Completion Report

Project Number: 21182-01
Loan Number: 1505
December 2006

BAN: Ninth Power Project

Asian Development Bank

CURRENCY EQUIVALENTS

Currency Unit – taka (Tk)

		At Appraisal	**At Project Completion**
		2 September 1996	12 July 2004
Tk1.00	=	$0.0237	$0.0169
$1.00	=	Tk42.15	Tk59.23

ABBREVIATIONS

ADB	–	Asian Development Bank
BERC	–	Bangladesh Energy Regulatory Commission
BOOT	–	build-own-operate-transfer
BPDB	–	Bangladesh Power Development Board
DESA	–	Dhaka Electric Supply Authority
DESCO	–	Dhaka Electric Supply Company Limited
EA	–	executing agency
EIRR	–	economic internal rate of return
FIRR	–	financial internal rate of return
FY	–	fiscal year
IDC	–	interest during construction
IPP	–	independent power producer
MPEMR	–	Ministry of Power, Energy and Mineral Resources
NLDC	–	National Load Dispatch Center
PBS	–	Pally Biddut Samity (rural power cooperative)
PGCB	–	Power Grid Company of Bangladesh Limited
PIO	–	Project Implementation Office
PSRB	–	Power Sector Reforms in Bangladesh
REB	–	Rural Electrification Board
TA	–	technical assistance

WEIGHTS AND MEASURES

GWh	(gigawatt-hour)	–	1,000,000 kilowatt-hours
km	(kilometer)	–	unit of distance
kV	(kilovolt)	–	1,000 volts
kWh	(kilowatt-hour)	–	1,000 watt-hours
MVA	(megavolt-ampere)	–	1,000,000 volt-amperes
MW	(megawatt)	–	1,000,000 watts
MWh	(megawatt-hour)	–	1,000,000 watt-hours
V	(volt)	–	unit of voltage
VA	(volt-ampere)	–	unit of reactive power
W	(watt)	–	unit of active power

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., FY1996 ends on 30 June 1996.

(ii) In this report, “$” refers to US dollars.

Vice President	L. Jin, Vice President
Director General	K. Senga, South Asia Department
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Team leader	Shamsuddin Ahmed, Senior Project Officer, BRM
Team members	Mainul Haque, Staff Consultant
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CONTENTS

BASIC DATA

A. Loan Identification

1.	Country	Bangladesh
2.	Loan Number	1505-BAN (SF)
3.	Project Title	Ninth Power Project
4.	Borrower	People's Republic of Bangladesh
5.	Executing Agencies	Bangladesh Power Development Board (BPDB) Dhaka Electric Supply Authority (DESA) Dhaka Electric Supply Company Ltd. (DESCO) Power Grid Company of Bangladesh Ltd. (PGCB)
6.	Amount of Loan	SDR92,931,000
7.	Project Completion Report Number	21182-01

B. Loan Data

1.	Appraisal	
	– Date Started	17 August 1996
	– Date Completed	2 September 1996
2.	Loan Negotiations	
	– Date Started	5 November 1996
	– Date Completed	8 November 1996
3.	Date of Board Approval	18 December 1996
4.	Date of Loan Agreement	9 January 1997
5.	Date of Loan Effectiveness	
	– In Loan Agreement	9 April 1997
	– Actual	17 July 1997
	– Number of Extensions	2
6.	Closing Date	
	– In Loan Agreement	31 July 2001
	– Actual	12 July 2004
	– Number of Extensions	3
7.	Terms of Loan	
	– Service Charge	1% per year
	– Maturity (years)	40
	–Grace Period (years)	10
8.	Terms of Relending	
	– Service Charge	8% per year
	– Maturity (years)	25
	– Grace Period (years)	5

9. Disbursements

a. Dates

Initial Disbursement	Final Disbursement	Time Interval
20 August 1998	12 July 2004	70.5 Months
Effective Date	**Original Closing Date**	**Time Interval**
17 July 1997	31 July 2001	49.16 Months

b. Amounts (SDR '000,000)

Category	Item	Original Allocation	Last Revised Allocation[a]	Amount Canceled	Net Amount Available	Amount Disbursed	Undisbursed Balance
01	Part A						
01A	Transmission Lines	23.69	18.50	6.05	17.64	17.64	0.00
01B	Substations	14.70	11.79	3.36	11.34	11.34	0.00
02	Part C						
02A	Distribution Facilities	20.07	17.41	2.75	17.32	17.32	0.00
02B	Substation	17.08	11.54	5.73	11.36	11.36	0.00
02C	Transmission Lines	0.26	0.30	(0.01)	0.27	0.27	0.00
03	Consulting Services (Parts A, B, C, D)	3.80	1.00	2.97	0.83	0.83	0.00
04	Service Charges	1.38	1.38	0.00	1.38	1.38	0.00
05	Unallocated	11.95	0.50	11.95	0.00	0.00	0.00
06	Compensation for BPDB Staff	0.00	7.16	(5.77)	5.77	5.77	0.00
	Total	**92.93**	**69.58**	**27.03**	**65.91**	**65.91**	**0.00**

[a] Reallocation of loan proceeds dated 23 October 2003

10. Local Costs (financed)

- Amount ($) 0
- Percent of Local Costs 0
- Percent of Total Cost 0

C. Project Data

1. Project Cost ($ million)

Cost	Appraisal Estimate	Actual
Foreign Exchange Cost	197.74	88.10
Local Currency Cost	115.96	73.91
Total	**313.70**	**162.01**

2. Financing Plan ($ million)

Cost	Appraisal Estimate			Actual		
Implementation Costs	Foreign	Local	Total	Foreign	Local	Total
Borrower Financed	0.00	115.96	115.96	0.00	73.91	73.91
ADB Financed	134.40	0.00	134.40	88.10	0.00	88.10
Other External Financing[a]	63.34	0.00	63.34	0.00	0.00	0.00
Total	**197.74**	**115.96**	**313.70**	**88.10**	**73.91**	**162.01**
IDC Costs						
Borrower Financed	0.00	31.80	31.80	0.00	17.91	17.91
ADB Financed	2.01	0.00	2.01	1.83	0.00	1.83
Other External Financing	0.00	0.00	0.00	0.00	0.00	0.00
Total	**2.01**	**31.80**	**33.81**	**1.83**	**17.91**	**19.74**

ADB = Asian Development Bank, and IDC = interest during construction.

[a] World Bank was to cofinance, but this did not materialize.

Cost Breakdown by Project Component ($ million)

Component	Appraisal Cost			Actual Cost		
	Foreign	Local	Total	Foreign	Local	Total
Part A: PGCB	65.54	49.03	114.573	39.02	35.66	74.68
Part B: PGCB	64.14	32.59	96.73	0.29	0.00	0.29
Part C1: DESCO	23.20	12.35	35.56	18.59	22.06	40.65
Part C2: DESA	40.18	20.07	60.25	21.29	15.99	37.28
Part D: BPDB[a]	4.67	1.90	6.57	8.91	0.20	9.11
Total	**197.74**	**115.96**	**313.70**	**88.10**	**73.91**	**162.01**

BPDB = Bangladesh Power Development Board, DESA = Dhaka Electric Supply Authority, DESCO = Dhaka Electric Supply Company Ltd., and PGCB = Power Grid Company of Bangladesh Ltd.

[a] Includes $8,319,233 disbursed for compensation for BPDB staff.

4. Project Schedule

Item	Appraisal Estimate	Actual
Date of Contract with Consultants		
BPDB Component	June 1997	February 2003
PGCB Component	June 1997	September 1999 and May 2003
Completion of Bidding		
DESA Component	February 1997	January 1998
DESCO Component	March 1998	January 2000
PGCB Component	August 1997	February 1999
Contract Award		
DESA Component	July 1997	January 1999
DESCO Component	July 1997	April 1998
PGCB Component	June 1997	June 1999
Completion of Engineering Designs		
DESA Component	December 1997	December 2002
DESCO Component	April 1998	October 2000
PGCB Component	June 1998	December 2000
Civil Works Contract for PGCB Component		
Date of Award	June 1997	June1999–July2000
Completion of Work	January 2000	January 2002–May 2003
Equipment and Supply Dates		
First Procurement	July 1997	24 March 1998
Last Procurement	April 2002	19 November 2002
Completion of Equipment Installation	December 2002	July 2003
Start of Operations		
Completion of Tests and Commissioning		
DESA Component	March 1999	October 2003
DESCO Component	June 2000	July 2003
PGCB Component	December 1999	May 2003
Award of Contract for Meghnaghat BOOT Project by BPDB	April 1997	July 1999
Commissioning of Meghnaghat BOOT Project		
–Gas Turbine 1	January 1999	July 2002
–Gas Turbine 2	April 1999	August 2002
–Steam Turbine	October 1999	September 2002

BPDB = Bangladesh Power Development Board, BOOT = Build, own, operate and transfer DESA = Dhaka Electric Supply Authority, DESCO = Dhaka Electric Supply Company Ltd., and PGCB = Power Grid Company of Bangladesh Ltd.

5. Project Performance Report Ratings

	Ratings	
Implementation Period	**Development Objectives**	**Implementation Progress**
a. From 18 July 1997 to 29 April 2001	Satisfactory	Satisfactory
b. From 20 June 2001 to 30 December 2004	Satisfactory	Partly Satisfactory

D. Data on Asian Development Bank Missions

Name of Mission	Date	No. of Persons	No. of Person-Days	Specialization of Members
Fact-Finding	4–16 May 1996	6	86	a, b, c, e, h, g
Appraisal	17 Aug–2 Sep 1996	7	119	a, b, c, d, e, f
Inception	21 Jan–3 Feb 1997	3	39	a, f, i
Review 1	12–14 Jul 1999	1	3	a
Review 2	25–28 Oct 1999	2	8	a, i
Review 3	19–21 Jan 2000	4	12	a, h, e
Review 4	3–15 May 2000	3	39	a, d, e
Review 5	16–25 Jul 2000	3	20	a, b, i
Review 6	2–12 Jun 2001	2	11	a, i
Review 7	28 Nov–10 Dec 2001	2	26	a, i
Review 8	14–23 May 2002	2	20	a, i
Review 9	14–28 Nov 2002	2	30	a, i
Review 10	8–14 Jul 2003	3	21	a, i
Project Completion Review	17–16 Aug 2006	2	30	a, j

a = mission leader/senior project engineer, b = senior program officer, c = senior project officer, d = social development specialist, e = senior project engineer, f = environment specialist, g = senior counsel, h = financial analyst, i = assistant project analyst, and j = staff consultant.

BANGLADESH
NINTH POWER PROJECT
(as completed)
Existing
Project
Planned
Hydropower Plant
Thermal Power Plant
Substation
Gas Field
230 kV Overhead Line
132 kV Overhead Line
400 kV Overhead Line
132 kV U/G Cable Line
River
International Boundary
Boundaries are not necessarily authoritative.
89°00'E
91°45'E
25°30'N
22°00'N
INDIA
INDIA
INDIA
MYANMAR
Bay of Bengal
DHAKA
CHITTAGONG
Panchagarh
Thakurgaon
Lalmonirhat
Sayedpur
Purbasadipur
Rangpur
Barapukuria
Palashbari
Joypurhat
Bogra
Naogaon
Bogra South
Niamatpur
Nawabganj
Rajshahi
Natore
Serajgonj
Jamuna Bridge
Shahzadpur
Pabna
Tangail
Baghabari
Ishurdi
Bheramara
Jamalpur
Mymensingh
RPC
Netrokona
Kishoreganj
Joydevpur
Kabirpur
Tongi
Ghorasal
Manikganj
Ashuganj
Chhatak
Sylhet
Kailashtila
Bibiyana
Beanibazar
Fenchuganj
Rashidpur
Moulvibazar
Srimangal
Shahibazar
Habiganj
B. Baria
Titas
Belabo
Marichakandi
Bakhrabad
Saldanodi
Bottail
Chuadanga
Jhenaidah
Faridpur
Magura
Gopalganj
Jessore
Madaripur
Noapara
Khulna Central
Khulna South
Goalpara
Gallamari
Bagherhat
Satkhira
Mangla
Bhandaria
Barisal
Bhola
Mathbaria
Patuakhali
Shahbazpur
Patharghata
Comilla North
Comilla South
Chandpur
Begunganj
Feni
Chowmohani
Khagrachari
Semutang
Rangamati
Karnaphuli Reservoir
Raozan
New Hathazari
Baraulia
Madanhat
Kaptai
Kulshi
Chandraghana
Sikalbaha
Halishahar
Dohazari
Bandarban
Cox's Bazar
Teesta R.
Jamuna R.
Brahmaputra R.
Kushiyara R.
Ganges R.
Padma R.
Madhumati R.
Meghna R.
Pussur R.
CHITTAGONG RING
to Comilla North
to Raozan
to Kaptai
New Hathazari
Baraulia
Madanhat
Kulshi
Bakulia
Sikalbaha
Halishahar
to Dohazari
DHAKA RING
to Kabirpur
to Ashuganj
Kamta
to Ishurdi
Tongi
Ghorasal
Maghbazar
Basundhara
Mirpur
Aminbazar
Rampura
Ullon
Gulshan
Bhulta
Kalyanpur
B. Bhaban
Dhanmondi
Maniknagar
Narinda
Shiddhirganj
Kamrangirchar
Haripur
Hasnabad
Shampur
Madanganj
Matuail
to Comilla
Sitalakhya
Munshiganj
Meghnaghat
0
25
50
75
Kilometers
N

I. PROJECT DESCRIPTION

1. Since 1973, the Asian Development Bank (ADB) has been the lead development partner in the sustainable development of the power sector in Bangladesh. During the 1980s, the power sector performed extremely poorly. In response, development partners active in the power sector suspended assistance, as well as approval of new initiatives and projects in the sector, towards the end of the 1980s. To address this unsatisfactory situation, ADB initiated a coordination meeting in December 1992, which involved the Government of Bangladesh, ADB, and other development partners, to discuss important power sector issues. That meeting produced an agreement among development partners to extend external assistance only for projects with links to reforms. As a significant milestone, the Government adopted a policy paper in September 1994, titled *Power Sector Reforms in Bangladesh* (PSRB), that formed the basis for reforms in the sector.

2. The Rural Electrification Project,[1] approved in 1995, was the first ADB-financed project in the power sector in Bangladesh with a reform link. The second one with such a reform link was the Ninth Power Project (the Project), which was approved in 1996. The Project aimed to evacuate and utilize electricity from the Meghnaghat 450-megawatt (MW) Power Project, which the private sector developed as an independent power producer on a build-own-operate-transfer (BOOT) basis. ADB supported the Meghnaghat Power Project through its public and private sector windows.[2]

3. The main objectives of the Project were to (i) evacuate and utilize the power generated from the Meghnaghat BOOT power project; (ii) maximize utilization of system assets through optimized load dispatch; (iii) upgrade the distribution system in Dhaka city; (iv) initiate vertical unbundling of Bangladesh Power Development Board (BPDB) into generation, transmission, and distribution entities; (v) corporatize[3] the transmission segment of BPDB; (vi) rationalize the boundary between Dhaka Electric Supply Authority (DESA) and Rural Electrification Board (REB); (vii) corporatize DESA; and (viii) prepare power generation projects for private sector participation.

4. The Project had four parts. Part A included (i) construction of 130 kilometer (km) of 230 kilovolt (kV) transmission lines from Meghnaghat power station to Haripur and Comilla, as well as turn-in of Ghorasal–Haripur 230 kV transmission line at Rampura; and (ii) extension of two 230 kV substations at Haripur and Comilla, and construction of a 230/132 kV substation at Rampura. As designed, Part B involved the construction of a national load dispatch center (NLDC) and associated communications networks, which were earmarked for cofinancing by the World Bank. At the request of the World Bank, an allocation for consulting services equivalent to $800,000 was kept under the Project to allow engineering works to continue until World Bank financing was in place. Part C included (i) construction of 280 km of 132 kV, 33 kV, 11 kV, and 0.4 kV distribution system in Dhaka, including connection of 91,000 new consumers by DESA; and (ii) enhancement of distribution capacity by about 200 megavolt-ampere (MVA), with connections for about 22,000 new consumers in the Mirpur area of Dhaka by Dhaka Electric Supply Company Limited (DESCO). Part D covered consulting services for feasibility studies and detailed engineering for a gas-based,

[1] ADB. 1995. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the People's Republic of Bangladesh for the Rural Electrification Project.* Manila.

[2] ADB. 1985. *Technical Assistance to the People's Republic of Bangladesh for the East Zone Thermal Power Project*, Manila (TA 714-BAN, approved on 31 October 1984 for $1,355,000); ADB. 1995. *Technical Assistance to the People's Republic of Bangladesh for Solicitation for the Private Sector Implementation of the Meghnaghat Power Project*, Manila (TA 2338-BAN, approved on 30 May 1995 for $211,000, which was increased to $433,000 in May 1997); ADB. 2000. *Report and Recommendation of the President to the Board of Directors on Proposed Loans to AES Meghnaghat Limited and Proposed Partial Risk Guarantee for the Meghnaghat Power Project in the People's Republic of Bangladesh.* Manila.

[3] Corporatize means transformation of an existing entity into a company under Companies Act 1994.

combined-cycle power generation project in the western part of Bangladesh, called the West Zone, and open-cycle, peaking-power generation projects in the eastern part of Bangladesh, called the East Zone.

5. Power Grid Company of Bangladesh Limited (PGCB) was the Executing Agency (EA) for Part A and Part B, while DESA was the EA for Part C1, DESCO for Part C2, and BPDB for Part D. The Power Division of the Ministry of Power, Energy and Mineral Resources (MPEMR) was responsible for overall coordination.

6. In response to the realization of surplus loan proceeds, mainly due to lower-than-expected bid prices, the project scope was revised during implementation. This helped to address additional critical needs, and enhanced project impact. On 20 November 1997, ADB approved a minor change under Part A to finance eligible costs of a 132 kV connecting transmission line from Mymensingh substation to Mymensingh power station. This line, which was being constructed with ADB's assistance under the Rural Electrification Project (footnote 1), had experienced a cost overrun. On 13 September 1999, ADB approved (ii) construction of about 10 km of a double-circuit 230 kV transmission line from the Meghnaghat power station to the Haripur–Hasnabad 230 kV transmission line; (iii) replacement of two 35/50 MVA, 132/33 kV transformers at Mirpur substation with two 50/75 MVA transformers; (iv) construction of turn-in lines from the Ullon–Tongi 132 kV transmission line at Rampura substation; and (v) procurement of an emergency restoration system, and replacement of old protection systems. Finally, in September 2001, ADB approved a change in scope under Part D to use SDR7,163,786 (equivalent of $10.0 million) in surplus loan proceeds to compensate BPDB staff who joined PGCB. Under Part B, ADB funded consulting services for drafting bidding documents, and assisted in the evaluation of bids for the NLDC. However, when World Bank decided not to provide cofinancing due to slow sector reform, NLDC was included as a component of the Power Sector Development Project[4] at the Government's request.

II. EVALUATION OF DESIGN AND IMPLEMENTATION

A. Relevance of Design and Formulation

7. The project design was in line with the country strategy[5], as well as ADB's strategy for power sector reforms. The overarching goal of the country operational strategy was to reduce poverty by (i) accelerating economic growth, (ii) providing direct assistance to the poor to improve their living conditions, and (iii) improving and protecting the environment. The Project aimed to improve the power supply by enhancing transmission and distribution, thereby accelerating industrial and service sector development. The objective of the power sector reforms was to improve financial and operational performance of the sector through unbundling of the sector into functional components, changing the business culture, and increasing private participation in the sector. As such, the project design supported the Government's efforts to restructure the power sector, accelerate economic growth, and generate employment.

8. During 1989–1994, ADB did not provide any assistance to the power sector in Bangladesh due to poor sector performance, and the Government's reluctance to introduce substantive sector reforms. PSRB, the new policy paper prepared by the Government in consultation with major development partners and adopted in 1994 (para. 1), focused on (i) changing the business environment through corporatization, commercialization, and increased private sector participation; (ii) implementing institutional improvements in existing

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[4] ADB. 2003. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the People's Republic of Bangladesh for the Power Sector Development Project.* Manila.

[5] ADB. 1993. *Country Operational Strategy for Bangladesh*

sector agencies; (iii) creating new sector agencies that could serve as role models for the sector; (iv) enlarging the scope of Pally Biddut Samity (PBS); (v) rehabilitating power plants; and (vi) strengthening the long-term planning process in the sector by updating the power system master plan for Bangladesh. The project design included linked reforms that supported the Government's efforts to unbundle BPDB into functional units, and restructure existing entities and create new ones for distribution. These reforms were appropriate at the time of project design, and remained valid during project implementation.

B. Project Outputs

9. As envisaged at appraisal, Part A of the Project involved (i) construction of 108 km of 230 kV double-circuit transmission lines from Meghnaghat to Haripur, Comilla, and Hasnabad; (ii) turn in of Ghorasal–Haripur 230 kV transmission line at Rampura; (iii) extension of two 230/132 kV substations at Haripur and Comilla; and (iv) construction of a new 230/132 kV substation at Rampura. These were to help evacuate power generated from Meghnaghat Power Plant without any time lag. Project design was changed during implementation to accommodate various developments, and to enhance its impact and effectiveness. Instead of constructing a line from Meghnaghat to Rampura for creating two supply sources for the Rampura substation, turn in of Ghorasal-Haripur 230 kV transmission line at Rampura was implemented. At the same time, a new line was drawn from Meghnaghat to isolate the Haripur–Hasnabad line from the Haripur 230 kV substation, and to link it with Meghnaghat. This added the Hasnabad 230/132 kV substation to evacuate power from Meghnaghat and relieve overloading of Haripur 230/132 kV substation (para. 6).

10. Under Part B, ADB funded consulting services for drafting bidding documents and assisting PGCB in the evaluation of the bids. Under Part C, system constraints were removed through the construction of 55 km of 132 kV, 33 kV, 11 kV, and 0.4 kV multiple-circuit distribution system in Dhaka; enhancement of distribution capacity by about 300 MVA; and 57,000 new connections in the Mirpur area and 91,000 new connections in other areas of Dhaka. This also created adequate facilities to utilize additional power from the Meghnaghat Power Plant.

11. Under Part D, an ADB-financed detailed engineering and feasibility study for gas-based East Zone open-cycle peaking power projects led to inclusion of a generation component under the project component of Power Sector Development Project (footnote 4). However, detailed engineering and feasibility studies for a gas-based West Zone combined-cycle power project were dropped due to BPDB's failure to engage a consultant within the stipulated period. However, given its importance, the study was included under the West Zone Power System Development Project[6] through a change in project scope. Consultant selection for the study is underway.

12. The Project has achieved the reform objectives envisaged at appraisal. One of the objectives was to unbundle BPDB into functional entities. With Government support, PGCB was incorporated in 1996. By December 2002, PGCB took over all transmission assets from BPDB, including load dispatch functions, and most transmission assets from DESA. Another objective was to restructure DESA through area rationalization and corporatization. The Government amended the DESA Act in 1998, redefining its boundary with REB. This step helped in transferring all distribution assets—more than 5,500 km of distribution lines with associated land and substations outside the redefined DESA area—to eight PBSs under REB by December 2002. DESCO was incorporated in 1996 with an objective to take over assets from DESA gradually, starting with DESA's distribution assets in the Mirpur area in

[6] ADB. 2001. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the People's Republic of Bangladesh for the West Zone Power System Development Project.* Manila.

October 1998. In April 2003, DESCO took over Gulshan Circle assets from DESA. PGCB and DESCO consolidated their operations, improved efficiencies, and reduced losses. A project framework comparing the Project's physical targets and expected outputs at appraisal with those at completion is in Appendix 1.

C. Project Costs

13. The estimated project cost at appraisal was equivalent to $313.70 million. ADB's portion at appraisal was SDR92.93 million ($134.40 million on 18 December 1996 at the time of approval). The World Bank was to contribute an additional $63.30 million for NLDC under Part B of the Project, though this did not materialize (para. 6). ADB covered the foreign exchange cost for the Project. The Government was to provide the equivalent of $116.00 million to cover the local currency needs of the Project. Following a review in November 2002, SDR18.64 million ($25.00 million) of surplus loan proceeds were canceled effective 31 December 2002. Thus, the net loan amount was reduced to SDR74.30 million ($99.47 million).

14. At completion, the actual cost of project works was $162.0 million, much lower than envisaged at appraisal. This was due primarily to lower-than-expected bid prices for the procurement of goods, services, and turnkey contracts. The cost also included the additional scope of the Project, plus compensation payments for BPDB staff who joined PGCB. A summary of appraisal and actual project costs by component is in Appendix 2. A summary of project costs by component is in Table 1.

Table 1: Project Cost by Component
($ million)

Component	Cost as Appraised			Cost at Completion		
	Foreign	Local	Total	Foreign	Local	Total
Part A: PGCB	65.540	49.033	114.573	39.019	35.660	74.679
Part B: PGCB[a]	64.148	32.591	96.739	0.285	0.000	0.285
Part C1: DESCO	23.206	12.358	35.564	18.593	22.059	40.652
Part C2: DESA	40.182	20.076	60.258	21.295	15.989	37.284
Part D: BPDB	4.670	1.903	6.573	8.908[b]	0.200	9.108
Total	**197.746**	**115.963**	**313.707**[c]	**88.100**	**73.908**	**162.008**

BPDB = Bangladesh Power Development Board, DESA = Dhaka Electric Supply Authority, DESCO = Dhaka Electric Supply Company Limited, and PGCB = Power Grid Company of Bangladesh Limited.

[a] As planned, World Bank was to cofinance this component. The Asian Development Bank's allocation of $0.800 million was for continued consulting services only.
[b] Includes $8.32 million disbursed for compensation for BPDB staff.
[c] Estimated cost excluding the World Bank component is $217.97 million.
Sources: Executing agencies' project completion reports, and Asian Development Bank's Loan Financial Information System.

15. The cost underrun of Part A was due primarily to lower-than-estimated prices of goods and services procured by PGCB for transmission lines and substations. PGCB's estimates were based on past procurement by BPDB under bilateral grants or supplier's credit, which was generally high.

16. Part C for DESCO had a substantial local cost overrun due to (i) high taxes and duties on imported goods, (ii) importation of additional goods for distribution system improvement, (ii) importation of additional meters required for replacement of faulty meters and additional new connections, and (iv) higher cost for interest during construction.

17. Part C for DESA had a significant cost underrun due primarily to lower-than-estimated prices of goods and services for transmission lines and substations. DESA's estimates were based on past procurement under bilateral grants or supplier's credit, which was generally high.

18. In Part D, the detailed engineering and feasibility studies for a gas-based combined-cycle power project in the west zone was dropped, which reduced the cost. Under the extended coverage, only 80% of $10.36 million was utilized to compensate BPDB staff joining PGCB.

19. Despite a time overrun of about 35.5 months, as well as an expansion of the project scope to include additional components, the actual cost of the Project was 25.7% less than the appraisal estimate of $217.97 million, excluding the envisaged World Bank financing for Part B.

D. Disbursements

20. Disbursements from the ADB loan by EA and category are in Appendix 3. Disbursements under the loan totaled SDR65.915 million ($88.1 million). After careful review in November 2002, SDR18.636 million ($25.0 million) of surplus loan proceeds were canceled effective 31 December 2002. The remaining surplus loan funds of SDR3.667 million ($5.38 million) were canceled at loan closing on 12 July 2004.

21. The initial disbursement under the loan was on 20 August 1998, while the final disbursement was on 12 July 2004. The disbursement period was about 5 years and 10 months, which was 1 year and 9 months longer than the appraised period of 4 years and 1 month. The loan was closed on 12 July 2004, nearly 3 years after the original closing date of 31 July 2001.

E. Project Schedule

22. The loan was declared effective on 17 July 1997, compared with a target date of 9 April 1997. The original date of loan closing was 31 July 2001, which was extended three times to 12 July 2004. The PGCB portion, which was expected to be completed by the end of 1999, was not finished until October 2003—almost 4 years later than envisaged. Delays in the appointment of PGCB management, and in handing over of project-associated assets by BPDB to PGCB due to stiff resistance from the BPDB workers union, delayed the engagement of consultants and start of works. PGCB also required time to consolidate its organizational structure. PGCB, however, completed its part of the Project in time to evacuate power fully from the Meghnaghat BOOT plant. Court cases by land owners over a number of tower locations delayed cross-country transmission line construction, which forced contractors to suspend works during working season. Working season for transmission line construction was limited, as most of the route passes through flood plains.

23. Part C for DESCO, which was to be completed by June 2000, was finished in July 2003—a delay of almost 3 years. As a new organization, DESCO had teething problems. The first management team was recruited in July 1997. DESCO could enter the Mirpur area only in 1998, which was their focus area. However, the entire management was fired in January 2000 for poor performance, leaving the organization with hardly any management throughout that year.

24. Part C for DESA, which was expected to be completed by March 1999, was finished in August 2003—a delay of more than 4 years. In most cases, DESA took excessive time for bid evaluation. Moreover, as a statutory body, DESA had to follow the Government's

contract approval process. In some cases, this required approval by the Cabinet Committee on Government Purchases, which was time-consuming.

25. A comparison of the appraisal estimates and the actual implementation schedule is in Appendix 4.

F. Implementation Arrangements

26. The implementation arrangements envisaged at appraisal generally were followed. EAs established project implementation offices (PIO) for the execution of the Project. PGCB had their PIO office in Dhaka, with two field offices at Comilla and Rupshi. An officer with the rank of deputy general manager headed the PIO with more than 10 officials. At DESA, the PIO was headed by a superintending engineer. The establishment of PIO offices, and the availability of responsible officials, helped smooth the execution of the Project. However, frequent changes of project directors for Part C with DESA undermined the implementation of their part of the Project.

G. Conditions and Covenants

27. The Government and the EAs complied with most of loan and project covenants stipulated in the Loan Agreement and the Project Agreement. However, some financial covenants were only partially complied with. The covenanted conditions under the loan, and their compliance status, are in Appendix 5.

28. Under one of the loan covenants, ownership, as well as operations and maintenance (O&M), of all transmission assets was to be transferred to PGCB by 31 December 2002. Despite initial delays in starting the asset transfer, BPDB transferred all transmission assets, including load dispatch function, by the stipulated date. DESA also transferred most transmission assets (other than those considered internal to DESA operations) to PGCB in the prescribed period. At that moment, PGCB was the sole transmission grid operator responsible for all new construction related to transmission.

29. Another loan covenant called for the restructuring of DESA, the poorly performing power sector entity, by redefining its boundary with REB, and by creating a corporate entity to take over DESA's remaining assets in the core metropolitan area. In 1998, Parliament redefined DESA's boundary through an amendment of the DESA Act, leaving only core Dhaka metropolitan area under DESA. Asset handover to REB began in 1997, though the process stagnated due to a stay order issued by a court. After the court order was vacated, DESA's asset transfer to REB accelerated, and was completed by December 2002. About 5,500 km of distribution lines with associated facilities and permanent establishments were transferred.

30. DESCO started its operations in 1998 by taking over the Mirpur area from DESA. In 2003, DESCO took over Gulshan Circle, and will take over the Tongi area from DESA in the near future. As such, DESCO's area of operation will be concentrated in the northern part of metropolitan Dhaka. At appraisal DESCO was expected to take over all assets of DESA. However, it was decided by the Government later that the remaining part of DESA would be converted into a separate corporate entity. ADB is providing technical assistance for the corporatization of DESA.[7]

31. In accordance with the covenant, PGCB and DESCO were sufficiently staffed, both technical and non-technical, for smooth operations of the entities. PGCB and DESCO have

[7] ADB. 2002. *Technical Assistance to the People's Republic of Bangladesh for the Corporatization of Dhaka Electric Supply Authority*, Manila (TA 3978 BAN, approved on 7 November 2002 for $850,000).

full operational freedom regarding implementation of projects; O&M; and carrying out their administrative, financial, and commercial responsibilities. DESCO and PGCB have introduced market-oriented pay structures and service conditions that are different from the Government system. To facilitate the transfer of staff from the mother entities to the newly created corporate entities, the Government approved a severance compensation package enabling staff to join the newly created corporate entities under new service conditions. This had been applied for BPDB staff that joined PGCB.

32. The status of compliance with financial covenants by PGCB and DESCO is in Appendix 6. DESCO broke even in FY2003, and reached a debt service coverage ratio of 2.96 in FY2005. DESCO's rate of return on equity was 28.46% in FY2005, nearly double the covenanted 15%, and was improving steadily. Its return on net fixed assets was only 5.35% in FY2005, about half the covenanted 10%, though this improved to 13.43% in FY2006. Its debt-equity ratio improved to 67:33 in FY2005. DESCO's financial performance will improve further as growth in its area is expected to exceed the national average of about 8%, increasing business in the future.

33. In FY2005, PGCB achieved (i) debt service coverage ratio of 1:3, (ii) return on net fixed assets of 10%, (iii) return on equity of 6.24%, and (iv) debt-equity ratio of 79:21. Financial indicators improved further in FY2006. An increase in PGCB's wheeling charge from Tk0.1768 per kilowatt-hour (kWh) to Tk0.2268 per kWh at 132 kV and Tk0.2291 per kWh at 33 kV, effective 1st January 2004, contributed significantly to PGCB's improving financial position.

34. The Government decided to sell 25% of DESCO and PGCB to the public through the stock exchange. In July 2006, DESCO sold 25% of its shares through the stock market, receiving a positive response. PGCB's share sale started 9 October 2006.

35. A formula for semiannual adjustments to the electricity tariff, enabling variations in fuel cost and exchange rate fluctuations to be addressed automatically, was adopted. The formula became effective 1 March 1997. Tariffs had been adjusted regularly up to September 2003. BPDB generation received 80% of tariff increases, with the rest allocated to transmission and distribution. The Bangladesh Energy Regulatory Commission (BERC) was established in April 2004, and is now responsible for setting tariffs. This will help to de-link tariff setting from political considerations, which had stalled tariff adjustment since September 2003.

36. For the consulting services required under Part A and Part B, PGCB negotiated contracts with the consultants, who were engaged under the extended scope of the Eighth Power Project[8] to handle engineering of Meghnaghat Power Project and NLDC.

37. The boards of directors of PGCB and DESCO were appointed according to the conditions in the loan documents, i.e., at least 25% part-time members must be from the private sector, representing consumer and professional interests.

H. Related Technical Assistance

38. Technical assistance for $175,000 was provided for valuation of assets to be transferred from DESA to DESCO. The consultant was engaged in 1999, and DESA and DESCO accepted the recommended methodology of valuing the assets. The basis was historical book value of assets less accumulated depreciation.

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8 ADB. 1989. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the People's Republic of Bangladesh for the Eighth Power Project.* Manila.

I. Consultant Recruitment and Procurement

1. Consultant Recruitment

39. The Project provided consulting services for assisting (i) PGCB in procurement and supervision of implementation of Meghnaghat BOOT project-related transmission lines and substations under Part A; (ii) PGCB with bid evaluation, design verification, and partial supervision of the implementation of NLDC under Part B; (iii) DESCO in designing, engineering, and supervising construction of the distribution facilities under Part C1; (iv) BPDB in conducting feasibility studies, engineering, preparing bid documents, and assisting in bid evaluation for the combined cycle power project in the west zone under Part D; and (v) BPDB in conducting feasibility studies, engineering, preparing bid documents, assisting in bid evaluation, and post-contract engineering for the peaking power project in the east zone under Part D of the Project. The scope and status of utilization are in Table 2.

Table 2: Scope of Consulting Services and Status of Utilization
(person-months)

Component	Scope		Utilization	
	International	National	International	National
Part A	20.0	15.0	19.7	0.0
Part B	30.0	25.0	15.0	6.5
Part C1	10.0	15.0	0.0	0.0
Part D	80.0	90.0	16.7	58.5
Total	**140.0**	**145.0**	**51.4**	**65.0**

Sources: Report and Recommendation of the President, and project completion reports of executing agencies

40. After the Government and ADB reached an understanding, PGCB was allowed to retain consultants engaged for initial design and engineering of works of Part A and Part B under the Eighth Power Project. In September 1999, PGCB engaged the same consultant for Part A under a new contract, and judiciously used the services of the consultant.

41. At the request of the World Bank, ADB financed consultant services for Part B. When World Bank financing for the NLDC did not materialize, ADB included the NLDC under the ongoing Power Sector Development Program (para. 6). The World Bank considered progress on sector reforms inadequate to consider reentering the power sector through cofinancing of this Project. PGCB engaged the same consultant used in the Eighth Power Project to update the feasibility study and prepare the bidding documents following ADB *Procurement Guidelines*. This facilitated the awarding of the NLDC contract in 2005.

42. DESCO hired the required qualified staff for project implementation through open competition. As such, DESCO did not recruit any consultants for project supervision.

43. BPDB was allowed to take advance actions for the recruitment of consultants for the feasibility studies. However, BPDB did not utilize this facility. BPDB engaged a consultant for the feasibility study for the East Zone Peaking Power Plant in February 2003, and the study was completed in September 2003. BPDB was unable to engage a consultant for the feasibility study for West Zone Combined Cycle Power Project, mainly due to the limited financial authority of BPDB and the lengthy project approval procedures of the Government. Thus, BPDB was unable to complete the scope of works under Part D.

2. Procurement

44. Goods and services for the Project were procured through international competitive bidding or international shopping procedures, following ADB's *Procurement Guidelines*, and

ADB's standard bidding documents for procurement of goods and services. Goods and services under design-build and turnkey contracts were procured through international competitive bidding following ADB's sample bidding documents for design-build and turnkey contracts. Civil construction works were procured through local competitive bidding following the EA's standard bidding procedures.

J. Performance of Consultants, Contractors, and Suppliers

45. The performance of the consultants and suppliers were generally satisfactory.

46. Under Part A, turnkey contracts for the construction of transmission lines were awarded to two contractors—one from the People's Republic of China, one from India. Both contractors required more than a 1-year extension to complete the work under the contract. The delays were caused by the (i) unavailability of some tower locations in time due to court cases over land possession, (ii) allocation of additional works through repeat orders, and (iii) a liquidity crisis of the People's Republic of China contractor.

47. The turnkey contractor for the supply, installation, and commissioning of the 33 kV underground cable under Part C(ii) suffered an initial setback when the first shipment of cables was damaged.

K. Performance of the Borrower and the Executing Agencies

48. The Borrower showed strong commitment to the Project, and prioritized reform measures. During project implementation, the Borrower ensured that sufficient counterpart funds were available. In particular, the Borrower's performance on sector reform was appreciable. Despite much difficulty, the Borrower and the EAs acquired land in a timely manner, demonstrating the Borrower's willingness to pursue the Project.

49. The Borrower showed commitment to reform by (i) creating PGCB for vertical unbundling of BPDB into functional entities, (ii) incorporating DESCO with an objective to dissolve DESA, (iii) amending the DESA Act for rationalization of DESA's boundary with REB, (iv) making the boards of directors of PGCB and DESCO fully autonomous in deciding financial and administrative matters, and (iv) allowing PGCB and DESCO to introduce market-oriented pay structures and commercially oriented service conditions for running on a commercial basis. The creation of the Meghnaghat Power Company Limited as a shell company under BPDB facilitated the smooth implementation of the Meghnaghat 450 MW BOOT Power Plant. PGCB and DESCO now are role models and agents of change.

50. However, the Government's commitment to establishing a framework for sustainable operations and commercial performance of the EAs, particularly the introduction of tariff-setting policy and regular implementation of adopted tariff adjustment formula, has fallen short. As a result, the EAs could not meet some financial covenants. In general, the Borrower's performance was considered substantially satisfactory.

51. To implement the Project, the EAs established their own PIOs with reasonable number of staff. The EAs implemented their respective components in accordance with the design, specification, and construction methods envisaged at the outset, and as agreed upon with ADB during implementation. However, frequent changes of DESA's project director affected smooth implementation of its component. Although PGCB and DESCO were new companies, they implemented the Project successfully. Their performances were more than satisfactory.

L. Performance of the Asian Development Bank

52. The performance of ADB was satisfactory. ADB cooperated well with the Borrower and the EAs in formulating the Project and processing the loan. During implementation, ADB's project staff actively monitored the project activities, and advised the EAs' staff on project implementation matters from time to time. The Bangladesh Resident Mission took over project administration after loan effectiveness, resulting in good interaction among ADB, EAs, consultants, and contractors. ADB's timely approval of contract awards and disbursements, close monitoring of progress of works, and timely intervention to resolve implementation issues contributed greatly to project completion. ADB fielded 10 project review missions, and interacted regularly with the Borrower and EAs. Missions from ADB headquarters visited the project sites on many occasions, and monitored project implementation through meetings and field visits. The Borrower and the EAs appreciated ADB's flexibility in changing the scope of the Project and in extending the loan closing date, which enabled the Borrower to utilize loan savings. Overall, ADB's performance in project implementation was highly satisfactory.

III. EVALUATION OF PERFORMANCE

A. Relevance

53. Reliable and adequate power supply is a prerequisite for industrialization, commercial development, and poverty reduction. As such, enhancement of power transmission capacity for evacuation of power from generating units, improvement in the efficiency of power transmission and distribution, and the provision of reliable and adequate power supply to new and existing customers are essential.

54. The Project aimed to facilitate private sector implementation of the Meghnaghat BOOT Power Plant, evacuate power from the plant, and improve the quality of the power supply to new and existing customers in and around Dhaka city. The design and formulation of the Project was to promote industrialization, commercial development, and poverty reduction in the relevant areas. Further, the Project conformed to the power sector development and reform strategy of the Government, which seeks to promote sustainable economic development through improved power infrastructure. The Project also was in line with ADB's country strategy (footnote 5), which envisaged reducing poverty through economic development. The development objectives envisaged at appraisal were fully achieved at project completion. The Project's scope was increased substantially during implementation, which enhanced its impact. As the second in a series of reform-linked projects in the power sector, the Project also addressed important sector issues and supported sector restructuring, including (i) unbundling of BPDB through creation of PGCB, thereby paving the way for separation of BPDB's generation, transmission, and distribution; (ii) corporatizing DESA through creation of DESCO; and (iii) assisting the private sector in implementing the Meghnaghat BOOT project by guaranteeing the private sector developer adequate power evacuation facilities. Therefore, the Project is considered highly relevant.

B. Efficacy in Achieving Outcomes

55. The Project is rated efficacious. The completed project components achieved the principal objectives: (i) evacuating power from the Meghnaghat BOOT project in a timely manner, (ii) connecting new consumers, and (iii) ensuring adequate and quality supply to consumers. These were achieved by construction of the project facilities (para. 4). Construction of new 230 kV and 132 kV transmission lines, construction of overhead (O/H) and underground (U/G) distribution networks, and installation of substations of various ratings and voltage levels helped to ensure uninterrupted evacuation of power from Meghnaghat Power Plant (and also from Haripur 360 MW Power Plant, which the private

sector built simultaneously on a BOOT basis) to Dhaka city and surrounding areas that account for more than 50% of the entire power market, and as well as to the markets in Chittagong Division. These helped to reduce load shedding[9] in the eastern part of Dhaka city caused by transmission bottlenecks, and to improve the quality of supply to existing and new consumers. The project facilities contributed partly to the remarkable economic growth achieved by the country in the years following completion of the Project.

56. Completed transmission and distribution facilities under the Project are expected to have direct and indirect incremental effects on income and poverty reduction. The Project helped in removing supply constraints in Dhaka city and surrounding areas, and in maintaining projected power demand growth of 8% per year. It also supported rapid industrial growth in and around Dhaka city. Industrial growth was centered on ready-made garments and the backward linkage textile industries, which account for most industrial employment in the country. In addition, construction under the components involved localized civil and erection works using skilled, semiskilled, and unskilled labor, which generated income. Overall, the project components contributed to poverty reduction directly in the project area, and indirectly all over the country.

57. One of the main objectives of the Project was to introduce power sector reform through corporatization of power sector entities on the basis of PSRB. Incorporation of PGCB and DESCO was designed to unbundle BPDB and corporatize DESA's operation. The introduction of service conditions different from civil service conditions, as well as better incentives package, helped to change the business culture in PGCB and DESCO, improve operational and project implementation efficiencies, and enhance financial performance. Area rationalization between DESA and REB widened REB's market share significantly. High performance standards set by DESCO and the PBSs that took over assets from DESA triggered competition among the distribution entities, and helped improve overall sector performance in terms of system loss reduction and greater efficiency in billing and collection. Appendix 7 highlights power sector operational performance since FY1994.

C. Efficiency and Achieving Outcome and Outputs

58. Insufficient and irregular supply of power in and around Dhaka is common. Overall demand for power had been increasing at 8% per year. Inadequate power supply is causing frequent load shedding. In this context, evacuation of power from the newly built Meghnaghat BOOT Power Plant (as well as from the Haripur 360 MW BOOT Power Plant), and improvement of the transmission and distribution network to increase efficiency of the system in and around Dhaka city, clearly demonstrate the efficiency of the investment. Improved quality and enhanced supply of power have increased the power demand from a large number of new consumers, and increased demand for power from the existing customers, to be met. This has helped to accelerate growth in industrial activity and poverty reduction, particularly among the urban poor. The Project is rated efficient in achieving its outputs and purpose.

59. The Project's financial and economic performance, as measured by the financial internal rate of return (FIRR) and economic internal rate of return (EIRR), were assessed. Assumptions in calculating the EIRR and FIRR, as well as the reasons for their variations from the ones calculated at appraisal, are in Appendix 8. Table 3 shows the FIRR and EIRR at appraisal and at completion of the Project.

[9] Load shedding means suspension of electricity supply in an area due to inadequate generation and/or inadequate transmission and distribution system capacity.

Table 3: Comparison of FIRR and EIRR at Appraisal and Project Completion

FIRR (%)		EIRR (%)	
At Appraisal	**At Completion**	**At Appraisal**	**At Completion**
15.0	22.5	17.1	29.2

FIRR = financial internal rate of return, and EIRR = economic internal rate of return
Sources: Report and Recommendation of the President, and staff estimate.

D. Preliminary Assessment of Sustainability

60. The ability of the EAs to preserve the assets created, or to restore them in good condition, through proper maintenance determines the Project's sustainability. PGCB and DESCO are the two new entities that have taken over assets from parent organizations and created new assets under the Project. Structured properly and staffed to do the job satisfactorily, they have proven their ability to minimize down time through timely maintenance of assets. PGCB and DESCO have become profitable organizations, and have sufficient cash to maintain the system.

61. Although PGCB and DESCO are new organizations, their employees have acquired sufficient experience while working for BPDB and REB. PGCB and DESCO staffs of all levels are receiving regular training on corporate management culture at home and abroad through twinning arrangements with US utilities. The United States Agency for International Development has provided support in these areas to PGCB since 2001 and to DESCO since 2005.

62. DESA has enough experience in maintenance. However, the staff's attitude towards maintenance, and resource constraints due to poor performance, might lead to unsustainable maintenance of the new or restored assets. Corporatization of DESA is expected to improve this situation in the near future. The Project is rated most likely to be sustainable.

E. Impact

63. No major environmental impact was anticipated at the inception of the Project. Minor environmental issues were addressed properly during design and implementation of the Project. No unanticipated issues, such as those affecting tribal people, were encountered during project implementation. A few tall trees needed to be cut down to maintain required electrical clearance. Acquisition of land for a 230/132 kV substation at Rampura affected a small number of families who were compensated adequately. The Project, through increased availability and reliability of power, would enhance the standard of living in Dhaka and adjoining areas. In addition, benefits will accrue to small enterprises, garments industries, and commercial enterprises, enhancing job opportunities for many people.

IV. OVERALL ASSESSMENT AND RECOMMENDATIONS

A. Overall Assessment

64. Reliable power supply is a prerequisite for faster economic development of the country. ADB's involvement in the sector since 1973 has helped to increase the power supply across the country. The Project aimed to remove bottlenecks in the transmission system, and expand and upgrade the distribution networks in and around Dhaka city. The objectives were to (i) ensure reliable supply to the existing customers, (ii) evacuate power from the newly built Meghnaghat Power Plant, and (iii) supply power to new customers. The Project aimed to accelerate economic development of the country through increased and more reliable power supply in and around Dhaka city. The objectives were achieved at the

end of the Project. Incremental and reliable supply of power, as a result of the Project, have enhanced economic activity in Dhaka city and surrounding areas. Upgrading and expanding transmission and distribution have helped increase job opportunities for many people.

65. The Project also was designed to initiate crucial sector reforms, including (i) vertical unbundling of BPDB through creation of a grid company (PGCB), (ii) rationalization of DESA's boundary with REB to hand over noncontiguous areas to REB where DESA was failing to perform, (iii) corporatization of remaining core areas of DESA through creation of a corporate entity (DESCO) to take over on a pilot basis small areas from DESA, (iv) introduction of a periodic power tariff adjustment formula to insulate sector entities from rises in fuel prices (indigenous natural gas) and exchange rate fluctuations. The greatest achievements of the Project are the success of PGCB and DESCO in improving technical standards and becoming profitable ventures. These have become the role models for the emerging corporate entities in the sector. The recent sale of about 25% of the shares of DESCO and PGCB in the capital market is a positive step by the Government to attract the private sector to the transmission and distribution segments of the power industry. However, the achievements are mixed in terms of system loss and achieving financial covenants.

66. The Project is assessed as highly relevant, efficacious, efficient, and most likely to be sustainable. As a result, the overall performance of the Project is rated as successful.

B. Lessons

67. Overdependence on consultants for project implementation minimizes initiatives of EAs' staff for implementing projects on time and for maintaining appropriate standards. The objective of technology transfer also was not met, as demonstrated by DESA's poor project implementation performance under the Project without consultant support. In the past, DESA was supported by consultants on a full-time basis for project implementation, which did not help DESA build in-house project implementation capacity. On the other hand, PGCB and DESCO built in-house capability in design, contracting, and supervision of project implementation with limited or no support from consultants.

68. Fewer approval steps for procurement helps with timely implementation of projects. The full financial authority now enjoyed by PGCB, DESCO, and other corporate entities of the power sector helped accelerate project implementation.

69. A gradual approach to reform in a complex, integrated sector such as the power sector is the most suitable option in Bangladesh and ADB's approach to power sector reforms has proven to be appropriate. This allows time to change prevailing mindsets, build consensus, trust and ownership among the stakeholders and demonstrate the tangible benefits of reform. The newly corporatized and private sector entities demonstrate that dependable power supply at affordable and financially viable prices can be achieved in Bangladesh. Other major development partners, including the World Bank, are now following this strategy.

70. This approach requires a longer-term, sustained commitment of development partners to engage in the sector, with a series of investment projects to promote continued progress in the implementation of the reform agenda. Substantial reforms still remain in the power sector in Bangladesh in order to achieve the sector objectives and broader economic and poverty reduction impact.

C. Recommendations

1. Project Related

a. Monitoring

71. The power sector had a poor record of O&M of power supply systems, leading to shortened plant lifetimes, frequent load shedding, and unreliable power supply. However, significant improvements have been achieved in recent years, especially after the formation of companies such as DESCO and PGCB. Given the significant investments to increase capacity and improve reliability, the investments should be monitored regularly. This monitoring could take place during the Annual Country Portfolio Review, and during further project processing.

b. Covenants

72. Enactment of the BERC Act in 2003, and the subsequent creation of the BERC in 2004, was a major step towards de-linking tariff setting from political considerations, and creating equal opportunities for public and private sector entities. With the gradual increase of independent power producers' market share, and the need for massive investment to sustain projected demand growth, full functioning of BERC is essential for taking up tariff setting responsibility without further delay.

73. The Government should emphasize, respect, and support the autonomy of corporate entities, which is the foundation of power sector reform.

c. Further Action or Follow-Up

74. To maximize the benefit of the model created under the Project to facilitate private sector participation in power generation, similar projects focusing on balanced development of all segments of the sector should be developed in future.

d. Additional Assistance

75. Given the rising demand, the power sector will require large investments to sustain the economic growth of the country. However, any future assistance from ADB to the power sector should accelerate implementation of the Government's sector reform program.

e. Timing of Project Performance Audit Report Preparation

76. The facilities created under the Project have reached capacity utilization, except the 230 kV transmission systems. As the full benefit of the Project is almost known, post-evaluation of the Project may be carried out anytime from 2007.

2. Other Recommendations

77. Retail power tariffs should be reviewed regularly, following the adopted pricing policy with periodic adjustment for fuel price increases and currency fluctuations, to enable all power sector entities to meet financial requirements.

78. Financial restructuring of BPDB and DESA as a part of corporatization of these entities is essential to make the sector financially sustainable.

PROJECT FRAMEWORK

Design Summary	Performance Indicators/Targets	Assessment After Completion	Remarks
1. Goal To meet current and future demand for electrical energy in the Dhaka area.	1. No load shedding by 2005.	1. Load shedding, which was prevailing in the northeastern part of Dhaka city due to transmission bottlenecks, substantially improved following completion and commissioning of 230 kV transmission lines and new substation at Rampura.	1. Implementation of 450 MW Meghnaghat Phase I and 360 MW Haripur BOOT projects with associated evacuation facilities persuaded the Government to implement similar BOOT projects. PGCB emerged as an efficient project implementation agency.
	2. No applications for electrical connection pending for more than 2 months by 2005.	2. DESCO took over Mirpur area from DESA in October 1998, and strengthened the distribution system and streamlined connection procedures. No connection applications are now pending beyond 2 months.	2. DESCO operations in terms of customer satisfaction are commendable.
2. Purpose • To expand and strengthen the network to deliver from BOOT stations to individual consumers.	1. Network to be able to handle 1,500 MW peak load.	1. 230 kV transmission system built under the Project is capable of handling more than 1,500 MW peak load.	1. Load growth during the project period was about 8%, as projected in Power System Master Plan, 1995.
• To collect adequate revenue for O&M and expansion.	2. ROE > 15% SFR > 30%	2. ROE and SFR in FY2004 (%) | | **ROE** | **SFR** | DESCO | 24.97 | 88.00 PGCB | 1.96 | 29.30	2. In FY2006, ROE of DESCO and PGCB improved to 42.84% and 11.63%, respectively; and SFR of DESCO and PGCB also increased to 94.00% and 78.50%, respectively.
• To establish sustainable and efficient power sector institution(s) in and around Dhaka.	3. Incorporation under Companies Act 1994. board members from outside the Government.	3. DESCO incorporated on 3 November 1996 under Companies' Act 1994 with board members from outside the Government.	3. New generation, transmission (PGCB), and distribution corporate entities have been created following the same principles.
• To establish a mechanism for least-cost dispatch of generation.	4. Decrease in transmission losses by 2%.	4. Overall transmission losses reduced from 4.52% in FY1994 to 3.42% in FY2004.	4. The World Bank did not finance the national load dispatch center, as envisaged in the Project. This has been included under Power Sector Development Project in 2003 (footnote 4). BPDB upgraded its existing load dispatch center and handed it over to PGCB for managing the system during the interim period.
• To prepare for future least cost generation expansion.	5. Increase in generation capacity by 1,000 MW.	5. BPDB prepared feasibility report for peaking power plants around the Dhaka	5. BPDB could not conduct a feasibility study for a gas-based base load power plant

Design Summary	Performance Indicators/Targets	Assessment After Completion	Remarks
		city. A 2x120 MW peaking power plant is under construction at Siddhirganj under the Power System Development Project.	due to failure to engage consultant within the project implementation period. This is being done under West Zone Power System Development Project (footnote 5).
3. Components/Outputs 3.1 New institutions established.	1. PGCB and DESCO created.	2. PGCB and DESCO were incorporated in 1996.	Efficiency and project management capability of PGCB and DESCO improved.
3.2 DESA's territory rationalized.	2. Core metropolitan areas retained. Semi-rural areas and noncontiguous areas handed over to PBSs	2. DESA boundary redefined through amendment of DESA Act in 1998 by the Parliament. More than 5,500 km of distribution lines and associated assets outside redefined DESA area were handed over to eight PBSs.	This has significant impact on system loss reduction and improving financial health of the PBSs.
3.3 New plant installed.	3. (i) Establishment of lines: • 130 km 230 kV • 280 km 132 kV, 33 kV, 11 kV, 0.415 kV • 132/33 kV substation capacity augmented by 200 MVA. (ii) Establishment of NLDC	(i) Establishment of lines: • PGCB constructed 108 km, double-circuit 230 kV and 1.5 km, four-circuit 132 kV transmission line. • DESA constructed 1.5 km, 132 kV O/H transmission; and 19.5 km, 33 kV U/G cables. • DESCO constructed 12 km, single-circuit 33 kV U/G; 20 km single circuit 11 kV U/G; and 20 km, 0.415 kV O/H lines. • PGCB and DESA augmented capacity of 132/33 kV substations by 450 MVA. (ii) NLDC was not constructed. PGCB utilized consultant's services to (a) prepare bidding documents, as per World Bank *Procurement Guidelines;* and (ii) prepare bidding documents, as per ADB *Procurement Guidelines*.	(i) Establishment of lines: • Construction of new lines was below target. • Augmentation of 132/33. kV substations capacity substantially exceeded target. (ii) The World Bank did not finance the NLDC. This has been taken up under Power Sector Development Project.
3.4 New consumers connected.	Residential, commercial, industrial, others – 113,000 new consumers.	• DESCO connected more than 57,000 new consumers in the Mirpur area between FY1999 and FY2003. • PBSs connected more than 200,000 new consumers during the same period.	New connection includes regularization of unrecorded consumers in DESA's data.

<table>
<tr><th>Design Summary</th><th>Performance Indicators/Targets</th><th>Assessment After Completion</th><th>Remarks</th></tr>
<tr><td>3.5 System loss reduced.</td><td>Loss < 15% of import.</td><td>DESCO reduced system loss in Mirpur area from 41% in FY1999 to 20% in FY2006.

Eight PBSs that took over assets from DESA reduced system loss in taken over areas from more than 40% to 11.7% in FY2006.</td><td>This had substantial impact on overall loss reduction (including power station consumption and transmission loss) from 37% in FY1994 to 25% in FY2005.</td></tr>
<tr><td>3.6 Power system properly maintained.</td><td>Maximum loss of 96 hours per year for any consumer.</td><td>Loss due to transmission system fault reduced to well below the target of 96 hours per year per consumer.</td><td></td></tr>
<tr><td>3.7 Tariffs restructured and raised.</td><td>Average tariff increased by 15% per kWh.</td><td>The Government increased average tariff by 15% in two stages in 1996.</td><td></td></tr>
<tr><td>3.8 System established for regular tariff adjustments.</td><td>Automatic tariff adjustment linked to: Tk per $ exchange rate and fuel costs.</td><td>Automatic tariff adjustment formula introduced in March1997.</td><td>Regular adjustment continued up to September 2003. Now Bangladesh Energy Regulatory Commission will implement the same.</td></tr>
<tr><td>3.9 Effective billing and collection.</td><td>C/B ratio > 97%</td><td>In FY 2005, C/B ratios were as follows:
DESCO – 97.1%
BPDB – 91.9%
DESA – 99.9%
REB – 99.5%
PGCB – 90.4%</td><td>Billing and collection efficiency has improved substantially. Most agencies introduced computerized billing and collection system.</td></tr>
<tr><td>3.10 Engineering studies for future expansion.</td><td>Studies for:

600 MW West Zone base load station

2 x 200 MW East Zone peak load station</td><td>BPDB engaged a consultant for feasibility study of peaking plants. Study completed.

BPDB failed to engage a consultant for feasibility study for west zone base load station within the Project period.</td><td>A project for 2 x 120 MW peaking plant at Siddhirganj has been included in Power Sector Development Project. Provision has been made under West Zone Power System Development Project for study for west zone base load station.</td></tr>
<tr><td>4. Inputs
4.1 Finance:
• Foreign $197.7 million
• Local $116.0 million

4.2 Consulting services: 285 person-months</td><td></td><td>4.1 Actual Finance:
• Foreign $88.1 million
• Local $73.9 million

4.2 Consulting Services: 116.4 person-months
<table><tr><th>Item</th><th>Foreign</th><th>Local</th></tr><tr><td>Part A</td><td>19.7</td><td>0.0</td></tr><tr><td>Part B</td><td>15.0</td><td>6.5</td></tr><tr><td>Part C</td><td>0.0</td><td>0.0</td></tr><tr><td>Part D</td><td>16.7</td><td>58.5</td></tr><tr><td>Total</td><td>51.4</td><td>65.0</td></tr></table></td><td>4.1 The World Bank did not finance Part B of the Project, which had an estimated cost of $95.7 million (foreign currency of $63.3 million, local currency of $32.4 million).
4.2 BPDB could not conduct one of two feasibility studies under Part D.

DESCO did not engage any consultant.</td></tr>
</table>

BPDB = Bangladesh Power Development Board, BOOT = Build, own, operate and transfer DESA = Dhaka Electric Supply Authority, DESCO = Dhaka Electric Supply Company Ltd., PGCB = Power Grid Company of Bangladesh Ltd., ROE = Return on Equity, SFR = Self Financing Ratio, C/B Ratio = Collecting to Billing Ratio, O & M = Operation and Maintenance, O/H = Overhead, and U/G = Underground

.

CAPITAL COST ESTIMATES

Table A2.1: Power Transmission Component
($ million)

Part A: PGCB Component

Item	Appraisal Foreign	Appraisal Local	Appraisal Total	Actual Foreign	Actual Local	Actual Total
Site Development	0.00	0.00	0.00	0.00	0.00	0.00
Plant, Equipment, and Materials						
Meghnaghat–Comilla 230 kV Transmission Line	18.08	3.45	21.53	8.40	4.07	12.47
Meghnaghat–Haripur 230 kV Transmission Line	5.56	1.06	6.62	9.14	2.77	11.91
Meghnaghat–Rampura 230 kV Transmission Line	10.62	1.79	12.41			
Extension of Comilla (North) 230/132 kV Substation	3.59	0.98	4.57	3.87	0.20	4.07
Extension of Haripur 230/132 kV Substation	1.38	0.79	2.17			
Construction of Rampura 230/132 kV New Substation	16.29	10.45	26.74	9.74	7.69	17.43
Engineering Services	0.50	0.12	0.62	0.31	0.00	0.31
Miscellaneous (vehicles, furniture, etc.)	0.000	0.27	0.27	0.00	0.93	0.93
Expansion of Mirpur 132/33 kV Substation by Replacing Existing Transformers With Higher Capacity Transformers				1.14	0.00	1.14
Strengthening of Transmission System				0.84	0.00	0.84
Construction of Haripur–Hasnabad 230 kV Transmission Line				2.07	0.68	2.75
Turn-in of Ullon–Tongi 132 kV line at Rampura 230/132 kV Substation				0.35	0.16	0.51
Finance Construction of a 132 kV Connecting Transmission Line From Mymensingh Substation to Mymensingh Power Station				2.37	0.00	2.37
Subtotal	**56.02**	**18.91**	**74.93**	**38.23**	**16.50**	**54.73**
Taxes and Duties	0.00	15.92	15.92	0.00	12.89	12.89
Total Base Costs	**56.02**	**34.83**	**90.85**	**38.23**	**29.39**	**67.62**
Total Physical Contingency	5.68	1.89	7.57	0.00	0.00	0.00
Total Price Escalation	2.84	0.99	3.83	0.00	0.00	0.00
Total Service Charge and Interest During Construction	1.00	11.32	12.32	0.79	6.27	7.06
Grand Total	**65.54**	**49.03**	**114.57**	**39.02**	**35.66**	**74.68**

kV = kilovolt.

Source: Report and Recommendation of the President and Project Completion Report of Power Grid Company of Bangladesh.

CAPITAL COST ESTIMATES *(continued)*

Part B: PGCB Component

Item	Appraisal			Actual		
	Foreign	Local	Total	Foreign	Local	Total
SCADA	19.93	1.71	21.64	0.00	0.00	0.00
EMS	5.02	0.13	5.15	0.00	0.00	0.00
Communications	29.60	6.32	35.92	0.00	0.00	0.00
Control Center Miscellaneous	0.43	0.04	0.47	0.00	0.00	0.00
NLDC Building	0.00	1.49	1.49	0.00	0.00	0.00
Engineering Services	0.80	0.20	1.00	0.29	0.00	0.29
Subtotal	55.78	9.89	65.67	0.29	0.00	0.29
Taxes and Duties	0.00	11.31	11.31	0.00	0.00	0.00
Total Base Costs	**55.78**	**21.20**	**76.98**	**0.29**	**0.000**	**0.29**
Total Physical Contingency	5.58	0.99	6.57	0.00	0.00	0.00
Total Price Escalation	2.79	0.49	3.28	0.00	0.00	0.00
Total Service Charges and Interest During Construction	0.00	9.91	9.91	0.00	0.00	0.00
Grand Total	**64.15**	**32.59**	**96.74**	**0.29**	**0.00**	**0.29**

EMS = emergency management system, kV = kilovolt, NLDC = National Load Dispatch Center, and SCADA = supervisory control and data acquisition.

Source: Report and Recommendation of the President and Project Completion Report of Power Grid Company of Bangladesh.

CAPITAL COST ESTIMATES *(continued)*

Table A2.2: Power Distribution Components
($ million)

Part C1: DESCO Component

	Appraisal			Actual		
Item	**Foreign**	**Local**	**Total**	**Foreign**	**Local**	**Total**
Site Development	0.00	1.21	1.21	0.00	1.53	1.53
Plant, Equipment and Materials						
33 kV Underground Cable Networks	1.67	0.38	2.05	0.77	0.23	1.00
33/11 kV Substations	3.66	0.32	3.98	2.29	0.69	2.98
11 kV and 400 V Networks	12.82	1.64	14.46	6.86	0.67	7.53
Meters and Customer Connection Materials	1.52	0.26	1.78	8.04	0.82	8.86
SCADA	0.02	0.01	0.03	0.00	0.00	0.00
Miscellaneous (vehicles, furniture, etc.)	0.00	0.38	0.38	0.00	1.67	1.67
Engineering Services	0.19	0.11	0.30	0.00	0.28	0.28
Overhead	0.00	0.00	0.00	0.00	1.50	1.50
Subtotal	**19.88**	**3.10**	**22.98**	**17.96**	**5.86**	**23.82**
Taxes and Duties	0.00	3.76	3.76	0.00	8.52	8.52
Total Base Costs	**19.88**	**8.07**	**27.95**	**17.96**	**15.91**	**33.87**
Total Physical Contingency	1.99	0.43	2.42	0.00	0.00	0.00
Total Price Escalation	0.99	0.21	1.20	0.00	0.00	0.00
Total Service Charges and Interest During Construction	0.35	3.65	4.00	0.63	6.15	6.78
Grand Total	**23.21**	**12.36**	**35.57**	**18.59**	**22.06**	**40.65**

kV = kilovolt, and SCADA = supervisory control and data acquisition.

Source: Report and Recommendation of the President and Project Completion Report of Dhaka Electric Supply Company.

CAPITAL COST ESTIMATES *(continued)*

Part C2: DESA Component

Item	Appraisal Foreign	Appraisal Local	Appraisal Total	Actual Foreign	Actual Local	Actual Total
Site Development	0.00	0.00	0.00	0.00	0.00	0.00
Plant, equipment and materials						
Three 132/33 kV Substations	13.34	0.84	14.18	4.42	0.05	4.47
Six 33/11 kV Substations	7.69	1.09	8.78	2.60	0.46	3.06
132 kV Overhead Transmission Line	0.37	1.42	1.79	0.37	0.17	0.54
33 kV Underground Distribution Lines	3.24	0.86	4.10	4.40	0.77	5.17
Meters and Customer Connection Materials	9.77	2.23	12.00	8.60	0.50	9.10
SCADA Upgrading	0.00	0.00	0.00	0.49	0.00	0.49
Subtotal	34.42	6.44	40.86	20.88	1.95	22.83
Taxes and Duties	0.00	6.51	6.51	0.00	8.95	8.95
Total Base Costs	**34.42**	**12.95**	**47.37**	**20.89**	**10.90**	**31.78**
Total Physical Contingency	3.44	0.64	4.08	0.00	0.00	0.00
Total Price Escalation	1.72	0.32	2.04	0.00	0.00	0.00
Total Service Charges and Interest During Construction	0.60	6.16	6.77	0.41	5.09	5.50
Grand Total	**40.18**	**20.08**	**60.26**	**21.29**	**15.99**	**37.28**

kV = kilovolt, and SCADA = supervisory control and data acquisition.

Source: Report and Recommendation of the President and Project Completion Report of Dhaka Electric Supply Authority.

CAPITAL COST ESTIMATES *(continued)*

Table A2.3: Power Generation Component
($ million)

Part D: BPDB Component

Item	Appraisal Foreign	Appraisal Local	Appraisal Total	Actual Foreign	Actual Local	Actual Total
Feasibility Study for the East Zone Open-Cycle Peaking Power Plant	2.00	0.52	2.52	0.57	0.20	0.77
Feasibility Study for the West Zone Combined-Cycle Power Plant	2.00	0.52	2.52	0.00	0.00	0.00
Compensation of BPDB Staff	0.00	0.00	0.00	8.32	0.00	8.32
Subtotal	4.00	1.04	5.04	8.89	0.20	9.09
Taxes and Duties	0.00	0.00	0.00	0.00	0.00	0.00
Total Base Costs	**4.00**	**1.04**	**5.04**	**8.89**	**0.20**	**9.09**
Total Physical Contingency	0.40	0.10	0.50	0.00	0.00	0.00
Total Price Escalation	0.20	0.00	0.20	0.00	0.00	0.00
Total Service Charges and Interest During Construction	0.07	0.76	0.83	0.00	0.00	0.00
Grand Total	**4.67**	**1.90**	**6.57**	**8.89**	**0.20**	**9.09**

BPDB = Bangladesh Power Development Board.

Source: Report and Recommendation of the President and Project Completion Report of Bangladesh Power Development Board.

DISBURSEMENT BY CATEGORY, YEAR, AND EXECUTING AGENCY

($)

Category		Executing Agency	Year 1998	1999	2000	2001	2002	2003	2004	Total
01	**Part A**									
01A	Transmission Lines	PGCB	0.00	1,785,353	6,614,914	8,542,749	3,311,176	2,849,894	55,951	23,160,037
01B	Substations	PGCB	0.00	402,791	2,789,331	1,169,927	7,949,481	1,806,187	636,168	14,753,884
02	**Part C**									
02A	Distribution Facilities		4,189,701	8,521,459	4,710,026	4,075,960	564,348	172,702	1,112,092	23,346,287
		DESA	327,789	649,011	2,134,288	3,301,245	134,844	57,200	1,073,187	7,677,563
		DESCO	3,861,912	7,872,448	2,575,738	774,715	429,504	115,502	38,905	15,668,724
02B	Substations		0	0	5,089,398	2,797,341	1,840,027	4,498,488	900,089	15,125,343
		DESA	0	0	4,899,483	1,269,707	1,320,466	4,444,836	900,089	12,834,581
		DESCO	0	0	189,916	1,527,634	519,560	53,652	0	2,290,763
02C	Transmission Lines		0	0	0	39,491	0	314,193	19,155	372,839
		DESA	0	0	0	39,491	0	314,193	19,155	372,839
		DESCO	0	0	0	0	0	0	0	0
03	**Consulting Services (Parts A, B, C, D)**		0	61,395	110,376	34,892	75,056	691,319	189,890	1,162,928
		PGCB	0	61,395	110,376	34,892	75,056	315,518	0	597,237
		BPDB	0	0	0	0	0	375,801	189,890	565,691
04	Service Charge		1,542	67,634	209,211	381,929	573,573	625,514	0	1,859,403
		PGCB	0.	7,945	59,547	149,150	269,690	305,515	0	791,847
		DESA	121	4,607	38,189	92,475	132,453	142,535	0	410,381
		DESCO	1,421	55,082	111,475	140,304	171,430	154,222	0	633,935
		BPDB	0	0	0	0	0	23,242	0	23,241
05	Unallocated		0	0	0	0	0	0	0	0
06	Compensation of BPDB staff	BPDB	0	0	0	0	0	5,000,000	3,319,233	8,319,233
	Total		**4,191,243**	**10,838,632**	**19,523,256**	**17,042,288**	**14,313,661**	**15,958,297**	**6,232,578**	**88,099,954**
	Disbursement by EA	PGCB	0	2,257,484	9,574,168	9,896,718	11,605,403	5,277,114	692,119	39,303,004
		DESA	327,910	653,618	7,071,960	4,702,918	1,587,763	4,958,764	1,992,431	21,295,363
		DESCO	3,863,333	7,927,530	2,877,128	2,442,653	1,120,495	323,376	38,905	18,593,421
		BPDB	0	0	0	0	0	5,399,043	3,509,123	8,908,165
		Total	**4,191,243**	**10,838,632**	**19,523,256**	**17,042,289**	**14,313,661**	**15,958,297**	**6,232,578**	**88,099,954**

BPDB = Bangladesh Power Development Board, DESA = Dhaka Electric Supply Authority, DESCO = Dhaka Electric Supply Company Ltd., EA = Executing Agency, and PGCB = Power Grid Company of Bangladesh Limited.

Source: Executing agencies' project completion reports and Asian Development Bank's Loan Financial Information System.

PROJECT IMPLEMENTATION SCHEDULE

PART A: PGCB COMPONENT

BOOT = build, own, operate and transfer; C=Commissioning; CA=Contract Award; CA(VO)=Contract Award (Variation Order); CO=Commercial Operation; DA=Design Approval; ER=Erection ; G1=Gas Turbine 1; G2=Gas Turbine 2; kV = Kilovolt; km = kilometer; MVA = megavolt-amphere; SH=Shipment; ST=Steam Turbine; T=Tender;

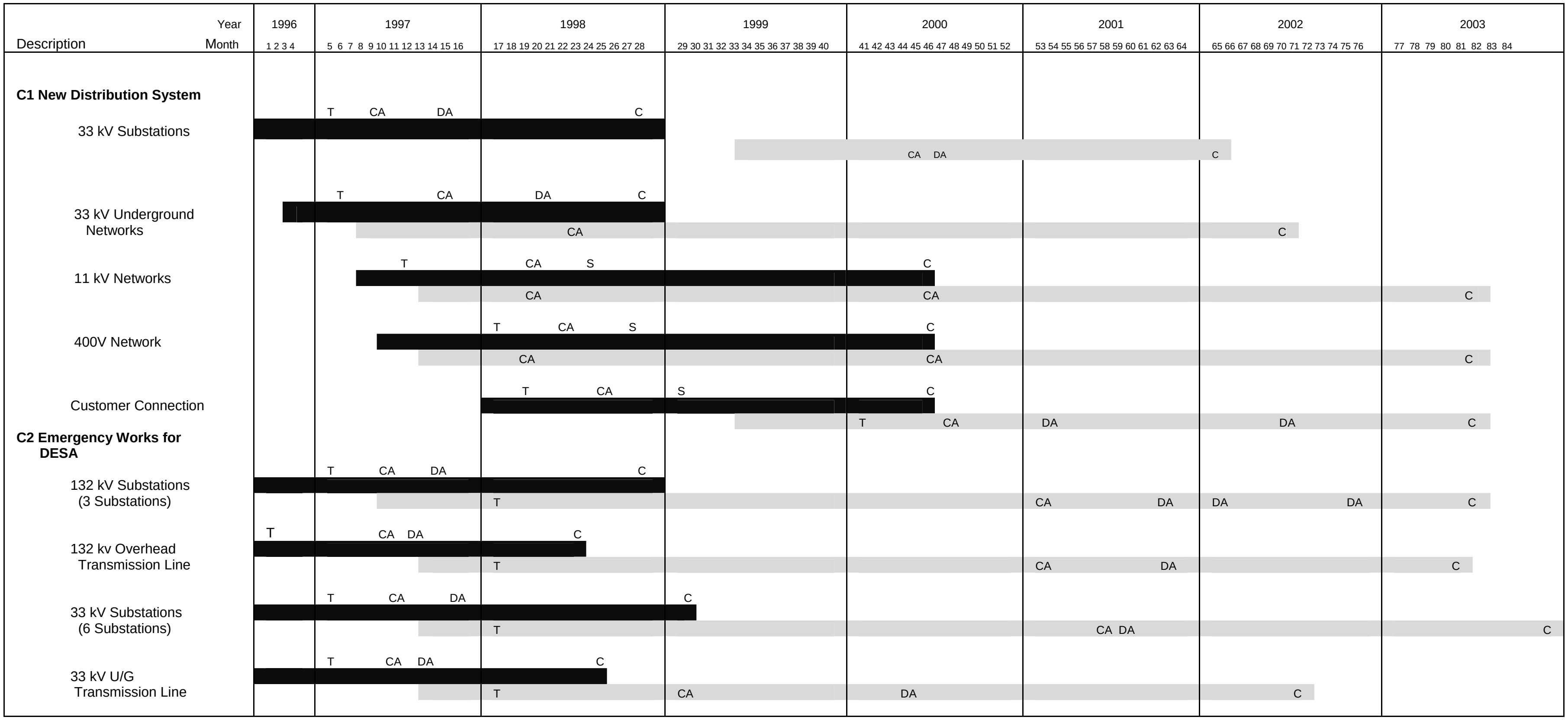
Appraisal
Actual

[a] Reconfigured as Turn-in of Gharasal – Haripur 230 kV Double Circuit Transmission Line to Rampura Substation
[b] Not part of this Project
[c] Extended Scope

Source: Report and Recommendation of the President and project completion report of the Executing agencies

PROJECT IMPLEMENTATION SCHEDULE *(continued)*

PART C1: DESCO AND PART C2: DESA COMPONENTS



C=Commissioning; CA=Contract Award; DA=Design Approval; kV = Kilovolt; T=Tender; U/G = underground

Appraisal

Actual

Source: Report and Recommendation of the President and project completion report of the Executing agencies.

STATUS OF COMPLIANCE WITH COVENANTS

Sl. No.	Covenant	Reference in Loan/Project Agreements	Status
	Sector		
1.	The Borrower shall relend the proceeds of the Loan to the Project Executing Agencies under respective Subsidiary Loan Agreements upon terms and conditions satisfactory to the Bank. Except as the Borrower and the Bank may otherwise agree, the terms for relending the proceeds of the Loan shall include interest at the rate of eight percent per annum inclusive of foreign-exchange risk and a repayment period of 25 years, including a grace period of five years.	LA, Section 3.01(a)	Complied with.
2.	The Borrower shall cause the Project Executing Agencies to apply the proceeds of the Loan to the financing of expenditures on the Project in accordance with the provisions of this Loan Agreement and the Project Agreement.	LA, Section 3.01(b)	Complied with.
3.	The goods and services and other items of expenditure to be financed out of the proceeds of the Loan and the allocation of amounts of the Loan among different categories of such goods and services and other items of expenditure shall be in accordance with the provisions of Schedule 3 to this Loan Agreement, as such Schedule may be amended from time to time by agreement between the Borrower and the Bank.	LA, Section 3.02	Complied with.
4.	Except as the Borrower and the Bank may otherwise agree, all goods and services to be financed out of the proceeds of the Loan shall be procured in accordance with the provisions of Schedule 4 and Schedule 5 to this Loan Agreement. The Bank may refuse to finance a contract where goods or services have not been procured under procedures substantially in accordance with those agreed between the Borrower and the Bank or where the terms and conditions of the contract are not satisfactory to the Bank.	LA, Section 3.03	Complied with.
5.	Except as the Borrower and the Bank may otherwise agree, the Borrower shall cause all goods and services financed out of the proceeds of the Loan to be used exclusively in the carrying out of the Project.	LA, Section 3.04	Complied with.
6.	Withdrawals from the Loan Account in respect of goods and services shall be made only on account of expenditures relating to (a) goods which are produced in and supplied from the services which are supplied from such member countries of the Bank as shall have been specified by the Bank from time to time as eligible	LA, Section 3.05	Complied with.

Sl. No.	Covenant	Reference in Loan/Project Agreements	Status
	sources for procurement, and (b) goods and services which meet such other eligibility requirements as shall have been specified by the Bank from time to time.		
7.	The closing date for withdrawals from the Loan Account for the purposes of Section 8.03 of the Loan Regulations shall be 31 July 2001 or such other date as may from time to time be agreed between the Borrower and the Bank.	LA, Section 3.06	Complied with.
8.	The Borrower shall cause the Project Executing Agencies to carry out the Project with due diligence and efficiency and in conformity with sound administrative, financial, engineering, environmental and public utility practices.	LA, Section 4.01(a)	Complied with.
9.	In the carrying out of the Project and operation of the Project facilities, the Borrower shall perform, or cause to be performed, all obligations set forth in Schedule 6 to this Loan Agreement.	LA, Section 4.01(b)	Complied with.
10.	The Borrower shall make available to the Project Executing Agencies, promptly as needed, and on terms and conditions acceptable the Bank, the funds, facilities, services, land and other resources which are required, in addition to the proceeds of the Loan, for the carrying out of the Project.	LA, Section 4.02	Complied with.
11.	The Borrower shall ensure that the activities of its departments and agencies with respect to the carrying out of the Project and operation of the Project facilities are conducted and coordinated in accordance with sound administrative policies and procedures.	LA, Section 4.03	Complied with.
12.	The Borrower shall furnish, or cause to be furnished, to the Bank all such reports and information as the Bank shall reasonably request concerning (i) the Loan, and the expenditure of the proceeds and maintenance of the service thereof; (ii) the goods and services and other items of expenditure financed out of the proceeds of the Loan; (iii) the Project; (iv) the administration, operations and financial condition of the Project Executing Agencies; (v) financial and economic conditions in the territory of the Borrower and the international balance-of-payments position of the Borrower; and (vi) any other matters relating to the purposes of the Loan.	LA, Section 4.04	Complied with.
13.	The Borrower shall enable the Bank's representatives to inspect the Project, the goods financed out of the proceeds of the Loan, and any relevant records and documents.	LA, Section 4.05	Complied with.

Sl. No.	Covenant	Reference in Loan/Project Agreements	Status
14.	The Borrower shall take all necessary actions which shall be necessary on its part to enable the Project Executing Agencies to perform its obligations under the Project Agreement including the establishment of tariffs as stipulated in Section 2.16 thereof, and shall not take or permit any action which would interfere with the performance of such obligations.	LA, Section 4.06	Partially complied with.
15.	The Borrower shall exercise its rights under the Subsidiary Loan Agreements in such a manner as to protect the interests of the Borrower and the Bank and to accomplish the purposes of the Loan.	LA, Section 4.07(a)	Complied with.
16.	No rights or obligations under the Subsidiary Loan Agreements shall be assigned, amended, abrogated or waived without the prior concurrence of the Bank.	LA, Section 4.07(b)	Complied with.
17.	It is the mutual intention of the Borrower and the Bank that no other external debt owed a creditor other than the Bank shall have any priority over the Loan by way of a lien on the assets of the Borrower. To that end, the Borrower undertakes (i) that, except as the Bank may otherwise agree, if any lien shall be created on any assets of the Borrower as security for any external debt, such lien will ipso facto equally and ratably secure the payment of the principal of, and service charge and any other charge on, the Loan; and (ii) that the Borrower, in creating or permitting the creation of any such lien, will make express provision to that effect.	LA, Section 4.08(a)	Complied with.
18.	The provisions of paragraph (a) of this Section shall not apply to (i) any lien created on property, at the time of purchase thereof, solely as security for payment of the purchase price of such property; or (ii) any lien arising in the ordinary course of banking transactions and securing a debt maturing not more than one year after its date.	LA, Section 4.08(b)	Complied with.
19.	The term “assets of the Borrower” as used in paragraph (a) of this Section includes assets of any administrative unit, including any such assets held by the Bangladesh Bank and any other institution performing the functions of a central bank for the Borrower.	LA, Section 4.08(c)	
	Others		
20.	Established, Staffed, and Operating PMU/PIU		Complied with.
21.	Fielding of Consultants		
22.	(a) For the consulting services required under Part A and Part B and referred to in paragraph 1(a) of this	LA, Para. 3, Schedule 5	Complied with.

Sl. No.	Covenant	Reference in Loan/Project Agreements	Status
	Schedule, a contract may be negotiated by PGCB with the consultants who have been engaged under the Bank-financed Eighth Power project (Loan No. 963-BAN[SF]). Before a contract is signed with such consultants, three copies of the draft contract as negotiated shall be furnished to the Bank for approval. Promptly after the contract is signed, the Bank shall be furnished with three copies of the signed contract. If any substantial amendment of the contract is proposed after its execution, the proposed changes shall be submitted to the Bank for prior approval.		
23.	(b) Except as the Bank may otherwise agree, the negotiation of a contract with the above-mentioned consultants shall be concluded within 90 days of the date of this Loan Agreement. If a contract is not negotiated, other consultants shall be engaged in accordance with the Bank's "Guideline on the Use of Consultants".		ADB's approval obtained before contract.
24.	The Borrower shall ensure that the Project Executing Agencies carry out Project implementation as follows: Part A and Part B by PGCB, Part C by DESA and DESC, and Part D by BPDB.	LA, Para 1, Schedule 6	Complied with.
25.	The Borrower (a) shall have (i) expedited or assisted in expediting the issue or execution of permits, licenses and other instruments required by law to enable PGCB and DESC to operate properly, and (ii) caused BPDB and DESA respectively, no later than the Effective Date, to appoint, in consultation with the Bank, the first boards of directors, who shall be full-time, of PGCB and DESC; and (b) shall ensure that at least 25 percent of the membership of such boards is representative of consumer and professional interests and is not drawn from the staff of the Borrower or any of its departments and agencies.	LA, Para 2, Schedule 6	Complied with.
26.	The Borrowers shall ensure that PGCB and DESCO appoint a sufficient number of qualified and experienced professional and support, technical and non technical staff, including engineers to enable PGCB and DESCO at all times to carry on their operations.	LA, Para 3, Schedule 6	Complied with.
27.	The Borrower shall, at all times, emphasize, respect and support the autonomy of PGCB and DESCO with respect to decisions regarding implementation of the Project, operation and maintenance and carrying out their administrative, financial and commercial responsibilities.	LA, Para. 4, Schedule 6	Complied with.

Sl. No.	Covenant	Reference in Loan/Project Agreements	Status
	Financial		
28.	With reference to Section 4.02 of this Loan Agreement, the Borrower shall ensure that all local-currency funds required for expeditious Project implementation are (a) committed in advance in its Annual Development Program on the basis of anticipated expenditure for the relevant year, and (b) transferred to PGCB and DESC at least one quarter of the year prior to the anticipated need or disbursement.	LA, Para. 5, Schedule 6	Complied with. Borrower allocated necessary funds in Annual Development Program by the Borrower.
	Social		
29.	The Borrower shall ensure that all land, rights in land or rights of way, and other rights or privileges are promptly acquired by or made available to PGCB, DESA and DESCO to ensure timely Project implementation.	LA, Para. 6, Schedule 6	Complied with.
	Environment		
30.	The Borrower shall ensure that during Project implementation measures satisfactory to the Bank are taken to minimize displacement or resettlement of people and environmental injury or damage cause by or resulting from Project implementation. Upon Project completion measures are also taken to meet national and international standards in respect of such resettlement and environmental concerns.	LA, Para. 7, Schedule 6	Complied with.
31.	Upon completion of the Project, the Borrower shall cause the Project Executing Agencies to be responsible for proper O&M of the Project facilities, including the provision of adequate funds for O&M, as follows: PGCB for Part A and Part B, and DESA and DESC for Part C.	LA, Para. 8(a) Schedule 6	Complied with.
32.	The Borrower shall ensure that implementation of the proposed (i) West Zone project engineered under Part D is entrusted in the first instance to independent private-sector generators of power, and (ii) East Zone projects engineered under Part D are entrusted to a corporatized generation subsidiary of BPDB.	LA, Para. 8(b) Schedule 6	
33.	Before 31 December 2002, the Borrower shall ensure that (a) ownership and O&M of all transmission responsibilities in the Borrower are effected by PGCB, and (b) O&M of all distribution responsibilities in Dhaka and its environs are undertaken by DESCO	LA, Para. 9, Schedule 6	Complied with. DESCO's area of operation has been redefined.
34.	The Borrower shall cause Project BME to be carried out by PGCB for Part A and Part B and by DESA and DESC for Part C. The BME, which will be reviewed by the	LA, Para. 10, Schedule 6	Complied with. DESA and DESC maintain consumer connection

Sl. No.	Covenant	Reference in Loan/Project Agreements	Status
	Bank, shall include verification under Part C of (a) the number of new connections, (b) the consumer categories of such connections, and (c) the improvement, or not, of service to consumers in Dhaka and its environs.		statistics by category. Service quality improved.
35.	The Borrower shall cause at least 2.5 million cubic meters per day of natural gas to be allocated and supplied to the Meghnaghat Power Company (MPC) for the Meghnaghat Project under a contract between MPC and Titas Gas Transmission and Distribution Company Limited to ensure uninterrupted operation of the Meghnaghat Project.	LA, Para. 11, Schedule 6	Complied with. 450 MW Meghnaghat plant in commercial operation since November 2002.
36.	Each Project Executing Agency shall carry out the Project with due diligence and efficiency, and in conformity with sound administrative, financial, engineering, environmental, and public utility practices.	PA, Section 2.01(a)	Complied with.
37.	In the carrying out of the Project and operation of the Project facilities, each Project Executing Agency shall perform all obligations set forth in Schedule 6 to the Loan Agreement to the extent that they are applicable to the Project Executing Agency.	PA, Section 2.01(b)	Complied with.
38.	Each Project Executing Agency shall make available, promptly as needed, the funds, facilities, services, equipment, land and other resources which are required, in addition to the proceeds of the Loan, for the carrying out of the Project.	PA, Section 2.02	Complied with.
39.	In the carrying out of the Project, each Project Executing Agency shall employ competent and qualified consultants and contractors, acceptable to the Bank, to an extent and upon terms and conditions satisfactory to the Bank.	PA, Section 2.03(a)	Complied with.
40.	Except as the Bank may otherwise agree, all goods and services to be financed out of the proceeds of the Loan shall be procured in accordance with the provisions of Schedule 4 and Schedule 5 to the Loan Agreement. The Bank may refuse to finance a contract where goods or services have not been procured under procedures substantially in accordance with those agreed between the Borrower and the Bank or where the terms and conditions of the contract are not satisfactory to the Bank.	PA, Section 2.03(b)	Complied with.
41.	Each Project Executing Agency shall carry out the Project in accordance with plans, design standards, specifications, work schedules and construction methods acceptable to the Bank. Each Project	PA, Section 2.04	Complied with.

Sl. No.	Covenant	Reference in Loan/Project Agreements	Status
	Executing Agency shall furnish, or cause to be furnished, to the Bank, promptly after their preparation, such plans, design standards, specifications and work schedules, and any material modifications subsequently made therein, in such detail as the Bank shall reasonably request.		
42.	Each Project Executing Agency shall take out and maintain with responsible insurers, or make other arrangements satisfactory to the Bank, for insurance of the Project facilities to such extent and against such risks and in such amounts as shall be consistent with sound practice.	PA, Section 2.05(a)	Not complied with.
43.	Without limiting the generality of the foregoing, each Project Executing Agency undertakes to insure, or cause to be insured, the goods to be imported for the Project and to be financed out of the proceeds of the Loan against hazards incident to the acquisition, transportation and delivery thereof to the place of use or installation, and for such insurance any indemnity shall be payable in a currency freely usable to replace or repair such goods.	PA, Section 2.05(b)	Complied with.
44.	Each Project Executing Agency shall maintain, or cause to be maintained, records and accounts adequate to identify the goods and services and other items of expenditure financed out of the proceeds of the Loan, to disclose the use thereof in the Project, to record the progress of the Project (including the cost thereof) and to reflect, in accordance with consistently maintained sound accounting principles, its operations and financial conditions.	PA, Section 2.06	Complied with.
45.	The Bank and each Project Executing Agency shall cooperate fully to ensure that the purposes of the Loan will be accomplished.	PA, Section 2.07(a)	Complied with.
46.	Each Project Executing Agency shall promptly inform the Bank of any condition which interferes with, or threatens to interfere with, the progress of the Project, the performance of its obligations under this Project Agreement or the subsidiary Loan Agreements, or the accomplishment of the purposes of the Loan.	PA, Section 2.07(b)	Complied with.
47.	The Bank and each Project Executing Agency shall from time to time, at the request of either party, exchange views through their representatives with regard to any matters relating to the Project, the Project Executing Agency and the Loan.	PA, Section 2.07(c)	Complied with.

Sl. No.	Covenant	Reference in Loan/Project Agreements	Status
48.	Each Project Executing Agency shall furnish to the Bank all such reports and information as the Bank shall reasonably request concerning (i) the Loan and the expenditure of the proceeds thereof; (ii) the goods and services and other items of expenditure financed out of such proceeds; (iii) the Project; (iv) the administration, operations and financial condition of the Project Executing Agency; and (v) any other matters relating to the purposes of the Loan.	PA, Section 2.08(a)	Complied with.
49.	Without limiting the generality of the foregoing, each Project Executing Agency shall furnish to the Bank quarterly reports on the execution of the Project and on the operation and management of the Project facilities. Such reports shall be submitted in such form and in such detail and within such a period as the Bank shall reasonably request, and shall indicate, among other things, progress made and problems encountered during the quarter under review, steps taken or proposed to be taken to remedy these problems, and proposed program of activities and expected progress during the following quarter.	PA, Section 2.08(b)	Complied with.
50.	Promptly after physical completion of the Project, but in any event not later than six months thereafter or such later date as the Bank may agree for this purpose, each Project Executing Agency shall prepare and furnish to the Bank a report, in such form and in such detail as the Bank shall reasonably request, on the execution and initial operation of the Project, including its cost, the performance by the Project Executing Agency of its obligations under this Project Agreement and the accomplishment of the purposes of the Loan.	PA, Section 2.08(c)	Complied with.
51.	Each Project Executing Agency shall (i) maintain separate accounts for the Project and for its overall operations; (ii) have such accounts and related financial statements (balance sheet, statement of income and expenses, and related statements) audited annually, in accordance with appropriate auditing standards consistently applied, by independent auditors whose qualifications, experience and terms of reference are acceptable to the Bank; and (iii) furnish to the Bank, promptly after their preparation but in any event not later than nine 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 the auditors' opinion on the use of the Loan proceeds and compliance with the covenants of this Loan Agreement), all in the English language. Each Project Executing Agency shall furnish to the Bank such further information concerning such accounts and financial statements and the audit thereof	PA, Section 2.09(a)	Complied with.

Sl. No.	Covenant	Reference in Loan/Project Agreements	Status
	as the bank shall from time to time reasonably request.		
52.	Each Project Executing Agency shall enable the Bank, upon the Bank's request, to discuss the Project Executing Agency's financial statements and its financial affairs from time to time with the Project Executing Agency's auditors, and shall authorize and require any representative of such auditors to participate in any such discussions requested by the Bank, provided that any such discussion shall be conducted only in the presence of an authorized officer of the Project Executing Agency unless the Project Executing Agency may otherwise agree.	PA, Section 2.09(b)	Complied with.
53.	Each Project Executing Agency shall enable the Bank's representatives to inspect the Project, the goods financed out of the proceeds of the Loan, all other plants, sites, works, properties and equipment of the Project Executing Agency, and any relevant records and documents.	PA, Section 2.10	Complied with.
54.	Each Project Executing Agency shall, promptly as required, take all action within its powers to maintain its corporate existence, to carry on its operations, and to acquire, maintain and renew all rights, properties, powers, privileges and franchises which are necessary in the carrying out of the Project or in the conduct of its business.	PA, Section 2.11(a)	Complied with.
55.	Each Project Executing Agency shall at all times conduct its business in accordance with sound administrative, financial, environmental and public-utility practices, and under the supervision of competent and experienced management and personnel.	PA, Section 2.11(b)	Complied with.
56.	Each Project Executing Agency shall at all times operate and maintain its plants, equipment and other property, and from time to time, promptly as needed, make all necessary repairs and renewals thereof, all in accordance with sound administrative, financial, engineering, environmental, public-utility, and O&M practices.	PA, Section 2.11(c)	Complied with.
57.	Except as the Bank may otherwise agree, the Project Executing Agencies shall not sell, lease or otherwise dispose of any of their assets which shall be required for the efficient carrying on of their operations or the disposal of which may prejudice their ability to perform satisfactory any of their obligations under this Project Agreement.	PA, Section 2.12	Complied with.

Sl. No.	Covenant	Reference in Loan/Project Agreements	Status
58.	Except as the Bank may otherwise agree, the Project Executing Agencies shall apply the proceeds of the Loan to the financing of expenditures on the Project in accordance with the provisions of the Loan Agreement and this Project Agreement, and shall ensure that all goods and services financed out of such proceeds are used exclusively in the carrying out of the Project.	PA, Section 2.13	Complied with.
59.	Except as the Bank may otherwise agree, the Project Executing Agencies shall duly perform all their obligations under the Subsidiary Loan Agreements, and shall not take, or concur in, any action which would have the effect of assigning, amending, abrogating or waiving any rights or obligations of the parties under the Subsidiary Loan Agreements.	PA, Section 2.14	Complied with.
60.	Each Project Executing Agencies shall promptly notify the Bank of any proposal to amend, suspend or repeal and provision of its Charter and shall afford the Bank an adequate opportunity to comment on such proposal prior to taking any action thereon.	PA, Section 2.15	Complied with.
61.	PGCB and DESCO shall maintain: (i) debt service coverage ratio of at least 1.3; (ii) rate of return on equity of at least 15 percent; iii) rate of return on net fixed assets of at least 10 percent; (iv) debt/equity ratio not exceeding 70.30. Also DESCO shall maintain a collection/import ratio of at least 85 percent beginning 30 June 2000	PA, Section 2.16	Partially complied with. Status given in Appendix 8.
62.	Submission of Quarterly Progress Reports	PA, Section 2.08	Complied with.
63.	Submission of Project Completion Report six months after completion of the Project	PA, Section 2.08(c)	Delayed submission. Partially complied with.

BME = Benefit Monitoring & Evaluation; BPDB = Bangladesh Power Development Board, DESA = Dhaka Electric Supply Authority, DESC & DESCO = Dhaka Electric Supply Company Ltd., LA = Loan Agreement; O & M = Operation and Maintenance; PA = Project Agreement; PGCB = Power Grid Company of Bangladesh Ltd.; PIU= Project Implementation Unit; and PMU = Project Monitoring Unit

STATUS OF COMPLIANCE WITH FINANCIAL COVENANTS

	Fiscal Year		1999	2000	2001	2002	2003	2004	2005	2006
	Covenants									
1	Debt-equity ratio 70:30									
		PGCB	46:54	61:39	65:35	65:35	80:20	80 :20	79:21	77:23
		DESCO	87:13	74:26	72:28	56:44	59:41	80:20	67:33	74:26
2	Debt service coverage ratio, 1.2									
		PGCB	—	1.57	1.24	0.65	1.03	1.16	1.30	1.60
		DESCO	(8.49)	0.22	0.66	1.24	1.86	1.03	2.96	5.15
3	Rate of return-on-average net fixed assets, 10%									
		PGCB	—-	5.16	8.34	8.42	3.56	6.27	10.00	11.40
		DESCO	(21.01)	(5.46)	(9.81)	(3.22)	0.54	3.83	5.35	11.70
4	Rate of return-on-equity, > 15%									
		PGCB	—	13.00	6.00	2.68	1.00	1.96	6.24	11.63
		DESCO	(11.01)	(6.37)	(7.53)	(5.34)	0.88	24.97	28.46	17.80
5	Self-financing ratio > 30%									
		PGCB					8.49	29.30	49.43	78.50
		DESCO				29.00	102.00	88.00	92.00	78.82
6	Accounts receivables (3 months eqv.)									
		PGCB	—	7.00	3.50	2.00	5.38	3.88	4.47	2.00
		DESCO	5.08	5.51	7.09	7.86	7.37	5.03	4.87	4.47
7	Net profit after tax (taka million)									
		PGCB	—	23.8	84.7	91.4	12.4	73.2	263.7	723.26
		DESCO	(133.5)	(72.6)	(79.8)	(53.7)	9.9	338.0	540.4	578.70

— = Not available, DESCO = Dhaka Electric Supply Company Limited, eqv. = equivalent, and PGCB = Power Grid Company of Bangladesh.

Source: Audited financial statements of DESCO and PGCB.

OVERALL SECTOR OPERATIONAL PERFORMANCE

Item	FY1994	FY1995	FY1996	FY1997	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	FY2006
Generation, MkWh													
BPDB+ IPP (Gross)	9,784	10,806	11,475	11,858	12,870	14,450	15,563	17,021	18,433	19,404	21,068	22,252	23,939
IPP						578	824	2,248	3,984	6,531	7,718	8,185	8,522
Net	9,221	10,166	10,845	11,243	12,182	13,634	14,739	16,309	17,672	18,691	20,316	21,411	22,978
Energy Import and Sales, MkWh													
Gross BPDB Sales	7,441	8,372	8,996	9,447	10,177	11,351	12,469	14,002	15,321	16,317	18,023	19,187	20,943
Import by BPDB Zones	5,082	5,586	5,825	5,810	6,238	7,045	7,515	8,324	8,935	9,404	12,292	12,732	12,027
Sales by BPDB Zones	3,745	4,209	4,445	4,485	4,757	5,405	5,965	6,762	7,398	8,011	10,952	11,534	11,038
Import by DESA	3,696	4,162	4,551	4,962	5,419	5,947	6,504	7,240	7,833	8,306	6,209	5,126	5,315
Sales by DESA	2,538	2,914	3,209	3,589	3,908	4,469	4,831	5,392	5,862	6,606	4,534	3,590	3,871
Import by DESCO						344	550	628	673	861	1,733	1,843	2,030
Sales by DESCO						205	369	440	494	681	1,400	1,536	1,696
Import by REB	906	1,247	1,372	1,472	1,718	2,442	3,172	4,114	4,712	5,913	6,728	7,489	8,476
Sales by REB	765	1,052	1,172	1,220	1,435	1,989	2,546	3,386	3,927	4,888	5,805	6,457	7,404
Import by WZPDCL												389	1,371
Sales by WZPDCL												306	1,147
Total Sales by BPDB Zones, REB, DESA, DESCO, & WZPDCL	**6,142**	**6,927**	**7,454**	**7,821**	**8,383**	**9,282**	**9,989**	**11,294**	**12,541**	**13,878**	**15,332**	**16,679**	**18,309**
System Loss, %													
BPDB	23.95	22.53	21.60	20.33	20.93	21.45	19.88	17.73	16.41	14.89	13.47	12.81	11.64
BPDB Zones	26.32	24.65	23.69	22.81	23.73	23.29	20.63	18.76	17.20	14.81	10.90	9.41	8.22
BPDB Zones (Net of Sales to REB)	30.26	29.42	28.44	27.59	29.09	30.57	27.73	26.53	23.20	20.73	21.33	20.01	19.08
DESA	31.34	30.00	29.49	27.67	27.89	24.84	25.72	25.53	25.16	20.47	26.98	29.96	27.16
DESA (Net of Sales to REB and DESCO)	32.77	31.71	31.30	29.55	30.13	29.89	34.56	36.55	35.61	31.21	33.72	29.96	27.16
DESCO						40.51	32.86	29.86	26.67	20.89	19.24	16.63	16.48
REB	15.61	15.67	14.60	17.15	16.46	18.55	19.74	17.68	16.67	17.33	15.59	13.78	12.65
WZPDCL												**21.38**	**16.48**
Overall Power System (including BPDB's station use and PGCB's transmission loss)	**37.23**	**35.89**	**35.04**	**34.04**	**34.87**	**35.77**	**35.82**	**33.65**	**31.97**	**28.48**	**27.23**	**25.04**	**23.52**
Billing and Collection, Tk Million													
BPDB Bills	14,067	15,684	16,791	18,487	21,014	23,622	27,359	31,903	35,653	40,541	43,998	43,949	46,139
BPDB Collection	11,551	14,142	15,577	16,264	17,018	16,698	22,515	27,436	31,808	36,568	39,887	40,372	44,472
DESA Bills	5,962	6,530	7,082	8,648	9,862	10,768	11,423	13,015	14,700	17,389	13,647	12,543	13,721
DESA Collection	4,742	5,841	5,998	7,084	7,929	8,200	10,007	11,403	14,274	15,91	14,458	12,530	12,747

Item	FY1994	FY1995	FY1996	FY1997	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	FY2006
										9			
DESCO Bills						569	1,067	1,297	1,470	1,746	4,902	5,466	6,424
DESCO Collection						337	836	1,042	1,309	1,534	4,306	5,306	6,207
REB Bills	2,101	2,710	3,180	3,518	4,448	6,139	7,837	10,810	12,857	16,78 1	20,139	22,520	25,736
REB Collection	2,079	2,594	3,124	3,348	4,253	5,763	7,596	10,164	13,020	16,80 7	19,918	22,417	24,953
WZPDCL Bills												1,098	4,105
WZPDCL Collection												1,227	4,735
Collection, as % of Billing													
BPDB	82.11	90.17	92.77	87.98	80.98	70.69	82.29	86.00	89.21	90.20	90.66	91.86	96.39
DESA	79.54	89.45	84.69	81.91	80.40	76.15	87.60	87.61	97.10	91.55	105.95	99.90	92.90
DESCO						59.23	78.35	80.31	89.04	87.87	87.84	97.07	96.63
REB	98.95	95.72	98.24	95.17	95.62	93.88	96.92	94.02	101.27	100.1 6	98.91	99.54	96.96
WZPDCL												111.69	115.34
Collection-Generation/ Collection-Import ratio, %													
BPDB Collection-Generation	62.45	69.85	72.73	70.09	64.03	55.53	65.93	70.75	74.57	76.77	78.45	80.09	85.17
DESA Collection-Import	54.61	62.61	59.72	59.25	57.98	57.24	65.07	65.25	72.67	72.81	77.36	69.97	67.67
DESCO Collection-Import						35.23	52.60	56.33	65.30	69.52	70.94	80.93	80.71
REB Collection-Import	83.51	80.72	83.90	78.85	79.88	76.46	77.79	77.40	84.39	82.80	83.49	85.82	84.69
WZPDCL Collection-Import												87.81	96.33

BPDB = Bangladesh Power Development Board, DESA = Dhaka Electric Supply Authority, DESCO = Dhaka Electric Supply Company Ltd., IPP = Independent Power Producer; REB = Rural Electrification Board; WZPDCL = West Zone Power Distribution Co. Ltd.

Source: Monthly Statements of Sectoral Entities.

ASSUMPTIONS OF ECONOMIC AND FINANCIAL INTERNAL RATE OF RETURNS

1. The economic analysis requires that all incremental inputs and outputs be expressed in terms of opportunity cost (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 domestic price level, i.e., at 1995–1996 domestic taka price. Traded goods, especially the foreign exchange component of the capital cost, have been converted into domestic price by multiplying by a shadow exchange rate factor of 1.20 and the relevant exchange rate.

2. The economic analysis considered a 20-year benefit stream after the construction of the facilities. No salvage value was considered at the end of the period.

3. Economic costs are based on financial prices, excluding taxes and duties and interest during construction (IDC). The economic cost of power is the long-run marginal cost of generation (Tk2.78 per kWh). This is based on the Asian Development Bank-funded Power System Master Plan Update. A wheeling charge of Tk0.23 per kWh has been subtracted from the purchase price of power by the distribution agencies, as the wheeling charge is the part of benefit in this case where transmission and distribution parts of the Project are lumped together.

4. The economic benefit of electricity consumption consists of non-incremental and incremental benefits. As severe load shedding is the norm in the country, savings from the displacement of alternative sources of energy by electricity is assumed to be the only source of benefit. Incremental benefits could be a factor, though they are assumed to be too small to be considered.

5. Alternative sources of energy to be displaced by electricity would be kerosene for lighting in case of domestic consumers, and diesel generator sets for industrial and commercial consumers. The actual savings would depend on the consumption levels of various sectors. Economic resource cost savings is assumed to be Tk3.22 per kWh for domestic consumers, whereas economic resource cost savings from the replacement of generators is assumed to be Tk5.5 per kWh.

6. Operation and maintenance (O&M) costs are assumed to be 2% of capital costs, as was assumed at appraisal. Like at appraisal, the economic and financial benefits of the Project are calculated after taking transmission and distribution losses of the system into account. If the decline in system losses in recent years continues, the net benefit from the Project would increase. This would be reflected in higher financial and economic internal rates of return.

7. For the financial analysis, the capital cost excludes IDC, but includes taxes and duties. No adjustment using shadow exchange rate is used. O&M cost is 2% of capital cost. The cost of purchased power is the price paid by the distribution entities to the generator minus the transmission cost, i.e., Tk1.89 per kWh.

8. Revenue is calculated based on the sale price of distribution agencies, such as Dhaka Electric Supply Authority, Dhaka Electric Supply Company Limited, Bangladesh Power Development Board, and Rural Electrification Board. The price also depends on the customer category. The weighted average price was calculated separately for each agency. Corporate income tax is assumed to be 35%, as normal corporate tax is 40%, while publicly traded companies pay 30%.

ASSUMPTIONS OF ECONOMIC AND FINANCIAL INTERNAL RATE OF RETURNS *(continued)*

A. Comparison with the Estimates at Appraisal

9. The economic internal rate of return at appraisal was calculated at 17.1%, while the estimate at the closure of the Project was 25.26%. One of the reasons for improved estimates was substantially smaller capital investment that was needed compared to what had been estimated at appraisal. Another reason was lower long run marginal cost (LRMC) of power generation, which took place after the appraisal.

10. The higher financial internal rate of return at project completion was due to the smaller amount of invested capital compared to the appraisal estimates. The lower cost of purchased power in real terms was the other major reason for better the performance (18.6%) compared to the appraisal estimate (15.0%).

ASSUMPTIONS OF ECONOMIC AND FINANCIAL INTERNAL RATE OF RETURNS *(continued)*

Table A8.1: Economic Internal Rate of Return
(taka million)

Year	Capital	O&M Cost	Energy Cost	Total Cost	Total Benefit	Net Cash Flow
1998	243.06			243.06		(243.06)
1999	615.95			615.95		(615.95)
2000	1,206.93			1,206.93		(1,206.93)
2001	1,179.46			1,179.46		(1,179.46)
2002	1,054.65			1,054.65		(1,054.65)
2003	685.45	86.00	2,675.91	3,447.36	3,184.00	(263.36)
2004	153.82	99.71	8,675.37	8,928.90	10,945.00	2,016.10
2005		102.79	9,028.47	9,131.26	11,723.00	2,591.74
2006		102.79	9,721.30	9,824.09	12,623.00	2,798.91
2007		102.79	9,721.30	9,824.09	12,623.00	2,798.91
2008		102.79	9,721.30	9,824.09	12,623.00	2,798.91
2009		102.79	9,721.30	9,824.09	12,623.00	2,798.91
2010		102.79	9,721.30	9,824.09	12,623.00	2,798.91
2011		102.79	9,721.30	9,824.09	12,623.00	2,798.91
2012		102.79	9,721.30	9,824.09	12,623.00	2,798.91
2013		102.79	9,721.30	9,824.09	12,623.00	2,798.91
2014		102.79	9,721.30	9,824.09	12,623.00	2,798.91
2015		102.79	9,721.30	9,824.09	12,623.00	2,798.91
2016		102.79	9,721.30	9,824.09	12,623.00	2,798.91
2017		102.79	9,721.30	9,824.09	12,623.00	2,798.91
2018		102.79	9,721.30	9,824.09	12,623.00	2,798.91
2019		102.79	9,721.30	9,824.09	12,623.00	2,798.91
2020		102.79	9,721.30	9,824.09	12,623.00	2,798.91
2021		102.79	9,721.30	9,824.09	12,623.00	2,798.91
2022		102.79	9,721.30	9,824.09	12,623.00	2,798.91
2023		102.79	9,721.30	9,824.09	12,623.00	2,798.91
2024		102.79	9,721.30	9,824.09	12,623.00	2,798.91
					EIRR =	**29.24%**

( ) = negative, EIRR = economic internal rate of return, and O&M = operation and maintenance.
Source: Staff assessment during project completion review preparation.

ASSUMPTIONS OF ECONOMIC AND FINANCIAL INTERNAL RATE OF RETURNS
(continued)

Table A8.2: Financial Internal Rate of Return
(taka million)

Year	Capital Cost	O&M	Energy Cost	Total Cost	Project Benefit	Net Revenue	Corporate Tax	Net Cash Flow
1998	256.81	0.00	0.00	256.81	0.00	(256.81)	0.00	(256.81)
1999	711.22	0.00	0.00	711.22	0.00	(711.22)	0.00	(711.22)
2000	1,419.30	0.00	0.00	1,419.30	0.00	(1,419.30)	0.00	(1,419.30)
2001	1,266.03	0.00	0.00	1,266.03	0.00	(1,266.03)	0.00	(1,266.03)
2002	1,124.31	0.00	0.00	1,124.31	0.00	(1,124.31)	0.00	(1,124.31)
2003	756.43	95.55	2,222.63	3,074.61	2,923.96	(150.65)	128.37	(279.02)
2004	169.22	110.68	6,808.73	7,088.63	9,536.06	2,447.43	818.98	1,628.45
2005		114.07	6,600.56	6,714.63	9,536.11	2,821.48	887.76	1,933.72
2006		114.07	6,609.08	6,723.15	9,675.53	2,952.38	933.58	2,018.80
2007		114.07	6,609.08	6,723.15	9,675.53	2,952.38	933.58	2,018.80
2008		114.07	6,609.08	6,723.15	9,675.53	2,952.38	933.58	2,018.80
2009		114.07	6,609.08	6,723.15	9,675.53	2,952.38	933.58	2,018.80
2010		114.07	6,609.08	6,723.15	9,675.53	2,952.38	933.58	2,018.80
2011		114.07	6,609.08	6,723.15	9,675.53	2,952.38	933.58	2,018.80
2012		114.07	6,609.08	6,723.15	9,675.53	2,952.38	933.58	2,018.80
2013		114.07	6,609.08	6,723.15	9,675.53	2,952.38	933.58	2,018.80
2014		114.07	6,609.08	6,723.15	9,675.53	2,952.38	933.58	2,018.80
2015		114.07	6,609.08	6,723.15	9,675.53	2,952.38	933.58	2,018.80
2016		114.07	6,609.08	6,723.15	9,675.53	2,952.38	933.58	2,018.80
2017		114.07	6,609.08	6,723.15	9,675.53	2,952.38	933.58	2,018.80
2018		114.07	6,609.08	6,723.15	9,675.53	2,952.38	933.58	2,018.80
2019		114.07	6,609.08	6,723.15	9,675.53	2,952.38	933.58	2,018.80
2020		114.07	6,609.08	6,723.15	9,675.53	2,952.38	933.58	2,018.80
2021		114.07	6,609.08	6,723.15	9,675.53	2,952.38	933.58	2,018.80
2022		114.07	6,609.08	6,723.15	9,675.53	2,952.38	933.58	2,018.80
2023		114.07	6,609.08	6,723.15	9,675.53	2,952.38	933.58	2,018.80
2024		114.07	6,609.08	6,723.15	9,675.53	2,952.38	933.58	2,018.80
							FIRR =	**22.49%**

( ) = negative, FIRR = financial internal rate of return, and O&M = operation and maintenance.
Source: Staff assessment during project completion review preparation.