none"> <li>BERC to be fully functional</li> </ul>	<ul style="list-style-type: none"> <li>Approval of BERC organizational chart by 2006</li> </ul>	BERC organizational chart was approved by government in November 2006 with clearance of the Secretaries Committee on Administrative Developments.
		<ul style="list-style-type: none"> <li>Appointment of the remaining commissioner by December 2007</li> </ul>	All the BERC commissioners had been appointed as of November 2007.
		<ul style="list-style-type: none"> <li>Gazette notification of tariff regulations by December 2007</li> </ul>	The Electricity Generation Tariff Regulations with the tariff-setting mechanism were published in the Bangladesh Government Gazette on 8 April 2008.
	<b>Private Sector Participation</b>		
	<ul style="list-style-type: none"> <li>Promotion of private sector participation</li> </ul>	<ul style="list-style-type: none"> <li>Completion of a study for promotion of private sector participation by June 2008</li> </ul>	Study completed in 2008.
		<ul style="list-style-type: none"> <li>Direct listing of PGCB and DESCO shares in local stock market by December 2007</li> </ul>	The Power Division of MPEMR approved offloading of 25% of PGCB and DESCO shares on the stock market in April 2006. 22.5% of DESCO shares were listed on the stock market in June 2006 and trading of PGCB shares began in October 2006. As of April 2008, 24.97% of DESCO shares and 23.75% of PGCB shares were being traded on the stock market.
		<ul style="list-style-type: none"> <li>Issue of PGCB local bonds by June 2007</li> </ul>	PGCB initiated steps to issue local bonds and engaged an issue manager. Poor market response forced PGCB to abandon the process.

Objective	Impact	Performance Target	Assessment after Completion
	<b>Operational Performance</b>		
	<ul style="list-style-type: none"> <li>Improved operational and financial performance of the power sector entities</li> </ul>	By December 2007 <ul style="list-style-type: none"> <li>Distribution losses: 17.4%</li> </ul>	Overall distribution loss was 17.84%
		<ul style="list-style-type: none"> <li>Collection to import ratio of 78.9%</li> </ul>	BPDB: 93.82% DESA: 83.95% DESCO: 90.37% WZPDC: 106.63 REB: 85.04%
		<ul style="list-style-type: none"> <li>Accounts receivable less than 3.5 months</li> </ul>	BPDB: 3.05 months DESA: 3.91 months DESCO: 3.36 months WZPDC: 3.36 months REB: 1.69 months
		<ul style="list-style-type: none"> <li>Debt-service coverage ratio not less than 1.4%</li> </ul>	Data for 2007 was not available. Data for DESA and DESCO in 2011 was as follows: DESA (DPDC): 2.3% DESCO: 3.04% Data for BPDB, WZPDCL and REB not available.
		By December 2008 <ul style="list-style-type: none"> <li>Distribution losses: 17.1%</li> </ul>	Overall distribution loss was 15.56%
		<ul style="list-style-type: none"> <li>Collection to import ratio of 79.2%</li> </ul>	BPDB: 85.47% DESA: 81.89% DESCO: 89.10% WZPDC: 85.48% REB: 85.49%
		<ul style="list-style-type: none"> <li>Accounts receivables less than 3.0 months</li> </ul>	BPDB: 2.55 months DESA: 3.61 months DESCO: 2.74 months WZPDC: 3.39 months REB: 1.54 months
		<ul style="list-style-type: none"> <li>Debt-service coverage ratio not less than 1.2</li> </ul>	Data for 2008 were not available. Data for DESA and DESCO in 2012 were as follows: DESA (DPDC): 1.27 DESCO: 2.00
<b>Capacity Development</b>			
Sector-wide capacity development to sustain reforms and restructuring, covering:			
<ul style="list-style-type: none"> <li>Corporate and financial management</li> </ul>	<ul style="list-style-type: none"> <li>Improved corporate and financial management of power sector entities</li> </ul>	<ul style="list-style-type: none"> <li>Enhanced capacity for business planning, investment and financial planning, funds mobilization, and commercialization</li> </ul>	Corporatization the enhanced overall management mechanisms in the specified fields

Objective	Impact	Performance Target	Assessment after Completion
<ul style="list-style-type: none"> <li>Information and communication technology</li> </ul>	<ul style="list-style-type: none"> <li>Operating efficiency and transparency</li> </ul>	<ul style="list-style-type: none"> <li>Introduction of advanced information and communication technology systems as e-procurement and a management information system</li> </ul>	<p>All sector entities introduced management information systems and regularly posted results to their respective website.</p> <p>E-procurement has yet to be introduced.</p>
<ul style="list-style-type: none"> <li>Long-term system planning</li> </ul>	<ul style="list-style-type: none"> <li>Updated least-cost development plans</li> </ul>	<ul style="list-style-type: none"> <li>Regular updates of demand forecast; and preparation of a power system master plan for generation, transmission, and distribution</li> </ul>	<p>Power system master plan (PSMP) was updated in 2010. Further updating of the plan is ongoing under JICA financing.</p>
	<ul style="list-style-type: none"> <li>Future investment projects</li> </ul>	<ul style="list-style-type: none"> <li>Preparation of future investment projects based on a least-cost development plan</li> </ul>	<p>Being followed. PSMP is the basis for preparing investment projects for generation and transmission segment.</p>
<ul style="list-style-type: none"> <li>Good governance</li> </ul>	<ul style="list-style-type: none"> <li>Improved sector and corporate governance</li> </ul>	<ul style="list-style-type: none"> <li>Enhanced predictability, accountability, transparency, and stakeholder participation in the business process</li> </ul>	<p>Corporatization enhanced predictability, accountability, and transparency in the sector.</p> <p>BERC's introduction of public hearing for tariff setting enhanced stakeholders' participation.</p>
<ul style="list-style-type: none"> <li>Customer relations</li> </ul>	<ul style="list-style-type: none"> <li>Enhanced customer satisfaction</li> </ul>	<ul style="list-style-type: none"> <li>Improved quality of service and customer relations</li> </ul>	<p>Enhancement of generation capacity substantially reduced load shedding.</p> <p>Investments in transmission and distribution systems improved quality of service.</p>
<ul style="list-style-type: none"> <li>Research and development</li> </ul>	<ul style="list-style-type: none"> <li>Application of latest energy efficiency and clean development mechanisms</li> </ul>	<ul style="list-style-type: none"> <li>Improvements in operational efficiency and reliability of power supply</li> </ul>	<p>Government provides incentives to introduce energy-efficient lighting and electric appliances.</p>
Human resource development and training	<ul style="list-style-type: none"> <li>Safe and efficient operation of power business</li> </ul>	<ul style="list-style-type: none"> <li>Optimally skilled human resources in the power sector with adequate capacity for planning, engineering, procurement, construction supervision, and operation and maintenance of the power supply system</li> </ul>	<p>Training of sector entities' officials is ongoing. More than 4,000 officials from sector entities were trained under the program.</p>

BERC = Bangladesh Energy Regulatory Commission, BPDB = Bangladesh Power Development Board, DESA = Dhaka Electric Supply Authority, DESCO = Dhaka Electric Supply Company Limited, JICA = Japan International Cooperation Agency, NWPDC = North West Zone Power Distribution Company Limited, PBS = *pally biddut samity* (rural electric cooperatives), PGCB = Power Grid Company of Bangladesh Limited, REB = Rural Electrification Board, and WZPDC = West Zone Power Distribution Company Limited.

## POLICY MATRIX

**Table A2: Policy Matrix for Release of Tranches**

Condition	Status /Remarks	First Tranche	Second Tranche
<b>A. National Action Plan for Power Sector Reforms</b>			
V. Government approval of 3-year Road Map for Power Sector Reforms (2006-2008), as agreed between the Government and ADB	<b>Complied with.</b>  On 13 September 2006, MPEMR approved 3-year Road Map for Power Sector Reforms (2006-2008), as agreed between the Government and ADB.	X	
VI. Establishment and implementation of a regular monitoring and reporting mechanism to oversee the power sector reform process	<b>Complied with.</b>  A three-tier monitoring and reporting mechanism was established to oversee the power sector reform process. Regular monitoring and reporting ongoing.	X	
VII. Submission of a technical project proposal (TPP) satisfactory to ADB for a sector-wide, medium-term capacity building program by the Power Division of MPEMR to the Planning Commission	<b>Complied with.</b>  In July 2006, Power Division of MPEMR prepared and submitted a TPP to the Planning Commission for a sector-wide, medium-term capacity building program. The Planning Commission approved the TPP on 26 June 2007.	X	
<b>B. A Fully Functional Legal and Regulatory Framework</b>			
VIII. Approval of the BERC Organogram by the Secretaries Committee on Administrative Developments	<b>Complied with.</b>  Government approved BERC organogram in November 2006 with clearance from the Secretaries Committee on Administrative Developments.	X	
IX. Gazette notification of the Licensing Regulations as finalized by BERC	<b>Complied with.</b>  The Licensing Regulations were published in the Government Gazette on 9 September 2006.	X	
X. Submission of Electricity Generation Tariff Regulations with the tariff-setting mechanism to the Energy and Mineral Resources of MPEMR.	BERC submitted the Electricity Generation Tariff Regulations with the tariff-setting mechanism to the Energy and Mineral Resources	X	



Condition	Status /Remarks	First Tranche	Second Tranche
XI. Appointment of the remaining one BERC commissioner	<b>Complied with.</b>  As of November 2007, all the BERC commissioners have been appointed.		X
XII. Gazette notification of the Electricity Generation Tariff Regulations with the tariff-setting mechanism as finalized by BERC	<b>Complied with.</b>  The Electricity Generation Tariff Regulations with the tariff-setting mechanism were published in the Bangladesh Government Gazette on 8 April 2008.		X
<b>C. Enhanced Financial Health of Power Sector Entities</b>			
XIII. Preparation of a draft financial restructuring plan for BPDB and DESA by the Power Division of MPEMR in a manner satisfactory to ADB	<b>Complied with.</b>  A draft financial restructuring plan for BPDB and DESA was prepared in March 2006 with assistance under ADB TA 4379-BAN	X	
XIV. Budget allocation of at least Tk1.8 billion by MOF for unfunded pension and gratuities for entities already corporatized, including WZPDCL, APSC and NWZPDC	<b>Complied with.</b>  In June 2007, MOF allocated Tk2.2 billion in the budget of FY2008 for payment of pension and gratuities for officials of already corporatized entities.	X	
XV. Reduction of the Government's outstanding debts to the power sector entities for electricity to less than Tk1.2 billion and the Government's autonomous bodies outstanding debts to less than Tk3.0 billion	<b>Complied with.</b>  As of April 2007, the outstanding of the Government's and its autonomous and semiautonomous bodies to power sector for electricity were reduced to Tk0.65 billion and Tk1.25 billion, respectively.	X	
XVI. Approval by the Government of the financial restructuring plan for BPDB and DESA	<b>Complied with.</b>  The National Steering Committee chaired by the Principal Secretary endorsed the financial restructuring plan for BPDB and DESA on 6 September 2006.		X
XVII. Budget allocation of at least another Tk1.8 billion by MOF for provision of unfunded pension and gratuities for entities already corporatized, including EGCB and DPDC	<b>Complied with.</b>  On 8 April 2008, MOF informed ADB of allocation of Tk1.8 billion for payment of pension and gratuities for EGCB and DPDC in the budget of FY2008.		X

Condition	Status /Remarks	First Tranche	Second Tranche
XVIII. Reduction of the Government's outstanding debts to the power sector entities for electricity to less than Tk1.0 billion and the Government's autonomous bodies outstanding debts to less than Tk2.5 billion	<b>Complied with.</b>  As of April 2008, outstanding dues owed by the Government are Tk0.93 billion, as against the requirement of less than Tk1.0 billion. Outstanding dues of the Government's autonomous and semiautonomous bodies' are Tk1.28 billion, as compared with the requirement of less than Tk2.5 billion.		X
<b>D. Continued Restructuring of sector Entities</b>			
XIX. Constitution of board of directors of DPDC, EGCB and NWZPDC in a manner satisfactory to ADB, and advertisement for the recruitment of the management of DPDC and NWZPDC	<b>Complied with.</b>  The board of directors of DPDC, EGCB and NWZPDC was reconstituted in October 2006 in accordance with principles and procedures as agreed with ADB. Management of DPDC was appointed during April-June 2007, while management of NWZPDC was appointed during August 2007-January 2008.	X	
<b>E. Increased Public-Private Partnership</b>			
XX. Formal approval by the Power Division of MPEMR for PGCB and and DESCO to offload up to 25% of their shares in the stock market in one or more tranches	<b>Complied with.</b>  Power Division of MPEMR approved offloading of 25% of PGCB and DESCO shares in the stock market in April 2006.	X	
XXI. Subject to favorable market conditions, initial offloading of PGCB and DESCO shares in the stock market	<b>Complied with.</b>  22.5% of DESCO shares were listed in the stock market in June 2006 and trading of PGCB shares commenced in October 2006. As of April 2008, 24.97% of DESCO shares and 23.75% of PGCB shares are being traded in the stock market.		X

ADB = Asian Development Bank, APSC = Ashuganj Power Station Company Limited, BERC = Bangladesh Energy Regulatory Commission, DESA = Dhaka Electric Supply Authority, DESCO = Dhaka Electric Supply Company limited, DPDC = Dhaka Power Distribution Company limited, EGCB = Electricity Generation Company of Bangladesh Limited, MOF = Ministry of Finance, MPEMR = Ministry of Power, Energy and Mineral Resources, NWZPDC = Northwest Zone Power Distribution Company Limited, PGCB = Power Grid Company of Bangladesh limited, TPP = technical project proposal, and WZPDC = West Zone Power Distribution Company Limited.

Source: Progress Report on Second Tranche Release, May 2008

**PROJECT COST – APPRAISAL VS. ACTUAL****Table A3.1: Project Cost Summary**  
(\$ million)

Project Component	At Appraisal			Actual		
	Foreign Exchange	Local Cost	Total Cost	Foreign Exchange	Local Cost	Total Cost
Part A: Clean Energy Capacity Expansion	145.11	89.59	234.70	295.58	79.79	375.38
Part B: Transmission System Efficiency Improvements	105.09	81.47	186.56	149.61	88.25	237.86
Part C: Distribution System Efficiency Improvement in DESA Area	49.63	35.37	85.00	70.18	32.59	102.77
Part D: Distribution System Efficiency Improvement in DESCO Area	100.17	64.55	164.72	86.09	21.38	107.47
Part E: Capacity Development	5.00	3.80	8.80	3.62	1.40	5.02
<b>Total</b>	<b>405.00</b>	<b>279.90</b>	<b>679.90</b>	<b>605.08</b>	<b>223.41</b>	<b>828.49</b>

**Table A3.2: Part A: Clean Energy Capacity Expansion**  
(\$ million)

Item		At Appraisal			Actual		
		Foreign Exchange	Local Cost	Total Cost	Foreign Exchange	Local Cost	Total Cost
<b>A.</b>	<b>Base Cost</b>						
	Preconstruction Cost	0.00	0.16	0.16	0.00	2.72	2.72
	Civil Works	0.00	18.01	18.01	0.00	1.21	1.21
	Power Station Equipment	114.67	1.59	116.26	270.36	39.04	309.39
	Other Materials	0.00	12.53	12.53	8.08	0.00	8.08
	Inland Transportation Cost	9.54	2.29	11.83	0.00	0.00	0.00
	Indirect Cost	0.00	1.03	1.03	0.14	2.50	2.64
	Consulting Services	1.20	0.16	1.36	1.32	0.00	1.32
	Duties and Taxes	0.00	40.14	40.14	0.00	24.82	24.82
	<b>Subtotal</b>	<b>124.21</b>	<b>75.75</b>	<b>199.96</b>	<b>279.90</b>	<b>70.28</b>	<b>350.18</b>
<b>B.</b>	<b>Contingencies</b>	<b>8.69</b>	<b>8.33</b>	<b>17.02</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b>C.</b>	<b>Financing Charges During Implementation</b>	<b>12.21</b>	<b>5.51</b>	<b>17.72</b>	<b>15.68</b>	<b>9.51</b>	<b>25.19</b>
	<b>Total Project Cost</b>	<b>145.11</b>	<b>89.59</b>	<b>234.70</b>	<b>295.58</b>	<b>79.79</b>	<b>375.38</b>

Source: Northwest Power Generation Company Limited.

**Table A3.3: Part B: Transmission System Efficiency Improvements**  
(\$ million)

Item		At Appraisal			Actual		
		Foreign Exchange	Local Cost	Total Cost	Foreign Exchange	Local Cost	Total Cost
<b>A.</b>	<b>Base Cost</b>						
	Preconstruction Cost	0.04	13.72	13.76	0.00	4.46	4.46
	Civil Works	0.95	4.43	5.38	0.00	0.06	0.06
	Transmission Lines	32.98	0.00	32.98	80.22	21.22	101.44
	Substations	47.90	0.00	47.90	45.74	14.58	60.32
	Other Materials	3.11	0.39	3.50	0.00	0.08	0.08
	Inland Transportation Cost	0.00	2.81	2.81	0.00	0.00	0.00
	Indirect Costs	3.28	17.03	20.31	0.00	1.19	1.19
	Consulting Services	0.79	0.56	1.35	0.78	0.00	0.78
	Duties and Taxes	0.00	29.40	29.40	0.00	39.98	39.98
	<b>Subtotal</b>	<b>88.26</b>	<b>67.78</b>	<b>156.04</b>	<b>126.74</b>	<b>81.56</b>	<b>208.31</b>
<b>B.</b>	<b>Contingencies</b>	<b>6.18</b>	<b>7.46</b>	<b>13.64</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b>C.</b>	<b>Financing Charges During Implementation</b>	<b>10.65</b>	<b>6.23</b>	<b>16.88</b>	<b>22.87</b>	<b>6.68</b>	<b>29.55</b>
	<b>Total Project Cost</b>	<b>105.09</b>	<b>81.47</b>	<b>186.56</b>	<b>149.61</b>	<b>88.25</b>	<b>237.86</b>

Source: Power Grid Company of Bangladesh Limited.

**Table A3.4: Part C: Distribution System Efficiency Improvement in DESA Area**  
(\$ million)

Item		Foreign Exchange	Local Cost	Total Cost	Foreign Exchange	Local Cost	Total Cost
<b>A.</b>	<b>Base Cost</b>						
	Preconstruction Cost	0.00	1.57	1.57	0.00	0.00	0.00
	Civil Works	0.00	1.86	1.86	0.00	0.18	0.18
	Transmission and Distribution Lines	11.68	0.00	11.68	19.17	6.23	25.40
	Substations	30.37	0.00	30.37	44.74	5.63	50.37
	Other materials	0.00	0.56	0.56	0.00	0.00	0.00
	Indirect Cost	0.00	10.94	10.94	0.00	0.00	0.00
	Duties and Taxes	0.00	14.72	14.72	0.00	10.45	10.45
	<b>Subtotal</b>	<b>42.06</b>	<b>29.64</b>	<b>71.69</b>	<b>63.91</b>	<b>22.49</b>	<b>86.40</b>
<b>B.</b>	<b>Contingencies</b>	<b>2.94</b>	<b>3.27</b>	<b>6.21</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b>C.</b>	<b>Financing Charges During Implementation</b>	<b>4.64</b>	<b>2.46</b>	<b>7.00</b>	<b>6.27</b>	<b>10.10</b>	<b>16.37</b>
	<b>Total Project Cost</b>	<b>49.63</b>	<b>35.37</b>	<b>85.00</b>	<b>70.18</b>	<b>32.59</b>	<b>102.77</b>

DESA = Dhaka Electric Supply Authority

Source: Dhaka Power Distribution Company Limited.

**Table A3.5: Part D: Distribution System Efficiency Improvement in DESCO Area**  
(\$ million)

Item		At Appraisal			Actual		
		Foreign Exchange	Local Cost	Total Cost	Foreign Exchange	Local Cost	Total Cost
<b>A.</b>	<b>Base Cost</b>						
	Pre-construction Cost	0.00	0.52	0.52	0.00	0.00	0.00
	Civil Works	0.00	0.76	0.76	0.00	0.12	0.12
	Distribution Lines	32.88	5.18	38.06	40.48	0.00	40.48
	Substations	16.54	2.27	18.81	17.19	2.75	19.94
	Transformers	7.70	0.46	8.16	3.81	0.00	3.81
	Meters	11.10	0.65	11.75	4.39	0.00	4.39
	Other Materials	14.68	0.92	15.60	6.74	0.00	6.74
	Indirect Costs	0.14	11.88	12.02	0.00	0.74	0.74
	Duties and Taxes	0.00	29.59	29.59	0.00	17.21	17.21
	<b>Subtotal</b>	<b>83.04</b>	<b>52.23</b>	<b>135.28</b>	<b>72.59</b>	<b>20.81</b>	<b>93.40</b>
<b>B.</b>	<b>Contingencies</b>	<b>5.81</b>	<b>6.84</b>	<b>12.65</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b>C.</b>	<b>Financing Charges During Implementation</b>	<b>11.32</b>	<b>5.48</b>	<b>16.80</b>	<b>13.50</b>	<b>0.57</b>	<b>14.07</b>
	<b>Total Project Cost</b>	<b>100.17</b>	<b>64.55</b>	<b>164.72</b>	<b>86.09</b>	<b>21.38</b>	<b>107.47</b>

DESCO = Dhaka Electric Supply Company  
Source: Dhaka Electric Supply Company Limited.

**Table A3.6: Part E: Capacity Development**  
(\$ million)

Item		At Appraisal			Actual		
		Foreign Exchange	Local Cost	Total Cost	Foreign Exchange	Local Cost	Total Cost
<b>A.</b>	<b>Base Cost</b>						
	Consulting Services	4.40	3.40	7.80	2.11	1.40	3.51
	Training Equipment				1.50	0.00	1.50
	<b>Subtotal</b>	<b>4.40</b>	<b>3.40</b>	<b>7.80</b>	<b>3.61</b>	<b>1.40</b>	<b>5.01</b>
<b>B.</b>	<b>Contingencies</b>	<b>0.54</b>	<b>0.40</b>	<b>0.94</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b>C.</b>	<b>Financing Charges During Implementation</b>	<b>0.06</b>	<b>0.00</b>	<b>0.06</b>	<b>0.01</b>	<b>0.00</b>	<b>0.01</b>
	<b>Total Project Cost</b>	<b>5.00</b>	<b>3.80</b>	<b>8.80</b>	<b>3.62</b>	<b>1.40</b>	<b>5.02</b>

Source: Power Division of the Ministry of Power, Energy and Mineral Resources.

## LOAN UTILIZATION AT APPRAISAL AND ACTUAL

### Table A4.1: Loan 2332-BAN

Category	Original Allocation	Partial Cancellation	Last Revised Allocation	Net Available Amount	Amount Disbursed	Undisbursed Balance
	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)
Power Stations and Connecting Transmission Lines (Part A)	123,010,000	0	133,100,000	133,100,000	131,897,922	1,202,078
Transmission Lines and Substations (Part B)	87,470,000	0	124,200,000	124,200,000	121,274,122	2,725,878
Distribution Lines, Substations and Other Materials	125,090,000	0	101,000,000	101,000,000	98,978,815	2,021,185
Part C	42,050,000	0	27,000,000	27,000,000	26,282,422	717,578
Part D	83,040,000	0	74,000,000	74,000,000	72,596,393	1,403,607
Consulting Services	1,990,000	0	2,880,000	2,880,000	2,112,394	767,606
Part A					1,329,690	
Part B					782,704	
Interest and Commitment Charge	38,820,000	0	38,820,000	38,820,000	14,858,902	23,961,098
Unallocated	18,100,000		0	0	0	0
<b>Total</b>	<b>400,000,000</b>		<b>400,000,000</b>	<b>400,000,000</b>	<b>369,022,156</b>	<b>30,977,844</b>

Undisbursed balance of \$30,977,844 was cancelled at loan account closing on 22 October 2014.

### Table A4.2: Loan 2333-BAN(SF)

Category	Original Allocation	Partial Cancellation	Last Revised Allocation	Net Available Amount	Amount Disbursed	Undisbursed Balance
	(\$ equivalent)	(\$ equivalent)	(\$ equivalent)	(\$ equivalent)	(\$ equivalent)	(\$ equivalent)
Equipment	499,852		1,606,887	1,606,887	1,506,857	
Training/Fellowship and Consulting Services	3,899,436		2,159,734	2,159,734	2,110,510	
Interest Charge	60,813		62,545	62,545	5,119	
Unallocated	539,899		0	0	0	
<b>Total</b>	<b>5,000,000</b>	<b>1,298,012</b>	<b>3,829,156</b>	<b>3,829,156</b>	<b>3,622,486</b>	<b>232,205</b>

An amount of SDR845,781.0 (\$1,298,012.0 equivalent) was partially canceled at the time of reallocation of loan proceeds on 13 December 2013 and an amount of \$232,205.00 equivalent was canceled at loan closing on 15 April 2014.

**DISBURSEMENT DETAILS**  
**Table A5.1: Disbursement by Category and Financial Year**

Number	Items	Category	Executing Agency	Allocation		Financial Year								
				Original	Latest	2008	2009	2010	2011	2012	2013	2014	2015	Total (\$)
				\$	\$									
1	Power Stations and Connecting Transmission	1	BPDB/ NWPGC	123,010,000	133,100,000	0	0	10,720,439	30,759,978	31,083,959	58,385,024	948,522	0	131,897,922
2	Transmission Lines and Substations	2	PGCB	87,470,000	124,200,000		4,792,221	21,775,108	23,373,614	25,278,058	21,068,487	160,296,380	8,060,254	121,274,122
3	Distributions Lines, Substations and Other			125,090,000	101,000,000	0	34,474,122	31,139,977	25,340,808	5,672,161	1,540,558	690,648	20,541	98,878,815
3A	PART C	3	DESA	42,050,000	27,000,000	0	0	10,957,420	12,088,853	2,026,934	498,027	690,648	20,541	26,282,422
3B	PART D	4	DESCO	83,040,000	74,000,000	0	34,474,122	20,182,557	13,251,955	3,645,227	1,042,531	0	0	72,596,393
4	Consulting Services	5		1,990,000	2,880,000									0
	PART A		BPDB/ NWPGC			0	137,179	78,739	107,708	321,640	496,834	187,591	0	1,329,690
	PART B		PGCB			50,840	71,961	99,047	136,182	100,608	118,877	205,188	0	782,704
	<b>Subtotal (Base Cost)</b>			<b>337,560,000</b>	<b>361,180,000</b>	<b>50,840</b>	<b>41,764,244</b>	<b>61,934,843</b>	<b>80,036,599</b>	<b>61,727,823</b>	<b>82,522,640</b>	<b>18,045,471</b>	<b>8,080,794</b>	<b>354,163,254</b>
			<b>BPDB/NWPGC</b>			0	137,179	10,799,178	30,867,686	31,405,599	58,881,858	1,136,113	0	133,227,613
			<b>PGCB</b>			50,840	7,152,943	19,995,688	23,828,105	24,650,063	22,100,224	16,218,709	8,060,254	122,056,826
			<b>DESA</b>			0	0	10,957,420	12,088,853	2,026,934	498,027	690,648	20,541	26,282,422
			<b>DESCO</b>			0	34,474,122	20,182,557	13,251,955	3,645,227	1,042,531	0	0	72,596,393
5	Interest and Commitment Charge	6		<b>38,820,000</b>	<b>38,820,000</b>	<b>192,500</b>	<b>956,575</b>	<b>2,097,469</b>	<b>2,681,296</b>	<b>2,771,327</b>	<b>3,538,913</b>	<b>2,620,823</b>	<b>0</b>	<b>14,858,902</b>
			BPDB/ NWPGC			70,720	3,142	365,722	1,034,094	1,409,983	2,525,098	165,003	0	5,573,762
			PGCB			50,288	163,832	677,169	798,262	1,106,687	947,749	2,355,515	0	6,099,502
			DESA			24,033	0	371,081	404,987	94,499	21,357	100,306	0	1,016,264
			DESCO			47,459	789,601	683,497	443,952	160,157	44,708	0	0	2,169,374
6	Unallocated	7		<b>23,620,000</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<b>Total</b>			<b>400,000,000</b>	<b>400,000,000</b>	<b>243,340</b>	<b>42,720,818</b>	<b>64,032,312</b>	<b>82,717,895</b>	<b>64,499,150</b>	<b>86,061,552</b>	<b>20,666,294</b>	<b>8,080,794</b>	<b>369,022,156</b>
			<b>BPDB/ NWPGC</b>			70,720	140,321	11,164,900	31,901,780	32,815,582	61,406,956	1,301,116	0	138,801,375
			<b>PGCB</b>			101,128	7,316,775	20,672,857	24,626,367	25,756,750	23,047,973	18,574,224	8,060,254	128,156,328
			<b>DESA</b>			24,033	0	11,328,501	12,493,840	2,121,433	519,385	790,954	20,541	27,298,686
			<b>DESCO</b>			47,459	35,263,723	20,866,054	13,695,907	3,805,385	1,087,239	0	0	74,765,767

BPDB = Bangladesh Power Development Board, DESA=Dhaka Electric Supply Authority, DESCO = Dhaka Electric Supply Company Limited, DPDC = Dhaka Electric Supply Company Limited, NWPGC = Northwest Power Generation Company Limited, and PGCB = Power Grid Company of Bangladesh Limited

Sources: Asian Development Bank Loan Financial Information System & Loan Agreement

**Table A5.2: Disbursement by Category and Financial Year**

Number	Items	Category	Allocation		Financial Year							
			Original	Latest								
			\$ equivalent	\$ equivalent	2008	2009	2010	2011	2012	2013	2014	Total (\$ equivalent)
1	Equipment	1	499,852	1,606,887	0	0	0	0	0	488,175	1,082,682	1,506,857
2	Training/Fellowships and Consulting Services	2	3,899,436	2,159,724	0	0	0	0	0	1,143,372	967,137	2,110,510
3	Interest Charges	3	60,813	62,545	0	0	0	0	0	101	5,018	5,119
4	Unallocated		539,899	0	0	0	0	0	0	0	0	0
<b>Total</b>			<b>5,000,000</b>	<b>3,829,156</b>						<b>1,631,649</b>	<b>1,990,837</b>	<b>3,622,486</b>

An amount of \$1,298,012.00 equivalent was partially cancelled at the time of reallocation of loan proceeds and an amount of \$232,205.00 equivalent on 15 April 2014.

Source: Loan Financial Information System of Asian Development Bank.



**Figure A6.1: Northwest Power Generation Company Limited**

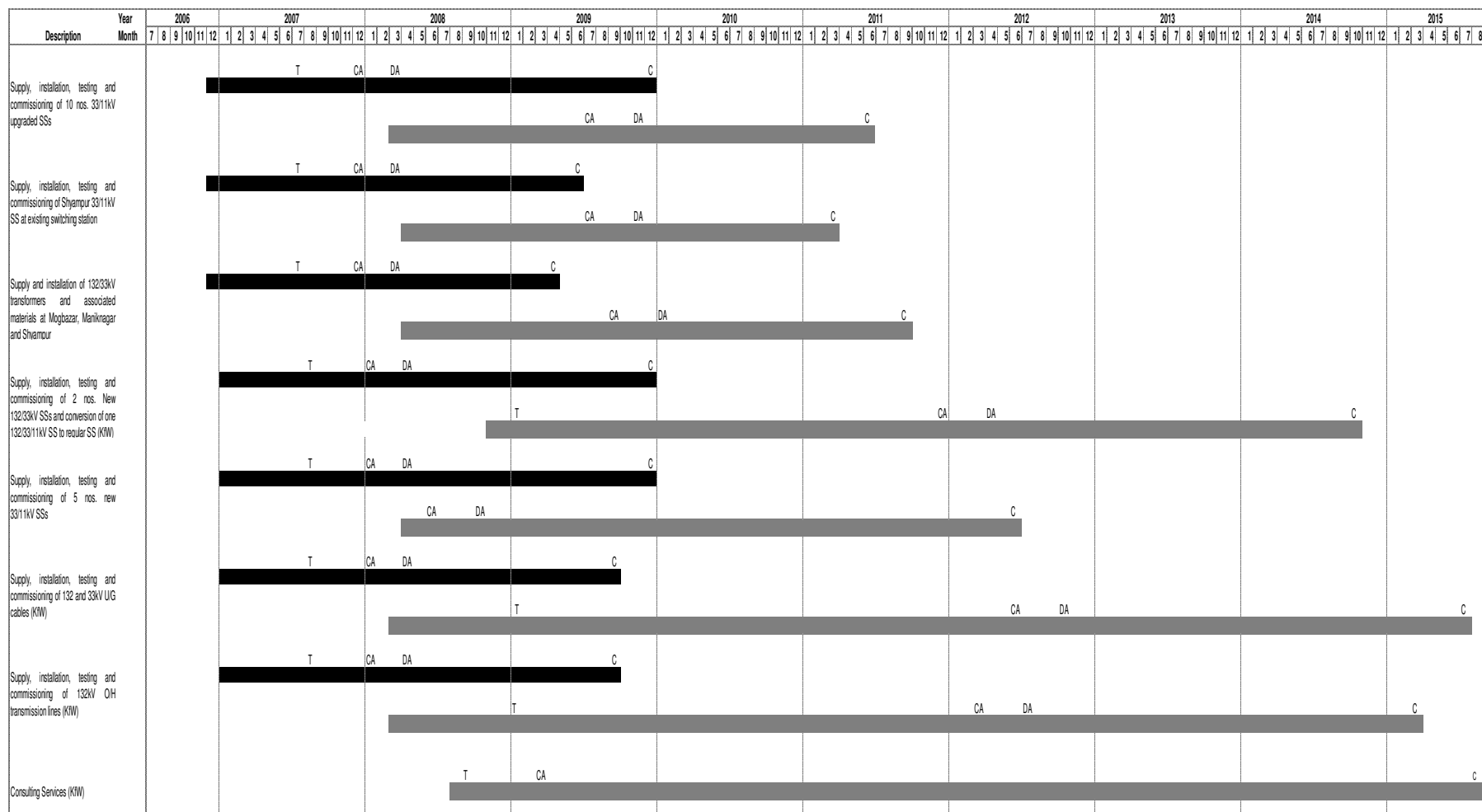


## Appendix 6



Source = Asian Development Bank and PGCB

### Figure A6.3: Dhaka Power Distribution Company Limited



C = commissioning, CA = contract award, DA = design approval, KfW = Kreditanstalt für Wiederaufbau, kV = kilovolt, OH = overhead, S = supply, SS = substation, T = tender, TL = transmission line, and UG = underground.

Source = Asian Development Bank and DESA

## Appendix 6



Source = Asian Development Bank and DESCO

## COMPLIANCE WITH MAJOR COVENANTS

Table A7.1: Loan 2332-BAN, 2333-BAN(SF): Sustainable Power Sector Development Program

Project Specific Covenants	Reference in Loan and Project Agreements	Status of Compliance at Completion
<b>Administrative</b>		
1. Within four months of effective date, the Borrower shall cause MPEMR to prepare and submit to ADB the needs assessment as referred in the Schedule 1 to the Loan Agreement. MPEMR shall incorporate ADB's comments to the design of the capacity development program and shall start the implementation of the project following the areas of priority identified in the needs assessment.	LA2333, Sch. 5, para. 4	Partly complied with.  Preliminary and revised needs assessment reports submitted to ADB on 3 April 2008 and 25 September 2008, respectively. Final submission was on 2 December 2009.
2. The Borrower shall ensure that women participants are included in all training and fellowship courses financed by the Project.	LA2333, Sch. 5, para. 5	Complied with.  Twenty-nine out of 389 participants in foreign training sessions were women.
3. The Borrower shall ensure that the sector entities, including but not limited to BPDB, DESCO, DPDC, and PGCB and such other entities which will be incorporated under the Borrower's applicable laws, shall be autonomous and shall operate independently in advancing their commercial and administrative interests. Specifically, the Borrower shall not intervene, directly or indirectly, in the conduct of actions of such sector entities, including their organizational structure, recruitment of personnel, procurement decisions, or actions regarding their respective management, operational, financial and commercial activities. The Borrower shall further refrain from taking any actions, directly or indirectly that inhibits, curb or otherwise limit the independence of such entities.	LA 2332, Sch. 5, para. 4	Partly complied with.  All incorporated entities (APSC, EGCB, NWPGC, DESCO, DPDC, and WZPDC) are autonomous and operating independently.  Northwest Zone Power Distribution Company (NWZPDC) was incorporated on 3 August 2005 and its first management was recruited during August 2007–January 2008. It obtained a distribution license from BERC on 2 November 2009. NWZPDC corporatization was not activated—and BPDB was not corporatized at all—mainly because BPDB resisted this process.
4. The Borrower shall ensure that each of the power sector entities established under the Companies Act, 1994, as amended, shall be constituted in accordance with principles and procedures acceptable to ADB. At least 50% of the membership of the Board of Directors of each such entity shall be persons who are neither current employees of such entity, nor have been Government employees in the	LA 2332, Sch. 5, para. 5	Complied with.  Agreed principles of the constitution of board of directors of incorporated entities, as was stipulated in the loan agreement, were followed in the initial years, but at present inclusion of the government officials in the boards have increased,



Project Specific Covenants	Reference in Loan and Project Agreements	Status of Compliance at Completion
3. Power Division of the Borrower's Power, Energy and Mineral Resources shall be the Project Executing Agency.	LA 2333, Sch. 5, para. 1	Complied with.  Power Division of MPEMR was the EA for capacity building component.
4. The Borrower shall cause MPEMR to establish a Project Management Unit (PMU) headed by a full time Project Director. The Project Director shall be directly responsible for (a) coordination of the activities under the Project; and (b) overall Project implementation, monitoring, supervision and reporting. The Project Director shall be supported by a team including, at least, a procurement specialist, a transmission specialist, a distribution specialist, a generation specialist and sufficient administrative staff. The team shall be supplemented by consultants as required.	LA 2333, Sch. 5, para. 2	Complied with.  PMU was established with a joint secretary as project director who was assisted by specialists of required disciplines.
5. The Borrower shall ensure that throughout the implementation of the Project, adequate allocations of the required counterpart funds are made, approved and released in a timely manner in order to ensure proper implementation of the Project.	LA 2333, Sch. 5, para. 3	Complied with.  The Borrower ensured adequate allocations and timely release of required counterpart funds.
6. Within six months of the effective date, the Borrower shall cause the EAs to establish a comprehensive Project Performance Management System (PPMS) acceptable to ADB. The PPMS shall carry out performance monitoring and reviews during Project implementation, to evaluate the scope, implementation arrangements, benefit monitoring, progress and achievement of the objectives of the Project. PPMS indicators shall serve as a basis for reports on Project implementation.	LA 2332, Sch. 5, para 26; LA2333, Sch. 5, para. 6	Partly complied with.  PPMSs were established during January 2008 to March 2012.
7. The Borrower shall cause each EA to prepare quarterly progress reports for its respective component to be submitted to ADB within 20 days at the end of each quarter. Such progress reports shall include a summary financial account for the Project loan components.	LA 2332, Sch. 5, para 27; LA 2333, Sch. 5, para. 7	Partly complied with.  EAs prepared quarterly progress reports regularly, but sometimes submission to ADB was late.
8. ADB shall review the implementation and operation of the Project based on quarterly progress reports. ADB and the EAs shall jointly undertake semiannual reviews of the Project to discuss and assess implementation	LA 2332, Sch. 5, para 28; LA 2333, Sch. 5, para. 8	Partly complied with.  Sometimes joint review was conducted once in a year. No mid-term review was conducted as there were no major issues related to project

Project Specific Covenants	Reference in Loan and Project Agreements	Status of Compliance at Completion
<p>progress, identify constraints and agree on strategies for resolving constraints. Within twenty-four months of the Effective Date, the EAs and ADB shall undertake a midterm review of the Project. During the midterm review, ADB and the EAs shall (i) review the scope, design, and implementation arrangements of the Project; (ii) identify changes needed since the time of the Project appraisal; (iii) assess implementation performance against Project performance indicators; (iv) review and establish compliance with legal covenants; (v) identify problems and constraints. The result of the midterm review shall be discussed by the EAs and ADB and if required, appropriate corrective measures shall be formulated to ensure successful Project implementation and achievement of the Project objectives.</p>		<p>implementation.</p>
<p>9. BPDB, PGCB, DESCO, DPDC and DESA shall (i) maintain separate accounts for the Project and for its overall operations; (ii) have such accounts and related financial statements audited annually, in accordance with appropriate auditing standards consistently applied, by independent auditors whose qualifications, experience and terms of reference are acceptable to ADB, and (iii) furnish to ADB, promptly after their preparation but in any event not later than 6 months after the close of the fiscal year to which they relate, certified copies of such audited accounts and financial statements and the report of the auditors relating thereto (including auditors' opinion on the use of the loan proceeds and compliance with the Loan covenants of the Loan Agreement [ as well as on the use of procedures for], all in the English language. BPDB, PGCB, DESCO, DPDC and DESA shall furnish to ADB such further information concerning such accounts and financial statements and the audit thereof as ADB shall from time to time reasonably request.</p>	<p>PAs. Section 2.09 (a)</p>	<p>Complied with.</p> <p>EAS maintained separate accounts for the project and for its overall operations. Foreign Aided Project Audit Department of Comptroller and Auditor General Office audited such accounts and submitted audit report to ADB.</p>
<p>10. The Borrower shall cause the EAs to appoint an independent external auditor in accordance with the Companies Act, 1994, as amended, which must also be auditor acceptable to ADB. The auditor shall shall conduct annual review of the disbursements</p>	<p>LA2332-BAN, Sch. 5, para. 24</p>	<p>Complied with.</p> <p>NWPGC, PGCB, DPDC, and DESCO appointed independent external auditor every year in accordance with the Companies Act, 1994, as amended for audit of company</p>



Project Specific Covenants	Reference in Loan and Project Agreements	Status of Compliance at Completion										
made by the EAs. In addition, ADB may conduct project procurement audits during implementation as part of its regular review.		accounts including disbursements made by the EAs under the project.										
11. Promptly after physical completion of the Project, but in any event not later than three months thereafter or such later date as ADB may agree for this purpose, each EA shall furnish ADB a Project Completion 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 of the EA of its obligations under the Project Agreement and the accomplishment of the purposes of the Loan.	PA. Section 2.08©	Partly complied with.  Power Division and DESCO complied on schedule. Delayed submission by NWPGC, DPDC, and PGCB.										
Financial												
1. The Borrower shall take all necessary actions to make the Bangladesh Energy Regulatory Commission fully functional no later than 31 December 2007.	LA. Sch. 5, para. 8	Complied with.  The government completed appointment of all BERC commissioners as of 25 November 2007.										
2. The Borrower shall cause each of BPDB, DESCO, DPDC and PGCB to comply at all times with the following financial covenants:	LA. Sch. 5, para. 9	Partly complied with.										
a) ratio of total operating expenses to total operating revenue shall not be higher than 85%;		<table><tr><th>Year</th><th>2015</th></tr><tr><td>NWPGC</td><td>87.67%</td></tr><tr><td>PGCB</td><td>69.31%</td></tr><tr><td>DPDC</td><td>96.87%</td></tr><tr><td>DESCO</td><td>90.92%</td></tr></table>	Year	2015	NWPGC	87.67%	PGCB	69.31%	DPDC	96.87%	DESCO	90.92%
Year	2015											
NWPGC	87.67%											
PGCB	69.31%											
DPDC	96.87%											
DESCO	90.92%											
b) debt-equity ratio shall not exceed 70:30;		<table><tr><th>Year</th><th>2015</th></tr><tr><td>NWPGC</td><td>58.4:41.6</td></tr><tr><td>PGCB</td><td>69:31</td></tr><tr><td>DPDC</td><td>87:13</td></tr><tr><td>DESCO</td><td>53:47</td></tr></table>	Year	2015	NWPGC	58.4:41.6	PGCB	69:31	DPDC	87:13	DESCO	53:47
Year	2015											
NWPGC	58.4:41.6											
PGCB	69:31											
DPDC	87:13											
DESCO	53:47											
c) accounts receivables shall not be more than 2 months billing for PGCB and shall not be more than 3 months billing for BPDB, DESCO and DPDC; and		<table><tr><th>Year</th><th>2015</th></tr><tr><td>NWPGC</td><td>2.02 months</td></tr><tr><td>PGCB</td><td>2.00 months</td></tr><tr><td>DPDC</td><td>2.18 months</td></tr><tr><td>DESCO</td><td>1.85 months</td></tr></table>	Year	2015	NWPGC	2.02 months	PGCB	2.00 months	DPDC	2.18 months	DESCO	1.85 months
Year	2015											
NWPGC	2.02 months											
PGCB	2.00 months											
DPDC	2.18 months											
DESCO	1.85 months											

Project Specific Covenants	Reference in Loan and Project Agreements	Status of Compliance at Completion	
d) debt service coverage ratio shall not be less than 1.2.		Year	2015
		NWPGC	1.88
		PGCB	1.14
		DPDC	1.84
		DESCO	2.74
Environmental			
1. The Borrower shall cause the EAs to ensure that the Project is undertaken and all Project facilities are operated and maintained in accordance with all applicable laws, rules and regulations of the Borrower, and ADB's Environment Policies (2002).	LA. Sch. 5, para. 17	Complied with.  The Borrower caused EAs to ensure that the Project is undertaken and all Project facilities are operated and maintained in accordance with all applicable laws, rules and regulations of the Borrower, and ADB's Environment Policies (2002).	
2. The Government will cause the EAs to ensure that (i) all necessary environmental clearances are obtained from the relevant statutory authorities of the Government and all environmental litigation measures set forth in the IEEs for each component are incorporated in detailed designs (including any amendments on account of detailed designs with prior ADB approval) and followed during construction and operation of the components, (ii) environmentally-friendly procurement guidelines of ADB are followed, (iii) all mitigation measures set forth in the IEE and environmental clearance will be implemented, (iv) all facilities renovated and/or established under the project loan will only use transformers that are free of polychlorinated biphenyls (PCB), and (v) any PCB waste generated during renovation and upgrade of project facilities will be managed in accordance with international best practices. The Government will cause the EAs to submit reports on the monitoring results, permits, licenses, and clearances obtained for the project loan. In case of any violation of laws and standards, the report will also include certification from the relevant authority that such violation has been remedied or an acceptable plan for its correction has been approved.	LA. Sch. 5, para. 18 and para. 19	Complied with.  IEE for each project component was prepared, translated in local language and made available to the public. IEEs and EIAs (as required by Bangladesh Law) for each project component were cleared by the Department of Environment. Environment-friendly specification for the power stations was incorporated in the bid documents. PGCB, DPDC and DESCO ensured procurement of transformers that are free of polychlorinated biphenyls (PCB).	

Project Specific Covenants	Reference in Loan and Project Agreements	Status of Compliance at Completion
<b>Social</b>		
1. The Borrower shall cause the EAs to ensure that all land acquisition, compensation, relocation and resettlement activities under the Project shall be carried out in accordance with (i) all applicable laws and regulations governing land acquisition in Bangladesh, (ii) ADB's Policy on Involuntary Resettlement (1995), and (iii) the agreed-upon RP. In case of discrepancies between the Government's laws, regulations, and procedures and ADB's requirements, ADB's requirements shall prevail. The Government will cause the EAs (i) to ensure that payment of compensation and other entitlements to the affected persons will be made prior to possession of land and assets on the basis of replacement cost and prior to the relocation of affected persons and commencement of civil works; (ii) to acquire or make available the land and rights to land free from any encumbrances required for commencement of construction activities in accordance with the schedule agreed under the related civil works contract; (iii) to ensure timely provision of budget for land acquisition and other activities outlined in the related RP; (iv) to meet any unforeseen obligations in excess of budget estimates; and (v) and to ensure that resettlement funds disbursements are audited annually by an independent auditor.	LA. Sch. 5, para. 11	Complied with.  All land acquisition, compensation, relocation and resettlement activities were carried out in accordance with (i) all applicable laws and regulations governing land acquisition in Bangladesh, (ii) ADB's Policy on Involuntary Resettlement (1995), and (iii) the agreed-upon RP.
2. The Borrower shall cause the EAs to update the RP upon finalization of alignment and detailed design.	LA, Sch. 5 para. 12	Complied with.  Final alignment and detailed design had resulted in no significant change in RP.
3. In the event of any unanticipated or unforeseen involuntary resettlement during implementation in another Component than Component B, the Borrower shall cause the EAs to update the RP.	LA, Sch. 5 para. 13	Complied with.  Updating RPs by EAs was not required.
4. Such updated RP shall be reviewed and approved by ADB prior to award of Works contract. The updated RP shall contain all final information related to affected households and related compensation packages. The Borrower shall cause the EAs to disclose the updated RP and ensure that the information shall be available to all affected persons, in a form acceptable to	LA, Sch. 5 para. 14	Complied with.  Updating RPs by EAs was not required.

Project Specific Covenants	Reference in Loan and Project Agreements	Status of Compliance at Completion
ADB.		
5. Within three months of the Effective Date, the Borrower shall cause the EAs to engage an independent expert or agency acceptable to ADB for monitoring and verification of the RP implementation. The Borrower shall cause the EAs to submit quarterly progress reports acceptable to ADB, on the land acquisition, resettlement, on implementation of RP, or updated RP.	LA, Sch. 5 para. 15	Complied with.  PGCB engaged CEGIS (a government-owned agency) on 27 June 2009.  Not applicable for others.
6. Within three months of effective date, the Borrower shall cause the EAs to establish an independent grievance redress Committee to hear any grievance or any complaints related to resettlement for the Project.	LA, Sch. 5 para. 16	Complied with.  PGCB established a grievance redress committee on 12 July 2009.
7. The Borrower shall cause the EAs to ensure that the project loan shall not cause any negative impact on tribal people. In the event of any unanticipated or unforeseen negative impact on tribal people, the Borrower shall cause the EAs to ensure that the project loan is implemented in accordance with ADB's <i>Policy on Indigenous Peoples (1998)</i> and the applicable laws and regulations of the government. In the event of any discrepancy between the government's laws and regulations and ADB's policy, then ADB's policy will prevail.	LA, Sch. 5 para. 20	Complied with.  No tribal people were affected by the project components.
8. The Borrower shall cause the EAs to ensure that the Works contractors under the Project comply with all applicable labor laws and regulations and incorporate provisions that contractors (i) shall not use children as labor; (ii) provide equal opportunity to women and men; (iii) shall follow legally-mandated provisions of labor including equal pay for equal work of equal value, health, safety, sanitation and working conditions. The contracts shall include termination clauses in case of breach of any of the stated provisions by the contractors. Compliance with these provisions shall be strictly monitored during implementation.	LA, Sch. 5 para. 21	Complied with.  All these provisions were incorporated in bidding documents and contracts.
9. The Borrower shall cause the EAs to ensure that the Works contracts include a requirement on the part of the contractors to conduct an information and education campaign on communicable diseases,	LA, Sch. 5 para. 22	Complied with.  All these provisions were incorporated in bidding documents and contracts.

Project Specific Covenants	Reference in Loan and Project Agreements	Status of Compliance at Completion
including but not limited to sexually transmitted diseases and HIV/AIDS for construction workers as part of the health and safety program at campsites during construction period.		
<b>Good Governance</b>		
1. The Borrower shall ensure that the Project funds are utilized effectively and efficiently to implement the Project and achieve the Project objectives. ADB shall have the right to conduct spot audits at any time during Project implementation to determine the degree to which the Project funds have been effectively and efficiently utilized to implement the Project and achieve its objectives, output and performance indicators. ADB shall also have the right to investigate possible financial or management impropriety in conducting the Project. The Borrower and each EA shall fully cooperate with any such investigation and extend all necessary assistance, including access to all relevant books and records as well as engagement by the EAs of independent auditors and experts that may be needed for satisfactory completion of such investigations. All costs related to such investigations shall be borne by the Project.	LA, Sch. 5 para. 23	Complied with.  The Borrower ensured utilization of project funds effectively and efficiently to implement the project.
2. The Borrower shall cause the EAs to take pro-active steps to ensure good governance and prevent corruption, by among other things (i) expanding the use of computerized billing systems and pre-paid meters; and (ii) including pre-ship inspection by an independent third party to ensure quality of the Goods and equipment procured.	LA, Sch. 5 para. 25	Partly complied with.  DPDC and DESCO expanded pre-paid metering and computerized billing.  NWPGC and DPDC engaged third-party pre-shipment inspection agents. DPDC and PGCB did not engage a third-party, pre-shipment inspection agent.

ADB = Asian Development Bank, AIDS = acquired immune deficiency syndrome, APSC = Ashuganj Power Station Company Limited, BERC = Bangladesh Energy Regulatory Commission, CEGIS = Center for Environmental and Geographic Information Services, DESCO = Dhaka Electric Supply Company Limited, DPDC = Dhaka Power Distribution Company Limited, EA = executing agency, EGCB = Electricity Generation Company of Bangladesh, HIV = human immunodeficiency virus, IEE = initial environment examination, NWPGC = Northwest Power Generation Company Limited, NWZPDC = North West Zone Power Distribution Company Limited, PCB = polychlorinated biphenyls, PGCB = Power Grid Company of Bangladesh Limited, PPMS = project performance monitoring system, RP = resettlement plan, and WZPDC = West Zone Power Distribution Company Limited

**Table A7.2: Loan 2334-BAN(SF): Sustainable Power Sector Development Program**

<b>Program-Specific Covenants</b>	<b>Reference in Loan Agreement</b>	<b>Status of Compliance at Completion</b>
<b>Implementation Arrangement</b>		
1. The Finance Division of the Ministry of Finance (MOF) and Power Division of the Ministry of Power, energy and Mineral Resources (MPEMR) of the Borrower shall be the Program Executing Agencies. As such, these EAs shall be responsible for overall coordination of the Program implementation and for ensuring that the proceeds of the Loan are disbursed and utilized in accordance with this Loan Agreement.	LA 2334, Sch. 5, para. 1	Complied with.  Finance Division of the MOF and Power Division of the MPEMR of the Borrower acted as program executing agencies.
<b>Use of Counterpart Funds</b>		
1. Throughout the implementation of the Program, the Borrower shall ensure that adequate allocations of the required counterpart funds are made, approved and released in a timely manner in order to ensure proper implementation of the Program.	LA 2334, Sch. 5, para. 2	Complied with.  The Borrower ensured timely release of required counterpart funds.
2. The Borrower shall ensure that the Counterpart Funds shall be used for financing the Program expenditures and associated costs of reform, including unfunded pension and gratuities of corporatized power sector entities, and settlement of outstanding dues of the Borrower and its autonomous/semiautonomous bodies to such power sector entities.	LA 2334, Sch. 5, para. 3	Complied with.  The borrower received Tk4.39 billion in counterpart funds from Bangladesh Bank (the central bank of Bangladesh) against disbursed amount of about \$64.0 million from the program loan. The borrower made special budgetary provisions from time to time to settle outstanding dues for supplying electricity to government and government's autonomous and semi-autonomous bodies, and also for settlement of unfunded pension and gratuities for newly corporatized entities.
<b>Implementation of Policy Letter and Policy Matrix</b>		
1. The Borrower shall ensure that the policies adopted and actions taken, as described in the Policy Letter and the Policy Matrix will continue in effect during the Program period and subsequently.	LA2334, Sch. 5, para. 4	Complied with.  All policies have been adopted and actions have been taken as described in the policy letter and policy matrix.
<b>Policy Dialogue</b>		
1. The borrower shall keep ADB informed of, and the Borrower and ADB shall from time to time exchange views on, the progress made in carrying out the policies and actions set out in the Policy Letter and the Policy Matrix.	LA2334, Sch. 5, para. 5	Complied with.  The Borrower kept ADB informed of progress made in carrying out the policies and actions.

Program-Specific Covenants	Reference in Loan Agreement	Status of Compliance at Completion
2. The Borrower shall continue timely policy dialogue with ADB on problems and constraints encountered during implementation of the Program and on desirable changes to overcome or mitigate such problems or constraints.	LA2334, Sch. 5, para. 6	Complied with.  No problems and constraints were encountered.
3. The Borrower shall keep ADB informed of policy discussions concerning the Program undertaken with other international and bilateral agencies as ADB may reasonably request and shall provide ADB with opportunity to comment on any resulting proposals	LA2334, Sch. 5, para. 7	Complied with.  The Borrower kept ADB informed of policy discussions with other international and bilateral agencies.
<b>Monitoring of the Program</b>		
1. The Borrower shall (i) establish and maintain a Program performance evaluation system for the Program, which shall include a data base on the status of policy measures and Program indicators based on the Policy Matrix and the design and monitoring framework for the Program; (ii) monitor the implementation of the Program and its impacts; and (iii) submit to ADB quarterly reports on the implementation of the Program, including accomplishment of the measures set forth in the Policy Letter and the Policy Matrix.	LA2334, Sch. 5, para. 8	Complied with. ADB and the government established a Program Progress Review Table for monitoring the implementation progress of the program and its impact.
2. The Borrower and ADB shall review the implementation of the Program and assess the impact of all relevant reforms in the sector every six months during Program implementation and at the end of the Program period. To facilitate such review, the Borrower shall assist ADB by providing relevant data and information in such detail as ADB may reasonably request.	LA2334, Sch. 5, para. 9	Complied with. The government and ADB jointly monitored program implementation and assessed the impact of key relevant sector reforms during review missions.
3. Approximately six (6) weeks before the anticipated withdrawal of the Second Tranche, or such other time as the Borrower and ADB may agree, a review shall be carried out concerning the Borrower's progress in implementing the policy reforms under the Program set out in the Policy Letter and the Policy Matrix, including the fulfillment of the conditions listed in Attachment 3 to Schedule 3 of the Loan Agreement.	LA2334, Sch. 5, para. 10	Complied with. An ADB review mission was conducted in Dhaka during 25–30 April 2008 to review the progress on implementing reforms under the program and the status of compliance with conditions set out in Attachment to Schedule 3 to the Loan Agreement.

Program-Specific Covenants	Reference in Loan Agreement	Status of Compliance at Completion
<b>Project Loans</b>		
1. The Borrower shall ensure the timely implementation of the Project Loan Agreements.	LA2334, Sch. 5, para. 11	Complied with.

ADB = Asian Development Bank

Source: ADB's Progress Report on Second Tranche Release



## STATUS OF COMPLIANCE WITH FINANCIAL COVENANTS

**Table A8: Financial Data of the Executing Agencies**

Financial Covenants and Targets	Compliance Status					
	Executing Agencies	Year				
		2011	2012	2013	2014	2015
1. Ratio of total operating expenses to total operating revenue shall not be higher than 85%	<b>DESCO</b>	77.58	88.54	97.32	96.28	90.92
	<b>DPDC</b>	88.64	94.63	103	102	96.87
	<b>NWPGC</b>	NA	NA	99.91	80.67	87.67
	<b>PGCB</b>	76.12	72.28	63.19	70.30	69.31
2. Debt-equity ratio shall not exceed 70:30	<b>DESCO</b>	58:42	59:41	58:42	56:44	53:47
	<b>DPDC</b>	103.00:(03.00)	108:(08)	100.43: (0.43)	99.85:0.15	87.00:13.00
	<b>NWPGC</b>	88.5:11.5	77.4:22.6	65.5 : 34.5	56.7:43.3	58.4:41.6
	<b>PGCB</b>	70 : 30	72 : 28	69:31	70 : 30	69:31
3. Accounts receivables shall not be more than 2 months billing for PGCB and shall not be more than 3 months billing for NWPGCL, DESCO, and DPDC	<b>DESCO</b>	2.43	2.05	1.95	1.87	1.85
	<b>DPDC</b>	2.97	2.75	2.35	1.84	2.18
	<b>NWPGC</b>	NA	NA	3.36	2.09	2.02
	<b>PGCB</b>	2.01	1.98	1.95	1.97	2.00
4. Debt-service coverage ratio shall not be less than 1.2.	<b>DESCO</b>	3.51	3.02	3.16	2.20	2.74
	<b>DPDC</b>	2.31	1.27	0.57	0.82	1.84
	<b>NWPGC</b>	NA	NA	0.30	1.50	1.88
	<b>PGCB</b>	1.48	1.78	1.90	1.11	1.14

DESCO = Dhaka Electric Supply Company Limited, DPDC = Dhaka Power Distribution Company Limited, NWPGC = North West Power Generation Company Limited, NA = not applicable, and PGCB = Power Grid Company of Bangladesh Limited.

Source: PGCB, DESCO, DPDC, NWPGC, and Power Cell.

## BULK AND RETAIL POWER TARIFF

**Table A9.1: Bulk Tariff Increase since 2008**

Year	2007	2008		2011						2012						2015		Bulk Tariff Increase (2008-2015)	
Effective Date	1 Mar 2007	1 Oct 2008		1 Feb 2011		1 Aug 2011		1 Dec 2011		1 Feb 2012		1 Mar 2012 (Fuel Cost Pass Through)		1 Sep 2012		1 Sep 2015			
BERC Order No and Date		BERC Order No: 2008/1, Dated: 29 Sep 2008		BERC Order No: 2011/02, Dated: 8 Feb 2011 (BST Effective for Stage-1)		BERC Order No: 2011/02, Dated: 8 Feb 2011 (BST Effective for Stage-2)		BERC Order No: 2011/07, Dated: 24 Nov 2011 (BST Effective for Stage-1)		BERC Order No: 2011/07, Dated: 24 Nov 2011 (BST Effective for Stage-2)		BERC Order No: 2012/08, Dated: 29 Mar 2012		BERC Order No: 2012/10, Dated: 22 Sep 2012		BERC Order No: 2015/01, Dated: 27 Aug 2015			
Utility Name	Tariff (TK/kWh)	Tariff (TK/kWh)	% Increase	Tariff (TK/kWh)	% Increase	Tariff (TK/kWh)	% Increase	Tariff (TK/kWh)	% Increase	Tariff (TK/kWh)	% Increase	Tariff (TK/kWh)	% Increase	Tariff (TK/kWh)	% Increase	Tariff (TK/kWh)	% Increase	Tariff (TK/kWh)	% Increase
PDB-230 KV																4.98			
PDB-132 KV	2.1132	2.4150	14.28%	2.7575	14.18%	2.9410	6.65%	3.5650	21.22%	4.2050	17.95%	4.5300	7.73%	5.3250	17.55%	5.0600	-4.98%	2.95	139%
PDB-33 KV	2.1069	2.4452	16.06%	2.6710	9.23%	2.8490	6.66%	3.4250	20.22%	3.9850	16.35%	4.2550	6.78%	4.9775	16.98%	5.1200	2.86%	3.01	143%
DPDC-132 KV	2.1132	2.4150	14.28%	2.7575	14.18%	2.9410	6.65%	3.5650	21.22%	4.2050	17.95%	4.5300	7.73%	5.3250	17.55%	5.6800	6.67%	3.57	169%
DESCO-33 KV	2.1069	2.4452	16.06%	2.7825	13.79%	2.9680	6.67%	3.6050	21.46%	4.2450	17.75%	4.5700	7.66%	5.4050	18.27%	5.8500	8.23%	3.74	178%
WZPDC-33 KV	2.1069	2.4452	16.06%	2.6415	8.03%	2.8175	6.66%	3.1550	11.98%	3.4750	10.14%	3.7400	7.63%	4.4300	18.45%	4.6400	4.74%	2.53	120%
REB-33 KV (Solvent)	2.1069																		
REB-33 KV (Marginal/Non-Solvent)	1.8209	2.3089	-	2.4745	7.17%	2.6395	6.67%	2.9150	10.44%	3.1750	8.92%	3.4225	7.80%	4.0325	18.45%	4.23	4.90%	1.93	101%
Average BST/Increase	2.04	2.37	16%	2.63	11%	2.80	6.66%	3.27	16.79%	3.740	14.39%	4.02	7.49%	4.70	16.92%	4.90	4.93%	2.86	140%
Average Bulk Supply Tariff (Without Wheeling Charge) (TK/kWh)						4.9000													
Average Bulk Supply Tariff (With Wheeling Charge-33 KV Level) (TK/kWh)						5.1791 (Wheeling Charge-33 KV Level: 0.2791 Tk/kWh)													
Average Bulk Supply Tariff (With Wheeling Charge-132 KV Level) (TK/kWh)						5.1768 (Wheeling Charge-132 KV Level: 0.2768 Tk/kWh)													

Average Bulk Supply Tariff (Without Wheeling Charge) (TK/kWh) **4.9000**

Average Bulk Supply Tariff (With Wheeling Charge-33 KV Level) (TK/kWh) **5.1791** (Wheeling Charge-33 KV Level: 0.2791 Tk/kWh)

Average Bulk Supply Tariff (With Wheeling Charge-132 KV Level) (TK/kWh) **5.1768** (Wheeling Charge-132 KV Level: 0.2768 Tk/kWh)

BERC = Bangladesh Energy Regulatory Commission, BPDB = Bangladesh Power Development Board, BST = Bulk Sales Tariff, DESCO = Dhaka Electric Supply any Limited, DPDC = Dhaka Power Distribution Company Limited, kV = kilovolt, kWh = kilowatt-hour, REB = Rural Electrification Board, and WZPDC = West Zone Power Distribution Company Limited Company.

Source = Bangladesh Energy Regulatory Commission

**Table A9.2: Retail Sales Tariff Increase since 2009**

Year	2009			2009/2010		2011				2012						2014		2015		Tariff Increase by BERC (2009-2015)			
Effective Date	1 Dec 2009		1 Mar 2007	1 Dec 2009 (REB) 1 Mar 2010 (PDB,DPDC,DESCO, WZPDC)		1 Feb 2011 (Adhoc-BST Pass Through)		1 Dec 2011 (Stage-1)		1 Feb 2012 (Stage-2)		1 Mar 2012 (Interim-Fuel Cost Pass Through)		1 Sep 2012 (Interim-BST Pass Through)		1 Mar 2014 (Operational Cost Adjustment)		1 Sep 2015 (Bulk, Transmission & Operational Cost Adjustment)					
	Utility Name	Average Tariff (TK/kWh)		% Increase	% Increase	Average Tariff (TK/kWh)	% Increase	Average Tariff (TK/kWh)	% Increase	Average Tariff (TK/kWh)	Total % Increase According to BERC Order, Date:22 Dec 2011	% Increase	Average Tariff (TK/kWh)	Total % Increase According to BERC Order, Date:22 Dec 2011	% Increase	Average Tariff (TK/kWh)	% Increase	Average Tariff (TK/kWh)	% Increase			Average Tariff (TK/kWh)	
BPDB	3.54	No Increase	3.54	6.03%	3.75	5.00%	3.94	13.62%	4.48	6.74%	4.78	21.28%	6.25%	5.08	21.28%	15.35%	5.86	7.17%	6.18	4.05%	6.43	81.81%	2.89
DPDC	3.74	No Increase	3.74	6.99%	4.00	5.00%	4.20	15.02%	4.83	7.76%	5.20	23.94%	6.25%	5.53	23.94%	14.83%	6.35	7.69%	6.79	3.24%	7.01	87.50%	3.27
DESCO	3.88	No Increase	3.88	6.29%	4.12	5.00%	4.33	14.16%	4.94	7.44%	5.31	22.65%	6.25%	5.64	22.65%	14.36%	6.45	7.34%	6.86	3.06%	7.07	82.40%	3.19
WZPDC	3.54	No Increase	3.55	5.98%	3.76	5.00%	3.94	12.69%	4.44	6.94%	4.75	20.51%	6.25%	5.05	20.51%	15.25%	5.82	7.14%	6.04	3.81%	6.27	76.73%	2.72
REB	3.40	6.57%	3.19	6.57%	3.40	5.00%	3.58	10.74%	3.96	6.58%	4.23	18.03%	6.25%	4.49	18.03%	15.14%	5.17	5.41%	5.59	1.97%	5.70	78.68%	2.51
Average	-	-	3.45	6.32%	3.67	5.24%	3.86	13.79%	4.39	7.15%	4.70		6.25%	5.00	20.90%	15.00%	5.75	6.96%	6.15	2.93%	6.33	83.59%	2.88

BERC = Bangladesh Energy Regulatory Commission, BPDB = Bangladesh Power Development Board, BST = bulk sale tariff, DESCO = Dhaka Electric Supply Company Limited, DPDC = Dhaka Power Distribution Company Limited, KV = kilovolt, kWh = kilowatt-hour, REB = Rural Electrification Board, and WZPDCL = West Zone Power Distribution Company Limited.

Source = Bangladesh Energy Regulatory Commission

## OPERATIONAL PERFORMANCE OF THE POWER SECTOR

Table A10: Operational Performance of Sector Entities

	FY2003	FY2004	FY2005	FY2006	FY2007	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015
<b>Generation, GWh</b>													
BPDB +non-grid RPPs (Gross)	12,881	13,342	14,067	15,417	15,495	16,155	16,431	17,064	15,525	16,073	18,910	20,669	22,163
BPDB + non-grid RPPs (Net)	12,159	12,584	13,223	14,456	14,539	15,167	15,449	16,072	14,673	15,200	17,897	19,645	21,103
IPP (BPDB)	6,531	7,718	7,939	8,286	8,245	9,094	8,832	8,369	8,564	8,707	8,341	7,878	8,470
RPP (BPDB)						44	1,342	3,029	6,248	9,495	10,244	10,508	10,785
REB SIPP a/			446	207	252	546	776	1,777	1,838	1,722	1,748	1,900	2,069
Import from India										-	0	2,265	3,380
Gross Total	19,412	21,060	22,452	23,910	23,991	25,839	27,380	30,240	32,175	35,997	39,243	43,221	46,867
Net Total	18,691	20,316	21,609	22,949	23,035	24,851	26,398	29,247	31,323	35,124	38,230	42,196	45,807
<b>Energy Import and Sales, GWh</b>													
PGCB Import	18,458	20,075	21,166	22,742	22,783	24,733	25,797	27,032	29,699	32,909	34,559	38,077	41,200
PGCB Transfer to Distribution Entities	17,710	19,363	20,385	21,677	22,323	23,919	24,972	26,274	28,949	31,965	33,550	37,004	40,060
Gross BPDB Sales	16,317	18,023	19,196	20,962	21,181	22,622	23,937	25,744	27,668	31,445	35,467	39,256	42,616
Import by BPDB Zones	6,230	6,281	5,989	5,180	5,305	5,639	6,042	6,747	7,338	8,136	8,737	9,597	10,486
Sales by BPDB Zones	4,838	4,941	4,791	4,193	4,426	4,827	5,222	5,862	6,380	7,148	7,693	8,456	9,315
Import by DESA/ DPDC	5,171	4,860	5,126	4,836	5,243	5,214	5,452	5,749	5,909	6,276	6,536	6,966	7,349
Sales by DESA/DPDC	3,471	3,185	3,590	3,862	3,915	4,107	4,457	4,980	5,251	5,656	5,943	6,341	6,694
Import by DESCO	856	1,740	1,843	2,023	2,191	2,574	2,743	2,934	3,123	3,402	3,726	4,064	4,321
Sales by DESCO	676	1,405	1,536	1,696	1,897	2,293	2,475	2,694	2,848	3,111	3,412	3,722	3,959
Import by REB	5,680	6,728	7,485	8,270	8,292	9,201	9,808	11,303	12,198	14,259	15,969	18,059	19,919
Sales by REB	4,888	5,805	6,457	7,197	7,001	7,845	8,438	9,629	10,475	12,264	13,754	15,582	17,346
Import by WZPDC	-	-	389	1,368	1,283	1,377	1,492	1,674	1,843	2,030	2,184	2,395	2,581
Sales by WZPDC	-	-	306	1,147	1,094	1,198	1,310	1,477	1,628	1,793	1,939	2,132	2,310
<b>Total sales by BPDB zones, REB, DESA/DPDC, DESCO &amp; WZPDC</b>	<b>13,873</b>	<b>15,336</b>	<b>16,680</b>	<b>18,094</b>	<b>18,333</b>	<b>20,270</b>	<b>21,902</b>	<b>24,642</b>	<b>26,582</b>	<b>29,973</b>	<b>32,741</b>	<b>36,233</b>	<b>39,624</b>
<b>System Loss, Percent</b>													
BPDB b/	15.94	14.42	12.77	11.56	10.78	10.56	10.03	9.55	8.80	8.26	5.41	5.00	4.87
PGCB Transmission Loss	4.06	3.55	3.69	4.68	2.02	3.29	3.20	2.81	2.52	2.87	2.92	2.82	2.77
BPDB Zones c/	22.35	21.33	20.01	19.06	16.58	14.40	13.58	13.11	13.06	12.15	11.95	11.89	11.17
DESA/DPDC c/	32.87	34.46	29.97	20.13	25.33	21.24	18.24	13.38	11.14	9.87	9.07	8.97	8.91
DESCO c/	21.06	19.24	16.64	16.20	13.44	10.91	9.79	8.18	8.79	8.54	8.44	8.41	8.37
REB c/	13.94	13.72	13.73	12.98	15.57	14.73	13.97	14.81	14.13	13.99	13.87	13.72	12.92
WZPDC c/	0.00	0.00	21.30	16.21	14.72	12.99	12.22	11.74	11.66	11.66	11.21	10.98	10.50
Overall Distribution Loss	22.66	21.79	19.93	16.53	17.84	15.56	14.24	13.25	12.59	12.11	11.87	11.80	11.27
<b>Overall Power System (Transmission &amp; Distribution)</b>	<b>25.78</b>	<b>24.51</b>	<b>22.81</b>	<b>21.16</b>	<b>20.41</b>	<b>18.43</b>	<b>17.03</b>	<b>15.75</b>	<b>15.14</b>	<b>14.67</b>	<b>14.36</b>	<b>14.13</b>	<b>13.50</b>
<b>Billing and Collection, Million Taka</b>													
BPDB Bills	40,541	43,998	43,524	45,855	47,811	53,485	61,331	68,533	77,348	112,143	157,543	137,207	147,897
BPDB Collection	36,568	39,887	40,379	44,484	52,799	54,060	58,911	66,776	74,303	102,236	147,202	128,300	138,232
BPDB Zones Bills			16,530	14,199	15,265	17,199	18,568	21,224	24,283	31,411	42,749	49,122	57,054
BPDB Zones Collection			16,049	14,180	17,168	17,171	18,078	20,344	23,493	29,852	40,564	46,439	54,781
DESA/DPDC Bills	17,389	13,647	12,543	12,747	13,298	14,997	17,061	19,634	22,191	28,702	37,710	41,713	46,214
DESA/DPDC Collection	15,919	14,458	12,530	13,149	14,950	15,592	17,011	19,391	22,008	27,752	36,833	41,166	46,034
DESCO Bills	2,217	4,902	5,466	6,424	7,381	9,094	9,888	10,911	12,400	16,095	22,114	24,610	27,560
DESCO Collection	1,643	4,306	5,306	6,207	7,706	9,095	9,709	10,775	12,271	15,860	22,137	24,740	27,720
REB Bills	16,781	20,139	22,404	25,736	26,132	29,283	31,625	37,460	42,474	55,993	78,016	91,239	106,643
REB Collection	16,807	19,918	21,820	24,598	26,320	29,359	31,252	36,692	41,812	53,764	75,214	91,145	105,659
WZPDC Bills	-	-	1,098	4,105	3,971	4,445	4,816	5,556	6,524	8,359	11,177	12,857	14,521
WZPDC Collection	-	-	1,227	4,735	4,965	4,366	4,680	5,432	6,377	7,961	10,758	12,352	14,318
<b>Collection, as percent of Billing</b>													
BPDB	90.20	90.66	92.77	97.01	110.43	101.07	96.05	97.44	96.06	91.17	93.44	93.51	93.46
BPDB Zones			97.09	99.86	112.47	99.84	97.36	95.85	96.74	95.04	94.89	94.54	96.02
DESA/DPDC	91.55	105.95	99.90	103.15	112.42	103.97	99.71	98.76	99.18	96.69	97.67	98.69	99.61
DESCO	74.10	87.84	97.07	96.63	104.40	100.01	98.18	98.75	98.96	98.54	100.10	100.53	100.58
REB	100.16	98.91	97.39	95.58	100.72	100.26	98.82	97.95	98.44	96.02	96.41	99.90	99.08
WZPDC	0.00	0.00	111.69	115.34	125.03	98.24	97.18	97.76	97.75	95.24	96.25	96.07	98.60
<b>Collection-generation/ Collection-import ratio, Percent</b>													
BPDB Collection-generation	77.19	79.08	80.93	85.79	98.53	90.40	86.42	88.13	87.61	83.64	88.38	88.84	88.91
BPDB Zones Collection-Import			77.67	80.83	93.82	85.47	84.14	83.29	84.11	83.50	83.55	83.30	85.29
DESA/DPDC Collection- import	72.81	77.36	69.97	82.38	83.95	81.89	81.52	85.54	88.13	87.15	88.81	89.83	90.74
DESCO Collection- import	58.50	70.94	80.92	80.98	90.37	89.10	88.57	90.67	90.26	90.13	91.66	92.07	92.17
REB Collection- import	82.80	83.49	84.02	83.18	85.04	85.49	85.02	83.45	84.53	82.59	83.04	86.20	86.28
WZPDC Collection-import	0.00	0.00	87.90	96.64	106.63	85.48	85.31	86.29	86.35	84.13	85.46	85.53	88.24

a/ - Data for the years 2003 and 2004 are merged in BPDB's gross b/ - As percent of gross generation, c/ - As percent of import, d/ - As percent of net generation

BPDB = Bangladesh Power Development Board, DESA = Dhaka Electric Supply Authority, DESCO = Dhaka Electric Supply Company Limited, DPDC = Dhaka Power Supply Company Limited, GWh = Gigawatt-hour, IPP = Independent Power Project, REB = Rural Electrification Board, RPP = Rental Power Project, SIPP = Small Independent Power Project, and WZPDC = West Zone Power Distribution Company Limited,

Note: Generation data excludes captive generation around 2,300 MW

Source = Monthly management reports from various sector entities

## STATUS OF ACCOUNTS RECEIVABLE OF POWER SECTOR ENTITIES

**Table A11: Accounts Receivable Data from 2005 to 2015**

Agency	Financial Year 2005		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015	
	Accounts receivable Tk. million	Months eqv.	Accounts receivable Tk. million	Months eqv.	Accounts receivable Tk. million	Months eqv.	Accounts receivable Tk. million	Months eqv.	Accounts receivable Tk. million	Months eqv.	Accounts receivable e Tk.	Months eqv.	Accounts receivable e Tk.	Months eqv.	Accounts receivable Tk. million	Months eqv.	Accounts receivable e Tk.	Months eqv.	Accounts receivable Tk. million	Months eqv.	Accounts receivable Tk. million	Months eqv.
BPDB																						
Government	360	2.84	434	4.55	214	2.81	299	2.94	349	3.53	424	4.32	486	3.99	494	3.54	883	4.02	1,103	4.69	1,609	5.86
Semi-gov/ Autonomous Bodies	3,186	14.56	1,601	17.70	313	4.82	474	4.21	494	4.75	696	5.15	788	5.86	869	5.80	1,200	4.91	1,599	6.97	2,154	8.00
Private	3,479	3.46	3,245	3.06	2,988	2.96	2,917	2.37	3,310	2.45	3,923	2.64	4,474	2.14	5,929	2.58	7,416	2.40	9,522	2.62	10,873	2.67
Total	7,025	5.20	5,280	4.24	3,515	3.05	3,690	2.55	4,153	2.67	5,043	2.93	5,748	2.45	7,292	2.82	9,498	2.67	12,224	2.98	14,636	3.17
DESA/DPDC																						
Government	184	3.70	334	6.75	149	2.93	195	3.84	271	3.81	360	6.20	518	8.33	733	9.61	988	10.25	1,276	11.80	932	7.55
Semi-gov/ Autonomous Bodies	1,103	11.16	1,132	12.17	281	3.00	409	4.50	813	6.45	695	7.09	826	6.88	734	5.51	883	4.85	1,091	5.50	1,278	5.41
Private	4,454	5.43	5,453	6.03	4,592	4.02	4,206	3.53	3,849	3.00	4,205	2.74	4,191	2.49	5,088	2.34	5,514	1.50	5,841	1.84	6,199	1.78
Total	5,741	4.83	6,919	6.61	5,022	3.91	4,810	3.61	4,933	3.33	5,260	3.11	5,536	2.97	6,555	2.75	7,384	2.35	8,208	1.84	8,408	2.18
DESCO																						
Government	360	7.33	360	6.56	119	2.56	63	1.31	101	2.14	181	3.77	284	5.36	450	6.42	668	7.44	711	7.05	769	6.34
Semi-gov/ Autonomous Bodies	377	12.42	339	11.11	124	2.74	138	2.68	180	3.39	190	3.33	183	2.68	143	1.69	239	1.91	250	1.80	399	2.52
Private	1,441	3.83	1,695	3.77	1,826	3.49	1,874	2.85	1,968	2.72	2,013	2.50	2,046	2.24	2,155	1.78	2,843	1.70	3,140	1.64	3,320	1.55
Total	2,177	4.78	2,394	4.48	2,069	3.36	2,075	2.74	2,248	2.73	2,384	2.62	2,513	2.43	2,748	2.01	3,750	1.99	4,101	1.90	4,488	1.85
WZPDC																						
Government	144	4.84	181	5.54	62	2.53	83	2.85	102	3.63	108	3.62	119	3.00	157	4.04	184	3.68	201	3.56	178	2.93
Semi-gov/ Autonomous Bodies	1,482	37.47	804	25.62	96	6.02	164	6.39	211	8.81	260	9.30	311	8.00	346	8.31	473	8.52	671	11.58	810	15.07
Private	1,199	3.71	1,105	3.65	932	3.29	992	3.19	1,061	3.09	1,130	2.84	1,216	2.20	1,462	2.45	1,728	2.12	2,017	2.14	2,101	1.95
Total	2,825	7.31	2,090	5.70	1,090	3.36	1,238	3.39	1,374	3.84	1,498	3.29	1,645	2.61	1,966	2.91	2,385	2.60	2,889	2.73	3,088	2.59
REB																						
Government	76	2.20	162	4.76	42	1.37	57	1.82	95	2.87	128	4.13	166	3.58	205	4.23	260	3.72	322	3.68	378	3.41
Semi-gov/ Autonomous Bodies	69	3.97	120	4.03	61	2.07	67	2.51	80	2.75	80	2.86	90	2.98	102	2.90	112	3.01	135	3.15	153	2.88
Private	3,210	1.77	3,473	1.67	3,640	1.69	3,642	1.53	3,907	1.52	4,562	1.49	4,977	1.68	6,927	1.51	9,584	1.50	9,732	1.30	10,672	1.24
Total	3,355	1.80	3,756	1.75	3,743	1.69	3,766	1.54	4,082	1.55	4,770	1.53	5,233	1.72	7,234	1.55	9,956	1.53	10,189	1.34	11,203	1.28
All Entities																						
Government	1,124	3.88	1,472	5.52	586	2.56	697	2.67	917	3.31	1,201	4.53	1,573	5.68	2,039	5.56	2,982	5.67	3,163	6.14	3,867	5.60
Semi-gov/ Autonomous Bodies	6,216	15.35	3,997	14.52	874	3.54	1,252	4.07	1,778	5.29	1,921	5.55	2,198	6.09	2,194	4.93	2,906	4.54	3,746	5.61	4,794	6.22
Private	13,783	3.18	14,971	3.12	13,979	2.73	13,631	2.36	14,095	2.25	15,834	2.17	16,904	2.09	21,561	1.99	27,084	1.82	30,251	1.76	33,164	1.71
Total	21,123	4.03	20,439	3.83	15,439	2.76	15,580	2.46	16,790	2.44	18,956	2.40	20,674	2.22	25,795	2.21	32,972	2.06	37,610	2.04	41,824	2.01

BPDB = Bangladesh Power Development Board, DESA = Dhaka Electric Supply Authority, DESCO = Dhaka Electric Supply Company Limited, DPDC = Dhaka Power Distribution Company Limited, REB = Rural Electrification Board, and WZPDC = West Zone Power Distribution Company Limited

Note: Data are based on agencies' monthly operational data

Source: Power Cell

## PROJECT FINANCIAL AND ECONOMIC ANALYSES

### ASSUMPTIONS

1. The financial and economic evaluation covers all the investment components of the project loan: (i) Part A: Clean Energy Capacity Expansion; (ii) Part B: Transmission System Efficiency Improvements; (iii) Part C: Distribution System Efficiency Improvement in Dhaka Electric Supply Authority (DESA) Area; and (iv) Part D: Distribution System Efficiency Improvement in Dhaka Electric Supply Company Limited (DESCO) Area.
2. Capital cost for Part A includes the cost of upgrading Sirajganj and Khulna simple-cycle 150 megawatt (MW) plants to 225 MW combined-cycle plants. Upgrading of the Sirajganj plant began before completion of the simple-cycle plant with financing from the government. Upgrading of Khulna plant is under implementation with ADB finance and is likely to be synchronized with the national grid by the end May 2016.
3. For financial analysis, the capital cost excludes interest during construction but includes taxes and duties. No adjustment was made using a shadow exchange rate. The cost of purchase of power was the bulk tariff for generation fixed by the Bangladesh Energy Regulatory Commission (BERC) from time to time and paid by the distribution entities to the Bangladesh Power Development Board (BPDB), the *de facto* single buyer, minus transmission cost. BPDB treated Northwest Power Generation Company Limited (NWPGC) as an independent power producer (IPP) and entered into a power purchase agreement (PPA) for the total plant life following IPP model. As such, for Part A, the tariff set in the PPA was considered for financial evaluation. Under the IPP model, fuel costs are a pass-through item and do not affect the producer's revenue stream. The revenue stream is insensitive to fuel type.
4. The economic analysis requires that all incremental inputs and outputs be expressed in terms of opportunity cost. That could be expressed either in domestic price or border price. As the output of this project is a non-tradable product, all inputs and outputs are expressed in 2007 domestic (taka) prices.
5. The economic analysis considered a 20-years benefit stream after construction. No salvage value was considered.
6. Economic costs are based on financial prices excluding taxes, duties and interest during construction. The economic cost of power is the long-run marginal cost of generation (Tk 2.97 per kilowatt hour [kWh]). The wheeling charge is considered as Tk0.2291/kWh up to 2015 and Tk0.2791 from 2016 onward and has been subtracted from the purchase price of power by the distribution agencies, as the wheeling charge is the part of benefit where the project's transmission and distribution components are combined.
7. The economic benefit of electricity consumption consisted of nonincremental and incremental benefits. As severe load shedding is the norm in Bangladesh, savings from displacing other sources of energy with electricity would be the only benefits. Although incremental benefit could be a factor, but is assumed to be too small for consideration.
8. Alternative energy sources to be displaced with electricity would be kerosene for lighting for domestic rural consumers and diesel generators for domestic, industrial, and commercial urban consumers. The actual savings would depend on the relative consumption levels of

various sectors. Weighted average economic resource cost savings is assumed to be Tk19.14/kWh for domestic, irrigation, commercial, and industrial consumers, respectively.

9. Operation and maintenance (O&M) costs are assumed to be 5 per cent of the capital costs for NWPGC power plants (increased by Tk1,600 million every fifth year for major overhauls). O&M costs of PGCB's transmission and DPDC and DESCO's distribution are assumed to be 1 per cent and 5 per cent, respectively.

10. As at appraisal, the project's economic and financial benefits were calculated after taking into account station use in generation, transmission, and distribution losses. System losses improved markedly during project implementation and are assumed to marginally reduce during the remaining years under consideration.

11. Revenue is calculated on the basis of DESA, DESCO, REB, and BPDB's sale prices, which vary by customer category. A weighted average price was calculated separately for each agency. Corporate income tax is assumed to be 37.5% for NWPGC, PGCB, DPDC, and DESCO.

12. Details of financial internal rates of return for all executing agencies are given in Tables A11.1, A11.2 A11.3 and A11.4 and those of EIRR in A11.5, A11.6, A11.7 and A11.8.

**Table A12.1: Financial Internal Rate of Return for Northwest Power Generation Company Limited**

(taka million)

Year	Capital Cost	O&M Cost	Fuel Cost	Total Cost	Net Generation, MWH	Operating Revenue			Net Cash Flow
						Capacity Charge	Energy Charge	Total Benefits	
2007	0.4	-		0.4				-	(0.4)
2008	4.9	-		4.9				-	(4.9)
2009	42.8	-		42.8				-	(42.8)
2010	3,258.3	-		3,258.3				-	(3,258.3)
2011	3,594.3	-		3,594.3				-	(3,594.3)
2012	5,319.6	-		5,319.6				-	(5,319.6)
2013	16,438.8	611.0	868.9	17,918.7	942,940.8	1,473.5	928.5	2,401.9	(15,516.8)
2014	7,388.2	1,432.9	13,907.1	22,728.2	1,847,189.9	4,052.3	14,244.5	18,296.9	(4,431.3)
2015	3,558.0	1,802.1	13,197.8	18,557.9	2,170,727.4	4,438.5	13,469.4	17,907.9	(650.0)
2016		1,977.9	18,662.7	20,640.6	2,844,081.9	4,661.4	18,906.7	23,568.1	2,927.5
2017		1,977.9	2,088.5	4,066.3	3,414,912.3	5,220.4	2,596.0	7,816.5	3,750.2
2018		3,577.9	2,074.9	5,652.8	3,389,186.5	5,631.0	2,547.0	8,178.1	2,525.3
2019		1,977.9	2,003.6	3,981.5	3,271,931.4	5,542.6	2,437.0	7,979.6	3,998.2
2020		1,977.9	2,050.9	4,028.8	3,257,726.8	5,465.4	2,263.4	7,728.8	3,700.0
2021		1,977.9	2,079.4	4,057.3	3,390,934.9	5,377.4	2,566.8	7,944.2	3,886.9
2022		1,977.9	2,065.4	4,043.3	3,365,458.9	5,289.7	2,519.9	7,809.6	3,766.3
2023		3,577.9	1,994.2	5,572.1	3,248,453.5	5,202.2	2,411.6	7,613.8	2,041.8
2024		1,977.9	1,996.5	3,974.4	3,235,747.5	5,125.5	2,249.0	7,374.4	3,400.0
2025		1,977.9	2,073.2	4,051.0	3,366,957.4	5,038.4	2,537.8	7,576.2	3,525.1
2026		1,977.9	2,059.7	4,037.5	3,341,731.2	4,951.6	2,492.8	7,444.4	3,406.8
2027		1,977.9	1,989.4	3,967.3	3,224,975.6	4,982.6	2,393.0	7,375.6	3,408.3
2028		3,577.9	2,009.6	5,587.5	3,213,768.2	4,301.5	2,235.9	6,537.3	949.8
2029		1,977.9	2,081.6	4,059.5	3,342,980.0	4,240.3	2,501.5	6,741.8	2,682.3
2030		1,977.9	2,075.5	4,053.3	3,318,003.5	4,217.7	2,460.7	6,678.5	2,625.1
2031		1,977.9	2,012.3	3,990.2	3,201,497.7	4,173.5	2,358.2	6,531.7	2,541.6
2032		1,977.9	2,017.6	3,995.5	3,191,788.8	3,950.2	2,222.7	6,172.8	2,177.4
2033		3,577.9	2,090.3	5,668.2	3,319,002.5	3,422.9	2,464.6	5,887.5	219.3
2034		1,977.9	2,083.8	4,061.7	3,294,275.8	3,392.7	2,426.6	5,819.3	1,757.6
								<b>FIRR =</b>	<b>4.6%</b>
								<b>WACC =</b>	<b>2.7%</b>

Source : Staff estimates

FIRR = financial internal rate of return, MWH = megawatt-hour, O&amp;M = operation and maintenance, and WACC = weighted average cost of capital.

Note: (1) FIRR analysis is done on the basis of gas-fired combined cycle operation of the plants. Capital cost for upgrading to combined cycle operation of the plants included; (2) O&M costs are assumed at 5% of capital cost; and (3) Major overhaul expenses are to incur every 5th year of operation. Tk 1,600 million per overhaul is estimated.



**Table A12.2: Financial Internal Rate of Return for Power Grid Company of Bangladesh Limited**

(taka million)

Year	Capital Cost	O&M	Total Cost	Energy Transmitted, GWh	Benefits	Net Cash Flow
2007	-	-	-		-	-
2008	32.3	-	32.3		-	(32.3)
2009	87.2	-	87.2		-	(87.2)
2010	1,036.6	-	1,036.6		-	(1,036.6)
2011	2,434.0	23.7	2,457.7	44.3	10.1	(2,447.7)
2012	3,322.8	52.5	3,375.3	142.2	32.3	(3,343.0)
2013	3,375.6	86.0	3,461.6	174.5	39.6	(3,422.0)
2014	2,859.6	117.2	2,976.8	452.3	102.7	(2,874.1)
2015	1,702.5	140.0	1,842.5	1,923.7	436.7	(1,405.8)
2016	720.5	148.5	869.0	2,327.3	644.7	(224.2)
2017		155.1	155.1	2,469.8	684.2	529.1
2018		155.1	155.1	2,603.4	721.2	566.1
2019		155.1	155.1	2,712.6	751.5	596.4
2020		155.1	155.1	4,133.5	1,351.8	1,196.7
2021	2,500.0	155.1	2,655.1	5,594.7	1,829.6	(825.5)
2022		155.1	155.1	7,161.4	2,342.0	2,186.9
2023		155.1	155.1	7,342.4	2,401.2	2,246.1
2024		155.1	155.1	7,537.7	2,465.0	2,309.9
2025		155.1	155.1	7,748.2	2,533.9	2,378.8
2026		155.1	155.1	7,974.7	2,608.0	2,452.8
2027		155.1	155.1	8,219.3	2,688.0	2,532.8
2028		155.1	155.1	8,483.4	2,774.3	2,619.2
2029		155.1	155.1	8,768.7	2,867.6	2,712.5
2030		155.1	155.1	9,076.8	2,968.4	2,813.3
2031		155.1	155.1	9,076.8	2,968.4	2,813.3
2032		155.1	155.1	9,076.8	2,968.4	2,813.3
2033		155.1	155.1	9,076.8	2,968.4	2,813.3
2034		155.1	155.1	9,076.8	3,028.3	2,873.1
					<b>FIRR =</b>	<b>6.2%</b>
					<b>WACC =</b>	<b>2.4%</b>

Source : Staff estimates

FIRR = financial internal rate of return, GWh= gigawatt-hour, O&M= operation and maintenance, and WACC = weighted average cost of capital.

Note: Capital investment to incur in 2021 for installation of 400/230 kV substation at Aminbazar .

**Table A12.3: Financial Internal Rate of Return for Dhaka Power Distribution Company Limited**

(taka million)

Year	Capital Investment	O&M Cost	Total Cost	Energy sold, GWh	Benefits	Net Cash Flow
2007	-	-	-		-	-
2008	10.5	-	10.5		-	(10.5)
2009	1.8	-	1.8		-	(1.8)
2010	794.6	-	794.6		-	(794.6)
2011	1,015.2	-	1,015.2	54.6	69.5	(945.6)
2012	455.9	91.1	547.0	204.9	161.3	(385.7)
2013	2,189.4	113.9	2,303.3	394.7	174.7	(2,128.6)
2014	1,380.0	223.4	1,603.3	660.0	364.4	(1,238.9)
2015	291.6	292.4	584.0	850.0	665.5	81.5
2016	451.1	306.9	758.0	1,106.6	620.8	(137.2)
2017		329.5	329.5	1,387.2	942.2	612.7
2018		329.5	329.5	1,693.8	1,374.7	1,045.2
2019		329.5	329.5	2,028.4	1,967.6	1,638.1
2020		329.5	329.5	2,393.7	1,639.5	1,310.0
2021		329.5	329.5	2,792.2	1,759.7	1,430.2
2022		329.5	329.5	3,227.8	1,717.4	1,387.9
2023		329.5	329.5	3,259.1	1,382.9	1,053.4
2024		329.5	329.5	3,291.7	1,006.9	677.4
2025		329.5	329.5	3,324.6	1,914.4	1,584.9
2026		329.5	329.5	3,357.9	1,691.0	1,361.5
2027		329.5	329.5	3,391.4	1,451.1	1,121.6
2028		329.5	329.5	3,425.4	1,193.6	864.1
2029		329.5	329.5	3,459.6	917.3	587.8
2030		329.5	329.5	3,494.2	621.1	291.6
<b>FIRR =</b>						<b>10.4%</b>
<b>WACC =</b>						<b>2.9%</b>

Source : Staff estimates

FIRR = financial internal rate of return, GWh = gigawatt-hour, O&M = operation and maintenance, and WACC = weighted average cost of capital.

**Table A12.4: Financial Internal Rate of Return for Dhaka Electric Supply Company Limited**

(taka million)

Year	Capital Investment	O&M Cost	Total Cost	Energy Sold, GWh	Benefits	Net Cash Flow
2007	-	-	-		-	-
2008	9.4	-	9.4		-	(9.4)
2009	3,123.1	-	3,123.1		-	(3,123.1)
2010	1,655.1	-	1,655.1		-	(1,655.1)
2011	1,230.9	-	1,230.9	13.9	17.0	(1,213.9)
2012	384.5	300.9	685.4	238.5	192.2	(493.3)
2013	143.5	320.1	463.6	481.3	229.3	(234.3)
2014		327.3	327.3	729.5	438.8	111.4
2015		327.3	327.3	986.1	808.5	481.2
2016		327.3	327.3	1,262.4	753.3	426.0
2017		327.3	327.3	1,569.9	1,121.0	793.6
2018		327.3	327.3	1,912.2	1,617.3	1,290.0
2019		327.3	327.3	2,292.9	2,301.3	1,974.0
2020		327.3	327.3	2,716.2	1,950.5	1,623.1
2021		327.3	327.3	3,186.8	2,142.7	1,815.3
2022		327.3	327.3	3,234.6	1,852.9	1,525.5
2023		327.3	327.3	3,283.1	1,522.3	1,195.0
2024		327.3	327.3	3,332.4	1,146.1	818.8
2025		327.3	327.3	3,382.4	2,071.9	1,744.6
2026		327.3	327.3	3,433.1	1,850.7	1,523.4
2027		327.3	327.3	3,484.6	1,610.3	1,283.0
2028		327.3	327.3	3,536.9	1,349.2	1,021.9
2029		327.3	327.3	3,589.9	1,066.1	738.8
2030		327.3	327.3	3,643.8	759.4	432.1
<b>FIRR =</b>						<b>9.0%</b>
<b>WACC =</b>						<b>1.2%</b>

Source : Staff estimates

FIRR = financial internal rate of return, GWh = gigawatt-hour, O&amp;M = operation and maintenance, and WACC = weighted average cost of capital.

**Table A12.5: Economic Internal Rate of Return for Northwest Power Generation Company Limited**

(taka million)

Year	Capital Investment	O&M Cost	Total Cost	Net Benefits	Net Cash Flow
2007	0.4	-	0.4	-	(0.4)
2008	4.6	-	4.6	-	(4.6)
2009	41.6	-	41.6	-	(41.6)
2010	3,256.1	-	3,256.1	-	(3,256.1)
2011	3,707.2	-	3,707.2	-	(3,707.2)
2012	5,100.8	-	5,100.8	-	(5,100.8)
2013	16,004.1	605.5	16,609.7	5,307.9	(11,301.7)
2014	6,699.4	1,405.7	8,105.2	15,198.8	7,093.7
2015	3,276.9	1,740.5	5,017.4	16,307.9	11,290.5
2016		1,902.2	1,902.2	16,984.0	15,081.8
2017		1,902.2	1,902.2	19,832.4	17,930.2
2018		2,902.2	2,902.2	21,131.3	18,229.1
2019		1,902.2	1,902.2	20,691.0	18,788.8
2020		1,902.2	1,902.2	19,658.8	17,756.6
2021		1,902.2	1,902.2	20,305.9	18,403.7
2022		1,902.2	1,902.2	19,888.1	17,985.9
2023		2,902.2	2,902.2	19,457.0	16,554.8
2024		1,902.2	1,902.2	18,620.2	16,717.9
2025		1,902.2	1,902.2	19,053.3	17,151.1
2026		1,902.2	1,902.2	18,643.7	16,741.5
2027		1,902.2	1,902.2	18,648.9	16,746.6
2028		2,902.2	2,902.2	15,676.5	12,774.2
2029		1,902.2	1,902.2	16,135.0	14,232.8
2030		1,902.2	1,902.2	15,937.1	14,034.9
2031		1,902.2	1,902.2	15,647.8	13,745.5
2032		1,902.2	1,902.2	14,386.8	12,484.6
2033		2,902.2	2,902.2	13,147.2	10,245.0
2034		1,902.2	1,902.2	12,933.5	11,031.2
				<b>EIRR =</b>	<b>38.3%</b>

Source : Staff estimates

EIRR = economic internal rate of return, and O&amp;M = operation and maintenance

**Table A12.6: Economic Internal Rate of Return for Power Grid Company of Bangladesh Limited**

(taka million)

Year	Capital Investment	O&M Cost	Total Cost	Net Benefits	Net Cash Flow
2007	-	-	-	-	-
2008	30.7	-	30.7	-	(30.7)
2009	83.2	-	83.2	-	(83.2)
2010	618.3	-	618.3	-	(618.3)
2011	2,106.1	141.9	2,248.0	58.7	(2,189.3)
2012	2,317.9	257.8	2,575.7	188.3	(2,387.4)
2013	2,596.9	387.7	2,984.6	231.2	(2,753.4)
2014	2,549.4	515.1	3,064.6	599.2	(2,465.4)
2015	1,795.2	157.2	1,952.3	2,548.5	596.2
2016	770.8	157.2	928.0	3,762.3	2,834.3
2017		157.2	157.2	3,992.6	3,835.4
2018		157.2	157.2	4,208.6	4,051.4
2019		157.2	157.2	4,385.2	4,228.0
2020		157.2	157.2	7,888.3	7,731.1
2021	2,000.0	157.2	2,157.2	10,676.8	8,519.6
2022		157.2	157.2	13,666.4	13,509.2
2023		157.2	157.2	14,012.0	13,854.8
2024		157.2	157.2	14,384.6	14,227.4
2025		157.2	157.2	14,786.4	14,629.2
2026		157.2	157.2	15,218.6	15,061.4
2027		157.2	157.2	15,685.3	15,528.2
2028		157.2	157.2	16,189.4	16,032.3
2029		157.2	157.2	16,733.9	16,576.7
2030		157.2	157.2	17,321.8	17,164.7
2031		157.2	157.2	17,321.8	17,164.7
2032		157.2	157.2	17,321.8	17,164.7
				<b>EIRR =</b>	<b>29.7%</b>

Source : Staff estimates

EIRR = economic internal rate of return, and O&amp;M = operation and maintenance

**Table A12.7: Economic Internal Rate of Return for Dhaka Power Distribution Company Limited**

(taka million)

<b>Year</b>	<b>Capital Cost</b>	<b>O&amp;M Cost</b>	<b>Total Cost</b>	<b>Net Benefits</b>	<b>Net Cash Flow</b>
2007	-	-	-	-	-
2008	10.0	-	10.0	-	(10.0)
2009	1.7	-	1.7	-	(1.7)
2010	831.7	-	831.7	-	(831.7)
2011	989.4	-	989.4	214.5	(775.0)
2012	467.6	-	467.6	470.1	2.4
2013	1,695.1	-	1,695.1	433.5	(1,261.6)
2014	1,191.1	199.8	1,390.8	1,006.2	(384.7)
2015	266.7	259.3	526.0	1,954.9	1,428.9
2016	457.9	272.7	730.5	1,688.4	957.9
2017	-	295.6	295.6	2,695.7	2,400.1
2018	-	295.6	295.6	4,083.2	3,787.6
2019	-	295.6	295.6	6,023.3	5,727.7
2020		295.6	295.6	4,727.0	4,431.4
2021		295.6	295.6	4,654.9	4,359.4
2022		295.6	295.6	4,288.7	3,993.2
2023		295.6	295.6	3,117.2	2,821.6
2024		295.6	295.6	1,800.5	1,504.9
2025		295.6	295.6	4,978.4	4,682.8
2026		295.6	295.6	4,196.3	3,900.8
2027		295.6	295.6	3,356.1	3,060.6
2028		295.6	295.6	2,454.1	2,158.6
2029		295.6	295.6	1,486.5	1,191.0
2030					
				<b>EIRR =</b>	<b>36.1%</b>

EIRR = economic internal rate of return, and O&M = operation and maintenance

Source : Staff estimates

**Table A12.8: Economic Internal Rate of Return for Dhaka Electric Supply Company Limited**

(taka million)

<b>Year</b>	<b>Capital Cost</b>	<b>O&amp;M Cost</b>	<b>Total Cost</b>	<b>Net Benefits</b>	<b>Net Cash Flow</b>
2007	-	-	-	-	-
2008	8.9	-	8.9	-	(8.9)
2009	2,438.8	-	2,438.8	-	(2,438.8)
2010	1,508.7	-	1,508.7	-	(1,508.7)
2011	1,097.8	197.8	1,295.6	50.3	(1,245.3)
2012	367.0	252.7	619.7	505.1	(114.6)
2013	158.0	271.1	429.1	488.0	58.9
2014	-	279.0	279.0	1,026.8	747.8
2015	-	279.0	279.0	2,094.0	1,815.1
2016	-	279.0	279.0	1,778.4	1,499.4
2017	-	279.0	279.0	2,816.7	2,537.8
2018	-	279.0	279.0	4,256.3	3,977.3
2019	-	279.0	279.0	6,286.5	6,007.6
2020		279.0	279.0	5,430.0	5,151.0
2021		279.0	279.0	5,465.4	5,186.5
2022		279.0	279.0	4,536.7	4,257.8
2023		279.0	279.0	3,476.3	3,197.4
2024		279.0	279.0	2,268.6	1,989.6
2025		279.0	279.0	5,270.9	4,992.0
2026		279.0	279.0	4,564.7	4,285.8
2027		279.0	279.0	3,796.3	3,517.3
2028		279.0	279.0	2,961.3	2,682.3
2029		279.0	279.0	2,055.1	1,776.2
2030					
				<b>EIRR =</b>	<b>24.3%</b>

EIRR = economic internal rate of return, and O&amp;M = operation and maintenance

Source : Staff estimates

## GENERATION AND LOAD SHEDDING DATA

Table A13: Generation and Load Shedding During FY1988 and FY2015

Financial Year (ending 30 June)	Capacity		Net Generation	Maximum Peak Generation	Load Shedding				
	Installed	Derated			Maximum	Minimum	Days	Duration	Energy not served
	(MW)	(MW)	(GWh)	(MW)	(MW)	(MW)		(Hours)	(GWh)
1988	2,146	1,859	6,214	1,317	200	10	54	74	N/A
1989	2,365	1,936	6,759	1,393	170	10	62	117	N/A
1990	2,352	1,834	7,345	1,509	180	15	29	51	N/A
1991	2,350	1,719	7,857	1,640	340	15	70	113	N/A
1992	2,398	1,724	8,450	1,672	550	25	232	660	N/A
1993	2,608	1,918	8,746	1,823	480	20	264	638	N/A
1994	2,608	1,881	9,295	1,875	540	23	210	670	N/A
1995	2,908	2,133	10,266	1,970	537	10	230	763	N/A
1996	2,908	2,105	10,901	2,087	545	10	301	1,007	N/A
1997	2,908	2,148	11,243	2,114	674	20	338	2,872	N/A
1998	3,091	2,320	12,194	2,136	711	32	346	2,119	N/A
1999	3,603	2,850	13,638	2,449	774	16	335	1,690	N/A
2000	3,711	2,665	14,739	2,665	536	10	255	872	N/A
2001	4,005	3,033	16,255	3,033	663	15	283	1,042	N/A
2002	4,230	3,218	17,445	3,218	367	5	267	930	N/A
2003	4,680	3,428	18,458	3,428	468	5	210	767	69
2004	4,680	3,592	20,302	3,592	694	2	232	951	147
2005	4,995	3,721	21,408	3,721	770	7	287	1,433	258
2006	5,245	3,782	22,978	3,782	1,312	15	348	96	843
2007	5,202	3,718	23,268	3,718	1,345	80	364	4,146	2,264
2008	5,201	4,130	24,946	4,130	2,087	20	358	2,695	968
2009	5,719	5,166	26,533	4,162	1,269	19	351	2,866	1,363
2010	5,823	5,271	29,247	4,606	1,459	31	354	2,846	1,952
2011	7,264	6,639	31,355	4,890	1,335	20	354	2,826	2,159
2012	8,716	8,100	35,118	6,066	1,058	44	264	824	1,647
2013	9,151	8,537	38,230	6,350	1,048	20	202	1,819	1,070
2014	10,416	9,821	42,196	7,356	932	0.0	125	100	515
2015	12,071	11,476	45,807	7,817	780	0.0	61	18	177

GWh = gigawatt-hour, MW = megawatt, and N/A = not available.

Note: 1 Duration in hours for 2006 is for May, 2006 only. Not recorded for other months  
2 2013 data are up to 31 March 2013

Source: Bangladesh Power Development Board