

**Document of
The World Bank**

Report No. 20224

PROJECT APPRAISAL DOCUMENT
ON A
PROPOSED IDA PARTIAL RISK GUARANTEE
IN THE AMOUNT OF US\$ 60.9 MILLION
OF A
SYNDICATED COMMERCIAL LOAN
TO AES HARIPUR (PRIVATE) LIMITED
FOR THE
HARIPUR POWER PROJECT
IN BANGLADESH

May 3, 2000

**Energy Sector Unit
South Asia Region**

CURRENCY EQUIVALENT
(Exchange Rate Effective 01/01/00)

Currency Unit = Takas (Tk.)
US\$ 1 = Tk 51.00

FISCAL YEAR
July 1 to June 30

ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
BPDB	Bangladesh Power Development Board
CAS	Country Assistance Strategy
CCGT	Combined Cycle Gas Turbine
COD	Commercial Operation Date
DESA	Dhaka Electric Supply Authority
DESCO	Dhaka Electricity Supply Company Limited
EAP	Environmental Action Plan
EIA	Environmental and Social Impact Assessment
ERR	Economic Rate of Return
FDI	Foreign Direct Investment
FRR	Financial Rate of Return
FY	Fiscal Year
GSA	Gas Supply Agreement
GWh	Gigawatt- hour
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association
IFC	International Finance Corporation
IPMS	IPP Monitoring System
IPPs	Independent Power Producers
JBIC	Japan Bank for International Cooperation
KfW	Kreditanstalt für Wiederaufbau
kV	Kilo Volt
kWh	Kilowatt-hour
LIBOR	London Inter-Bank Overnight Rate
MCF	Thousand Cubic Feet
MIGA	Multilateral Insurance and Guarantee Agency
MMCFD	Million Cubic Feet per Day
MW	Megawatt
NPS	Nominal Pipe Size
O&M	Operation and Maintenance
PBS	(Palli Bidyut Samitis) Rural Electricity Cooperatives
PCDP	Public Consultation and Disclosure Plan
PPA	Power Purchase Agreement
PRG	Partial Risk Guarantee
PSC	Production Sharing Contract
PSR	Project Status Report
REB	Rural Electrification Board
RMS	Regulating and Metering Station
T&D	Transmission and Distribution
TCF	Trillion Cubic Feet
VAT	Value Added Tax

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BANGLADESH
HARIPUR POWER PROJECT

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Map: IBRD 30844

BANGLADESH

Haripur Power Project

Project Appraisal Document

Date: May 3, 2000
Country Director: Frederick Thomas Temple
Project ID: P065131
Task Manager: S. Vijay Iyer
Sector Director: Alastair J. McKechnie
Sector(s): PP – Electric Power and Other Energy
Theme(s): Energy and Private Sector Development
Poverty Targeted Intervention: N

Loan Credit Guarantee Other (specify)

Project Financing
(US\$ in million)

IDA PRG	60.90
IFC A Loan	40.00
IFC B Loan	14.10
Equity	<u>68.00</u>
Total:	183.00

Proposed coverage: The Partial Risk Guarantee (PRG) would provide coverage for debt service default caused by breach of contractual obligations of the Government of Bangladesh under the Implementation and Guarantee Agreements entered into between the Government and AES Haripur (Private) Ltd. (AESH).

Project sponsor: AES Corporation, USA

Nature of underlying financing: Syndicated Commercial Loan guaranteed by IDA.

Terms of financing:

Principal amount (US\$m): approximately US\$ 61 million

Final maturity: 15 years

Amortization profile: equal semi-annual installments

Financing available without guarantee: No

If yes, estimated cost or maturity: N.A.

Estimated financing cost: LIBOR + 2.00/2.25 percent per annum

Project implementation period: April 1999 - June 2001

Expected effectiveness date: 06/30/2000 **Expected closing date:** 12/31/2015

I. Project Development Objectives and Key Performance Indicators

A. Project Development Objectives (See Annex 1)

1. The Project consists of a 360-MW gas-fired combined cycle electric power plant to be developed, owned, and operated by AES Haripur (Private) Ltd. (AESH); a wholly-owned subsidiary of AES Corporation, a US company incorporated in Delaware. The principal objective of the Project is to enable Bangladesh meet its power demand in a cost-effective manner. AESH was awarded the Project following an international competitive bidding process in 1997, involving shortlisted firms who had previously indicated interest in developing power projects in Bangladesh. The price of electricity, approximately US¢3.0/kWh, is one of the lowest tariffs offered by Independent Power Producing plants internationally. The Project would be supported by an IDA Partial Risk Guarantee (PRG) which is critical to securing financing for the project.
2. Unreliable power supply, which has been a growing problem in Bangladesh, has reached crisis proportions. The demand-supply imbalance has caused towns and villages throughout the country to suffer load-shedding of eight hours or more per day. This has become a major bottleneck to economic growth and poverty reduction. An independent study commissioned by the Bank in 1999 shows that power shortages are constraining gross domestic product (GDP) growth between 0.3 and 0.5 percent per annum. In addition, shortage of power prevents expansion of electricity coverage beyond the existing low level of approximately 15 percent of the population. To address the power shortages, the Government has invited private investors to bid for generation projects under a competitive and transparent bidding framework. The Bank and the Asian Development Bank (ADB) have supported the Government's strategy of seeking private sector participation in power generation. This support has been instrumental in ensuring a transparent, policy-based framework for such private sector participation. Haripur is the first land-based project to be implemented under this framework.
3. The Project is part of the national least-cost power generation investment plan. It would help reduce power shortages and secure significant economic benefits for the country. The Project would generate savings by displacing less efficient plants running on imported liquid fuels. By enabling the Government to shift investment costs to the private sector, this Project would help free scarce public resources for poverty alleviation and social development. It is path-breaking in terms of attracting substantial private capital investment flows for infrastructure development in Bangladesh.
4. The Project is consistent with the Bank Group's strategy in the power sector, the mainstay of which is to promote reform and private sector investment to improve the efficiency, quality and access of electricity services. The sector is inefficient and characterized by high losses in the power system, low tariffs and poor revenue collection. The main utilities, which are Government-controlled, lack autonomy, and are neither, oriented to customer service nor commercial viability. All stakeholders agree that maintaining the *status quo* is not a viable option so that reforms are necessary. There are, however, divergent views on the desirable scope of changes and the speed at which reforms can or ought to be implemented. These range from making the existing enterprises more efficient to restructuring and privatization. A recent Policy Statement reflects these divergent views as the Government is reluctant to make controversial decisions in the period preceding general elections. Nevertheless, this project would contribute to the Government's reform effort by: (i) establishing a systematic framework for preparing, evaluating and processing private sector participation in generation projects; (ii) promoting commercial discipline; and (iii) paving the way for privatization of electricity distribution.
5. The Haripur Project is being submitted jointly by the International Development Association (IDA) and the International Finance Corporation (IFC) for Board approval, reflecting the continuing close collaboration between the two institutions in promoting the reform effort in the Bangladesh power sector. Since the Project sponsors did not wish to seek equity insurance through MIGA, Bank Group participation in the Project is limited to IDA and IFC. This operation would be the second IDA Partial

Risk Guarantee (PRG) under the Pilot Program approved by the IDA Board in November 1997.¹ The first IDA PRG for an amount of US\$ 30 million was approved on December 10, 1998 for the Azito Power Project in Côte d'Ivoire. The combined IDA Guarantee coverage remains within the ceiling of US\$ 300 million set under the Pilot Program.

B. Key Performance Indicators (See Annex 1)

6. During the construction phase, progress in installation and erection of the power plant and the off-site structures (gas pipeline and transmission line) would be monitored by IDA and IFC supervision missions, as well as by the Independent Engineer appointed by IFC and the commercial lenders. In the operation phase, the key plant performance indicators would be availability, thermal efficiency and output. The development objective indicator would be the overall increase in power supply and the resulting reductions in power shortages.

II. Strategic Context

A. Sector-Related Country Assistance Strategy (CAS) Goal Supported by the Project (See Annex 1)

7. The Project is consistent with the Bank's Country Assistance Strategy (CAS), dated March 6, 1998 and CAS Progress Report discussed by the Board on July 20, 1999, which emphasize the need for engaging the private sector in developing infrastructure. IDA's role in the power sector, as spelled out by the CAS, is to: (a) facilitate private participation in new power projects through the IDA-supported Private Sector Infrastructure Development Fund and IDA Guarantees; and (b) support the emergence of a privatized and competitive industry, such as independent generation, transmission and distribution companies that would take over the commercial functions of state-owned utilities, Bangladesh Power Development Board (BPDB) and Dhaka Electric Supply Authority (DESA). The Project is also consistent with the Bank's overall power sector policy, which advocates efficiency and competitiveness through restructuring and reforms.

B. Main Sector Issues and Government Strategy

8. The main sector issues and the Government's strategy to respond to these issues are outlined below:

(i) Electricity supply shortages

9. Only 15 percent of Bangladesh population has access to electricity. In rural areas, about 10 percent of the population is electrified. Lack of access to electricity is considered an impediment to poverty reduction. Against this background, electricity demand in Bangladesh has risen at nearly 8 percent per annum over much of the past decade. Power generation capacity has not kept pace with demand, leading to persistent and crippling power shortages that affect all consumers and undermine economic growth. Electricity theft and technical losses are high and artificially inflate demand. Capacity shortfalls have been rising from approximately 150 MW in 1992 to nearly 700 MW in the last two years; the demand-supply gap is expected to widen further in the absence of capacity additions. Besides inadequate generation capacity, the power system in Bangladesh suffers from low plant availability caused by poor operation and maintenance of public sector power plants. Power shortages have adverse implications on the poor, as they hurt economic growth (and hence employment) and deny them the benefits of using electricity for lighting and other applications.

¹ A Proposal for IDA Guarantees in IDA-only Countries (IDA/R97-135).

10. The installation of adequate and efficient private generation capacity would alleviate the impact of power shortages. The Government took the initiative of inviting the private sector to establish Independent Power Producers (IPPs) under a "Private Sector Power Generation Policy" issued in September 1996. To date, a total of seven IPPs with a combined capacity of approximately 1,780 MW have been contracted or are under negotiation (about 350 MW, consisting of three projects, have been commissioned), to enable the country to meet projected demand by 2004-05 (see Table 1 below):

Table 1: Independent Power Producer Projects - 2000*

Project	Approximate Capacity in MW
Haripur	360
Meghnaghat 1	450
Baghabari	170
Khulna Barge	110
Haripur Barge	110
Baghabari Barge	130
Meghnaghat 2	450
Total	1,780

* Projects contracted or under negotiations.

11. The introduction of the 360-MW Haripur power plant into the system in June 2001 would substantially alleviate power shortages. It would also help increase electricity coverage in Bangladesh. The price at which the Project would supply power to this grid - approximately US\$3.0/kWh - is particularly attractive and well below the average sale tariff of the utilities.

(ii) Sector reform

12. The sector suffers from the typical problems of state-ownership and management: poor service, high costs, poor operational and financial performance, under-investment and high level of subsidies. The state utilities, with the exception of the rural electricity system, consistently suffer losses (combined annual losses exceed US\$ 100 million) and provide unreliable service. There is a growing perception that change is needed and that the poor performance of the state utilities is unacceptable. The public disaffection was in evidence during street protests against summer load shedding last year and the surveys conducted by the Bangladesh Chapter of Transparency International.

13. In response to donors' request to the Government to spell out its plans for reforms, the Government produced its vision for the sector under the "Policy Statement on Power Sector Reforms" of January 2000. The salient features of the Government's reform strategy as articulated in the Policy Statement are: (i) segregation of power generation, transmission and distribution functions into separate services; (ii) corporatization and commercialization of emerging power sector entities; (iii) creation of a regulatory commission; (iv) private sector participation in power generation and distribution; (v) introduction of cost-reflective tariff for financial viability of the utilities and promoting efficient use of electricity; (vi) development of demand management, including energy efficiency measures to conserve energy; and (vii) development of alternative/renewable energy sources. Although the policy statement includes many good features, it does not provide a specific vision about how private sector participation will be increased in the sector, nor does it provide a time frame for the introduction of critical reforms. Furthermore, despite the Government's public statement, there are divergent views among stakeholders on important aspects such as increased private participation.

14. The development partners recognize that in view of the political and institutional constraints in Bangladesh, particularly general elections in 2001, the reform process would be relatively slow initially and would require sustained involvement by the principal stakeholders to maintain forward momentum. There is an ongoing dialogue between the Government and the development partners on implementing the Government's reform strategy. The reform measures implemented to date are: (i) formulation of draft electricity legislation recently approved by the Cabinet and to be submitted to Parliament; and (ii) the creation of the Power Grid Corporation of Bangladesh (PGCB) to eventually take over the functions of transmission of electricity from BPDB, the main integrated sector utility. The draft electricity law requires further development in some areas, such as the independence of the proposed sector regulator and its authority to set tariffs. PGCB needs to be operationalized by transfer of assets from BPDB. The IPP program is viewed as a transitional strategy to introduce international private participation into the sector and ensure that the economy does not suffer from power shortages in the interim. The program would strengthen sector reform efforts by commercializing the sector and paving the way for private participation in other segments such as transmission and distribution. It would also promote the strategic partnership among the country's stakeholders, and other financiers such as ADB.

(iii) Financial performance

15. The main utilities in the sector are: (i) the Bangladesh Power Development Board (BPDB), which is responsible for public power generation, transmission and distribution in the main cities excepting Dhaka and certain rural areas; (ii) the Dhaka Electricity Supply Authority (DESA) which is responsible for distribution in Dhaka with the exception of one supply district; (iii) the Dhaka Electricity Supply Company Limited (DESCO), a corporate entity recently created, and supported by an ADB Credit, to distribute electricity and to eventually take over distribution in Dhaka; (iv) the Power Grid Company of Bangladesh (PGCB), a corporate entity that is expected to take over the transmission and dispatch function; and (v) the Rural Electricity Board (REB) that oversees the distribution of electricity by 54 rural energy cooperatives in Bangladesh.

16. Both the principal utilities, BPDB and DESA, produce annual accounts late and their audits are qualified. They operate at a loss on account of: (i) the high level of unrecorded consumption and inadequate billing/metering system (only about 70 percent of the generation of electricity is billed for); (ii) poor recovery of bills (only about 80 percent of the bills are paid); and (iii) inadequate tariffs. Furthermore, their balance sheets are weak, being characterized by a lack of liquidity (which would be more pronounced if questionable arrears were written off), and in the case of DESA, negative equity. To address the liquidity shortfall, the utilities are paying only a fraction of their dues to the suppliers, and do not meet their debt service obligations to the Government in full. Taking also into account the need to implement a minimal level of investments, Government support to the power utilities is currently in the order of US\$ 300 million per annum.

17. The rural energy cooperatives, patterned on the US model, presently account for 17 percent of the national electricity market. The cooperatives, whose share of the market is steadily growing, are successful enterprises and perform remarkably well compared to the larger, state-run utilities. Although rural consumers pay a higher tariff than the urban ones, the rural cooperatives have lower technical and non-technical losses (18 percent, which is acceptable for a rural dispersed system). The revenue billing and collections are highly efficient; 94 percent of electricity billed is collected.¹ The rural system relies on BPDB for supply of bulk power. The good financial performance of most of these cooperatives is being undermined because of power shortages and BPDB's tendency to shed the load of the rural system

¹ Corresponding figures are considerably better for the purely rural networks established by the cooperatives. Due to a recent large scale take over of peri-urban networks from BPDB/DESA, the ratios have somewhat worsened temporarily until the networks are rehabilitated.

first during shortages. BPDB's monopoly on power generation and the power shortage constraints are threatening to limit the future success of the rural electricity systems. REB is moving towards establishing its own, though limited, generation plants. IFC has recently approved financing for three small IPP projects of 10 MW each in the rural electricity system.

18. The Government has recognized in its January 2000 Policy Statement that the long-term solution to improving the financial health of the sector lies in addressing the issues in distribution. The privatization of distribution is made difficult by powerful vested interests benefiting from electricity theft, corruption and employment of constituents. Even though the Government's intention is to ultimately privatize, it has, in the interim, initiated a strategy to improve the operational and financial performance of BPDB and DESA. It has appointed a new Chairman to head the BPDB and revamped DESA's management. Under new leadership, the utilities have already moved to establish better management information systems, computerize billing systems and improve revenue collections. In the six-month period ending November 1999, BPDB's collections have increased by nearly 15 percent, compared with the same period in 1998. BPDB is now operating on the basis of specific revenue targets and is strengthening administrative and legal measures, such as instituting criminal proceedings against staff and trade union leaders found colluding in revenue theft and illegal connections of consumers. Similar initiatives have been launched by DESA's management. These measures are in the right direction but it is doubtful that they will be sustainable given the limitations in improving the performance of Government utilities. The Government has agreed to submit a financial action plan to IDA by December 2000, which would provide for measures to improve BPDB's financial viability, as well as BPDB's annual audited accounts.

(iv) IPP risks

19. This operation takes into account lessons learned from IPPs in other countries regarding the risks of an unconstrained IPP program. Since IPPs impose fixed obligations, denominated in foreign currency, the sector and macroeconomic impacts can be severe, particularly if the utilities do not reform and collect sufficient revenue from electricity sales.

20. There are significant contrasts between IPPs contracted by Bangladesh and those in other countries. First, the larger IPPs referred to in Table 1 were selected by competitive bidding. Second, the Government has acknowledged the macroeconomic risks of an unconstrained IPP program by taking a decision to adopt a ceiling on future IPPs until such time as the finances of the sector are strengthened. *Within the context of this operation, the Government has undertaken to enter into consultations with IDA regarding any new IPP proposals beyond the initial 1,780 MW. The consultations would determine whether the proposed new IPP project would meet the following pre-agreed criteria: (i) least cost; (ii) competitively bid; and (iii) compliance with defined prudent debt service coverage ratios by BPDB, DESA or other utilities as well as by the Government.*

21. In order to monitor the country's foreign exchange exposure resulting from IPPs and more generally from foreign direct investments and external borrowings, the Government is establishing a Management and Monitoring System in the Bangladesh Bank (the central bank). ADB, in consultation with IDA, is providing technical assistance to establish and operate this system. The monitoring and reporting system would provide for early warning signals in the event of any balance of payment problems arising from contingent liabilities of the Government. It would also facilitate regulation of foreign exchange commitments across all sectors, including IPPs, by requiring full disclosure from Governmental and private sector entities entering into financing agreements.

22. Third, the Government and AESH have entered into an agreement that provides for priority to Haripur IPP over IPPs contracted subsequently with regard to dispatch, power purchase payments, foreign

exchange availability and gas supply. Since the priority afforded to Haripur is generally known, investors are likely to be cautious in the future.

23. In addition, the Government has agreed to equalize gas prices¹ to public and private sector plants by the time IPP capacity reaches 1,780 MW. This would help promote greater sector efficiency through the economic dispatch of plants, since there will be no distortions due to differential gas prices. This would ensure that IPPs would not be kept idle in preference to less efficient public sector plants.

C. Sector Issues to be Addressed by the Project and Strategic Choices

24. So far, the bulk of the investments in Bangladesh's power sector have been made by the Government through the utilities it controls so that a public sector plant is the main alternative to Haripur. Power plants in the public sector have been inadequately maintained so that their availability has been below norms; furthermore, they use fuel inefficiently. Lastly, by constructing power plants in the public sector, the Government is taking all the risks, including the technical and the operational risks. Hence, the option of having the Project built in the public sector was rejected.

25. By having Haripur built as an IPP, all the commercial and operational risks will be shifted to the private sector. Furthermore, the private sector will also have the responsibility for arranging investment finance for the Project in the form of both debt and equity, thereby alleviating the fiscal burden on the Government's budgetary resources. In this way, the Government would limit its direct external debt obligations by providing guarantees on its own performance. Lastly, the plant is expected to be operationally reliable as the Project revenues are entirely contingent on plant availability and delivery of power at contracted levels.

III. Project Description Summary

A. Project Description

26. The Project consists of a 360-MW gas-fired combined cycle power plant to be built, owned and operated by a special purpose company incorporated in Bangladesh, AES Haripur (Private) Limited. AESH is a wholly-owned subsidiary of AES offshore companies, AES Victoria Holdings BV (Netherlands) and AES Victoria Partners (Netherlands). Both of these companies are wholly-owned subsidiaries of AES Global Power Holdings, which in turn is owned by AES Corporation of USA. AES Corporation is one of the leading power companies in the world (see IFC Report for a corporate profile). The Project will be constructed at Haripur, approximately 20 kilometers southeast of the capital city of Dhaka.

27. The Project will deliver power at approximately US\$3.0/kWh, inclusive of the price of gas at US\$ 2.40 per thousand cubic feet. This price is based on an 80 percent plant availability factor. The scheduled Commercial Operations Date (COD) for the Project is June 30, 2001. In order to comply with their contractual commitment date of COD by June 2001, AES has initiated construction of the Project on the basis of equity financing, with the expectation that IDA would be in a position to provide a guarantee to support a portion of the commercial financing subject to IDA's requirements being met.

28. BPDB will purchase the entire output of the Project under a 22-year Power Purchase Agreement (PPA) and will construct a short transmission line (about 1 km) to connect the Project switchyard (substation) with its existing Haripur substation. The transmission line will be owned and operated by BPDB. Gas will be supplied to the Project under a Gas Supply Agreement (GSA) for the term of the PPA

¹ Equalization is subject to eliminating differences in tax treatment between public and private sector plants.

by Titas Gas Transmission Company, Ltd. (Titas); a state-owned enterprise and a subsidiary of Petrobangla (the national oil and gas company). Titas will construct, own, and operate a 1.3 km natural gas pipeline connecting the project with its gas distribution system. Under an Implementation Agreement, the Government has guaranteed both BPDB's and Titas' respective obligations under the PPA and GSA. The Project site has been leased to AESH by the Government through the Ministry of Industries, under a Land Lease Agreement.

Project cost and financing plan

29. The total Project cost is estimated at approximately US\$ 183 million. The project will be financed through a combination of equity and quasi equity in the form of shareholder subordinated debt (approximately 37 percent) and senior commercial debt (approximately 63 percent). Equity of about US\$ 68 million will be provided by AES Corporation through its various subsidiaries described in para. 26 above. The debt facilities of US\$ 115 million will be provided through IFC A and B loans and a commercial loan facility supported by an IDA PRG. The IFC A loan would be for an amount up to US\$ 40.0 million for a term of 15 years while the IFC B loan would be up to US\$ 14.1 million with a maturity of 10 years. In order to leverage the IFC B loan to the maximum, in terms of both amounts and maturity, 11 major international banks were invited to submit financing proposals. On this basis the B loan was set at US\$ 14.1 million. The balance of the financing consisting of a commercial loan to be guaranteed by the PRG was set at US\$ 60.9 million. The PRG guaranteed loan will be in two tranches - Tranche A will consist of US\$ 10.0 million and Tranche B of US\$ 50.9 million. Repayment under Tranche A would commence after the final repayment of the B loan and would amortize over the period between years 10 to 15. Under Tranche B, principal repayments would amortize over a 15-year term, including a two-year grace period, from the signature of the IDA PRG loan facility. This structure would complement the term of the IFC B loan and would reduce the debt service burden for the Project in the earlier years. The financing plan also includes a six-month debt service reserve account which will be fully funded from debt and equity funds. In addition, the sponsors will commit to US\$ 7.5 million of standby equity as contingency finance for cost overruns. There may be further changes to the financial plan up to Financial Closure but these are not expected to be significant. Total senior debt for the Project has been limited to a level which would ensure a projected minimum debt service coverage ratio of 1.35 and an average of 1.6 for the duration of the senior loan facilities. Please see Annex 3 for details of the Project Cost and Financing Plan.

30. AES has mandated a consortium of international banks, with Citibank as Agent Bank, to arrange the IFC B loan jointly with IFC as well as to arrange and fund the PRG commercial loan facility. These facilities would be syndicated on a pro-rata basis as one financing package. The Citibank consortium currently comprises four other banks namely Dresdner Kleinwort Benson of the UK; ANZ Grindlays Bank of Australia; Credit Agricole Indosuez of France; and Hypovereinsbank of Germany. The consortium has indicated that it would charge AESH, a margin of 2.25 basis points per annum plus LIBOR for Tranche A of the IDA PRG loan Facility and 2.00 basis points plus LIBOR for Tranche B of the Facility (the margin is a reflection of current market appetite for doing business in an emerging market country like Bangladesh and the commercial risks being assumed by the lenders). In addition, AESH would pay to IDA a Guarantee Fee of 75 basis points per annum on outstanding amounts of the IDA PRG loan Facility, consistent with the pricing guidelines of the Board Paper on IDA Guarantees. AESH has also agreed to pay GOB directly a fee of 15bp. per annum for their counter-guarantee to IDA. Non-payment of this fee would not affect the enforceability of the counter-guarantee by IDA.

Proposed IDA PRG

31. The proposed IDA PRG will provide coverage for loan default by AESH on scheduled debt service payments, of both principal and interest of the IDA PRG loan Facility, resulting from the

Government's failure to meet its payment obligations under the Implementation and Government Guarantee Agreements. Commercial risks, such as completion and operations risks, and natural force majeure risks relating to the Project, will be borne by the sponsors and commercial lenders. Most of the commercial risks will be mitigated by the engineering, procurement and construction (EPC) and the operations and maintenance (O&M) contracts and various commercial insurance arrangements. The risk allocation between the project participants is given below:

Table 2: Risk Sharing Matrix

Phase	Risks/Obligation	Investors & Lenders	Government	IDA PRG
Pre-construction	Project Design	x		
	Debt and Equity Financing	x		
Construction	Cost Overrun	x		
	Construction Delays	x		
Operation	Operation and Maintenance	x		
	Output quality specifications	x		
	Supply of fuel		x	x
	Tariff Payment		x	x
Concession Term	Currency Devaluation		x	
	Currency convertibility and transferability		x	x
	Political Force Majeure ^{1/}		x	x
	Prevention of dispute resolution through arbitration		x	x
	Changes in Law		x	x
	Expropriation		x	x
	Land Lease		x	x
	Natural Force Majeure ^{2/} relating to Project	x		
	Natural Force Majeure ^{2/} relating to interconnection system and gas supply pipeline		x	x

^{1/} Political force majeure: war (declared or undeclared), civil disorder, national and regional strikes, coups d'etat, etc.

^{2/} Natural force majeure: acts of God, earthquakes and hurricanes, fires, floods, etc.

32. The obligations of the Government under the Project Documents are detailed in the IDA PRG Term Sheet in Annex 12. These relate to the following principal categories of risks which will be backstopped by IDA:

- (a) breach of contract by the Government with respect to its payment obligations under the Implementation Agreement and the Government Guarantee relating to the purchase of power and the supply of gas, and Government legal action and third party legal action in Bangladesh to frustrate dispute resolution mechanism;
- (b) political force majeure events, including expropriation;
- (c) changes in law and events making the Project Agreements unenforceable or void or having a material adverse effect on the ability of the company to pay, or the lenders to receive payments of any guaranteed amount;

- (d) currency convertibility or transferability relating to the Government's undertaking to make sufficient foreign exchange available for local currency conversion and repatriation of debt service and dividend payments; and
- (e) natural force majeure events limited to BPDB's obligations to construct and operate the power interconnection system and Titas' obligations relating to the gas pipeline.

33. The PRG Agreement will be entered into between IDA and the Agent Bank on behalf of the commercial lenders. Under the PRG Agreement, the lenders will be entitled to make a demand for that portion of any principal and/or interest payment, which has fallen due and has not been paid by AESH as a result of the failure of the Government to pay certain amounts due under the Implementation Agreement and the Government Guarantee of the PPA, GSA and the Land Lease Agreement. The PRG could only be called once the debt service reserve accounts have been accessed and there still remains a shortfall in the debt service payment to lenders. In the case of a dispute, the IDA Guarantee would be callable only if the Government is obligated to pay and has failed to do so as provided under the agreed dispute resolution provisions in the Implementation Agreement and the Government Guarantee. However, if the Government or third party takes legal action in reference to a claim by AESH to prevent dispute resolution in accordance with the Agreement, then the IDA guaranteed lenders would be entitled to make demand for provisional payment on the IDA PRG. (Coverage in relation to third party litigation in Bangladesh would be subject to the lenders obtaining Government approval.) The lenders considered this to be a critical risk in this operation and require IDA's support. Coverage for this type of risk has not been provided in previous guarantee operations.

34. In keeping with Board Policy on IDA Guarantees, the PRG structure would be non-accelerable. In the event that the Project is terminated, as a result of a Government default, IDA would make payments in accordance with the amortization schedule pre-agreed with the commercial banks in the IDA Facility Agreement. IDA would seek reimbursement on the basis of the same amortization schedule from the Government under its Indemnity Agreement, for any payments made to lenders under the IDA PRG. This is designed to help phase the Government's liability in the event of a call on the PRG. IDA would, however, retain the option, at its sole discretion, to prepay outstanding principal and accrued unpaid interest. IDA would reserve its right to demand immediate payment from the Government for any amounts paid to lenders should the Guarantee be triggered. Consequently, there would be a clear financial disincentive for the Government to cause a call on the PRG, particularly since any Government default would also have an impact upon other senior lender facilities, as well as on the sponsor's equity, and could result in Project termination and enforcement of security.

Principal PRG risks

35. The potential risks faced by IDA is of the PRG being called as a result of the occurrence of any of the specific events as detailed in Annex 12. The principal risks for IDA are: (i) the convertibility and transferability of the local currency and availability of foreign exchange; (ii) the adequacy of revenues to enable BPDB to pay for the power generated; and (iii) the reliability of production and transmission of gas in sufficient quantities for the Project.

Foreign exchange convertibility and transferability

36. Under the Implementation Agreement and the Government Guarantee, the Government has guaranteed the convertibility and transferability of the local currency into foreign exchange for debt service payments by AESH to the commercial lenders. Since BPDB's obligations under the PPA will be denominated in Takas, the lenders are seeking IDA's support to backstop this Government undertaking.

37. The country is considered moderately indebted with a relatively comfortable external debt service ratio of 10 percent.¹ The country's total outstanding external debt is around US\$ 14 billion, of which US\$ 13.7 billion is in the form of very long-term concessional debt and the balance of US\$ 281 million is in short term commercial debt, comprising only 2 percent of the total external debt. Bangladesh's foreign exchange reserves are currently in the region of US\$ 1.7 billion, and are projected to rise to approximately US\$ 3.5 billion by year 2010 which would be sufficient to cover two months of imports throughout this period.

38. ADB and IDA are currently assisting the Bangladesh Bank to develop a framework to monitor the country's direct and contingent foreign exchange liabilities. This would be in terms of inflows of private capital and outflows of debt service payments and dividends, to assess its impact on the country's foreign exchange resources. The Government has undertaken, in the Indemnity Agreement with IDA, to monitor the level of its foreign exchange contingent liabilities arising from payment obligations to IPPs. Any incremental obligations, together with the country's annual debt service coverage ratio, would be reported to IDA annually. The Government has also covenanted to IDA that it would maintain an annual external debt service threshold if between 18-20 percent on a projected basis. Once the debt service coverage ratio reaches 18 percent, a consultation process between IDA and the Government for implementation of corrective policy action would be triggered.

39. The Bank has also conducted a review of the macroeconomic implications of the IPP Program, as currently envisaged, and of the Production Sharing Contracts concluded with foreign companies. The analysis, detailed in Annex 10, shows that the external debt service ratio is expected to remain relatively stable up to year 2005, but would rise to just over 16 percent between years 2006-10. The current account deficit would, however, remain at sustainable levels during this period.

Sector revenue

40. A significant risk associated with the Project relates to BPDB's ability to meet its payment obligations under the PPA to AESH (Annex 5 provides details on sector finances). According to the financial projections under a business-as-usual (no reform) scenario, BPDB would require budgetary support to meet its operating revenue shortfall. This would mean that BPDB would not generate sufficient revenues to meet its payment obligations to the contracted IPPs, including Haripur, from year 2005 onwards (see Tables 6 and 7 in Annex 5).² This risk is expected to be mitigated through the Government's Guarantee of BPDB's obligations under the PPA since the IDA PRG could only be called if the Government fails to make the required payments to AESH. Under its Guarantee of the PPA payments, the Government would be obligated to make the payment to the Project Company within 25 days of a demand notice in the event of non-payment by BPDB. Since BPDB is a governmental agency operating in a public sector environment, the lenders perceive BPDB's payment risk as political rather than commercial and, therefore, require IDA to support BPDB's payment obligations. The IDA PRG could only be called if the Government fails to make the required payments to AESH. The risk of BPDB and GOB not meeting its payment obligations to AESH will be further mitigated by the priority of payments afforded to AESH, along with the three IPPs that were contracted before Haripur and would share the same priority ranking. The Financial Projections as indicated in Annex 5 (Tables 6 and 7) show that while the performance of BPDB will remain unsatisfactory, it will still generate adequate cash revenues to cover operating expenses, and meet its payment obligations to the four priority IPPs, including Haripur.³ As a further safeguard, the Government has agreed under the Indemnity Agreement with IDA that no additional IPPs beyond the 1,780 MW ceiling would be contracted unless the

¹ External debt service ratio refers to the ratio of annual debt service to the sum of exports of goods and services and remittances.

² Refer to "Cash Coverage Ratio for IPP Payment" in Tables 6 and 7 of Annex 5.

³ Refer to "Adjusted Cash Coverage Ratio for IPP Payment in Tables 6 and 7 of Annex 5.

Government can demonstrate to IDA BPDB's compliance with a minimum debt service ratio of 1.2.¹ The likelihood of a call on the IDA Guarantee is, therefore, considered to be relatively manageable given: (i) the Government's comfortable external debt situation; (ii) the priority of payments over future IPPs afforded to Haripur by the Government (through an amendment of the Implementation Agreement); and (iii) the project-related safeguards obtained from the Government in the Indemnity Agreement.

41. Annex 5 also reviews the financial projections of BPDB under a reform scenario up to year 2007. Under such a scenario, projections in Table 8 indicate that there should be sufficient cash flow to cover all IPP payments as well as its other obligations, such as debt service to the Government.

Gas supply

42. The Government's Guarantee of the gas supply to the Project will also be backstopped by the PRG. Proven gas reserves in Bangladesh were estimated in 1994 at 12.7 trillion cubic feet (TCF), of which 3.1 TCF, have been produced and 9.7 TCF remain as reserves. With annual production of about 0.28 TCF the ratio of reserves to production can, therefore, be estimated at 35 years, compared with 10-15 years for most gas producing countries, which is longer than the term of the GSA. The Haripur Project will utilize approximately 26 billion cubic feet of gas each year over the life of the GSA. Given that there is more than ample gas reserves to meet the Project's requirements, IDA will backstop the gas reserve risk to lenders under the PRG only in the event that a shortfall is caused by gas exports.

43. Although the country has ample gas resources, its gas production and transmission capacity may be constrained. A recent study has concluded that there would be sufficient production capacity until 2004 to meet the demand; a shortfall of about 50 MMCFD could occur in 2005, which could easily be met by increasing temporarily the production of existing fields. Beyond then, a Government decision will have to be made whether to invest in the development of Petrobangla gas fields, or to contract additional gas supplies from foreign oil companies, which have ample gas reserves. In this respect, the Government completed a second offering of exploration acreage to the petroleum industry in 1997. The offering attracted considerable interest, and contracts are to be awarded in the near future. The situation will be monitored by IDA supervision missions.

44. With respect to the country's existing natural gas transmission system, several studies have concluded that the North-South pipeline system from Habiganj to Ashuganj, is not likely to have adequate capacity in line with demand beyond year 2001. This would be one of the sources of gas supply to the Haripur Project. To address this capacity constraint, Petrobangla has decided to undertake a phased investment of a 30-inch loop between Rashidpur and Ashuganj. The first phase of investment is already under project preparation by Petrobangla for which bids have been invited. Petrobangla has confirmed that the construction of the loop would be completed by the time the Haripur Project is commissioned. The second phase of the investment, involving a second 30-inch loop between Rashidpur and Habiganj, is expected to be undertaken sometime in the year 2002/03.

45. Petrobangla and the Ministry of Energy have provided AESH with assurances in the form of a letter of amendment to the Implementation Agreement which provides for gas supplies to the Haripur Project to be given priority over other IPPs in the unexpected event of a supply shortfall. The Haripur station is located between two key transmission lines that supply gas from the northeast and the southeast gas fields. Thus, the Project would be strategically located to access gas before the supplies reach Dhaka. Furthermore, the project would be the first land based IPP, with long term gas supply contractual

¹ This financial ratio will be based on the three-year financial projections of BPDB and would take into account the financial impact of the proposed new IPP.

arrangements and penalties for non-delivery with the state of gas transmission company Titas. Other bulk users such as BPDB have no long-term gas supply arrangements with the company.

B. Key Policy and Institutional Reforms Supported by the Project

46. The project supports and promotes: (i) efficiency in Bangladesh's electricity sector through cost-efficient power generation; (ii) private investment in construction and operation of generation facilities; (iii) sectoral reforms by creating a more dynamic context for private sector participation and strengthening government-donor (IDA) dialogue; (iv) actions to improve BPDB's financial viability through the preparation of a financial action plan due in December 2000; and (v) systematic monitoring of contingent liabilities arising from foreign investments.

C. Benefits and Target Population

47. The target population are the electricity consumers, as well as the potential consumers of electricity including the poor which are presently denied service on account of shortages of generating capacity. The Project would: (i) enable commercial credit for private infrastructure development; and (ii) provide an efficient, low-cost and well managed electricity generation facility. The Project promises substantial economic benefits to Bangladesh: (i) when commissioned, it would help alleviate the power shortage, which has become a major bottleneck to economic growth; (ii) it would generate estimated savings of about US\$ 28 million annually by displacing higher cost imported diesel fueled projects (which also have adverse environmental implications); and (iii) it will reduce the need for public investment in the power sector, thus enabling the Government to deploy more funds to meet poverty alleviation and other social needs.

D. Institutional and Implementation Arrangements

48. **Executing Agency.** The Project will be implemented by a special purpose company, AES Haripur (Private) Ltd. incorporated under the laws of Bangladesh.

49. **Project Contractual Arrangements.** The contractual structure of the transaction is consistent with industry standards with respect to the allocation of commercial, technical, and political risks among the parties in a limited recourse project financing structure. The contractual structure consists of:

- (a) **An Implementation Agreement** dated September 17, 1998 for a period of 22 years from commercial operations date between Project Company and the Government defines the rights and obligations of the parties. Under this Agreement, the Government grants the Project Company right to construct and operate the Project on the plant site. It guarantees the payment obligations of BPDB under the PPA, the obligations of Titas under the Gas Supply Agreement, and of the Ministry of Industries under the Land Lease Agreement. It assures AESH of all fiscal incentives and other benefits, provided in the Private Sector Power Generation Policy of Bangladesh, and the free convertibility and transferability of foreign exchange, through Bangladesh Bank, required to meet the company's foreign currency remittances;
- (b) **A Power Purchase Agreement** between the Project Company and BPDB dated September 17, 1998, with a term of 22 years from commercial operation date, provides for the sale of electricity to BPDB for the term of the Implementation Agreement on the basis of a two-part tariff consisting of: (i) a capacity payment, with non-escalable component to cover debt service, and an escalable component to cover return on equity, fixed operation and maintenance costs, insurance and other fixed costs; and (ii) an energy payment composed of a variable operation and maintenance payment and a fuel payment. The escalable

capacity payment has a foreign component denominated in US\$ and a local currency component;

- (c) **A Gas Supply Agreement** between the Project Company and Titas dated September 17, 1998, with a 22-year term from COD provides for Titas to supply all the Plant's requirements of gas at a price determined from time to time by the Ministry of Energy and Mineral Resources. The gas price is denominated in US\$ but payable in equivalent Takas;
- (d) **A Land Lease Agreement** between the Project Company and the Ministry of Industries which grants a lease to the company for a term that is equal to (i) the 25th anniversary of the commercial operations date; or (ii) the third anniversary of the expiration or termination of the PPA, whichever is longer;
- (e) **The Engineering and Procurement and Construction (EPC) Contract** dated April 23, 1999, between the Project Company and a South Korean consortium consisting of Hyundai Engineering and Construction and Hyundai Heavy Industries. The EPC Contract is a fixed price turnkey contract under which the EPC contractor will procure all work and services necessary in connection with the design, engineering, procurement, site clearance, construction, start-up and testing of the plant. Hyundai has an established track record in turnkey construction work but has not to date installed the kind of gas turbine to be used for the Project. The contractual responsibility for the installation of the gas turbine has, thus, been given to the manufacturer, Mitsubishi Heavy Industries; and
- (f) **An O&M Service Contract** dated April 23, 1999, between AESH and AES Bangladesh Operations (AESBO), an offshore wholly-owned subsidiary of AES Corporation. AESBO will be responsible for the administration, operation, repair, and maintenance of the Project to international standards. The company will have a back-to-back Agreement with AES Corporation to provide personnel and management services to assist AESBO in the performance of their obligations under the Agreement. AES Corporation has an extensive track record globally in the operation of power plants.

IV. Project Rationale

A. Project Alternatives Considered and Reasons for Rejection

50. A number of prior studies have established that combined cycle electricity generation technology, fueled by indigenous natural gas, is the least cost option for base-load power generation in Bangladesh. Natural gas is an indigenous resource and constitutes the least cost, environmentally friendly fuel for power generation. The rationale for implementing the project through the private sector and not the public sector stems from the Government's desire to reap increased efficiencies and reduce need for public sector investment (para. 24).

**B. Major Related Projects Financed by the Bank and/or Other Development Agencies
(Completed, Ongoing and Planned)**

Table 3: Major Related Projects

Sector Issue	Project	Latest Supervision (PSR) Ratings (Bank-financed projects only)	
		Implementation Progress (IP)	Development Objective (DO)
Bank-financed			
Address distribution bottlenecks and increase commercial awareness	Power Distribution 16 Towns – Closed	U	U
Increase level of access to electricity	Rural Electrification III	HS	HS
Increase power supply	Private Sector Infrastructure Development Project	S	S
Other development agencies			
Address constraints in transmission and distribution, and initiate structural reforms	ADB Power IX Project		
Address constraints in transmission and distribution, and deepen the reforms initiated under Power IX	ADB Dhaka Transmission and Distribution Project		
Generation and distribution	JBIC (various loans)		
Generation, transmission and distribution	KfW (various loans)		

IP/DO Ratings: HS (Highly Satisfactory), S (Satisfactory), U (Unsatisfactory), HU (Highly Unsatisfactory)

C. Lessons Learned and Reflected in Proposed Project Design

51. Learning from the experience with IPPs in other countries, certain safeguards have been incorporated in the project design with respect to mitigating sectoral and macroeconomic risks. These safeguards (as described in Section II, B.) strike a balance between project specific measures and sector measures to ensure that IDA does not undertake implied obligations to third parties on the monitoring of the IPP Program.

D. Indications of Borrower Commitment and Ownership

52. The Haripur project has been developed under the “Private Sector Power Generation Policy” of September 1996. The document expresses Government's intention to maximize power generation through private sector sponsored projects. Several IPPs are already in operation, including one supported by IFC (Khulna Barge), and their performance has been satisfactory. Based on the IPP development program by 2005, the country would have an excess of 1,500 MW of private power in a 4,500 MW system. The Government has recently approved a Power Sector Reform Policy Statement which indicates the main directions of reforms in the power sector it will consider; in addition, it has approved a new electricity legislation, with some weaknesses, which is to be submitted to the Parliament shortly. The Government has also agreed to a set of safeguards, which aim to support prudent policies for the sector.

E. Value Added of IDA Support in this Project

53. IDA has actively assisted the Government in formulating a Private Power Policy since 1996 and in establishing and operating the Power Cell in the Ministry of Energy and Mineral Resources, to oversee and promote private power development. Following Board approval of IDA's Pilot Program in November 1997, the Government formally wrote to the Bank confirming its interest in utilizing a guarantee to mobilize commercial finance in support of the Haripur Project. The benefit perceived by the Government of an IDA PRG was that it would allow for risk sharing with the private sector, with the Government, through its counter guarantee to IDA, assuming only those risks relating to its own performance undertakings under the Implementation Agreement and the Government Guarantee. Unlike an IDA Credit in which the Government takes the full performance and repayment risks, the PRG would not create any additional liabilities for the Government other than those already contracted under the Project Agreements.

54. In keeping with IDA's "lender of last resort" role, AES was asked to maximize all other possible sources of finance such as export credits and IFC A and B loans with a view to minimizing IDA's support. Bangladesh, an IDA country, has very limited access to the international loan and capital markets because of its lack of credit rating. As a result, it is mainly dependent on concessional finance from multilateral and bilateral sources for financing its infrastructure development. In the event, only limited amounts of export credits were available for the country and mainly on the basis of direct loan guarantees from the Government. Given the relatively constrained emerging market environment at the time, the market appetite with respect to the IFC B loan also proved to be limited and furthermore, its availability was conditional upon the PRG being available in appropriate ratios. Therefore, the IDA PRG was critical to the mobilization of the balance of the debt financing for the Project.

55. The PRG will help catalyze the largest commercial financing package to date for Bangladesh of US\$ 75 million, consisting of an IFC B loan and a PRG commercial loan Facility, by making the risk profile acceptable to lenders. These facilities would have an overall term of 15 years, thereby providing the Project with the longest tenure to date for any non-concessional finance. The 15-year term is critical to the viability of the Project financing structure, given the very competitive tariff levels under the PPA.

56. The PRG, compared with IDA credits, is particularly suited to help Government's transition from public to private finance through political risk mitigation and effective risk sharing with project sponsors and lenders (see Risk Sharing Matrix on page 9). This is consistent with the Board paper on IDA Guarantees, which provides for priority to be given to guarantees for private sector projects as opposed to IDA credits. In addition, the PRG by catalyzing commercial finance, helps to leverage IDA resources. In terms of IDA exposure, IDA credits generally tend to be for a term of 40 years, while the term of the PRG loan facility will be 15 years.

57. The PRG, in a limited but significant way, has also contributed to the sector reform process by establishing a framework for policy dialogue with the Government and raising the awareness of the stakeholders towards the need for reform. In addition, by leveraging its support for the Haripur investment, IDA was able to obtain agreement of the Government on specific commitments designed to limit the exposure of both the sector and the economy (see para. 20). These commitments should help ensure that IDA plays a continued role in the reform dialogue. The PRG has also helped towards institution building by improving the awareness and skill base of the Government and its agencies in areas of financial engineering and international finance. This should help to facilitate private investment in the country by making governmental agencies more effective counter-parties for potential investors and lenders.

V. Summary Project Analyses

A. Economic (see Annex 4) NPV = US\$ 76 million; ERR = 16 percent

58. Haripur will be one of the most thermally efficient facilities on the Bangladesh power grid. However, based on present understanding, the Government may charge IPPs (such as Haripur) much higher natural gas prices than to BPDB plants. This would “inflate” the financial cost of IPP power production relative to a non-discriminatory natural gas pricing policy. Because of its superior thermal efficiency, Haripur can tolerate a certain extent of gas price discrimination without impairing its full capacity utilization. However, beyond a certain point, differential pricing may cause Haripur to be under-utilized.

59. The Government intended to charge BPDB plants and IPPs about US\$ 1.00 and US\$ 2.40 respectively per MCF of natural gas. At this price differential, Haripur’s financial cost of production will be high enough, relatively to the competing BDBP-plants, to reduce its annual capacity utilization well below the potential. This risk has been recognized and Bangladesh has committed to equalize the prices of gas to IPPs and public sector plants by the time the total IPP capacity reaches 1,780 MW.¹ According to the latest schedule for commissioning of IPPs, the 1,780 MW level would be reached sometime in FY 2004.

60. The economic assessment of the Project, taking into account prospective economic and power sector developments in Bangladesh over the 24-year project cycle, indicates that it will deliver net economic benefits under a considerable range of adverse conditions (including the two-year construction period). The base case returns an ERR of 16 percent and a Net Present Value of US\$ 76 million (at a discount rate of 12 percent). The base case assumes that the above mentioned gas price discrimination would apply during Haripur’s four initial operating years (2001-04). However, if the differential pricing of natural gas were ended by commissioning date of Haripur (i.e. mid-2001), the plant would be dispatched at its full potential output from start of the operating period and the ERR would increase to 22 percent.

61. The project economics were tested under various risk scenarios with changes in key factors such as: (i) delayed or inadequate escalation of tariffs; (ii) delayed start and/or slower pace of loss reduction; (iii) currency devaluation which reduces (real) revenue for several years and/or triggers tariff increases affecting the demand growth for electricity; and (iv) constrained production from the Haripur plant if there were a prolonged period (up to 2010) of gas price discrimination. Sensitivity analyses on these risks indicate ERR results between 10 and 13 percent.

B. Financial

62. The financial performance of the Project will be monitored *inter alia*, through the review of the audited annual accounts of AESH. The Project demonstrates sound financial prospects in terms of income, cash-flows and debt service coverages, with a financial rate of return (FRR) of 12 percent. Sensitivities with respect to reductions in dependable capacity of the plant, increases in heat rate and higher O&M expenses have been analyzed. Details are to be found in Section VI of the IFC report.

C. Technical

63. The project site location and power plant design have a number of features which make the project attractive for power development. These include: (i) the land being owned by the Government

¹ Equalization of gas prices is subject to eliminating differences in tax treatment between public and private sector plants.

and having been designated for industrial use since 1956; (ii) delivery of materials to the project site is possible throughout the year via the Sitalakhya river; (iii) the power plant will burn indigenous natural gas; (iv) once-through cooling water can be obtained from the Sitalakhya River; (v) much of the land-uses adjacent to the power plant are industrial; (vi) use of appropriate combined cycle gas turbine technology that maximizes use of environmentally friendly, indigenous fuel resource; (vii) modest marginal investments in government financed off-site facilities such as interconnections for gas supply and power evacuation; and (viii) equipment supply and installation by reputed international firms with sound track record. In addition, minimal environmental and socio-economic impacts are anticipated primarily due to the project design, fuel type, and location.

D. Institutional

(a) Executing agencies

64. The executing agency for the project is AES Haripur (Private) Ltd., a fully owned subsidiary of AES Corporation. AES has a sound track record in the development, construction and operation of similar plants worldwide (see detailed profile of the company in the attached IFC Board Document). The commercial lenders and IFC have appointed an experienced Independent Engineer (Sargent and Lundy) to review the construction and management of the Project until commissioning.

(b) Project management

65. Project management will be undertaken by AES Bangladesh Operations under an O&M contract.

E. Environmental and Social Environment Category: A

66. Pursuant to O.P. 14.25, a detailed Environmental and Social Impact Assessment (EIA), in accordance with World Bank and the Government/DOE requirements has been completed. In addition to the power plant, the EIA also covers off-site structures such as access road, transmission line and gas pipeline. An Environmental Assessment Summary was released by the IDA Secretariat on April 7, 1999. A copy of the Environment and Social Impact Assessment Report was released through the Bank's Public Information Center in March 1999. The Environment and Social Impact Assessment Report has been publicly disclosed and discussed in Bangladesh, both at the project site and the Haripur village. No public queries or objections have been raised. The resettlement action plans have been prepared and implemented with the full participation, cooperation and satisfaction of the affected people.

Environmental assessment

67. **Location and construction impact.** The power plant will be located in close proximity to two villages Kuripara and Haripur. The environment impacts are manageable, primarily due to the project design, fuel type and the fact that the land immediately adjacent to the power plant is mostly used for industrial purposes. The construction materials and equipment would be barged to the site through the Sitalakhya river, which flows adjacent to the plant. A short access road and a canal bridge have been constructed by AESH to facilitate light transport to the project site.

68. **Air Emission.** Since the Haripur plant will be equipped with modern and efficient gas turbines, that will burn natural gas in combined cycle operation, the projected emission rates at operating loads at or above 50 percent will comply with World Bank emission guidelines. In view of the plant's high efficiency and low power purchase price, it is expected that the plant would be continuously dispatched at 85-90 percent load factor. Therefore, no major impact on the ambient air from the thermal plume is anticipated. Since the Haripur plant will displace existing, older and less efficient plants that run on fossil

fuel, it will reduce total air emissions from power generation in Bangladesh. Monitoring during the periods of initial operation will verify that the impacts are within acceptable limits.

69. Haripur, once commissioned, will largely displace aging gas/steam and liquid fuel thermal power plants in the power system. As a result, the net impact of the project will be to lower total greenhouse gas emissions from the Bangladesh power sector. Specifically:

- the proposed power plant will emit, assuming 87.5 percent load factor and 46 percent conversion efficiency, approximately 326,727 tons per year of carbon – which is equivalent to 1,172,000 tons/year of CO₂;
- gas and diesel plants in the Haripur area currently producing the equivalent amount of power, emit an estimated 2,740,000 tons per year of CO₂;
- therefore, if Haripur plant displaces all of these current plants, then there is an annual reduction of 1,568,000 tons per year of CO₂, and if power production continues in the old plants at half current levels, then there would still be a net reduction of 784,000 tons per year of CO₂. It is expected that over the years, varying extent of production from old plant will be displaced ranging from half to full generation of Haripur; and
- nationwide, the total estimated CO₂ emissions due to fossil fuel combustion in Bangladesh (1995) were 20.8 million tons per year, or 0.2 ton per capita. In comparison, India is 1.0 ton per capita, and the U.S. is 20.5 tons per capita. The Haripur plant will bring per capita emissions to an even lower level.

70. **Water.** Cooling water will be withdrawn from the Sitalakhya river at a rate of 9.2 cubic meters per second at full load operation of the plant, which is around 4.2 percent of the minimum river flow. It will be circulated back to the same river and the temperature rise will not be more than 1.1 degree C above the ambient level at a distance of 100 meters.

71. **Noise.** As a part of the baseline monitoring studies, an ambient noise assessment was undertaken in the vicinity of the power plant, to predict the potential impact of the project. The daytime ambient noise monitoring results (from all locations) were dominated by nearby industrial/commercial sources, road and river traffic, and the existing power plant noise. The assessment shows that within a distance of around 220 meters from the plant boundary along the eastward noise vector towards Kuripara Village, the noise level would exceed the World Bank guidelines during operation of the power plant. Pursuant to the noise assessment, AESH is incorporating appropriate corrective plant design measures to ensure full compliance with World Bank and the Government noise emission limits. Furthermore, AESH is committed to implementing a post-construction monitoring plan to assure the measures undertaken, in design of the power plant, have been effective.

72. **Environmental Action Plan.** The implementation of the Environmental Action Plan (EAP) is designed to reduce the negative impact of the project. The EAP is designed for the entire life of this project and will be detailed and made more specific as individual program details are developed. It will incorporate environmental management strategies, disclosure measures, monitoring activities, implementation schedule, cost estimates, and consultations to ensure effective implementation of the recommended mitigation measures. The sponsor has a corporate commitment to environment protection activities and will ensure that appropriate resources are in place. The EAP revisions will be reviewed prior to implementation of major components. The project sponsor will nominate one individual at the power plant to act as Environmental Inspector (EI) who will ensure proper implementation of the EIA action plan in Annex 11. The contact with local community will continue through Community Liaison

Officer (CLO) and Community Advisory Committee (CAC) to resolve conflicts or grievances by an individual or group who feels aggravated by project activities.

Social assessment

73. The construction and operation of the proposed power plant will cause modest economic dislocation and involuntary resettlement of local people. AESH has a well established record of corporate commitment to environmental and social responsibility, and has deployed appropriate resources to ensure that project affected people are compensated in accordance with World Bank guidelines. As such, a Resettlement Action Plan (RAP), is intended to mitigate the potential negative effects of the project. Pursuant to O.P. 14.25, a copy of the Environmental Assessment Summary (including the summary of social impact assessment and resettlement action plans) was circulated to the Board on April 7, 1999.

74. The uninhabited land at the project site covering 8.74 acres is owned by the Ministry of Industries and has been designated for industrial development since 1956. Most of the land has until recently been used for local agricultural purposes by 39 plot holders, who have been leasing the land from the Ministry. The project will cause economic dislocation/loss of income for the households, tenants, day laborers employed by the leaseholders and boatmen operating an informal ferry service. AESH has reached a compensation agreement on a voluntary basis with these groups, based on the following principles:

- (a) valuation of crop losses on the vegetable plots, for both plot leaseholders and tenants, has been based on a single value expressed in annual income per unit of land. It was agreed that AESH would provide compensation at this rate to cover a year's worth of income;
- (b) day laborers, who work regularly at the project site, have agreed to a one-time payment equal to 90 days' income; and
- (c) the 18 boatmen, who will be affected by the closure of the informal boat landing at the project site, have acknowledged they would be able to continue their work and could shift to other sites along the Sitalakhya river. When asked to estimate their losses they agreed that a month's income would be sufficient compensation for such relocation.

75. Involuntary resettlement will be caused by the construction of an access road to the project site, gas pipeline as well as a gas regulating and metering station. The access road and canal bridge abutment, encompassing 0.72 acre, will affect the homestead land and buildings of five joint families totaling 52 persons. The owners of these assets and AESH have agreed that AESH shall extend sufficient compensation in cash to cover the full replacement value of assets, including costs for dismantling, relocation and rebuilding at a new site.

76. A **Supplemental Resettlement Action Plan** for the gas supply facilities has been prepared in cooperation with Titas Gas Transmission and Distribution Company, which is the implementing agency for the gas pipeline. There will be a permanent loss of 1.26 acres of homestead land and 2.18 acres of agricultural land (in addition, 1.67 acres will be temporarily requisitioned for the construction period). A total of 95 households with 548 family members will be in some way affected by land taking for the gas supply facilities, but there will be no total loss of livelihood to any of the households, and no household will be rendered landless. However, 40 dwelling houses occupied by 24 households with a total of 128 family members will be dismantled, and the people will be required to relocate to a new place of living.

77. Titas has acquired the land for the gas supply facilities through the Deputy Commissioner of Narayanganj District under the Bangladesh law for acquisition and requisition of immovable property.

As the compensation assessed under the Bangladesh law is often found to be less than the full replacement value of the lost assets, AESH has made available additional monetary compensation to the persons affected by the gas supply facilities, so that they are also compensated at full asset replacement value, like those who are affected by the land-taking for the access road to the project site.

F. Participatory Approach

78. A comprehensive **Public Consultation and Disclosure Plan** (PCDP) has been implemented by AESH in two phases, enabling affected people to voice their concerns and providing a mechanism for incorporation of these concerns into power plant design and project implementation.

79. The first phase of the PCDP started with the scoping mission in May 1998. This phase consisted of formal and informal meetings with identified stakeholders, field visits and village meetings. As a preparation for the Phase II activities, the release of the EIA was advertised in local newspapers, and copies of the EIA were distributed to the project stakeholders as identified in the baseline census. Furthermore, one copy of the EIA was placed for 60 days at the Office of Madanpur Union Parishad and another at the Office of Dhamgar Union Parishad for easy access by local people and regional stakeholders. Information brochures written in Bangla, containing a non-technical summary of the EIA report's findings, were kept at both places for free distribution. In addition, registers were provided at each location for written comments, suggestions and advice on implementation and operation of the Project.

80. During Phase II of the PCDP, AESH solicited public comments on the project by arranging four meetings with different stakeholder groups:

- (a) Consultation with Women's Group in Kuripara - February 7, 1999;
- (b) Consultation with Villagers in Kuripara - February 22, 1999;
- (c) Consultation with Regional Stakeholders at Madanpur - March 12, 1999; and
- (d) National Level Discussion on Environmental Issues - April 7, 1999.

81. The national level discussion on environmental issues was held in Dhaka, to which representatives of project affected people, NGOs, government authorities and union leaders were invited. In addition to these meetings, AESH and their consultants made courtesy calls to stakeholders, who did not attend the meetings and/or whose opinions had not hitherto been voiced.

82. The EIA and its Environmental and Resettlement Plans have been supplemented by adding details of the public consultation process, including AESH's responses to concerns raised by the various stakeholders and details of measures taken to incorporate these concerns into power plant design and project implementation.

83. During construction, AESH is undertaking continued consultations with affected people to ensure that implementation of the resettlement action plan is adequately monitored, and that those affected are rehabilitated in compliance with IFC and World Bank requirements. A grievance mechanism is provided in the EIA and implementation monitoring reports will note progress and outcomes in compensation payments, relocation and training, identifying any problems and corrective measures taken. A final monitoring report will document the results of the action plan.

VI. Sustainability and Risks

A. Sustainability

84. The sustainability of the Project will be underpinned through a combination of the following factors: (i) economic benefits to the Government from the first land based IPP with the most competitive tariff internationally would help to address critical shortages of power in the country; and (ii) private sector operation backed by firm financing commitments and commercial and financial benefits to AESH.

B. Critical Risks (reflecting assumptions in the fourth column of Annex 1)

Table 4: Critical Risks

Risk	Risk Rating	Risk Minimization Measure
From Outputs to Objective		
Market demand for electricity	M	Project will alleviate shortages and projections are based on established studies such as the Power System Master Plan. However, should demand grow slower than projected, low cost of power from Haripur would enable it to replace costly energy produced by plants operating on imported liquid fuels.
Sector reforms proceed slowly so that little progress is made	H	Parallel dialogue with the Government in collaboration with other donors; covenants for sector and fiscal discipline in the Indemnity Agreement.
Payments by BPDB	H	Government's budgetary support; covenants in the Indemnity Agreement to contain IPP program; financial action plans for improving performance of BPDB.
Political force majeure	S	Competitive bidding selection under transparent policy framework; lowest priced project globally; general public support for improving power situation.
From Components to Outputs		
Viable financing plan is put in place/project completion risk	N	Financial commitment of AESH, lenders, IFC and IDA. Fixed price turnkey contract, and track record of AES.

Risk	Risk Rating	Risk Minimization Measure
From Outputs to Objective		
Supply of gas in adequate quantities	S	Gas supply contract; substantial private investment in gas exploration and production; carrying out of timely new investment in gas transmission infrastructure.
Electrical transmission line	N	Small investment; proximity of existing substation and BPDB's track record of capacity to complete required interconnection facilities.
Project delays	M	Liquidated damages; fixed price turn key contract; track record of AES and EPC contractors.
Overall Risk Rating	S	Project has substantial risk due to the sector's weaknesses and slow reforms.

Risk Rating - H (High Risk), S (Substantial Risk), M (Modest Risk), N (Negligible or Low Risk)

VII. Guarantee Effectiveness Conditions

85. The conditions precedent are the customary conditions for project financing of this type and include the following :

- (a) conclusion and execution of all project and loan documentation, PRG Agreement, Indemnity Agreement and Project Agreement;
- (b) provision of an environmental management plan and a resettlement plan that meet IDA's guidelines and implementation thereof;
- (c) effectiveness of all required insurance (to include IDA as an additional insured on third-party liability insurance);
- (d) firm commitment for sufficient financing to complete construction of the project, including the contribution of equity by the sponsors;
- (e) the payment of the first installment of the PRG fee and the Initiation and Processing Fees; and
- (f) provision of satisfactory legal opinions.

VIII. Readiness for Implementation

86. The EPC contract has been awarded and construction has already commenced. The first gas turbine will be installed by February 2001 with Project commissioning scheduled for June 2001.

IX. Compliance with Bank Policies

87. This project complies with all applicable Bank policies and is in line with CAS objectives.



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Annex 1

Project Design Summary

Hierarchy of Objectives	Key Performance Indicators	Monitoring and Evaluation	Critical Assumptions
<p>Sector-related CAS Goal:</p> <p>Enhance sector efficiency and competition with private sector participation</p>	<p>Sector Indicators:</p> <p>(i) Progress on sector reforms</p> <p>(ii) Degree of private sector participation in the sector</p>	<p>Sector/Country Reports:</p> <p>(i) CAS progress reports</p> <p>(ii) Economic and Sector reports</p> <p>(iii) Reports from Government</p>	<p>(from Goal to Bank Mission)</p> <p>(i) IDA support for Haripur would facilitate sector reform dialogue</p> <p>(ii) The emergence of competitive, low cost IPPs like Haripur would provide impetus to extend competition and private participation to electricity distribution</p> <p>(iii) Contribution to economic growth and poverty alleviation</p>
<p>Project Development Objective:</p> <p>Increase power availability through low-cost private generation</p>	<p>Outcome /Impact Indicators:</p> <p>(i) Plant commissioned on time and to capacity</p> <p>(ii) Reduction in power shortages</p>	<p>Project Reports:</p> <p>Project supervision and progress reports and annual financial statements</p>	<p>(from Objective to Goal)</p> <p>(i) Increased availability of lower-cost power would strengthen the Government's ability to tackle deeper issues of sector reform</p> <p>(ii) BPDB would be able to effectively dispatch Haripur and efficiently distribute the resulting electricity (nearly 2,100 GWh p.a.)</p>
<p>Output from each component:</p> <p>Financing and construction of the Haripur Power Plant</p>	<p>Output Indicators:</p> <p>(i) Financial closure in June 2000</p> <p>(ii) Plant commissioned in June 2001</p>	<p>Project Reports:</p> <p>Project supervision and progress reports</p> <p>Project audit reports</p>	<p>(from Outputs to Objective)</p> <p>(i) The provision of an IDA Partial Risk Guarantee would facilitate the financial closure of the project</p> <p>(ii) AESH would complete and commission the plant on time</p>
<p>Project Components/Sub-components:</p> <p>N.A.</p>	<p>Inputs: (budget for each component)</p> <p>N.A.</p>	<p>Project reports:</p> <p>N.A.</p>	<p>(from Components to Outputs)</p> <p>N.A.</p>

Annex 2

Project Description

1. The Project consists of a 360-MW (at standard ISO) gas-fired combined cycle electric power plant to be developed, owned and operated by AES Haripur Private Limited (AESH or "The Company"), a wholly-owned subsidiary of the AES Corporation ("AES"). The Project will be constructed on a leased site located at Haripur which is approximately 20 kilometers southeast of Dhaka.
2. The Company was selected as the sponsor pursuant to an international competitive bidding process that was conducted by the Government with the assistance of the World Bank. The Project has been identified as part of the least-cost expansion plan for the power sector and is deemed to be critical in meeting Bangladesh's power demand. It offers electricity at US¢/2.73 per kWh, which is one of the lowest prices in the world that have so far been contracted with an IPP. This favorable outcome for Bangladesh is attributable to an efficient and transparent competitive bid process, and falling world market prices for gas turbine equipment combined with the introduction of more efficient combined cycle technology.
3. The combined cycle gas turbine (CCGT) plant will include a gas fired combustion turbine and its generator, a heat recovery boiler utilizing the waste heat of the combustion turbine, a steam turbine and its generator, and all necessary auxiliary facilities. Natural gas will be supplied to the project by Titas from the existing national grid. Titas has entered into the contract based on a review of their current natural gas supply and anticipated future demand levels. The CCGT will be cooled continuously with water drawn from the Sitalakhya River and/or local ground water reservoirs.
4. The project will incorporate all necessary infrastructure for operations, including administrative offices, plant control room, warehousing facilities, and workshops. In addition, a natural gas transmission line, a regulating and metering station (RMS), and an electrical transmission line are required for plant operations and the distribution of electricity. Construction and operation of these facilities are the responsibility of Titas and BPDB.
5. Construction will last approximately 23 months (having commenced in April 1999), although AES will be allowed about 120 days extension to reach COD due to delays in granting certain GOB consents. Construction involves raising the project site's elevation by roughly one meter above the highest recorded water level of the Sitalakhya River, or approximately 4.9 meters above the existing ground elevation. This will require approximately 200,000 cubic meters of fill most of which will be dredged from the Sitalakhya River.
6. The project is located in an industrial area approximately 20 miles from Dhaka (the nation's capital) and is adjacent to an industrial facility. There are also many other industrial facilities along the river as well as BPDB owned open cycle (100 MW) generation station adjacent to the existing Haripur substation.
7. The project location is adjacent to the Sitalakhya River and is compact consisting of approximately 8.7 acres of land. Road access to the site will be by a raised road connecting the site to the Dhaka-Chittagong highway. Improvements to the road requiring purchase of land, resettlement of people, and construction of a bridge over a small canal is required. The road will be used for normal access to the site. During construction, the primary supply route to the plant will be by river barge. This requires a wharf (jetty) to be provided. Imported equipment is expected to be shipped to the Mongla port and then barged over 4 to 5 days to the site.

8. To support and maintain the dredged material on the project site, sheet piling will be required in the areas adjacent to the Akkha Canal and Sitalakhya River. The sheet piles will be driven to the required depth and where appropriate supported with anchor tie-downs.
9. Construction of a land access route will be required to facilitate the safe and efficient operation of the power plant on a daily basis. The road will be constructed primarily by manual labor and supported by mechanized equipment where appropriate (e.g., earthmovers, graders, and packers).
10. The project configuration will be a single gas turbine and generator, a heat recovery boiler, a steam turbine with generator, and all necessary auxiliary facilities. The project will have once through cooling using continuously drawn river water. The lump sum turnkey contract with Hyundai is intended to be complete for all works associated for the Haripur power project including site preparation, access road and bridge, obtaining any additional lay down space for construction materials, and provision of housing for the Hyundai work force. No colony is included for the project. AES does not plan any other contracts to be awarded except for professional support services. The lump sum turnkey contract with Hyundai will be split for tax efficiency purposes.
11. Hyundai has selected Mitsubishi Heavy Industries (MHI) to provide the gas turbine. The 701F industrial frame machine, fired solely on natural gas and on combined cycle, is capable of meeting the PPA requirements.
12. A 230-kV electrical transmission line will be constructed to connect the plant's switchyard to the existing Haripur Sub-station, located approximately 0.5 km north of the power plant. The 230-kV-transmission line will be constructed, owned, and operated by BPDB.
13. A NPS 20 (nominal pipe size, 20 inches) steel pipeline will connect the gas pipeline, constructed by Titas, to power plant, providing a safe and efficient method for the transportation of natural gas. Titas will construct, own, and operate the connecting 1.3 kilometers natural gas pipeline. The permanent pipeline easement will be approximately six meters in width (i.e., 20 feet). An additional six meters (i.e., 20 feet) of temporary working space will also be required by Titas during pipeline construction.
14. A regulating and metering station (RMS), occupying approximately 45 by 72 meters (i.e., approximately 150 by 240 feet) will be constructed to control the volume and flow of gas entering the power plant. The RMS will also contain facilities to adjust gas pressure under various operating conditions as well as gas metering and flow measurement. Titas will construct, own, and operate the RMS.
15. AESH will provide operation and maintenance services and will be responsible for recruiting and training operating personnel for the project. During operation of plant, a crew of approximately 20-25 persons will be required for daytime operations and roughly seven to ten persons for night-time operations.

Annex 3

**Estimated Project Costs
Project Costs and Financing Plan**

Project Cost	\$ millions	%	Financing Plan	\$ millions	%
EPC	124.0	68.5	<u>Equity</u>		
Other Construction	22.0	12.2	AES	68.0	37.2
Development Costs	8.0	4.4			
Physical and Price Contingencies	5.0	2.8	<u>Debt</u>		
Financing Costs	3.0	1.7	IFC 'A'	40.0	21.9
IDC	12.0	6.6	IFC 'B'	14.1	7.7
Debt Service Reserve Account	<u>9.0</u>	<u>3.9</u>	IDA PRG	<u>60.9</u>	<u>33.2</u>
			Total Debt	115.0	62.8
Total	183.0	100.0	Total	183.0	100.0

Annex 4

Project Economic Analysis

1. This Annex builds on IFC's economic appraisal of the Haripur project.

General Approach

2. The economic assessment of the Project, taking into account prospective economic and power sector development in Bangladesh over the 24-year project cycle (including the two-year construction method), indicated that it will deliver net economic benefits under a considerable range of adverse conditions.
3. The following assumptions are made for the base case scenario:
 - 8 percent annual load growth;
 - any delay in the commissioning of the Haripur plant is mirrored by a similar delay in construction expenses;
 - the average tariff is escalated at 5 percent p.a. in real terms, until the assumed willingness-to-pay (WTP) ceiling of US¢ 6.7/kWh is reached in 2003;
 - loss reduction from current level (32.5 percent) occurs at an annual rate of 1.5 percent until the assumed target rate of 15 percent is reached in 2012;
 - natural gas is valued at its long run marginal cost for power (US\$ 1.55 per MCF); and
 - over the period 2001-2004, there will be a large natural gas price preference favoring state-owned generators, resulting in reduced plant dispatch rates for Haripur during its four initial operating years.
4. Under these conditions, the project Economic Rate of Return (ERR) is 16 percent.
5. Risks to this outlook include:
 - willingness-to-pay is lower than base case assumption;
 - loss reduction occurs at a slower pace than base case assumption;
 - delayed escalation of tariffs and/or delayed start of loss reduction;
 - currency devaluation; and
 - prolonged period of gas price discrimination.
6. Sensitivity analyses on these risks show ERR results of between 10 and 13 percent. If the differential pricing of natural gas was ended by commissioning date of Haripur, the plant would be

dispatched at its full potential output¹ from start of the operating period and the ERR would increase to 22 percent.

Supply and Demand of Power

7. Bangladesh's GDP is expected to continue to grow in the range of 5 percent to 6 percent per year. On this basis, given the close correlation between growth in GDP and power demand², the predicted growth rate of electricity consumption will be 8.3 percent per year assuming no change in real tariffs, and 8.1 percent per year if there were a 5 percent real price increase in 2001 and another in 2002. For the purposes of the present analysis, a forecast of 8 percent per year is assumed.

8. The least-cost expansion plan and related studies by international consultants³ have established that any addition in generating capacity to meet base load in Bangladesh should be based on gas turbines (in 300-450 MW increments) that run on indigenous natural gas in combined cycle mode (CCGT), as economically least-cost. Haripur, which is a 360 MW CCGT base-load facility, meets the least-cost criteria and its contracted cost of power is among the lowest in the world.

9. The Government's expansion plan foresees commissioning of Haripur in 2001, to be followed by other CCGT plants and several peaking plants as needed. Staff projections indicate a capacity deficit (including 15 percent reserve) of about 600 MW in year 2000, which would grow to 5,160 MW by 2015 if not met by the envisaged system expansion. The planned capacity additions would provide an approximate balance between supply and demand, so that by 2015 the total capacity⁴ would equal a projected peak load of about 8,130 MW (including the 15 percent reserve requirement).

10. The risks for over-investment in power generation and reduced need for the Haripur plant are thought to be minimal. The project analysis indicates that between now and the time Haripur is commissioned, the system will not be able to fully meet the load, and will have potentially serious reliability problems due to inadequate reserves. In light of these current and medium term shortages, a possible reduced load growth (i.e. below 8 percent per year) should not impact on project performance provided that, if the generation program ever caught up with demand, the commissioning schedule of the IPP program would thereafter be tailored to match load growth as closely as feasible.⁵

Valuation of Benefits and Costs

11. All costs and benefits are expressed in constant 1999 US dollars. Except for the tariff, there are no anticipated changes in the underlying real prices that could affect the economic resource flows in a material way, and no adjustments for shadow exchange rate or shadow wage rate⁶ have been made. No residual values have been assumed.

¹ "Full potential output" implies a constant Plant Factor of 90 percent. Such a high Plant Factor is considered appropriate because Haripur, being a modern CCGT plant which can be assumed to be well maintained given its ownership and management arrangements – would be expected to operate at this level (at equalized gas prices), in light of its fuel efficiency and reliability and the energy needs in Bangladesh.

² Over the period 1984 to 1998, there has been a close statistical relationship between real GDP growth and growth of BPDB's bulk power transfers at 132kV.

³ Acres (1995), Argonne Laboratories (1998).

⁴ According to the expansion plan, total capacity in 2015 would amount to 8,132 MW, comprised of 2,413 MW old capacity, 3,960 MW new CCGTs and 1,759 MW peaking plants.

⁵ The disclosure provisions for new contingent liabilities of the Government, the movement toward a more fully commercial power sector.

⁶ The Thaka-denominated operating costs are small.

Valuation of Output

12. The main problem measuring consumer benefits in Bangladesh is that evidence of willingness-to-pay (WTP) above the actual tariff is scant, there being no adequate WTP-study available. The benefit valuation is therefore based on the average yield (billed retail sales) of the Rural Electricity Board (REB), currently about US¢ 6/kWh -- slightly higher than the average tariff of DESA and BPDB -- as a lower-bound proxy for WTP. Based on interview evidence from the 1996 Impact of Electrification Study, it would be reasonable to assume that with attendant improvements in reliability of service, the average tariff could be raised by at least 5 percent¹ and perhaps considerably more before incurring enough consumer resistance to undermine the load forecast. Hence, 5 percent real increases in 2001 and in 2002 have been modeled, which result in a WTP estimate of US¢ 6.7/kWh from 2003. This is 12 percent over and above the current REB tariff and is based on the hypothesis that if the increases were to occur, consumers would be willing to pay them.

13. Billed sales reflect about 4 percent transmission losses plus 28.5 percent distribution losses (technical and non-technical). It is assumed that negligible system loss reductions will occur during the first two years of the evaluation period, when Haripur is being constructed, but an annual loss reduction of 1.5 percent should be feasible in the long term in the context of a reform scenario. Consequently, a loss reduction program has been assumed to be implemented over the period 2001-2011, until a loss level of 15 percent is reached in year 2012. This translates into increasing sales per kWh produced.

Costs

14. The analysis uses the commercial values of capital costs and related operating and maintenance costs, as estimated by the Sponsors in their financial model.² For purposes of evaluating economic costs, natural gas is valued at its estimated long run marginal cost for power in Bangladesh (US\$ 1.55 per MCF).

15. The marginal cost of Transmission and Distribution (T&D) is evaluated at US¢ 3.1/kWh, based on the different utilities' load forecasts and proposed incremental investments, as well as operation and maintenance costs -- for expanding and operating the T&D network to support projected load growth. The total T&D bill attributable to the project is calculated at the year 2000 loss level, and held constant as project end-user sales grow in proportion to loss reduction. This allows the T&D cost per kWh sold to decline proportionately with loss reduction -- reflecting an anticipated gradual improvement in system efficiency -- which is a reasonable long-term outcome in a reform scenario.

Dispatch Analysis

16. The utilization rates of thermal power plants mainly depend on their relative thermal efficiency in converting fuel to electricity and on the relative fuel prices which they face. The lower the fuel price and the higher the efficiency of any one plant, the lower will be its variable cost per kWh produced and the higher its capacity utilization.

¹ This would have to be done largely through increase of the domestic tariff, which is now cross-subsidized, otherwise industrial and commercial consumers may have an incentive to self-supply.

² However, this being an economic rather than a financial analysis, all financial transfers, debt reserve pre-funding and initial working capital are excluded.

17. Haripur will be one of the most thermally efficient facilities on the Bangladesh power grid. However, based on present understanding, the Government may charge much higher natural gas prices to IPPs such as Haripur than to BPDB plants. This would “inflate” the financial cost of IPP power production relative to a non-discriminatory natural gas pricing policy. Because of its superior thermal efficiency, Haripur can tolerate a certain extent of gas price discrimination without impairing its full capacity utilization. However, beyond a certain point, differential gas pricing may cause Haripur to be under-utilized.

18. As now understood, BPDB plants and IPPs will be charged about US\$ 1.00 and US\$ 2.40 respectively per MCF of natural gas. At this price differential, Haripur’s financial cost of production will be high enough relative to that of competing BDBP-plants to reduce its annual capacity utilization well below the potential. This risk has been recognized and agreement has been reached with the authorities to equalize the prices of gas to IPPs and public sector plants by the time the total IPP capacity reaches 1,780 MW. According to the latest schedule for commissioning of IPPs, the 1,780 MW level would be reached sometime in FY 2004.

Results

19. The following assumptions are made for the base case scenario: 8 percent annual load growth; an annual increment of 5 percent real is applied to the end-user tariff until assumed WTP ceiling of US¢ 6.7/kWh (in dollars of 1999) is reached in 2003; losses are reduced from 32.5 percent to 15 percent at an annual rate of 1.5 percent as private participation in the power sector increases over time. Natural gas is valued at its estimated long run marginal cost (US\$ 1.55 per MCF). Any delay in the commissioning of the Haripur plant is mirrored by a similar delay in construction expenses. In these conditions, and assuming that the above mentioned natural gas pricing differential would apply until 2004, the project Economic Rate of Return (ERR) is 16 percent.

20. However, if the period of gas price differentiation were prolonged, the ERR to the Project would decrease. For example, if the differential pricing would continue up to 2010, the ERR would be 10 percent. On the other hand, if the differential pricing were ended by commissioning date of Haripur (i.e. mid-2001), the plant would be dispatched at its full potential output from start of the operating period and the ERR would increase to 22 percent.

21. The sensitivity of the project ERR has also been tested for variations of the other assumptions which could have a major impact on the ERR. These variables are willingness-to-pay, loss reduction and devaluation. Three scenarios have been constructed to portray these risks:

Risk scenario 1: Devaluation of the local currency

In the first risk scenario, the ERR is tested for a devaluation of the Taka, which is presumed to lead to consumer resistance to the tariff increases that would be necessary to maintain the real dollar-value of sales. These circumstances are illustrated by a 15 percent real reduction in revenues over the period 2001-2003 (assuming that consumption would be maintained by not increasing tariffs commensurately with devaluation), followed by a gradual recovery in real tariffs until US¢ 6.7 is reached in year 2010. The resulting ERR is 13 percent.

Risk scenario 2: Slower pace of sector reform

Secondly, the ERR is tested for a decrease in WTP from US¢ 6.7 to US¢ 6.4 per kWh and a drop in the loss reduction rate from 1.5 to 1 percent per year, which would cause the ERR to go down to 13 percent.

Risk scenario 3: Delayed sector reform

The third scenario is portrayed by tardy implementation of the reform program, not allowing for any tariff increase in real terms until 2006, and also deferring the start of the loss reduction program to 2006. This would cause the ERR to fall to 12 percent.

The different outcomes are summarized in Table 1 below:

Table 5: ERR and NPV Results

Situation	ERR (percent)	NPV @ 12.0% \$ million
Base Case	16	76
Base Case sensitivity 1: Constrained dispatch 2001-2010	10	-37
Base Case sensitivity 2: Gas prices equalized by 2001	22	150
Risk scenario 1: Devaluation	13	25
Risk scenario 2: Lower WTP and loss reduction	13	18
Risk scenario 3: Slow reform	12	7

Conclusions

22. The economic assessment indicates that the Project will deliver net economic benefits under a considerable range of adverse circumstances. These results can be regarded as a conservative, lower bound, measure of economic benefits. For one thing, it does not include a measure of “consumer surplus”. Further, the commissioning of Haripur is estimated to eliminate a substantial portion of unserved energy demand in Bangladesh, thereby sustaining long-term economic growth and mitigating civil unrest caused by power shortages; these benefits are difficult to quantify and have not been captured.

**ERR Calculation (Base Case)
Assumptions**

- 8 percent annual load growth;
- the plant is commissioned in July 2001 (any commissioning delay is mirrored by a similar delay in construction expenses);
- the average tariff is escalated at 5 percent p.a. in real terms, until the assumed willingness-to-pay (WTP) ceiling of US¢ 6.7/kWh is reached in 2003;
- loss reduction from current level (32.5 percent) occurs at an annual rate of 1.5 percent until the assumed target rate of 15 percent is reached in 2012;
- natural gas is valued at its long run marginal cost for power (US\$ 1.55/MCF); and
- over the period 2001-2004, there will be a large natural gas price preference favoring state-owned generators, resulting in plant dispatch rates for Haripur in the range of 2–42 percent during its four initial operating years – after 2004 the plant will be dispatched at its full potential output (i.e. at 90 percent plant factor).

**Table 6: Economic Resource Flow
US\$ million (1999 prices)**

Year	Benefits	Investment Costs	Fuel Costs	Transmission & Distribution	Operational & Maintenance	Total Costs	Net Benefits
1999		49.99				49.99	-49.99
2000		110.88				110.88	-110.88
2001	34.69		9.11	16.69	7.78	33.58	1.12
2002	2.39		0.58	1.07	7.05	8.70	-6.32
2003	63.88		15.18	27.80	8.30	51.28	12.60
2004	48.72		11.34	20.77	7.97	40.08	8.64
2005	142.62		32.54	59.58	9.79	101.91	40.72
2006	145.47		32.54	59.58	9.79	101.91	43.57
2007	148.33		32.54	59.58	9.79	101.91	46.42
2008	151.18		32.54	59.58	9.79	101.91	49.27
2009	154.03		32.54	59.58	9.79	101.91	52.13
2010	156.88		32.54	59.58	9.79	101.91	54.98
2011	159.74		32.54	59.58	9.79	101.91	57.83
2012	161.64		32.54	59.58	9.79	101.91	59.73
2013	161.64		32.54	59.58	9.79	101.91	59.73
2014	161.64		32.54	59.58	9.79	101.91	59.73
2015	161.64		32.54	59.58	9.79	101.91	59.73
2016	161.64		32.54	59.58	9.79	101.91	59.73
2017	161.64		32.54	59.58	9.79	101.91	59.73
2018	161.64		32.54	59.58	9.79	101.91	59.73
2019	161.64		32.54	59.58	9.79	101.91	59.73
2020	161.64		32.54	59.58	9.79	101.91	59.73
2021	161.64		32.54	59.58	9.79	101.91	59.73
2022	161.64		32.54	59.58	9.79	101.91	59.73
						ERR:	16.3%

Annex 5

Financial Assessment of the Sector Utilities

Introduction

1. The offtaker from the Haripur Power Plant will be the Bangladesh Power Development Board (BPDB). It is an integrated utility which is presently responsible for power generation, transmission and distribution (outside Dhaka and rural areas). BPDB's financial performance depends to a large degree on that of the Dhaka Electricity Supply Authority (DESA), which accounts for approximately 41 percent of power sales, and which is responsible for electricity distribution in Dhaka. Additionally, BPDB sells power to Palli Bidyut Samitis (PBS) i.e., consumer-owned cooperatives. The sector is being reorganized with the Power Grid Company of Bangladesh (PGCB) poised to take over the transmission system, as well as the responsibility for dispatch of power plants from BPDB.
2. The financial performance of BPDB in recent years has been unsatisfactory, particularly on account of DESA, its main customer. As a result, this Annex reviews the financial performance of both BPDB and DESA, as well as their financial prospects under "business as usual" and "reform" scenarios. The review does not specifically reflect the financial impact of the transfer of functions from BPDB to PGCB as preparatory financial plans are yet to be elaborated for the latter.

Historical Financial Performance

Bangladesh Power Development Board

3. The present accounting system of BPDB cannot provide reliable and timely financial information. At present, there are delays in preparing the accounts and completing audits. However, accounting systems are being computerized and streamlined. The FY98 accounts have been audited and the FY99 accounts are in draft form.
4. The FY98 audit report highlights the following weaknesses:
 - no fixed assets register was maintained;
 - assets were depreciated on an aggregate basis without considering the expected life of the different categories of assets;
 - dispute with DESA over the valuation of assets transferred in FY91 was still not settled;
 - no aging of the accounts receivables was made;
 - the provision for doubtful debts is 5 percent, which may not be adequate; and
 - stores were not physically verified.
5. The following analysis is based on data furnished by BPDB. Detail financial results appear in Appendix 1 of this Annex. BPDB's financial performance in recent years can be summarized as follows (in US\$ terms):

Table 1: Financial Performance of BPDB (FY1994-98)
(US\$ million)

Fiscal Year Ending June 30:	1994	1995	1996	1997	1998
GWh Generated	9,221	10,166	10,833	11,243	12,194
GWh Sold	7,448	8,371	8,996	9,446	10,176
Unaccounted for Electricity (%)	19.2	17.7	17.0	16.0	16.5
Average Revenue (US¢/kWh)	4.71	4.67	4.47	4.48	4.46
Gross Revenues	359	398	410	435	463
Expenses					
Fuel	148	199	193	212	215
O&M	54	51	52	50	65
Administration and Other	12	14	15	15	14
Depreciation	<u>122</u>	<u>130</u>	<u>131</u>	<u>137</u>	<u>139</u>
Total Expense	336	394	390	414	433
Gross Income	23	5	20	21	30
Interest and Other	<u>93</u>	<u>154</u>	<u>46</u>	<u>50</u>	<u>32</u>
Net Income	(70)	(149)	(26)	(29)	(2)
Rate of Return on Assets (%)	0.9	0.2	0.8	0.8	1.2
Times Interest Earned ¹	3.10	2.05	2.42	2.97	3.03
Operating Ratio ² (%)	94	99	95	95	93

6. The following comments are called for:

- BPDB's sales in GWh have grown significantly in recent years, from 7,448 GWh in 1994 to 10,176 GWh in 1998, equivalent to 9 percent average growth per annum. Sales would have grown even faster had BPDB been able to meet demand in full (unmet demand in 1998 has been estimated at 500 GWh);
- unaccounted for electricity (physical losses as well as unbilled consumption on account of inaccurate billing, theft etc.) has declined from 19.2 percent in 1994 to 16.5 percent in 1998 which is still unacceptably high. Had losses been reduced to about 10 percent (a reasonable level for a utility such as BPDB), BPDB would be able to bill for an additional US\$ 36 million or 8 percent in additional revenues;
- tariffs were not changed over FY1994-1996. Over September 1997 to March 1998, tariffs have been increased periodically, resulting in an annual nominal average increase of 5 percent. However, this increase in tariff was below inflation and in US\$ terms, tariffs have declined from US¢4.7/kWh in 1994 to US¢4.5/kWh in 1998. In December 1998, the gas tariff was increased by 15 percent but the power tariffs were not revised to reflect this considerable increase in operating costs. In addition, tariffs are heavily cross subsidized, to support DESA,

¹ [(Operating Income + Depreciation)/Interest Charge].

² Operating Expense/Operating Revenue.

and BPDB's urban households, largely at the expense of industrial and commercial customers;
and

- fuel expenses account for 50 percent of BPDB's operating costs. Natural gas accounts for approximately 77 percent of BPDB's generation (in kWh) and 62 percent of fuel expenses. On the other hand, liquid fuels account for only 16 percent of generation, but 38 percent of fuel expenses. That is because liquid fuels are imported, and taxed, while gas is produced locally, and sold below cost.
7. Though on average, BPDB lost US\$ 55 million per annum over the period FY94-98, it has shown positive operating margins, earning a Return on Assets of about 1 percent. While BPDB had positive operating cash flows, it did not generate sufficient cash to cover its debt service. BPDB's balance sheets in US\$ terms can be summarized as follows:

Table 2: BPDB's Summary Balance Sheets (FY1994-98)
(US\$ million)

Fiscal Year Ending June 30:	1994	1995	1996	1997	1998
Net Fixed Assets	3,319	3,482	3,373	3,213	3,017
Current Assets					
Accounts Receivable	310	355	376	417	484
Other	114	179	224	251	260
Less: Current Liabilities	<u>745</u>	<u>593</u>	<u>728</u>	<u>787</u>	<u>848</u>
Net Current Assets	(321)	(60)	(128)	(118)	(104)
Total Assets	2,997	3,422	3,246	3,094	2,913
Long Term Debt	1,323	1,490	1,367	1,269	1,142
Equity	1,674	1,932	1,879	1,825	1,771
Total Debt and Equity	2,997	3,422	3,246	3,094	2,913
Current Ratio ¹	0.6	1.0	0.9	1.0	1.0
Accounts Receivable (DESA) in days	320	242	270	323	410
Accounts Receivable (non- DESA) in days	315	396	395	388	374
Long Term Debt: Equity ² (%)	79	77	73	70	64

8. BPDB's balance sheets call for the following comments:

- BPDB faces significant liquidity problems on account of weak collections. Accounts receivable of BPDB have increased from US\$ 310 million in FY94 to US\$ 484 million in FY98 equivalent to 12.5 months of sale. The arrears are due from DESA (US\$ 223 million or 14 months of sale equivalent), and from BPDB's direct customers (US\$ 262 million or 12 months of sale equivalent); on the other hand, rural cooperatives pay on a timely basis. In recent years, BPDB has been recovering 65 percent of its bills to DESA, and 91 percent of its bills to other customers;

¹ Current Assets / Current Liabilities.

² Long Term Debt/Equity.

- most of BPDB's debt originates as soft loans from development agencies, which are on-lent through the Government. While the Government is servicing its debt to the donors, BPDB has been largely unable to meet its debt service obligations to the Government. In 1995, the equivalent of US\$ 453 million of outstanding debt service obligation was converted into Government equity. Since that time, debt service obligations have again accumulated to US\$ 680 million equivalent, so that another debt-to-equity conversion appears imminent; and
- BPDB is able to maintain its liquidity only through massive support from the Government in the form of low interest loans and equity injections which in FY98 equaled to US\$ 85 million (US\$ 195 million including default in debt service liabilities).

9. In summary, BPDB's financial performance in recent years has been unsatisfactory. The utility is dependent on significant Government support to maintain its activities. Moreover, it has not been able to allocate sufficient resources to meet its operation and maintenance requirements (plant factor in BPDB's generating plants has been on average only 50 percent vs. a norm of 80 percent) and to contribute towards the financing of an investment program commensurate with the requirements of the sector.

Dhaka Electricity Supply Authority

10. DESA is a Government-owned utility responsible for distribution of electricity in Dhaka city. It was created following a restructuring of BPDB in 1991. DESA is unable to provide accounting data in a timely manner. DESA requires around nine months to prepare its accounts after the close of the financial year followed by another 2-3 months to complete the audit. The Bank received the audit report of DESA for FY98 in May 1999. While the auditor submitted an unqualified audit report, the Bank's review of the Management Report highlighted certain observations as follows:

- no asset register was maintained;
- DESA transactions with BPDB were not reconciled;
- DESA's Accounts Receivable were excessive -- no aging of receivables was made;
- DESA as a matter of practice made a provision of 10 percent of the total turnover as doubtful debts. The auditors expressed their reservations on whether this percentage is adequate; and
- DESA has not serviced its debts over the years.

11. DESA's financial statements appear in Appendix 2 in Taka and can be summarized in US\$ as follows:

Table 3: Financial Performance of DESA (FY1994-1998)
(US\$ million)

Fiscal Year Ending June 30	1994	1995	1996	1997	1998
GWh Purchased	3,696	4,162	4,551	4,936	5,419
GWh Sold	2,538	2,914	3,210	3,589	3,908
Unaccounted for Electricity (%)	31	30	29	27	28
Electricity Purchase Price (US¢/kWh)	3.94	3.96	3.78	3.71	3.66
Average Revenue (US¢/kWh)	5.55	5.57	5.32	5.55	5.30
Gross Revenues	144	166	173	202	216
Expenses					
Power Purchase Cost	146	165	172	183	200
O&M	12	16	14	18	19
Admin. & Other	4	4	5	7	8
Depreciation	11	11	11	10	10
Total Expense	173	196	203	219	236
Gross Income	(29)	(30)	(30)	(17)	(21)
Interest and Other	17	20	4	16	12
Net Income	(46)	(50)	(33)	(33)	(33)
Rate of Return on Assets (%)	-13	-14	-16	-10	-14
Times Interest Earned	N/A	N/A	N/A	N/A	N/A
Operating Ratio (%)	121	119	118	109	110

12. The historical results of DESA call for the following observations:

- DESA's retail tariffs are identical to BPDB's and in FY99 averaged about US¢4.91/kWh (Tk2.41/kWh). DESA's bulk sales tariff to PBSs is 5 percent below the bulk purchase price of electricity; in addition it incurs transmission losses, so DESA loses on this account average approximately US\$ 15 million per annum;
- DESA's system losses are particularly high, and in FY98 averaged 28 percent, against a norm for urban networks of 7-10 percent. Foregone revenue on this account can be estimated at US\$ 55 million per annum; and
- DESA's bulk purchase tariff from BPDB was approximately US¢3.50/kWh (Tk1.72/kWh) in 1999, which would give the utility a margin of US¢1.40/kWh (Tk0.69/kWh), equivalent to 40 percent over and above the purchase price. Under normal circumstances, that margin ought to be sufficient for the utility to cover its operating costs and finance part of its investment program. However, given its high level of network losses, DESA has been incurring operating deficits.

13. In all, over the past five years, DESA has lost US\$ 196 million largely on account of the high level of losses in its system. As a matter of fact, since its inception in October 1991, DESA has never been able to generate a positive operating margin.

14. DESA's balance sheets can be summarized in US\$ as follows:

Table 4: DESA's Summary Balance Sheets (FY1994-1998)
(US\$ million)

Fiscal Year Ending June 30	1994	1995	1996	1997	1998
Net Fixed Assets	428	471	488	503	515
Current Assets					
Accounts Receivable	104	125	151	185	222
Other	35	24	(2)	(9)	13
Less: Current Liabilities	<u>307</u>	<u>373</u>	<u>409</u>	<u>464</u>	<u>544</u>
Net Current Assets	(168)	(224)	(260)	(288)	(309)
Total Assets	260	247	228	215	206
Long Term Debt	242	264	263	265	265
Equity	<u>18</u>	<u>(18)</u>	<u>(35)</u>	<u>(50)</u>	<u>(59)</u>
Total Debt and Equity	260	247	228	215	206
Current Ratio	0.45	0.40	0.36	0.38	0.43
Accounts Receivable (days)	269	281	322	339	380
Accounts Payable to BPDB (days)	186	235	263	313	399
Long Term Debt: Debt & Equity	N/A	N/A	N/A	N/A	N/A

15. As can be seen from the above table:

- DESA's accounts receivable are particularly high and on the increase. Its collection efficiency is around 80 percent and accounts receivable has reached US\$ 222 million in FY98. This amount represents more than a year of sale;
- DESA's current ratio is unsatisfactory. As a matter of fact, it has financed its activities largely by withholding payments for power purchase to BPDB. In FY98 DESA's account payable to BPDB for power purchase stood at about US\$ 218 million, equivalent to 399 days of purchases. On average, DESA's working capital has been decreasing by US\$ 40 million each year. DESA is not servicing its debts to the Government. Its debt service arrears have reached US\$ 195 million in FY98. Its Debt Service Coverage Ratio also remains at an unacceptable level of negative 0.4 in FY98; and
- DESA at present does not have any equity or reserves, as Government injections have not been sufficient to cover its deficits.

16. In summary, during FY98 DESA purchased 5,419 GWh of energy from BPDB of which it could sell only 3,908 GWh. In financial terms DESA purchased electricity for US\$ 200 million, billed for approximately around US\$ 213 million (had losses been normal at around 10 percent, DESA could have billed altogether for US\$ 258 million) and collected about US\$ 165 million. Being unable to generate a positive cash flow, DESA has to rely on Government support to finance its operating deficits, meet its debt service obligations, and contribute to the financing of its expansion. The Government annual support amounts to approximately US\$ 34 million (including debt service, the level of support increases to US\$ 65 million). The financial predicament of DESA affects adversely the quality of service to consumers, the ability of the utility to mobilize external financing, and the realization of investment plans commensurate with system requirements. It has also adverse implications for BPDB, as explained above.

Financial Prospects

17. The financial prospects of BPDB and DESA have been analyzed under two different scenarios based on: (i) current operation parameters being unchanged (**business-as-usual**); and (ii) a **reform scenario**. Demand for electricity in Bangladesh, according to the reference forecast of Power Sector Master Plan (PSMP) is expected to grow by approximately 8-10 percent annually. It is further assumed that all investment requirements would be met and Government would fund any gap between available financial resources and investment program in the form of debt and equity (40:60 ratio). It was also assumed that IPPs would be commissioned as follows:

Table 5: IPPs Commissioning Schedule

IPP	Capacity (MW)	1 st -yr tariff (Tk/ kWh) ¹	Commissioning Date Met / Expected
Khulna Barge	110	4.62	September 1998
Haripur Barge	110	2.51	June 1999
Baghabari Barge	130	2.51	June 1999
Baghabari	170	2.63	July 2001
Haripur	360	1.30	June 2001
Meghnaghat 1	450	1.59	January 2002
Meghnaghat 2	450	1.59	July 2003
Total²	1,780		

(a) Business-as-usual (no reform) scenario

18. Under this scenario it is assumed that both BPDB and DESA will continue to perform at their present levels of efficiency. Basic assumptions for this scenario are as follows:

- retail Tariffs are adjusted in accordance with present trends – Tk.05/kWh each year for all end user tariff categories other than agriculture and Tk0.08/kWh for bulk tariff to DESA;
- transmission and distribution losses remain at the present levels; and
- collection efficiency does not improve.

19. Assuming that BPDB and DESA continue in a Business as Usual scenario, an evaluation of the financial prospects of these two utilities was made on the basis of two demand growth scenarios: (i) a reference demand growth rate of 8 percent per annum; and (ii) a trend growth rate of 5 percent per annum. The projections for BPDB and DESA under the reference scenario are at Appendices 1 and 2. Financial highlights for BPDB can be summarized in US\$ as follows:

¹ Based on gas price of US\$1.55/MCF.

² Apart from the above IPPs, a 60 MW barge mounted power plant and three small 10 MW power plants have been contracted by REB/PBSs.

Table 6: Financial Performance of BPDB under Business-as-usual scenario and Reference Demand Growth (US\$ million)

Fiscal Year Ending June 30:	1999	2000	2001	2002	2003	2004	2005	2006	2007
	----- Projected -----								
Sales (GWh)	11,352	12,099	12,508	15,200	16,489	17,924	19,484	21,115	22,942
T&D Losses (% of availability)	17	17	17	17	17	17	17	17	17
Average Tariff (US¢/kWh)	4.20	4.17	4.06	3.95	3.84	3.73	3.61	3.50	3.39
Average Cost Of Supply (US¢/kWh)	3.87	4.01	3.83	3.81	3.80	3.86	3.94	3.79	3.61
Net Income	(54)	(41)	(26)	(27)	(37)	(64)	(101)	(99)	(90)
Gob Support For Investment	139	190	263	295	336	367	414	452	484
Ratios									
Operating Ratio (%)	90	94	92	94	96	101	106	105	104
Return On Net Fixed Assets (%)	2	1	2	2	1	0	-2	-2	-1
Debt : Debt & Equity Ratio (%)	43	43	43	42	42	42	43	44	44
Self Financing Ratio (%)	-31	-39	-24	-27	-35	-46	-58	-57	-56
Collection Efficiency (%)	80	80	80	80	79	79	79	79	79
Receivables From DESA (Days)	495	562	647	638	692	739	782	824	859
Receivables From Non-DESA (Days)	367	363	374	333	332	330	329	329	328
Current Ratio	1.1	1.2	1.4	1.5	1.7	1.9	2.1	2.3	2.6
Cash Coverage Ratio For IPP Payment ¹	4.6	1.8	2.0	1.3	1.1	1.0	0.9	0.9	0.9
Adjusted Cash Coverage Ratio For IPP Payment ²	4.6	1.8	2.0	2.0	2.1	2.4	2.6	2.8	3.2
Debt Service Coverage Ratio	0.7	0.5	0.6	0.4	0.2	(0.1)	(0.4)	(0.5)	(0.5)
Gob Support To Meet 1.2 DSCR	75	102	86	102	128	157	197	206	207

Table 7: Financial Performance of BPDB under Business as Usual Scenario and Low Demand Growth (US\$ million)

Fiscal Year Ending June 30	1999	2000	2001	2002	2003	2004	2005	2006	2007
	----- Projected -----								
Sales (GWh)	11,352	12,140	12,509	13,918	14,710	15,442	16,297	17,031	17,889
T&D Losses (% Of Availability)	17	17	17	17	17	17	17	17	17
Average Tariff (US¢/kWh)	4.20	4.17	4.06	3.95	3.84	3.73	3.61	3.50	3.39
Average Cost Of Supply (US¢/kWh)	3.87	3.84	3.81	3.99	4.03	4.00	4.17	4.07	3.95
Net Income	(54)	(20)	(23)	(54)	(73)	(84)	(131)	(137)	(141)
Gob Support For Investment	139	171	223	265	301	309	350	354	353
Ratios									
Operating Ratio (%)	90	90	91	98	102	104	112	113	113
Return On Net Fixed Assets (%)	2	2	2	0	-1	-1	-4	-4	-5
Debt : Debt & Equity Ratio (%)	43	42	42	42	43	43	45	46	47
Self Financing Ratio (%)	-31	-30	-25	-42	-56	-62	-87	-97	-106
Collection Efficiency (%)	80	80	80	80	79	79	79	79	79
Receivables From DESA (Days)	495	560	648	685	750	814	871	931	983
Receivables From Non-DESA (Days)	367	361	374	361	365	372	377	385	391
Current Ratio	1.1	1.2	1.4	1.5	1.7	1.9	2.0	2.2	2.4
Cash Coverage Ratio For IPP Payment	4.6	2.3	2.1	1.2	1.0	1.0	0.8	0.8	0.8
Adjusted Cash Coverage Ratio For IPP Payment	4.6	2.3	2.1	1.9	1.9	1.8	1.9	1.9	1.9
Debt Service Coverage Ratio	0.7	0.6	0.6	0.3	0.0	(0.1)	(0.5)	(0.6)	(0.7)
Gob Support To Meet 1.2 DSCR	75	83	80	120	150	160	204	216	223

¹ (Cash Balance after meeting all cash operating expenditure excluding IPP Payment)/(Total IPP Payment).

² (Cash Balance after meeting all cash operating expenditure excluding IPP Payment)/(IPP Payment to Haripur 360 and three contracted Barges). Cash operating expenditure includes: Fuel cost, O&M expense, Administrative expense, and IPP Payments.

20. The following comments on the projections under this scenario are noted:

- BPDB continues to incur losses as its operation efficiency does not improve. However, under the low growth scenario, its expected losses are higher;
- under the reference demand scenario, BPDB would be able to introduce more efficient power plants into the system which will reduce financial losses;
- BPDB would fail to maintain its DSCR at 1.2 level, and Government would have to provide average annual cash support above US\$ 140 million over the period FY99 to FY07 for BPDB to maintain 1.2 DSCR; and
- as a result of inefficiencies in its distribution system, BPDB would not be able to generate sufficient cash flow for investment so that it would have to rely solely on external financing. This would result in a burden to the Government of nearly US\$ 250 million annually to finance the sector's investment needs in the high growth scenario in the period FY99-07.

21. In summary, it is evident that BPDB would become insolvent if the current measures to improve its operational performance are not sustained. Reforming the sector and improving the distribution management is a critical part of the solution. Financial performance of DESA would be similar to BPDB in this scenario and is not further elaborated.

(b) Reform scenario

22. The financial prospects of the sector under a reform scenario depict a viable power sector within 4 years. In this scenario the improvements in performance is determined by early actions on system losses, collection efficiency and tariff structure. Under this scenario, sector performance would improve gradually on the basis of the following assumptions:

- (i) annual tariff increases by 5 percent per annum from FY00 onwards in all categories except agriculture. This would increase the average tariff of BPDB to Tk3.04/kWh by FY07 from FY00 level of Tk2.17/kWh. Tariffs in FY00 have been increased by 5 percent in two phases – July 1 and September 1, 1999;
- (ii) transmission and distribution loss in BPDB is reduced to 8 percent by FY02 from 17 percent in FY98 (system loss in January 2000 had declined to 15 percent);
- (iii) BPDB's revenue collection from DESA improves to 100 percent by FY02 from 65 percent in FY98;
- (iv) BPDB's revenue collection from non-DESA consumers improves to 100 percent by FY01 from 91 percent in FY98;
- (v) Tariff structure of DESA remains similar to BPDB's and due to consumer mix 5 percent annual increase in tariff results in DESA tariff increase to Tk3.45/kWh by FY07 from its FY00 level of Tk2.45/kWh;
- (vi) Transmission and Distribution loss in DESA is reduced to 8 percent by FY03 from 28 percent in FY98; and
- (v) DESA's revenue collection from its consumers improves to 100 percent by FY01 from 78 percent in FY98.

23. Performance of BPDB under the above assumptions could be promising as the following indicates:

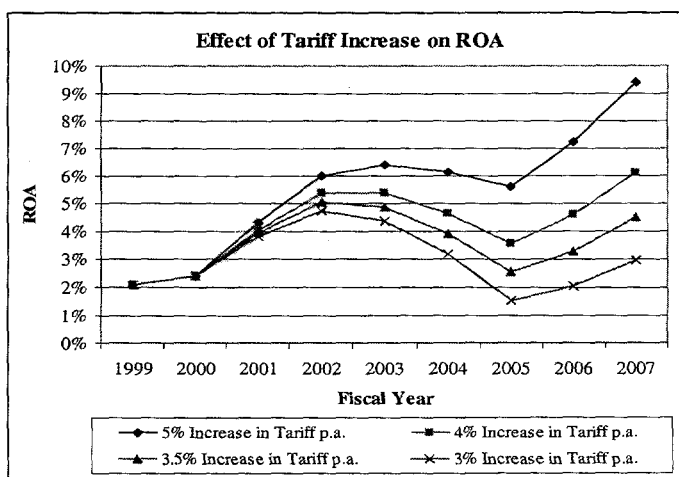
Table 8: Financial Performance of BPDB under Reform scenario and Reference Demand Growth (US\$ million)

Fiscal Year Ending June 30:	1999	2000	2001	2002	2003	2004	2005	2006	2007
	----- Projected -----								
Sales (GWh)	11.352	12.606	13.481	16.747	18.167	19.748	21.467	23.264	25.277
T&D Losses (% Of Availability)	17	13	10	8	8	8	8	8	8
Average Tariff (US¢/kWh)	4.20	4.17	4.13	4.09	4.05	4.01	3.97	3.93	3.89
Average Cost Of Supply (US¢/kWh)	3.87	3.84	3.55	3.45	3.44	3.49	3.56	3.52	3.45
Net Income	(54)	(18)	27	63	72	68	58	70	89
Gov Support For Investment	137	117	120	81	89	85	93	108	116
Ratios									
Operating Ratio (%)	90	90	84	82	83	85	87	87	86
Return On Net Fixed Assets (%)	2	2	4	6	6	6	6	6	7
Debt : Debt & Equity Ratio (%)	43	43	42	40	39	38	37	36	35
Self Financing Ratio (%)	-29	4	42	57	57	57	53	54	60
Collection Efficiency (%)	83	91	98	100	100	100	100	100	100
Receivables From DESA (Days)	477	458	426	327	287	251	220	194	170
Receivables From Non-DESA (Days)	361	331	295	226	199	174	153	134	118
Current Ratio	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Cash Coverage Ratio For IPP Payment	4.7	2.6	3.9	2.4	2.1	1.8	1.7	1.6	1.6
Adjusted Cash Coverage Ratio For IPP Payment	4.7	2.6	3.9	3.7	3.9	4.4	4.9	5.3	5.8
Debt Service Coverage Ratio	0.7	1.0	1.6	2.1	2.1	2.2	2.2	2.4	2.7
Gov Support To Meet 1.2 DSCR	73	29	-	-	-	-	-	-	-

24. The reference demand scenario on the basis of the above assumptions provides solid results. Since all the reform assumptions may not materialize, a series of sensitivity analyses were carried out to evaluate their impact on the viability of the sector. The following assumptions were considered for the sensitivity analysis.

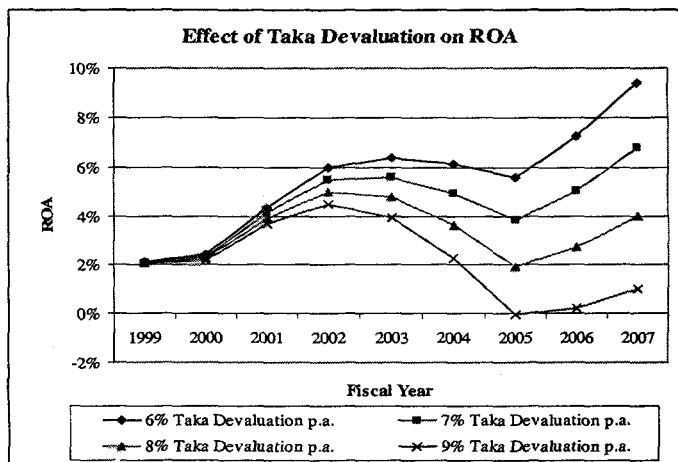
- Tariff increases 5 percent per annum;
- Taka devalues by 6 percent per annum; and
- Gas price increases to US\$1.55/MCF by FY2005¹.

25. Under the reform scenario, BPDB can be expected to earn a Return on Assets equivalent to 9 percent by the end of FY07. Should the tariff increase be less than 5 percent per annum, BPDB's Return on Assets would remain satisfactory as long as the adjustment does not fall below 3.5 percent per annum. With this rate of tariff adjustments BPDB will be able to maintain sustainable Operating Ratio and its other financial indicators like DSCR would remain satisfactory.

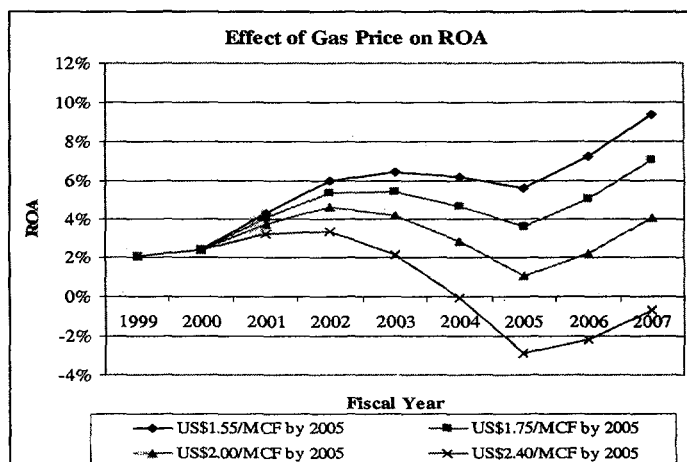


¹ The assumption of gas price increase to US\$ 1.55/MCF by FY05 increases BPDB's operating costs substantially, while keeping it at that level over FY05-07 results in gradual increases in Net Income.

26. Devaluation of Taka has an adverse effect on the Return on Assets of BPDB. The scenario assumes 6 percent devaluation of Taka per annum. BPDB could sustain up to a 8 percent devaluation per annum. Furthermore, with a devaluation rate of 8 percent per annum, other financial indicators like Operating Ratio, Debt Service Coverage Ratio and Self Financing Ratio of BPDB would remain at acceptable levels.



27. The gas price is assumed to be equalized for both BPDB and IPP power plants. Furthermore it is assumed that gas price would be increased to US\$1.55/MMCF by FY05 (equivalent to the LRMC of gas for power generation). Natural gas accounts for most of BPDB's operating expenses. Furthermore purchases from IPPs are also dependent on gas tariffs. The stress test shows that BPDB can remain financially viable with gas price up to US\$2.00/MMCF.



Conclusion

28. A "business-as-usual" (with no reform) scenario would result in continuing poor performance of BPDB. The steps being taken currently to improve the financial viability of BPDB and DESA need to be sustained. The results of the shorter-term need to be consolidated by implementing broader reform measures, i.e. eventual private sector ownership and management of distribution. Only then will the sector achieve lasting financial health and be free from dependence on government subsidies. IPPs like Haripur could provide the right opportunity for instilling commercial discipline in the sector and promote positive change.

BANGLADESH POWER DEVELOPMENT BOARD														
INCOME STATEMENT														
YEAR ENDING JUNE 30														
TK MILLION														
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
	[----- Audited -----]					[----- Estimated -----]								
GENERATION	2,908	2,497	2,497	2,590	2,557	2,895	3,355	3,435	4,303	4,616	5,006	5,546	5,966	6,386
CAPACITY/BPDB(MW)														
GENERATION IN GWh (NET)														
BPDB GENERATION	9,221	10,166	10,833	11,243	12,194	13,060	12,620	13,446	12,691	11,691	10,356	11,053	10,945	10,558
IPP GENERATION	-	-	-	-	-	578	1,870	1,533	5,512	8,056	11,109	12,282	14,342	16,917
TOTAL GENERATION IN GWH	9,221	10,166	10,833	11,243	12,194	13,639	14,490	14,979	18,203	19,747	21,466	23,334	25,287	27,475
SYSTEM LOSS AS % OF GENERATION	19.2	17.7	17.0	16.0	16.5	16.8	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5
TOTAL SALES IN GWH	7,448	8,371	8,996	9,446	10,176	11,352	12,099	12,508	15,200	16,489	17,924	19,484	21,115	22,942
AVERAGE TARIFF	1.88	1.87	1.87	1.96	2.07	2.06	2.17	2.24	2.31	2.38	2.45	2.52	2.59	2.66
RPC GENERATION							123	245	245	245	245	245	245	184
WHEELING CHARGE							0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
OPERATING REVENUE														
REVENUE FROM ELECTRICITY SALES	14,019	15,682	16,784	18,492	21,019	23,416	26,231	27,988	35,071	39,194	43,854	49,028	54,602	60,926
REVENUE FROM RPC							22	43	43	43	43	43	43	32
OTHER OPERATING REVENUES	347	290	346	505	406	639	716	764	957	1,070	1,197	1,338	1,490	1,663
TOTAL OPERATING REVENUE	14,366	15,972	17,130	18,997	21,425	24,055	26,969	28,795	36,071	40,307	45,094	50,410	56,136	62,621
OPERATING EXPENSES														
FUEL COST - BPDB only	5,916	7,969	8,041	9,274	9,940	9,825	9,447	10,810	10,894	11,253	10,770	12,595	13,501	13,464
GENE., TRANS. & DISTR. EXP.	1,816	1,717	1,799	1,788	2,092	2,239	2,395	2,563	2,742	2,934	3,140	3,360	3,595	3,846
MAINTENANCE	326	329	360	407	929	402	480	515	557	606	660	723	797	882
GENERAL & ADMIN.. EXPENSES	218	212	246	266	265	284	304	325	348	372	398	426	456	488
METERING, BILLING & COLL. EXP.	219	288	327	323	316	335	354	373	400	423	448	474	502	532
BAD DEBT PROVISIONS	50	27	25	35	35	57	63	67	83	92	102	113	125	139
PROVISION FOR ASSET INSURANCE FUND	10	15	15	15	15	16	20	21	26	31	35	39	44	49
DEPRECIATION	4,890	5,229	5,481	5,963	6,439	7,028	7,284	7,549	7,879	8,270	8,722	9,227	9,784	10,410
PAYMENTS TO IPPS	-	-	-	-	-	1,378	4,879	4,206	10,937	14,835	21,151	26,440	30,213	35,016
TOTAL OPERATING EXPENSES	13,446	15,785	16,293	18,071	20,032	21,564	25,225	26,428	33,865	38,816	45,426	53,398	59,016	64,826
OPERATING INCOME	919	186	837	926	1,393	2,491	1,743	2,367	2,206	1,491	(332)	(2,988)	(2,880)	(2,205)
INT. CHGD TO OPERATIONS	1,873	2,635	2,609	2,319	2,583	2,316	2,422	2,433	2,507	2,648	2,825	3,104	3,464	3,896
AMORT. OF CURRENCY FLUCTUATION	(1,831)	(2,362)	2,359	135	1,107	(2,824)	(1,467)	(1,354)	(1,262)	(1,162)	(1,049)	(948)	(948)	(948)
PRIOR PERIOD ADJUSTMENT	(8)	(1,166)	(1,678)	(9)	8	-	-	-	-	-	-	-	-	-
NET PROFIT (LOSS)	(2,793)	(5,977)	(1,092)	(1,267)	(74)	(2,649)	(2,145)	(1,420)	(1,563)	(2,319)	(4,206)	(7,040)	(7,293)	(7,049)
OPERATING RATIO (%)	94	99	95	95	93	90	94	92	94	96	101	106	105	104
RETURN ON EQUITY (%)	-4.2	-8.3	-1.4	-1.6	-0.1	-3.2	-2.5	-1.6	-1.6	-2.1	-3.5	-5.4	-5.2	-4.5
RETURN ON ASSETS (%)	0.9	0.2	0.8	0.8	1.2	2.1	1.5	2.0	1.8	1.2	-0.3	-2.2	-2.0	-1.4

BANGLADESH POWER DEVELOPMENT BOARD														
BALANCE SHEET														
TK MILLION														
June 30	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
	[----- Audited -----]					[----- Estimated -----]								
GROSS FIXED ASSETS.														
FIXED ASSETS	175,910	179,171	183,293	208,534	213,034	219,629	227,612	235,913	246,208	258,426	272,558	288,344	305,756	325,310
LESS: ACCUMULATED DEPRECIATION	70,394	75,623	81,104	87,067	93,506	100,534	107,817	115,367	123,245	131,515	140,237	149,464	159,248	169,658
NET FIXED ASSETS	105,516	103,548	102,189	121,467	119,528	119,095	119,794	120,546	122,963	126,912	132,321	138,880	146,508	155,652
WORK IN PROGRESS	27,182	36,009	38,518	18,639	19,984	24,191	25,155	31,198	37,025	42,822	47,836	52,766	59,254	67,349
TOTAL FIXED ASSETS	132,698	139,557	140,707	140,106	139,512	143,286	144,949	151,744	159,988	169,734	180,157	191,645	205,762	223,001
OTHER DEPOSIT WORKS	44	70	134	120	153	153	153	153	153	153	153	153	153	153
CURRENT ASSETS														
CASH	2,012	3,429	6,330	7,588	8,681	8,681	8,681	8,681	8,681	8,681	8,681	8,681	8,681	8,681
INVENTORIES	2,734	3,961	4,630	5,568	6,029	5,976	6,195	6,547	6,942	7,383	7,852	8,360	8,946	9,624
ACCOUNTS RECEIVABLES DESA ONLY	5,268	4,364	5,324	7,126	10,311	13,857	17,886	22,232	27,735	33,944	40,954	48,857	57,728	67,701
ACCOUNTS RECEIVABLES NON-DESA	7,121	9,871	10,379	11,091	12,113	13,253	14,515	15,850	17,509	19,347	21,389	23,656	26,163	28,941
TOTAL RECEIVABLES	12,389	14,235	15,703	18,218	22,424	27,110	32,401	38,082	45,244	53,291	62,343	72,513	83,891	96,642
BAD DEBT PROVISIONS	(341)	(368)	(394)	(429)	(464)	(521)	(584)	(651)	(734)	(826)	(928)	(1,041)	(1,167)	(1,305)
ADVANCES, DEPOSITS & PREPAID EXPENSES	1,102	2,586	2,010	2,010	2,083	2,187	2,297	2,411	2,532	2,659	2,792	2,931	3,078	3,232
TOTAL CURRENT ASSETS	17,895	23,842	28,280	32,955	38,753	43,432	48,989	55,070	62,664	71,188	80,740	91,443	103,429	116,872
INTER OFFICE ADJUSTMENTS	(961)	(2,446)	(3,209)	(3,785)	(4,278)	(4,278)	(4,278)	(4,278)	(4,278)	(4,278)	(4,278)	(4,278)	(4,278)	(4,278)
TOTAL ASSETS	149,676	161,024	165,911	169,396	174,140	182,594	189,813	202,689	218,527	236,797	256,772	278,964	305,066	335,748
EQUITY														
PAID IN CAPITAL	28,273	44,639	46,584	48,986	51,340	55,425	61,354	70,052	80,394	92,881	107,348	124,643	144,649	167,360
GRANTS & DEPOSITE WORK FUND	4,093	4,222	4,343	4,403	4,466	4,412	4,482	4,653	4,819	4,985	5,135	5,284	5,464	5,676
APPRAISAL SURPLUS (AR&FEF Fund)	55,748	55,748	55,748	55,748	55,748	55,748	55,748	55,748	55,748	55,748	55,748	55,748	55,748	55,748
RETAINED EARNINGS	(21,149)	(27,126)	(28,218)	(29,485)	(29,560)	(32,208)	(34,354)	(35,774)	(37,337)	(39,655)	(43,861)	(50,901)	(58,194)	(65,244)
TOTAL EQUITY	66,964	77,483	78,457	79,652	81,996	83,378	87,230	94,680	103,625	113,959	124,370	134,774	147,666	163,540
LIABILITIES														
GOVERNMENT	7,389	8,273	9,339	10,704	11,858	14,249	17,812	23,114	29,382	36,925	45,610	55,969	67,889	81,613
FOREIGN BORROWINGS	43,885	49,700	45,867	42,790	39,070	42,995	42,483	41,899	41,219	40,851	40,762	40,755	40,747	40,740
TOTAL OF LONG TERM DEBT	51,275	57,973	55,206	53,494	50,928	57,244	60,295	65,013	70,601	77,777	86,372	96,723	108,636	122,353
CONSUMER DEPOSITS, PENSION FUND ETC.	1,651	1,771	1,851	1,917	1,948	2,177	2,428	2,696	3,009	3,352	3,728	4,141	4,594	5,091
CURRENT LIABILITIES														
ACCOUNTS PAYABLE	17	17	950	1,367	1,171	1,234	1,489	1,587	2,154	2,519	2,991	3,633	4,050	4,450
DEPOSITS, BANK LOANS	217	260	272	306	325	341	358	376	395	415	435	457	480	504
CURRENT PORTION OF LTD	4,530	4,497	4,831	5,250	5,250	5,217	4,904	5,115	5,401	5,304	5,263	5,476	5,721	5,721
DEBT SERVICE LIABILITIES (PRIN)	12,478	6,980	9,400	11,399	14,225	14,225	14,225	14,225	14,225	14,225	14,225	14,225	14,225	14,225
DEBT SERVICE LIABILITIES (INTER)	11,174	10,713	13,517	15,006	17,264	17,264	17,264	17,264	17,264	17,264	17,264	17,264	17,264	17,264
OTHER CURRENT LIABILITIES	1,371	1,330	1,428	1,005	1,033	1,514	1,619	1,733	1,854	1,984	2,123	2,271	2,430	2,600
TOTAL CURRENT LIABILITIES	29,787	23,797	30,398	34,334	39,268	39,795	39,860	40,300	41,293	41,711	42,302	43,326	44,170	44,765
TOTAL LIABILITIES	82,713	83,541	87,455	89,745	92,145	99,216	102,583	108,010	114,903	122,839	132,402	144,190	157,400	172,208
TOTAL CAPITAL & LIABILITIES	149,677	161,025	165,912	169,396	174,140	182,594	189,813	202,689	218,528	236,797	256,772	278,964	305,066	335,748
CURRENT RATIO	0.6	1.0	0.9	1.0	1.0	1.1	1.2	1.4	1.5	1.7	1.9	2.1	2.3	2.6
DEBT : DEBT & EQUITY RATIO (%)	45	45	43	42	41	43	43	43	42	42	42	43	44	44

BANGLADESH POWER DEVELOPMENT BOARD														
CASH FLOW STATEMENT														
YEAR ENDING JUNE 30														
TK MILLION														
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
	[----- Audited -----]					[----- Estimated -----]								
OPERATING REVENUE														
REVENUE FROM SALE OF POWER		15,682	16,784	18,492	21,019	23,416	26,253	28,031	35,114	39,237	43,897	49,072	54,646	60,958
OTHER INCOME		290	346	505	406	639	716	764	957	1,070	1,197	1,338	1,490	1,663
LESS: INCREASE IN RECEIVABLES		(1,846)	(1,468)	(2,515)	(4,207)	(4,686)	(5,291)	(5,681)	(7,161)	(8,048)	(9,052)	(10,170)	(11,378)	(12,751)
TOTAL CASH REVENUE		14,126	15,662	16,482	17,218	19,370	21,678	23,114	28,910	32,259	36,042	40,240	44,758	49,870
OPERATING EXPENDITURE														
POWER PURCHASE FROM IPPS (Barges & Haripur)						1,378	4,879	4,206	7,218	8,065	8,665	9,011	9,359	9,766
POWER PURCHASE FROM IPPS (Others)									3,719	6,770	12,486	17,429	20,854	25,250
FUEL COST		7,969	8,041	9,274	9,940	9,825	9,447	10,810	10,894	11,253	10,770	12,595	13,501	13,464
GENERAL, ADMIN & MAINTENANCE		2,258	2,404	2,461	3,287	2,924	3,179	3,403	3,647	3,913	4,198	4,508	4,847	5,216
METERING, BILLING & OTHER		1,469	2,020	347	323	352	374	394	426	454	483	514	546	581
LESS: INCREASE IN PAYABLES		0	(933)	(417)	196	(63)	(255)	(98)	(567)	(365)	(472)	(642)	(417)	(400)
TOTAL CASH OPER. EXPENDITURE		11,696	11,532	11,664	13,746	14,416	17,624	18,714	25,336	30,090	36,130	43,416	48,689	53,877
CASH SURPLUS/(DEFICIT) AFTER OPERATING EXPENDITURE		2,430	4,130	4,818	3,472	4,953	4,054	4,400	3,573	2,170	(88)	(3,175)	(3,931)	(4,007)
OPERATING EXPENDITURE														
INCREASE IN OTHER CURRENT ASSETS		1,252	(606)	348	75	51	329	466	516	568	602	647	732	832
DECREASE IN OTHER CURRENT LIABILITIES		(2)	(110)	389	(47)	(497)	(123)	(131)	(140)	(150)	(160)	(170)	(182)	(194)
OTHER WORKING CAPITAL REQUIREMENTS		1,250	(716)	737	28	(446)	206	335	376	419	443	477	550	637
CASH SURPLUS/(DEFICIT) BEFORE DEBT SERVICING		1,180	4,846	4,081	3,444	5,399	3,848	4,064	3,198	1,751	(530)	(3,652)	(4,482)	(4,644)
DEBT SERVICING														
INTEREST		2,635	2,609	2,319	2,583	2,316	2,422	2,433	2,507	2,648	2,825	3,104	3,464	3,896
REPAYMENT		4,922	5,020	4,405	5,209	5,266	5,217	4,904	5,115	5,401	5,304	5,263	5,476	5,721
LESS: DEFAULT IN DEBT SERVICING		5,959	(5,223)	(3,489)	(5,084)									
TOTAL DEBT SERVICE PAYMENTS		13,516	2,407	3,235	2,709	7,582	7,639	7,337	7,623	8,048	8,128	8,367	8,940	9,617
CASH SURPLUS/(DEFICIT) AFTER DEBT SERVICING		(12,336)	2,439	846	736	(2,183)	(3,791)	(3,272)	(4,425)	(6,297)	(8,659)	(12,020)	(13,422)	(14,261)
OTHER SOURCES														
GRANTS, DEPOSIT WORK FUND, ETC.		130	121	60	64	(54)	69	171	167	166	150	149	180	212
CONSUMER DIPOSIT, PENSION FUND, ETC.		120	80	65	32	229	251	268	312	343	376	413	453	497
TOTAL OF OTHER SOURCES		250	201	125	96	175	320	439	479	509	527	562	633	709
CASH AVAILABLE FOR INVESTMENT PROGRAM		(12,086)	2,641	971	831	(2,008)	(3,471)	(2,833)	(3,946)	(5,789)	(8,132)	(11,458)	(12,789)	(13,552)
FINANCING SOURCES														
EQUITY		16,366	1,945	2,402	2,355	4,085	5,928	8,699	10,342	12,486	14,467	17,295	20,005	22,712
LONG TERM DEBT (GOB)		1,807	1,296	1,603	1,582	2,723	3,952	5,799	6,895	8,324	9,645	11,530	13,337	15,141
LONG TERM DEBT (ONLENT BY GOB)		6,403	4,932	1,307	1,845	1,319	1,384	1,460	1,541	1,626	1,717	1,813	1,813	1,813
TOTAL LONG TERM SOURCES		24,576	8,173	5,311	5,782	8,127	11,264	15,958	18,777	22,437	25,829	30,639	35,156	39,666
INCREASE IN CASH		1,686	2,864	1,258	1,092									
DEBT SERVICE COVERAGE RATIO		0.2	0.6	0.6	0.4	0.7	0.5	0.6	0.4	0.2	(0.1)	(0.4)	(0.5)	(0)
GOB SUPPORT TO MEET 1.2 DSCR						3,699	5,319	4,740	5,949	7,907	10,284	13,693	15,210	16,184
SELF FINANCING RATIO (%)		-112	33	16	15	-31	-39	-24	-27	-35	-46	-58	-57	-56
CASH SURPLUS WITHOUT OTHER IPP PAYMENTS		1,180	4,846	4,081	3,444	5,399	3,848	4,064	6,917	8,521	11,956	13,777	16,372	20,606
CASH COVERAGE RATIO FOR IPP PAYMENT						4.6	1.8	2.0	1.3	1.1	1.0	0.9	0.9	0.9
ADJUSTED CASH COVERAGE RATIO FOR IPP PAYMENT						4.6	1.8	2.0	2.0	2.1	2.4	2.6	2.8	3.2

DHAKA ELECTRIC SUPPLY AUTHORITY														
INCOME STATEMENT														
YEAR ENDING JUNE 30														
TK MILLION														
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
	[----- Audited -----]					[----- Forecast -----]								
OPERATING STATISTICS														
ENERGY PURCHASE IN GWH	3,696	4,162	4,551	4,936	5,419	5,947	6,338	6,552	7,962	8,637	9,389	10,206	11,061	12,018
T&D LOSSES (%)	31	30	29	27	28	28	28	28	28	28	28	28	28	28
ENERGY SOLD IN GWH	2,538	2,914	3,210	3,589	3,908	4,289	4,571	4,725	5,742	6,229	6,771	7,361	7,977	8,667
PURCHASE TARIFF (Tk/kWh)	1.58	1.59	1.58	1.62	1.69	1.72	1.83	1.91	1.99	2.07	2.15	2.23	2.31	2.39
SALES TARIFF (Tk/kWh)	2.22	2.23	2.22	2.42	2.45	2.41	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80
OPERATING REVENUE														
SALES REVENUE	5,638	6,510	7,135	8,696	9,875	10,333	11,194	11,808	14,637	16,189	17,936	19,866	21,927	24,257
OTHER OPERATING REVENUES	87	101	48	57	43	103	112	118	146	162	179	199	219	243
TOTAL OPERATING REVENUE	5,724	6,611	7,183	8,753	9,917	10,437	11,306	11,927	14,783	16,351	18,116	20,064	22,146	24,499
OPERATING EXPENSES														
COST OF ENERGY	5,823	6,603	7,187	7,998	9,240	10,228	11,619	12,536	15,871	17,908	20,217	22,794	25,586	28,762
OPERATING & MAINTENANCE EXPENSES	481	651	604	796	881	843	1,025	1,193	1,360	1,537	1,733	1,948	2,181	2,434
ADMINISTRATIVE EXPENSES	102	76	110	156	172	184	197	210	225	241	258	276	295	316
PROVISION FOR BAD DEBTS	65	76	118	164	205	207	224	236	293	324	359	397	439	485
DEPRECIATION	449	451	451	450	452	606	737	858	978	1,105	1,246	1,400	1,568	1,750
TOTAL OPERATING EXPENSES	6,920	7,857	8,471	9,564	10,949	12,067	13,802	15,033	18,727	21,115	23,813	26,815	30,069	33,746
OPERATING INCOME	(1,196)	(1,246)	(1,288)	(811)	(1,032)	(1,631)	(2,496)	(3,107)	(3,944)	(4,764)	(5,697)	(6,751)	(7,924)	(9,247)
NON OPERATING INCOME/DIVID. INCOME	36	43	49	62	83	78	85	88	113	125	138	153	168	185
FIXED CHARGES														
INTEREST	751	852	662	927	960	1,091	1,287	1,538	1,839	2,212	2,639	3,099	3,593	4,124
LESS: INTEREST DURING CONSTR.	404	512	358	627	674	771	883	1,024	1,187	1,391	1,606	1,846	2,108	2,394
INT. CHGD TO OPERATIONS	347	340	304	300	286	321	404	514	652	822	1,032	1,253	1,485	1,730
AMORT. OF CURRENCY FLUCTUATION	(344)	(453)	151	(393)	(278)									
NET INCOME	(1,851)	(1,996)	(1,392)	(1,443)	(1,514)	(1,874)	(2,815)	(3,532)	(4,483)	(5,460)	(6,591)	(7,851)	(9,241)	(10,792)
ADJUSTMENT FOR RETAINED EARNINGS	(0)	(0)	34	(3)	(17)									
RETURN ON ASSETS	-13%	-14%	-16%	-10%	-14%	-13%	-16%	-16%	-18%	-18%	-19%	-20%	-21%	-22%
RETURN ON EQUITY	-veEq	-veEq	-veEq	-veEq	-veEq	-veEq	-veEq	-veEq	-veEq	-veEq	-veEq	-veEq	-veEq	-veEq
OPERATING RATIO (%)	121	119	118	109	110	116	122	126	127	129	131	134	136	138

DHAKA ELECTRIC SUPPLY AUTHORITY														
BALANCE SHEETS														
TK MILLION														
June 30	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
	[----- Audited -----]				[----- Forecast -----]									
FIXED ASSETS.														
GROSS FIXED ASSETS	15,655	15,689	15,625	15,664	15,707	21,068	25,627	29,828	34,007	38,431	43,331	48,697	54,530	60,845
LESS: DEPRECIATION	6,625	7,075	7,479	7,929	8,380	8,986	9,723	10,581	11,559	12,665	13,911	15,311	16,879	18,629
NET FIXED ASSETS	9,030	8,614	8,146	7,735	7,327	12,082	15,904	19,247	22,448	25,766	29,420	33,385	37,651	42,216
WORK IN PROGRESS	8,076	10,254	12,211	14,050	16,245	13,815	12,731	12,664	13,404	14,850	16,259	17,678	19,137	20,659
TOTAL FIXED ASSETS	17,107	18,868	20,357	21,785	23,572	25,897	28,635	31,911	35,852	40,616	45,679	51,063	56,787	62,875
LONG TERM INVESTMENT	12	13	13	183	261	50	50	50	50	50	50	50	50	50
CURRENT ASSETS														
CASH	346	49	(700)	(927)	(93)	118	118	118	118	118	118	118	118	118
INVENTORIES	938	437	345	400	567	523	575	637	711	799	894	996	1,105	1,223
ACCOUNTS RECEIVABLES	4,161	5,005	6,302	8,076	10,278	12,344	14,583	16,945	19,872	23,110	26,697	30,670	35,056	39,907
BAD DEBT PROVISIONS	(392)	(467)	(586)	(750)	(955)	(1,162)	(1,386)	(1,622)	(1,914)	(2,238)	(2,597)	(2,994)	(3,433)	(3,918)
OTHER ASSETS	495	930	855	888	1,071	1,124	1,181	1,240	1,302	1,367	1,435	1,507	1,582	1,661
TOTAL CURRENT ASSETS	5,547	5,954	6,217	7,687	10,868	12,948	15,072	17,318	20,089	23,156	26,547	30,297	34,428	38,991
TOTAL ASSETS	22,666	24,834	26,587	29,655	34,701	38,895	43,756	49,279	55,991	63,822	72,277	81,410	91,265	101,917
EQUITY														
PAID-UP CAPITAL	3,322	3,868	4,426	5,177	6,121	7,222	8,819	10,894	13,256	16,285	19,845	23,983	28,758	34,217
GRANTS & DEPOSIT WORK FUND	199	241	267	257	291	291	291	291	291	291	291	291	291	291
APPRAISAL SURPLUS (AR&FEF Fund)	5,987	5,987	5,987	5,987	5,987	5,987	5,987	5,987	5,987	5,987	5,987	5,987	5,987	5,987
RETAINED EARNINGS	(8,802)	(10,799)	(12,157)	(13,603)	(15,133)	(17,007)	(19,822)	(23,355)	(27,837)	(33,298)	(39,889)	(47,740)	(56,981)	(67,774)
TOTAL EQUITY	706	(704)	(1,477)	(2,182)	(2,734)	(3,508)	(4,726)	(6,183)	(8,304)	(10,735)	(13,767)	(17,480)	(21,946)	(27,279)
LONG TERM LIABILITIES														
GOVERNMENT LOAN	1,274	1,638	2,023	2,524	3,157	3,841	4,856	6,189	7,714	9,683	12,006	14,715	17,848	21,438
FOREIGN LOAN	7,894	8,402	8,331	8,323	8,299	8,964	9,812	10,877	12,199	13,829	15,489	17,183	18,917	20,693
TOTAL	9,168	10,040	10,354	10,846	11,457	12,805	14,668	17,066	19,913	23,512	27,495	31,899	36,765	42,131
MEDIUM TERM LIABILITIES														
SECURITY DEPOSITS, PENSION FUND & GPF/CPF	511	556	640	739	800	833	895	940	1,144	1,256	1,382	1,522	1,670	1,839
CURRENT LIABILITIES														
ACCOUNTS PAYABLE - BPDB	2,968	4,259	5,171	6,861	10,101	13,647	17,676	22,022	27,525	33,734	40,744	48,647	57,518	67,490
ACCOUNTS PAYABLE - OTHERS	843	850	835	837	871	740	682	679	718	796	871	947	1,025	1,107
ACCOUNTS PAYABLE BANK LOAN, TAXES & DEPOSITS	3,811	5,109	6,007	7,698	10,971	14,387	18,358	22,701	28,243	34,530	41,615	49,594	58,544	68,597
UNCOLLECTED GOVT. DUTY	643	571	589	594	677	690	705	722	740	760	782	806	832	862
CURRENT PORTION OF LTD.	194	299	410	542	691	847	1,015	1,194	1,414	1,659	1,929	2,229	2,560	2,926
OTHER LIABILITIES - INTEREST	383	586	1,024	1,472	1,931	1,931	1,931	1,931	1,931	1,931	1,931	1,931	1,931	1,931
OTHER LIABILITIES	5,629	6,481	7,142	8,069	9,029	9,029	9,029	9,029	9,029	9,029	9,029	9,029	9,029	9,029
DEDUCTION BY GOVT. ON DSL AND RPA	7	7	8	10	14	14	14	14	14	14	14	14	14	14
TOTAL	1,615	1,888	1,890	1,867	1,867	1,867	1,867	1,867	1,867	1,867	1,867	1,867	1,867	1,867
TOTAL LIABILITIES & EQUITY	22,666	24,834	26,587	29,655	34,701	38,895	43,756	49,279	55,991	63,822	72,277	81,410	91,265	101,917
CURRENT RATIO	0.5	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
DEBT : DEBT & EQUITY RATIO (%)	93	108	117	125	131	138	148	157	172	184	200	221	248	284

DHAKA ELECTRIC SUPPLY AUTHORITY														
CASH FLOW STATEMENT														
YEAR ENDING JUNE 30														
TK MILLION														
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
	[----- Audited -----]					[----- Forecast -----]								
CASH FLOW FROM OPERATING ACTIVITIES														
OPERATING INCOME	(1,202)	(1,239)	(749)	(949)	(1,553)	(2,411)	(3,018)	(3,831)	(4,639)	(5,559)	(6,598)	(7,756)	(9,062)	
DEPRECIATION + OTHER NON-CASH EXPENSES	526	570	612	640	813	961	1,094	1,271	1,429	1,605	1,798	2,007	2,235	
TOTAL	(676)	(670)	(137)	(309)	(740)	(1,450)	(1,924)	(2,560)	(3,210)	(3,954)	(4,800)	(5,749)	(6,827)	
DEDUCTIONS														
INTEREST CHARGED TO OPERATION	340	304	300	286	321	404	514	652	822	1,032	1,253	1,485	1,730	
PRINCIPAL	586	437	459	459	465	498	541	594	660	741	824	909	996	
INCREASE IN WORKING CAPITAL	(1,883)	(997)	(1,322)	(2,375)	(1,509)	(1,807)	(2,055)	(2,718)	(3,160)	(3,628)	(4,156)	(4,737)	(5,401)	
OTHER	(45)	(85)	(99)	(61)	(33)	(62)	(44)	(204)	(112)	(126)	(139)	(149)	(168)	
TOTAL	(1,001)	(340)	(661)	(1,691)	(757)	(967)	(1,045)	(1,676)	(1,790)	(1,980)	(2,218)	(2,491)	(2,843)	
OTHER SOURCES (GRANTS, DEPOSIT WORK FUND)	41	26	(10)	34	-	-	-	-	-	-	-	-	-	
FUNDS AVAILABLE FOR INVESTMENT	366	(303)	513	1,415	16	(483)	(880)	(883)	(1,419)	(1,974)	(2,582)	(3,258)	(3,984)	
INVESTMENT PROGRAM	2,213	1,893	2,048	2,317	2,719	3,475	4,134	4,919	5,870	6,309	6,784	7,293	7,838	
FINANCING GAP	1,847	2,196	1,535	902	2,703	3,958	5,014	5,802	7,289	8,284	9,366	10,550	11,822	
FINANCED BY														
EQUITY & RESERVES	546	559	750	944	1,101	1,597	2,075	2,362	3,030	3,559	4,138	4,775	5,460	
LONG TERM DEBT (GOB)	364	385	511	634	734	1,065	1,383	1,575	2,020	2,373	2,759	3,183	3,640	
LONG TERM DEBT (FOREIGN)	506	517	47	157	1,080	1,296	1,555	1,866	2,239	2,351	2,469	2,592	2,722	
TOTAL	1,415	1,461	1,308	1,735	2,914	3,958	5,014	5,802	7,289	8,284	9,366	10,550	11,822	
INCREASE (DECREASE) IN CASH	(431)	(735)	(226)	833	211	0	0	0	0	0	(0)	0	(0)	
CASH BEGINNING OF PERIOD	346	49	(700)	(927)	(93)	118	118	118	118	118	118	118	118	
CASH END OF PERIOD	(85)	(686)	(927)	(93)	118	118	118	118	118	118	118	118	118	
DEBT SERVICE COVERAGE RATIO	(0.7)	(0.9)	(0.2)	(0.4)	(0.9)	(1.6)	(1.8)	(2.1)	(2.2)	(2.2)	(2.3)	(2.4)	(2.5)	
SELF FINANCING RATIO (%)	18	-15	25	60	1	-14	-21	-18	-25	-31	-38	-45	-53	

Annex 6

Project Processing Schedule

Project Schedule	Planned	Actual
Time taken to prepare the project (months)	12	20
First Bank mission (identification)	02/28/99	02/05/99
Appraisal mission departure	03/31/99	02/05/99
Negotiations	06/01/99	07/05/99
Planned Date of Effectiveness	06/30/2000	

Bank staff who worked on the project included:

Name	Speciality
S. Vijay Iyer	Task Manager/Senior Financial Analyst
Farida Mazhar	Principal Financial Officer/Guarantees
Andrew Fitchie	Guarantees Lawyer
Marc Heitner	Team Leader
Syed I. Ahmed	Country Lawyer
Mark Segal	Senior Economist
A.S.M. Bashirul Huq	Program Officer
M. Iqbal	Energy Specialist
Arun Banerjee	Energy Specialist
Stefan Jansson	Economist
Anthony Sparkes	Power Engineer
Jitendra Shah	Environment Specialist
Warren Waters	Social Specialist
Reidar Kvam	Social Specialist
Zaidi Sattar	Macroeconomist
Shekar Shah	Macroeconomist
Raihan Elahi	Financial Analyst
Anna Goodman	Team Assistant
Pratima Kochar	Program Assistant

Annex 7

Documents in the Project File

1. Environmental Assessment, Board, April 7, 1999.
2. Environmental Impact Assessment Report, March 1999.
3. Resettlement Action Plan, March 1999.
4. Indemnity Agreement.

Annex 8

Statement of Loans and Credits

Project ID	FY	Borrower	Purpose	Original Amount in US\$ Millions			Difference between expected and actual disbursements		
				IBRD	IDA	Cancel.	Undisb.	Orig	Frm Rev'd
P058468	2000	Bangladesh	Agricultural Serv. Innovation & Reform	0.00	5.11	0.00	5.02	0.17	0.00
P009484	1996	Bangladesh	Agriculture Research Management	0.00	45.12	1.37	23.01	23.47	0.00
P050745	1999	Bangladesh	Arsenic Mitigation Water Supply	0.00	32.55	0.00	31.07	9.07	0.00
P009496	1995	Bangladesh	Bangladesh Integrated Nutrition	0.00	53.94	0.58	34.55	20.27	0.00
P009549	1996	Bangladesh	Coastal Embankment Rehabilitation	0.00	61.99	0.00	15.53	3.61	7.17
P009482	1997	Bangladesh	DHAKA WATER/SAN. IV	0.00	68.58	0.00	57.21	38.23	0.00
P009524	1999	Bangladesh	Dhaka Urban Transport	0.00	173.87	0.00	161.63	8.74	0.00
P049790	1999	Bangladesh	Export Diversification	0.00	31.80	0.00	27.22	0.85	0.00
P009555	1993	Bangladesh	Female Secondary School	0.00	66.56	0.00	14.90	13.10	10.04
P044811	2000	Bangladesh	Financial Institutions Development	0.00	46.39	0.00	46.39	0.00	0.00
P009470	1992	Bangladesh	Forest Resources Management	0.00	48.95	3.29	9.42	11.30	4.15
P009468	2000	Bangladesh	Fourth Fisheries	0.00	27.70	0.00	26.77	1.48	0.00
P009533	1995	Bangladesh	Gas Infrastructure Development	0.00	112.19	0.00	52.79	54.51	55.87
P037857	1998	Bangladesh	HEALTH AND POP PROGRAM	0.00	249.44	0.00	178.13	-0.17	0.00
P041887	1999	Bangladesh	Municipal Services	0.00	134.47	0.00	128.32	132.59	0.00
P009560	1996	Bangladesh	NON-FORMAL EDUCATION	0.00	9.57	0.00	5.58	2.10	0.00
P044789	1998	Bangladesh	PRIV SEC INFR DEVT	0.00	226.41	0.00	225.15	114.82	0.00
P040985	1997	Bangladesh	Poverty Alleviation	0.00	97.76	0.00	13.37	-0.06	0.00
P009550	1998	Bangladesh	Primary Education Development	0.00	149.32	0.00	142.88	35.80	0.00
P009545	1996	Bangladesh	River Bank Protection	0.00	149.69	0.00	31.83	9.60	13.39
P040713	1998	Bangladesh	SILK DEV PILOT PROJ.	0.00	11.16	0.00	9.76	4.55	0.00
P009465	1994	Bangladesh	Second Road Rehabilitation & Maintenance	0.00	219.05	0.00	68.46	-14.64	0.00
P009518	1997	Bangladesh	Second Rural Roads & Markets	0.00	142.45	0.00	72.25	4.61	19.59
P009540	1991	Bangladesh	Improvement	0.00	48.27	0.00	12.65	8.34	6.93
P037294	1999	Bangladesh	Third Inland Water Transport	0.00	273.61	0.00	261.88	22.23	0.00
Total:				0.00	2485.95	5.24	1655.77	504.57	117.14

Annex 9

Bangladesh Gas Reserves, Production and Transportation

Gas Reserves

1. Bangladesh potentially have very large natural gas resources. Proven gas reserves in Bangladesh are estimated at 12.7 trillion cubic feet (TCF), of which 3.1 TCF have been produced and 9.7 TCF remain. The remaining proven and probable reserves could probably be increased by as much as 10 TCF using existing production structures. With annual production of about 0.28 TCF, the ratio of reserves to production is estimated at 35 years compared to 10-15 years for most gas producing countries. (See Table 1 below). The State owned entity, Petrobangla, has responsibility for overseeing the entire hydrocarbon resources of the country. It is involved, through its various subsidiaries, in oil and gas exploration, production, and distribution.

Gas Production

2. Natural gas in Bangladesh is produced by two subsidiaries of Petrobangla - Sylhet Gas Fields Ltd. and Bangladesh Gasfields co. Ltd. In 1993, the Government announced a new petroleum policy, which provided for private sector participation in the Gas sector through production sharing contracts (PSCs) to augment the gas production activities of Petrobangla's production operating companies. To date, Petrobangla has signed six PSCs with companies such as Occidental, Cairn Energy PLC, Holland Sea Search, Unocal, Rexwood-Oakland and UMC Bangladesh Corporation. Table 1 gives details of the main gas producing fields and their production capacity, including the development activities of the international companies. Cairn Energy (UK) explored and developed the Sangu offshore field which started production in 1998 and has a rated capacity of 160 MMCFD while Occidental (US) recently started production from its Jalalabad field which has a rated capacity of 100 MMCFD. Total production capacity is currently estimated at 1,075 MMCFD and is projected to increase to 1,254 MMCFD by 2004/5. Almost 50 percent of the gas is used for power generation, and the balance for fertilizers, industries and residential consumption. According to a recent study, a shortfall in gas production could emerge from year 2003/4. Given that both foreign oil companies and Petrobangla have reserves awaiting development, a decision will have to be taken not later than 2002 whether the supply gap in 2003/2004 will be met by developing Petrobangla's fields, or by contracting foreign oil companies for the additional quantities.

Gas Transport

3. Several recent studies have reviewed the country's existing natural gas transmission system in the context of projected gas demand and have concluded that that the North-South pipeline system from Rashidpur to Ashuganj would not have adequate capacity to handle flows beyond 2001 and leading up to 2004/2005. To address this capacity constraint it was recommended a phased investment of a 30-inch loop between Fenchuganj and Ashuganj. The first phase of the proposed investment, consisting of the construction of a 30-inch loop between Habiganj and Ashuganj, is already under tendering by Petrobangla and is being funded through the Government's investment budget. The second phase, involving a second 30-inch loop between Fenchuganj and Habiganj is expected to be undertaken sometime in 2002/3.

Table 1: Natural Gas and Condensate Reserves of Bangladesh

	Year Discovery	Gas in Place	Natural Gas (billion cubic feet)				Condensate			
			Receivable Reserves P+P	Recovery Factor	Cumulative Production 12/31/97	Net Remaining Reserves	Receivable Reserves P+P	Cumulative Production 12/31/97	Net Remaining P+P Reserves	
A. Producing Fields										
Bakhrabad	19	1,432	867	61	534	333	2.13	0.78	1.35	
Belabo (Narsingdi)	1990	194	126	65	10	116	0.31	0.02	0.29	
Feni	19	132	80	61	39	41	0.24	0.09	0.15	
Habiganj	19	3,669	0,895	52		1,260	0.1	0.03	0.07	
Kailashtila	1982	3,657	2,529	89	135	2,394	27.50	1.57	25.99	
Meghna	19	159	104	65	4	100	0.21	0.01	0.20	
Rashidpur	19	2,242	1,309	56	110	1,199	4.0	0.16	3.84	
Sangu (2)	1996	1,031	846	82	-	846	N/A	-	N/A	
Sylher (Haripur)	1955	444	266	60	150	106	0.89	0.55	0.34	
Titas	1982	4,130	2,100	51	1,459	841	3.02	1.95	1.07	
Subtotal		17,098	18,124		3,070	7,046	38.46	5.16	33.30	
B. Suspended Fields										
Chhatah	1959	58	35	62	27	9	0.08	-	0.06	
Kamta	1991	325	195	60	21	174	0.04	-	0.04	
Subtotal		383	231		40	183	0.12	-	0.12	
C. Non-Producing Fields										
Beanibazar	1981	243	167	69	-	167	1.82	-	1.82	
Begumngoni	1977	25	15	60	-	15	0.01	-	0.01	
Fenchuganj	1988	350	210	60	-	240	0.52	-	0.52	
Jalalabad (1)	1989	1,500	900	60	-	900	15.15	-	15.15	
Kutubdia (2)	1977	780	468	60	-	468	0	-	0	
Samulang (2)	1995	164	98	80	-	98	0.02	-	0.02	
Shabazpur (3)	1995	514	333	65	-	333	N/A	-	N/A	
Shadanadl	1996	200	140	70	-	140	0.42	-	0.42	
Subtotal		3,776	2,331		-	2,331	17.84	-	17.84	
GRAND TOTAL		25,257	12,686		3,128	9,560	58.52	5.16	21.38	

Main source of GIP and P+P ultimate recovery by Petrobangla's report of February 1997, with exceptions of Chhatala Fields - see Note 4.

Note 1: Jalalabad is under PSC with Oxy.

Note 2: Kulubdia, Semulang, and Sangu fields are under a PSC with Caim. Source of recoverable reserves is Caim.

Note 3: Source of recoverable reserves for Shabazpur is Unocal.

Note 4: The P+P reserves in Chhatala of 1900 BCF GIP were not considered reasonable and have been reduced to 56 BCF GIP with a recovery of 36 DCF.

Annex 10

Macroeconomic Impact of Foreign Investment for IPPs

Background

1. The Bangladesh economy has enjoyed a fair degree of macroeconomic stability and moderately improved growth performance recently. During the last three years, GDP growth has averaged 5 percent with inflation of around 6 percent, low current account deficit of about 2 percent of GDP, and modest but sustainable fiscal deficits of around 4 percent of GDP. The economy is moderately indebted with debt service at around 10 percent of foreign exchange earnings. However, economic activity is being seriously hampered by energy shortages which deprive the economy of 0.3-0.5 percentage points of GDP growth each year. Unless adequate generation capacity is established in the short to medium term, the 7 percent annual GDP growth required to have a perceptible impact on poverty reduction is unlikely to materialize soon.

2. Attracting private foreign investment in power generation is a feasible option for solving the power crisis. The present exercise seeks to highlight the macroeconomic implications of meeting energy shortages through the instrument of limited IPPs, focusing primarily on the economy's ability to meet its foreign exchange liabilities arising from the FDI in IPPs, while maintaining macroeconomic stability.

Impact of Energy FDI

3. The macroeconomic impacts of energy sector reform with limited intake of FDIs (and removal of energy constraints) are captured in a modeling framework that postulates GDP and its components (agriculture, manufacturing and services) to respond to the increasing energy supplies coming from investment in gas and power sectors. In Bangladesh, the manufacturing sector has a higher energy-intensity and a higher elasticity response than either agriculture or services. Given its share in GDP (26 percent), energy elasticities of manufacturing output are estimated at 0.1 (with energy constraint) and 0.15 (once energy constraint is removed).

4. **Macro Implications of Limited IPPs:** A scenario on the following assumptions has been developed to assess the impact of FDI inflows involving 7 IPPs that have been presently contracted. These IPPs being: 360 MW Haripur, 450 MW Meghnaghat I, 450 MW Meghnaghat II, 170 MW Baghabari, 130 MW Baghabari barge, and 110 MW each for Khulna and Haripur barge. It is assumed that no further IPPs come on stream until 2010 and investment in gas is limited to first and second round bids; power supply grows 10 percent a year due to IPPs, but only upto 2003 after which energy constraints kick in; and GDP growth averages 5.3 percent during 2001-10. External debt service ratio rises, but still remains at a modest average level of 16 percent during 2006-10 [see Table 1]. However, any slippage from a minimum 10 percent annual export growth, on a sustained basis, could result in the economy becoming vulnerable to foreign exchange shortages with a debt service ratio reaching 20 percent. Long-term sustainability in fiscal performance will still require fiscal measures such as extension of VAT, gas and power tariff adjustments and strengthening of revenue collection efforts at BPDB..

5. **Alternative Scenario:** An alternative scenario of providing energy supply through public investments was also examined through the same modelling framework. The assumption was that the Government provides all the funds needed for alleviating energy shortages from internal sources and without carrying out sectoral reforms. Investments in power transmission and distribution are also to be financed entirely by the Government. The energy elasticity response, particularly in the manufacturing sector, and generally on GDP, is muted. The results show that both the internal and external debt

sustainability conditions are not met and the present value profile of total debt spirals upward beyond 2000. Large fiscal deficits lead to excessive domestic borrowing—the domestic debt ratio quadruples by 2010—with all the adverse consequences on private investment, inflation and interest rates. Present value profile of total debt clearly show that this scenario is not sustainable.

6. **Observations:** The key messages emerging from this analysis are the following:
- (a) for a limited number of IPPs (say 7 in number) to be viable, the economy would have to register a strong export performance of at least 10 percent annual growth in the next decade (2001-10). Strengthening of revenue effort at BPDB is also imperative for maintaining fiscal balance;
 - (b) unless energy investments stimulate domestic production with adequate spillover into exports, the wherewithal for future debt servicing and profit repatriation might be found lacking. Calculations show that the negative impact on reserves is minimized, if not reversed, if increased power supplies contribute 20-30 percent to incremental exports. Herein lie the downside risks: should export performance falter, the economy could face foreign exchange constraints, hurting its ability to service debt liabilities;
 - (c) the Government can hardly afford to undertake an internally financed investment program in the energy sector without carrying out sectoral reforms. Even with sectoral reforms, there are risks of unstable debt dynamics and crowding out of government investments in social sectors in the public investment scenario unless the investments in energy are financed by more concessional bilateral and/or multi-lateral aid; and
 - (d) there is an important asymmetry between the downside risks and upside opportunities associated with the energy FDIs. The costs to the economy are more certain than the benefits. Once the FDI deals with the IPPs are signed, the projected repatriation payments are virtually locked-in by government guarantees. The postulated productivity and export effects, however, remain contingent on improvements in power sector management and on the prevalence of an enabling business environment. The latter depends critically on continuation of political stability and policy reforms. The costs of failures in these areas will be higher in the presence of the additional energy FDI.

7. Thus, in order to deal with the risks posed by the energy FDI, which is especially significant in the context of Bangladesh's fragile financial system and the weak fiscal state of BPDB, this analysis underscores the need for comprehensive reforms not just in the energy sector but also in external trade, to achieve greater export orientation, and in macroeconomic management, in order to be better prepared to respond to a possible external payment problem. Sustaining the hitherto strong export performance into the first decade of the next century will certainly provide the basis for a more vigorous foreign private participation in the energy sector.

8. **Impact of adding more IPPs:** This imposes additional foreign exchange payments liabilities; hence, the need for a much stronger export performance -- at least 12-13 percent annual growth -- which is a formidable order for any economy in the long-term. Therein lie the external risks. Internally, there would need to be more far-reaching reforms in the energy sector in order to improve the operational and financial performance of electricity utilities so that the power utilities, notably BPDB and DESA, are able to generate sufficient operating cash revenues to pay their obligations to independent power producers. In addition, there would be a need for a much stronger revenue effort to keep domestic debt burden under control and fiscal balance in line.

Government Monitoring

9. **Monitoring Systems:** Against the background of Government's concern on the implications of servicing FDI, the Bangladesh Bank intends to establish a mechanism to monitor the inflows of private capital and outflows of profit and income repatriation (including interest and principal payments on private debt). The foreign exchange obligations and contingent liabilities arising from the IPP program would form a subset of this system. The Asian Development Bank is funding the project to set up the external debt monitoring system to which the World Bank is providing staff and technical inputs.

10. The IPP payments monitoring system (IPMS) would collect and evaluate information from the utilities and Bangladesh Bank and prepare a bi-annual brief on the status of the following indicators:

- (a) **Ratio of external debt service.** Given the emergence of payment obligations from FDI, it has become necessary to include servicing of publicly guaranteed FDI obligations and supplier credits (in addition to the traditional volume of concessional debt service payments) in relation to exports of goods and services (including worker remittances);
- (b) **Present value.** Value of annual debt service payments discounted by appropriate domestic and international interest rates of external debt service to exports of goods and services (including worker remittances);
- (c) **Ratio of external debt service to GDP;**
- (d) **Present value of external debt service to GDP; and**
- (e) **Ratio of IPP payments to projected foreign exchange reserve.**

11. In order to establish and operate this system successfully, the following steps are being taken with assistance from the World Bank, as necessary:

- (a) Bangladesh Bank is preparing an information input format which would enable receiving payments-related data from utilities such as BPDB and Titas/Petrobangla, as well as from private sector entities;
- (b) Bangladesh Bank is setting up a mechanism to process this information and compute the indicators described in the previous paragraph;
- (c) Bangladesh Bank will develop a format for reporting these indicators to MOF on a bi-annual basis; and
- (d) MOF to develop a review mechanism and generate a report to the high-level committee if necessary.

Table 1: Base Case Scenario (Business as usual)					
Indicators	1999	2000	2001	2002-05 (average)	2006-10 (average)
	.....(in percent).....				
Real Sector					
Growth Rate of GDP	4.3	5.1	5.3	5.4	5.3
Investment Growth (GDI)	7.8	8.9	7.5	5.4	4.6
Per Capita GDP Growth	2.7	3.4	3.7	3.9	3.7
Exports/GDP	12.8	14.0	14.1	14.7	15.8
Imports/GDP	19.6	22.1	22.3	22.2	21.8
Private Investment/GDP	16.7	17.4	17.9	18.0	17.5
Public Investment/GDP	6.0	6.3	6.3	6.3	6.1
Gross Domestic Savings/GDP	15.9	15.6	15.9	16.7	17.7
Gross National Savings/GDP	19.6	19.2	19.3	19.4	19.4
Fiscal Performance					
Total Revenues/ GDP	9.8	10.9	11.6	11.9	12.1
Total Expenditures/GDP	14.5	14.7	15.1	15.0	14.8
Government Deficit/ GDP	-4.7	-3.8	-3.5	-3.1	-2.7
Foreign Financing/GDP	2.3	2.0	2.2	2.1	1.8
Domestic Borrowing/GDP	2.4	1.8	1.4	0.9	0.9
Sustainable Primary Deficit/GDP	-3.5	-3.6	-3.6	-3.4	-2.6
Primary Fiscal Deficit/GDP, before grants	-3.3	-2.	-2.0	-1.7	-1.6
Primary Fiscal Deficit/GDP, after grants	-2.1	-1.5	-2.0	-1.3	-1.3
Domestic Debt/GDP	12.2	12.0	11.3	9.2	7.5
Balance of Payments					
Nominal import growth rate	14.4	15.2	9.7	7.8	7.4
Nominal export growth rate	2.8	11.3	9.6	10.0	10.1
Current Account Deficit/GDP	-3.1	-4.5	-4.8	-4.9	-4.2
Sustainable Current Account Deficit/GDP	-0.8	-1.1	-1.1	-1.0	-0.5
Primary Current Account Deficit/GDP	-2.6	-3.9	-4.3	-4.2	-3.2
Gross Reserves (US\$ mil.)	1645	1806	1982	2462	3448
Gross Reserves (months imports GFS)	2.1	2.0	2.0	2.0	2.0
External Debt Profile					
External Debt/GDP	30.1	31.6	31.6	30.1	24.6
Debt Service/(XGS+Remit.)	9.1	10.0	11.5	11.9	16.3
Debt Service/GDP	1.5	1.8	2.1	2.2	3.1
PV External Debt/(XGS+Remit.)	163	146	134	102	53
PV External Debt/GDP	27	26	24	18	10

Annex 11

Environmental and Social Action Plan
(see Section V.E. of the Project Appraisal Document)

Table 1: Construction Impact Mitigation, Monitoring, and Management Measures

Issue/Concern	Management Measures	Net Effects	Monitoring
Sitalakhya River Dredging			
Disruption of aquatic habitats.	The best available hydraulic dredging equipment will be utilised and dredging activities carried out as expeditiously as possible.	Short-term impacts are anticipated during dredging and drying activities. However, they can be greatly minimised with the proper dredging and drying of materials.	The Environmental Inspector (EI) will monitor the effectiveness of the preventative siltation measures taken by the EPC Contractor.
Disruption to fishery resources.	Dredging activities will occur during the months of March through May when water levels and flow are the lowest and fish spawning is not occurring.		The EI will monitor and assess the effectiveness of the temporary containment areas for the dredged material to ensure excess run-off is not entering the Sitalakhya River and/or Akkha Canal.
Siltation effects in the Sitalakhya River.	Dredged materials will be dried on-site in an area capable of containing and filtering muddy water and sediments.		
Disruption of river traffic and related safety concerns.	BIWTA will be consulted to determine appropriate safety and/or scheduling standards to be followed. Dredging will be conducted according to an approved dredging plan.	No significant effects are anticipated provided BIWTA is consulted prior to dredging commencement.	The EI will also monitor and assess transportation and safety conditions on the Sitalakhya River.
Site Filling			
Alteration of surface drainage patterns and flows. Potential for flooding on adjacent lands.	Detailed site design will determine how to divert site drainage to minimise impacts to the land and water adjacent to the project site.	No significant net effects are anticipated as a result of site grading activities. However, depending on the drying process selected short-term impacts may be experienced in areas immediately adjacent to the project site.	The EI will monitor site filling and grading activities to ensure run-off from the project site is controlled and filtered where appropriate. The EPC Contractor will also directly supervise site grading activities to ensure compliance with the detailed site design.
	Sediment fencing, or equivalent, will be installed around the perimeter of the project site to minimise run-off and siltation effects from site filling activities.		
Contaminated Sediments			
Surficial sediment samples were collected and analyzed during preparation of the EIA. No contamination was identified in these samples. However, the potential to encounter contaminated sediments during dredging activities and to re-suspended them in the water column and deposition in new downstream locations may exist.	Prior to dredging, representative sampling will be undertaken to determine the potential for contaminants and suitability of the material for use on the project site. Dredging activities will occur during the months of January through April when water levels and flow are the lowest and fish spawning is not occurring. The EPC Contractor will be required to employ dredging methods that minimise adverse effects on the river.	Based on the preliminary results of the surficial sediment sampling undertaken to date, no re-suspension of contaminants is anticipated.	The EI will monitor the effectiveness of dredging methods used by the EPC Contractor and where contaminated sediments are identified the EI will ensure dredging activities do not occur in these areas.

Table 1: Construction Impact Mitigation, Monitoring, and Management Measures (contd.)

Construction of Bridge over Akkha Canal	Construction of the access bridge may result in some instream activities that have the potential to release sediments into the Akkha Canal and disrupt fish passages.	At the crossing locations, on the banks of the Akkha Canal, construction berms and/or sediment fencing should be installed to minimise the amount of site run-off entering the Canal.	No significant effects are anticipated if mitigation measures are properly implemented.	The EI will monitor Canal crossing activities to ensure run-off from the project site and siltation of the Akkha Canal is minimised and contained where appropriate.
Jetty Construction	Disruption and/or relocation of fishing traps and informal country boat landing area.	<p>Advance notice will be given to those persons potentially affected by construction activities.</p> <p>A general shipping and receiving schedule should be established and fisherfolk and country boat operators informed so they are generally aware when vessels will be using the jetty and surrounding area.</p> <p>Where feasible, construction of the piling supports will coincide with dredging activities to avoid repetitive impacts associated with siltation in the Sitalakhya River.</p>	<p>Short-term and periodic disruptions to established fishing and landing areas.</p> <p>Potential localised, short-term sedimentation impacts may occur.</p>	Grievance mechanism is provided in the EIA to allow direct communication with the Sponsor. No additional monitoring is required.
Social Concerns	Economic Dislocation of Informal Country Boat Operators	Compensation will be paid to these projects affected people as outlined in the Resettlement Action Plan (RAP).	Loss of on-site landing area.	Monitoring activities outlined in RAP.
Economic Dislocation of Agricultural Plot Holders, Tenants, and Day Labourers.	<p>Since the land is owned by the Ministry of Industries and has been designated for industrial development since 1956, no long term dislocation management plan has been developed.</p> <p>A one-time lump sum payment will be made by AES to the agricultural plot stakeholders based on the productivity of an individual's plot averaged over one year as discussed in the RAP. Compensation will be paid prior to the initiation of major on-site construction activities as per the RAP.</p> <p>A community liaison officer will also be appointed by AES to resolve any unforeseen issues in a mutually acceptable way to those involved.</p>	A net loss of approximately 8.03 acres of cultivated land.	Monitoring activities outlined in RAP.	

Table 1: Construction Impact Mitigation, Monitoring, and Management Measures (contd.)

Resettlement (Access Road)	<p>AES is acquiring land for the proposed access road. Land acquisition and/or relocation of existing residents are being undertaken consistently with IFC, World Bank, and Bangladesh guidelines.</p> <p>A community liaison officer will also be appointed by AES to resolve any issues in a mutually acceptable way to those involved. The CLO will also aid in easing the transition of the resettled families between communities [refer to RAP for additional information].</p>	<p>Land required for the access road is being obtained under a willing buyer – willing seller condition. Compensation rates have been negotiated and are discussed in detail in the RAP. With the effective implementation of the RAP, no significant net effects are anticipated.</p>	<p>The Community Liaison Officer will maintain open channels of communication between the resettled families and AES. Where unforeseen issues arise, AES take an active role to help resolve the issues with those directly involved.</p>
Influx of Temporary Labourers	<p>Where appropriate, the EPC Contractor will assist in finding suitable accommodations for the small imported workforce.</p> <p>However, considering the proximity of Dhaka City, Narayanganj, and other developed areas near the project site, it is anticipated that these persons will be able to find local accommodations already in place.</p>	<p>The influx of workers may result in an increased demand for goods and services in the local area. It is seen that most effects will be beneficial to the economy of the area, but may have some adverse impacts due to overcrowding.</p>	<p>AES will monitor impacts to the local village during construction of the power plant and will work with EPC Contractor and Community Liaison Officer to mitigate any adverse effects.</p>
Cultural Properties: increased noise impacts during the construction period to the Kuripara Mosque.	<p>With implementation of the mitigation measures identified throughout this section, no additional mitigation measures are required.</p>	<p>No net effects are anticipated as a result of project development activities.</p>	<p>Grievance mechanism is provided in the EIA to allow direct communication with the Sponsor. No additional monitoring is required.</p>
Procurement of Local Labour, Goods, and Services			
Economic benefits to the Haripur Region.	<p>Contractors will be encouraged to utilise local labour, goods, and services. Whenever these are available at competitive quality and price, contractors will be expected to follow a local procurement policy.</p>	<p>The construction phase of the project will create significant local benefits, which are estimated to be several millions of dollars.</p>	<p>None</p>

Table 2: Operation Impact Mitigation, Management, and Monitoring Measures

Issue/Concern	Management Measures	Net Effects	Monitoring
<p>Air Quality</p> <p>NOx emissions at or below 50% operating condition.</p>	<p>Use dry low-NOx burner for the gas turbine.</p> <p>Use of a 60-meter high stack to optimise dispersion of exhaust gases.</p> <p>Monitor operating load conditions.</p> <p>Monitoring of natural gas parameters.</p>	<p>As the power plant is designed as a base load facility, it is anticipated that the power plant will operate at high-end loads. Operation under low-end load conditions are expected to be infrequent and of a short duration only (start-up and shut-down activities).</p> <p>As such, the annual average NOx emissions rate is expected to comply with IFC, World Bank, and Bangladeshi emission guidelines.</p>	<p>Monitoring of NOx emissions at plant start-up (first quarter), during low load scenarios (i.e. less than 55%), and where required annually.</p> <p>Monitoring of gas quality.</p>
<p>Noise</p> <p>Elevated sound levels at some nearby receptors.</p>	<p>Layout the plant to direct noise away from sensitive receptors.</p> <p>Use of barrier and acoustical attenuation to minimise noise as discussed in Appendix M of the EIA.</p> <p>Power plant will be compliant with all applicable guidelines.</p>	<p>Where the noise model indicated the possibility for exceedence (eastward vector/Kuripara Village), mitigation options were examined to bring the power plant into full compliance with applicable IFC, World Bank, and Bangladesh guidelines. The Sponsor is incorporating appropriate mitigation measures in design of the power plant to ensure the full compliance with noise emission limits.</p>	<p>One time measurement of noise contribution after plant commissioning at 100% load condition.</p>
<p>Effluent Water Discharge</p> <p>Cooling Water Discharge</p> <p>Thermal cooling water discharge to Sitalakhya River</p>	<p>Discharge at the deepest point of the river.</p>	<p>Temperature of effluent discharge and river water temperature rise 100 meters from the outfall port will meet IFC, World Bank, and Bangladesh guidelines.</p>	<p>The Sponsor will undertake one time monitoring to delineate the extent and characteristics of the thermal plume.</p>
<p>Wastewater Discharge</p> <p>Wastewater discharges from pre-treatment system, boiler blowdown, Heat Recovery Steam Generator (HRSG) sump, make-up water treatment system, and sewage treatment system.</p>	<p>Treatment of all wastewater prior to discharge into Sitalakhya River. Construction and operation of wastewater effluent treatment systems.</p>	<p>Discharge wastewater will comply with Bangladesh, IFC and World Bank Guidelines.</p>	<p>Quarterly monitoring of wastewater effluent quality will also be undertaken by the Sponsor to ensure compliance with applicable guidelines.</p>

Table 2: Operation Impact Mitigation, Management, and Monitoring Measures (contd.)

Local Employment			
Approximately 20 to 25 skilled and semi-skilled personnel will be hired to operate the power plant.	Provide necessary training to develop local work force. Implement training programs to facilitate advancement of local persons.	Positive impact on local employment and skill upgrading.	None
Local Procurement of Goods and Services			
Participation of the local economy in the development of the power plant.	The Sponsor and their EPC Contractor will follow a policy of preferential local purchase of goods and services whenever they are available locally at an appropriate level of quality and at competitive prices.	The project by its nature will create positive benefits that will be enhanced by adopting a proactive procurement approach.	None
Bangladesh Power Supply			
Power supply to the national grid.	Maintain plant in good running order.	Contribution of a reliable 360 MW of power to the national grid.	Tariff metering provided to BPDB as per Power Purchase Agreement

Annex 12

Term Sheet for IDA PRG Loan Facility and the IDA PRG

BORROWER:	AES Haripur (Private) Ltd. (AESH).
GUARANTOR:	International Development Association.
FACILITY AMOUNT:	US\$ 60.9 million consisting of: Tranche A: US\$ 10.9 million. Tranche B: US\$ 50.0 million.
CURRENCY:	US Dollars.
LEAD ARRANGER:	Citibank N.A. as Lead Arranger and lender, together with a syndicate of banks consisting of the same participating banks as in the IFC B Loan Facility.
LENDERS:	Citibank N.A., Kleinwort Dresdner Bank, ANZ Grindlays, Credit Agricole Indosuez and Hypovereinsbank.
AGENT BANK:	Citibank N.A.
USE OF PROCEEDS:	Proceeds to be used for design, engineering, procurement, construction and financing costs of the Project (excluding development fees, lease payments, local taxes and duties).
AVAILABILITY:	The Facility will be available for drawing subject to the satisfaction of all Conditions Precedent contained in the Common Terms Agreement and in the IDA PRG Facility Agreement from Financial Closure until after Commercial Operations Date (COD).
DRAWDOWN:	Pari Passu with the IFC A and B loans for the Project.
TERM:	Tranche A: 15 years including 10-year grace period. Tranche B: 15 years including 2-year grace period.
REPAYMENTS:	(a) Tranche A will be repayable in equal semi-annual installments of principal payments, the first repayment commencing after the amortization of the IFC B loan in year 10; and (b) Tranche B will be repayable in equal semi-annual installments of principal payment with the first repayment commencing six months after COD.
INTEREST RATE:	Variable rate based on six months US\$ LIBOR.
MARGIN:	Tranche A: 2.25 percent p.a., payable by AESH to the lenders (indicative). Tranche B: 2.00 percent p.a., payable by AESH to the lenders (indicative).

COMMITMENT FEE:	1 percent p.a. on undrawn commitments, payable by AESH to the lenders, quarterly in arrears from signature of the IDA PRG Facility Agreement.
FRONT-END FEE:	1.75 percent of IDA PRG Facility amount, payable by AESH to the lenders, within 30 days from signature of the IDA PRG Loan Facility.
IDA GUARANTEE FEE:	During disbursement: 75 bp p.a. on disbursed amounts; 25 bp p.a. on undrawn amounts; and thereafter, 75 bp p.a. on the outstanding amounts of principal as of the date of fee payment. All fees will be payable in advance of each interest period (the first fee payment would fall on the date of effectiveness of the IDA PRG, or 60 days from signature, whichever is earlier).
IDA INITIATION FEE:	IDA will charge AESH a one-time Initiation Fee of 0.15 percent of the IDA PRG Facility amount or US\$ 100,000 (whichever is higher) to cover IDA's project preparation and development costs, payable upon first disbursement of the IDA PRG Facility. IDA may also charge a Processing Fee of up to 0.50 percent of the PRG Facility amount to cover IDA's out-of-pocket and other expenses.
PARTIAL RISK GUARANTEE:	<p>The IDA PRG is non-accelerable and any payment thereunder will be in accordance with the original amortization schedule of the IDA PRG Facility. However, IDA has the option, exercisable at its sole discretion, to prepay the guaranteed lenders the outstanding guaranteed loan amount plus accrued interest. IDA will guarantee to the Agent, acting on behalf of the IDA-guaranteed Lenders, amounts of scheduled principal and interest the Agent would have otherwise received from AESH but for the failure of the Government to discharge payment obligations under the Implementation Agreement and the Government Guarantee, (reduced by any amounts which the Government may have paid in part settlement of its obligations and any amounts the Lenders are entitled to withdraw from debt payment and debt service reserve accounts).</p> <p>If there is a dispute between the Government and AESH as to the Government's obligation to pay or the amount of its liability, the IDA PRG would be callable only in respect of amounts that the Government is obligated to pay, and fails to pay, in accordance with the dispute resolution procedures contained in the Implementation Agreement or the Government Guarantee.</p> <p>In the event the Government takes legal action in breach of its commitment in the Implementation Agreement to resolve dispute by arbitration, or a third party takes legal action in Bangladesh to prevent arbitration being pursued by the company and/or the IDA guaranteed lenders, the IDA Guarantee lenders may demand provisional payment under the IDA PRG after a waiting period of six months during which AESH and the IDA guaranteed lenders must have exercised "best endeavors" to remove the impediment to arbitration. Subject to best endeavors and the provision of acceptable security, IDA would make provisional payment. If at any time, within three</p>

years subsequent to such payment, arbitration proceedings determined that the Government had no liability or less liability than the provisional payment amount, IDA would be entitled to “claw-back” the provisional payment from the lenders by calling on the security. IDA would not owe any legal duty to the Government to exercise such right of “claw-back”.

PRG COVERAGE:

- (a) Breach of Contract: failure of Government to pay an undisputed amount due under the GOB Guarantee or the Implementation Agreement, including:
 - (i) payments due pursuant to the Power Purchase and Gas Supply Agreement;
 - (ii) any Termination Amount (limited to outstanding IDA PRG Facility debt) in respect of GOB Event of Default;
 - (iii) GOB payment obligations resulting from occurrence of natural force majeure preventing or delaying the construction of interconnection facilities or gas supply pipeline); and
 - (iv) indemnity in respect of invalidity of the PPA, GSA or Land Lease Agreement.
- (b) Expropriation or Nationalization;
- (c) Foreign currency convertibility and transferability: any inability to convert or any restriction imposed under applicable laws of Bangladesh on the conversion of Taka into US\$ or the transfer of US\$ out of Bangladesh;
- (d) Changes in the laws of Bangladesh:
 - (i) making the performance by the Government of its obligations or the exercise by the Company of its rights under the Implementation Agreement; or
 - (ii) making the exercise by the lenders of their rights under the financing documents illegal, unenforceable or void; or
 - (iii) having a material adverse effect on the ability of the Company to pay or the lenders to receive or recover payment of any principal or scheduled interest amounts liability under the IDA Guarantee, provided the effect of such changes in law is continuing for more than 90 days; or
 - (iv) making the construction and operation or maintenance of the Project subject to more onerous requirements.
- (e) The inability of the Company or/and the IDA guaranteed lenders to commence or complete dispute resolution in accordance with the Project Agreements by reason of court proceedings initiated by the Government or its agencies (or by third parties in Bangladesh courts) to stay, prevent or annul the dispute resolution process or to have the dispute transferred to or determined by court proceedings; and

- (f) The failure to supply: (i) the requisite quality of gas for any reasons; or (ii) the requisite quantity of gas, except by reason of force majeure outside Bangladesh or inability to recover gas economically as result of export by Bangladesh to third parties.

**EXCLUDED OBLIGATIONS
FROM PRG COVER:**

Obligations resulting in any payment by the Government arising in connection with:

- (a) AESH event of default;
- (b) Any events of force majeure taking place outside Bangladesh and events of natural force majeure (except those affecting the construction and operation of the gas transportation facilities or the interconnection facilities) affecting the Project;
- (c) Government undertakings in the Direct Agreements between Lenders, AESH and Government, including amendments thereto (with the exception of dispute resolution provisions permitting lenders to join arbitration and the non assignment of the Government Guarantee);
- (d) Claims arising from pre existing litigation in relation to the Land Lease for the site; and
- (e) Invalidity, illegality or unenforceability of the PSA, GSA or Land Lease which was known to AESH or the lenders or was discoverable by exercise of reasonable due diligence.

CONDITIONS PRECEDENT:

Usual and customary conditions for financing of this type including the following:

- (a) Conclusion and execution of all project and financing documentation (including amendments) and provision of relevant legal opinions;
- (b) Delivery of an environmental assessment (addressing resettlement issues) that meets World Bank 1998 guidelines;
- (c) Effectiveness of all required insurance (to include IDA as named additional insured on project insurance and third-party liability insurance);
- (d) Firm commitment for sufficient financing to complete construction of the project, including satisfactory contribution of equity by the sponsors;
- (e) Satisfaction of all conditions precedent under the Financing Documents;
- (f) Execution of Indemnity Agreement with Government and provision of satisfactory Bangladesh legal opinions;
- (g) Execution of the IDA Project Agreement with the Company; and

- (h) Payment of the first installment of the IDA Guarantee Fee and payment of IDA Initiation Fee and Processing Fee.

**SUSPENSION OF
ADDITIONAL COVERAGE:**

If any of the following events occurs and is continuing, IDA may by written notice to the Agent deny guarantee coverage to subsequent drawdowns:

- (a) Any event (potential event of default) which with the passing of time or giving of notice may lead to a claim on the IDA PRG;
- (b) Breach of covenant by AESH under the IDA Project Agreement;
- (c) Suspension of lending by IDA to Bangladesh or breach by Bangladesh of its obligations under the Indemnity Agreement;
- (d) Suspension or lapse of Bangladesh from membership in IDA or the International Monetary Fund; and
- (e) Events of default under the financing documents.

**CESSATION OF
COVERAGE:**

Except in respect of demand notices already delivered to IDA, default in payment of Guarantee Fees will automatically terminate the IDA PRG. The IDA PRG will also terminate in the event that (i) any changes are made without IDA's consent, to those provisions of the IDA PRG Facility Agreement in respect of which IDA's consent to amend is required.

SUBROGATION:

If and to the extent IDA makes any payment under the IDA PRG and Bangladesh has failed to reimburse IDA for the amount so paid in accordance with the terms of the Indemnity Agreement and such failure has continued for at least 60 days, IDA will be subrogated immediately to the lenders' rights, except that IDA shall not have any voting rights for enforcement of security prior to either (i) payment in full of the outstanding guaranteed amount or (ii) acceptance of an agreed payment schedule upon termination of the Project. In these circumstances, lenders will retain voting rights in respect to any unguaranteed outstandings, subject to IDA's vote against enforcement upon reasonable grounds.

CLAIMS:

Claims by the lenders must be made within 90 days of non-payment by AESH with IDA paying within 60 days thereafter.

GOVERNING LAW:

Laws of England.

INDEMNITY AGREEMENT

PARTIES:

IDA and People's Republic of Bangladesh.

INDEMNITY:

Bangladesh will reimburse and indemnify IDA on demand, or as IDA may otherwise direct, for any payment made by IDA under the IDA PRG and for all losses, damages, costs and expenses incurred by IDA arising from or in connection with the IDA PRG.

COVENANTS: In addition to undertakings customary for the Indemnity Agreement, Bangladesh covenants to: (i) put in place a monitoring scheme for direct and contingent foreign exchange liabilities; (ii) consult with IDA prior to contracting any IPP capacity exceeding 1,780 MW; (iii) equalise gas prices by latest when installed generation capacity reached 1,780 MW; (iv) submit a financial action plan for BPDB; and (v) ensure that BPDB meets its payment obligations under the Power Purchase Agreement.

REMEDIES: If Bangladesh breaches any of its obligations under the Indemnity Agreement, IDA may suspend or cancel, in whole or in part, the rights of Bangladesh to make withdrawals under any other credit with IDA.

CHOICE OF LAW: The Indemnity Agreement will follow the legal regime and include dispute settlement provisions customary for agreements between member countries and IDA.

PROJECT AGREEMENT

PARTIES: IDA and AESH.

REPRESENTATIONS AND WARRANTIES: The Company will represent, among other standard provisions, that it (i) is in compliance with applicable environmental laws and other applicable IDA requirements; and (ii) has not been a party to any corrupt or fraudulent practice in relation to the Project.

COVENANTS: AESH will covenant, that it will (i) use the proceeds of the disbursements under the IDA PRG Facility exclusively for the Project and in accordance with the terms and conditions thereof; (ii) comply with applicable laws, including environmental laws and the EAP, provide annual audited financial statements and access to the Project site to IDA; and (iii) use best endeavors to contest and overturn any court order preventing arbitration under contractual dispute resolution provisions.

COSTS AND EXPENSES: AESH will indemnify and reimburse IDA for out-of-pocket expenses occasioned by any amendments to or by the preparation for and actual enforcement of or protection of rights under the IDA PRG or the financing documentation.

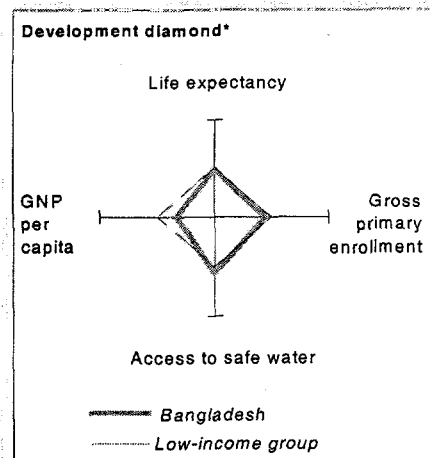
CHOICE OF LAW: Laws of England, with UNCITRAL dispute resolution.

Annex 13

Country at a Glance

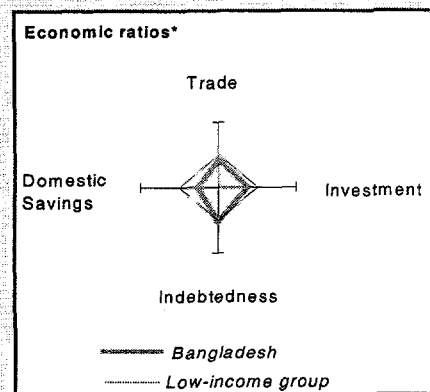
POVERTY and SOCIAL

	Bangladesh	South Asia	Low-income
1998			
Population, mid-year (millions)	125.6	1,305	3,515
GNP per capita (Atlas method, US\$)	350	430	520
GNP (Atlas method, US\$ billions)	44.0	555	1,844
Average annual growth, 1992-98			
Population (%)	1.6	1.8	1.7
Labor force (%)	2.1	2.3	1.9
Most recent estimate (latest year available, 1992-98)			
Poverty (% of population below national poverty line)	36	..	..
Urban population (% of total population)	20	27	31
Life expectancy at birth (years)	61	62	63
Infant mortality (per 1,000 live births)	57	77	69
Child malnutrition (% of children under 5)	68	53	..
Access to safe water (% of population)	84	81	74
Illiteracy (% of population age 15+)	47	49	32
Gross primary enrollment (% of school-age population)	96	100	108
Male	93	109	113
Female	100	90	103



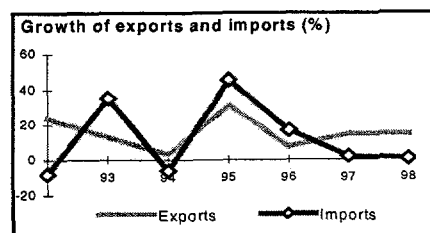
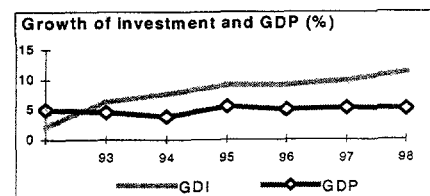
KEY ECONOMIC RATIOS and LONG-TERM TRENDS

	1978	1988	1997	1998	
GDP (US\$ billions)					
Gross domestic investment/GDP	17.1	18.4	21.6	22.2	
Exports of goods and services/GDP	4.1	5.8	12.4	13.8	
Gross domestic savings/GDP	7.8	9.4	15.3	17.1	
Gross national savings/GDP	8.4	11.9	19.4	21.0	
Current account balance/GDP	-2.9	-4.3	-2.2	-1.2	
Interest payments/GDP	0.3	0.6	0.4	0.4	
Total debt/GDP	23.4	41.4	36.9	38.3	
Total debt service/exports	20.8	22.1	10.6	9.1	
Present value of debt/GDP	..	..	21.1	..
Present value of debt/exports	..	..	129.8	..
(average annual growth)					
GDP	4.7	4.7	5.3	5.1	4.7
GNP per capita	2.3	3.1	3.8	4.2	3.1
Exports of goods and services	5.4	14.4	14.5	14.3	6.8



STRUCTURE of the ECONOMY

	1978	1988	1997	1998
(% of GDP)				
Agriculture	41.6	29.8	23.1	22.2
Industry	21.4	22.4	27.1	27.9
Manufacturing	15.8	14.8	17.3	18.1
Services	37.0	47.8	49.8	49.9
Private consumption	90.8	87.2	80.1	77.6
General government consumption	1.4	3.3	4.6	4.4
Imports of goods and services	13.4	14.7	18.7	18.9
(average annual growth)				
Agriculture	3.0	2.6	6.1	3.0
Industry	4.3	6.9	5.6	8.3
Manufacturing	2.9	7.0	6.2	9.2
Services	6.1	4.7	4.7	4.3
Private consumption	4.9	4.0	4.1	6.7
General government consumption	5.1	5.8	6.0	-0.3
Gross domestic investment	2.9	6.0	10.0	11.2
Imports of goods and services	4.6	10.5	2.0	0.6
Gross national product	4.9	4.8	5.5	5.9



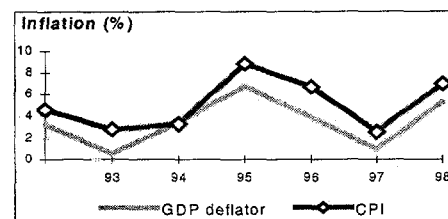
Note: 1998 data are preliminary estimates.

* The diamonds show four key indicators in the country (in bold) compared with its income-group average. If data are missing, the diamond will be incomplete.

Bangladesh

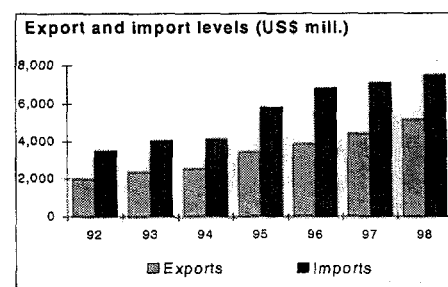
PRICES and GOVERNMENT FINANCE

	1978	1988	1997	1998
Domestic prices (% change)				
Consumer prices	..	6.3	2.5	7.0
Implicit GDP deflator	25.7	7.6	1.0	5.3
Government finance (% of GDP, includes current grants)				
Current revenue	..	8.9	9.3	9.6
Current budget balance	..	..	2.2	2.2
Overall surplus/deficit	..	-5.3	-4.3	-4.2



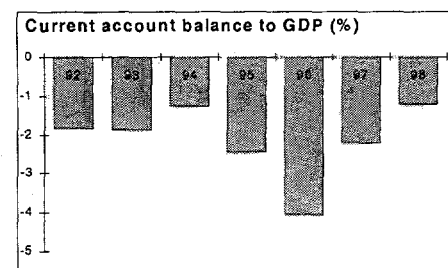
TRADE

	1978	1988	1997	1998
<i>(US\$ millions)</i>				
Total exports (fob)	..	1,232	4,427	5,172
Jute goods	..	81	116	108
Leather and leather products	..	147	196	190
Manufactures	..	825	3,755	4,531
Total imports (cif)	..	2,986	7,120	7,525
Food	..	704	197	373
Fuel and energy	..	272	361	506
Capital goods	..	1,090	2,000	1,342
Export price index (1995=100)	..	58	102	109
Import price index (1995=100)	..	90	100	101
Terms of trade (1995=100)	..	64	103	108



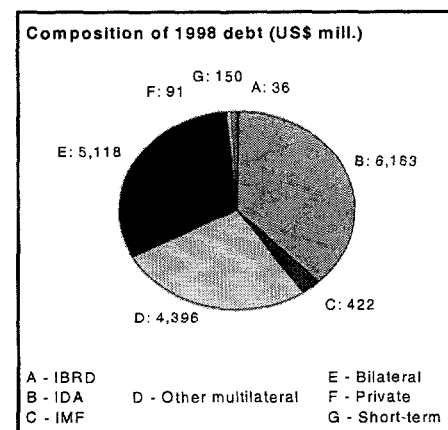
BALANCE of PAYMENTS

	1978	1988	1997	1998
<i>(US\$ millions)</i>				
Exports of goods and services	572	1,486	5,083	5,879
Imports of goods and services	1,431	3,252	7,677	8,049
Resource balance	-859	-1,765	-2,594	-2,170
Net income	-32	-133	-107	-100
Net current transfers	506	788	1,770	2,017
Current account balance	-385	-1,110	-909	-520
Financing items (net)	338	1,255	589	651
Changes in net reserves	48	-145	320	-131
Memo:				
Reserves including gold (US\$ millions)	..	..	1,719	1,739
Conversion rate (DEC, local/US\$)	15.1	31.2	42.7	45.4

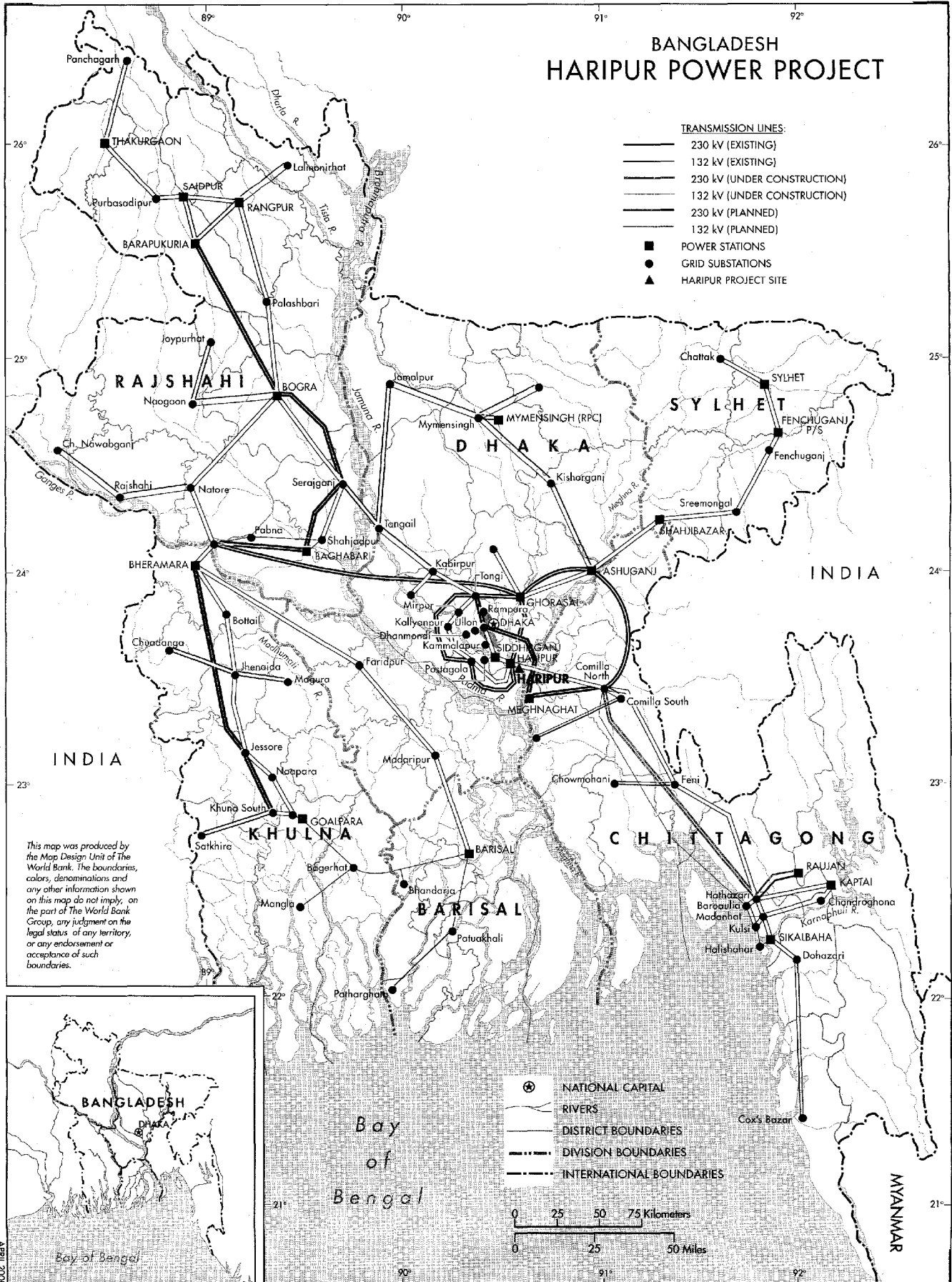


EXTERNAL DEBT and RESOURCE FLOWS

	1978	1988	1997	1998
<i>(US\$ millions)</i>				
Total debt outstanding and disbursed	3,083	10,692	15,125	16,376
IBRD	55	66	38	36
IDA	608	3,188	5,701	6,163
Total debt service	146	504	705	683
IBRD	4	5	7	6
IDA	4	36	96	105
Composition of net resource flows				
Official grants	0	824	736	589
Official creditors	414	786	326	359
Private creditors	12	-21	-28	-23
Foreign direct investment	0	3	-116	252
Portfolio equity	0	0	0	0
World Bank program				
Commitments	163	221	460	646
Disbursements	103	291	299	347
Principal repayments	0	10	59	66
Net flows	103	281	241	281
Interest payments	8	31	44	45
Net transfers	96	250	196	236



BANGLADESH HARIPUR POWER PROJECT



TRANSMISSION LINES:

- 230 kV (EXISTING)
- 132 kV (EXISTING)
- 230 kV (UNDER CONSTRUCTION)
- 132 kV (UNDER CONSTRUCTION)
- 230 kV (PLANNED)
- 132 kV (PLANNED)
- POWER STATIONS
- GRID SUBSTATIONS
- ▲ HARIPUR PROJECT SITE

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- ⊙ NATIONAL CAPITAL
- RIVERS
- DISTRICT BOUNDARIES
- - - DIVISION BOUNDARIES
- - - INTERNATIONAL BOUNDARIES

