



# Report and Recommendation of the President to the Board of Directors

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Project Number: 44192  
August 2010

## Proposed Loan People's Republic of Bangladesh: Bangladesh–India Electrical Grid Interconnection Project

Asian Development Bank

## **CURRENCY EQUIVALENTS**

(as of 26 July 2010)

Currency Unit – taka (Tk)

Tk1.00 = \$0.0144

\$1.00 = Tk69.42

In this report, a rate of \$1 = Tk70.00 has been used.

## **ABBREVIATIONS**

ADB	–	Asian Development Bank
BPDB	–	Bangladesh Power Development Board
EIRR	–	economic internal rate of return
EMP	–	environmental management plan
HVDC	–	high voltage direct current
IEE	–	initial environmental examination
LILO	–	loop-in loop-out
PAM	–	project administration manual
PGCB	–	Power Grid Company of Bangladesh
PGCIL	–	Power Grid Corporation of India
SAARC	–	South Asian Association for Regional Cooperation
SDR	–	special drawing right
TA	–	technical assistance

## **WEIGHTS AND MEASURES**

MW	–	megawatt
kV	–	kilovolt
km	–	kilometer

## **NOTE**

In this report, "\$" refers to US dollars unless otherwise stated.

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## CONTENTS

	<b>Page</b>
I. THE PROPOSAL	1
II. THE PROJECT	1
A. Rationale	1
B. Impact and Outcome	2
C. Outputs	3
D. Investment and Financing Plans	3
E. Implementation Arrangements	4
III. TECHNICAL ASSISTANCE	5
IV. DUE DILIGENCE	5
A. Technical	5
B. Economic and Financial	6
C. Governance	6
D. Poverty and Social	8
E. Safeguards	8
F. Risks and Mitigating Measures	9
V. ASSURANCES	10
VI. RECOMMENDATION	10

## APPENDIXES

1. Design and Monitoring Framework
2. List of Linked Documents

## I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed loan to the People's Republic of Bangladesh for the Bangladesh–India Electrical Grid Interconnection Project. The design and monitoring framework for the project is in Appendix 1.

2. Bangladesh and India will establish a cross-border interconnection between the western electrical grid of Bangladesh and the eastern electrical grid of India to facilitate the exchange of electricity between the two countries. In accordance with technical, operational, and economic considerations, the proposed interconnection will include about 125 kilometers (km) of 400 kilovolts (kV) double-circuit transmission line between the electrical substations at Baharampur in India and Bheramara in Bangladesh, a 400 kV switching station at Baharampur, a 500-megawatt (MW) back-to-back high voltage direct current (HVDC) substation (400/230 kV) at Bheramara, and associated infrastructure on both sides. The interconnection will facilitate an initial power flow of 500 MW into Bangladesh from the Indian grid starting in 2012, with a provision to expand the power flow to 1,000 MW. This will help to address the significant power shortages in Bangladesh. The project only covers the part of the interconnection facilities to be established in Bangladesh.

## II. THE PROJECT

### A. Rationale

3. The Bangladesh economy has grown by about 6% a year on average since 2005 and this level of growth is expected to continue. Despite its notable macroeconomic progress, Bangladesh's electrification ratio is still very low, with only 47% of the population having access to electricity in 2009.<sup>1</sup> Rapid economic growth is causing electricity demand to increase sharply as the country continues to industrialize and raise the living standards of its large population. In 2009, the dependable power-generating capacity was only 3,800 MW, while the peak demand was about 5,500 MW, implying a peak deficit of nearly 1,700 MW.<sup>2</sup> This has been resulting in frequent power cuts and voltage fluctuations. A World Bank study states that Bangladesh loses nearly \$1 billion of economic output a year due to power outages and an unreliable energy supply.<sup>3</sup> Bangladesh needs to diversify its energy sources as there are concerns over the long-term availability of domestic natural gas, which fuels about 85% of the national power sector generation capacity.<sup>4</sup>

4. To overcome the power supply crisis, several initiatives have been taken to add new generating capacity. The government has renewed attempts to mobilize private capital to build power plants, whose investment requirements exceed the resources available in the public sector. In spite of past success in mobilizing private capital to establish large power stations, international financial markets remain volatile and there is strong worldwide demand for power plant equipment that hampers significant capacity addition in Bangladesh. As a short-term measure, the government has allowed rental power plants of 50–100 MW to be installed. Other initiatives by the government include the refurbishment of old gas turbines and the conversion of open-cycle gas turbine generators to combined-cycle power plants, which is expected to result

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<sup>1</sup> Government of Bangladesh, Ministry of Power, Energy, and Mineral Resources. Bangladesh Development Forum, 15–16 February 2010, Dhaka.

<sup>2</sup> ADB. 2009. *Sector Assessment Program Evaluation Bangladesh: Energy Sector*. Manila.

<sup>3</sup> World Bank. 2007. *South Asia Growth and Regional Cooperation*. Washington, DC.

<sup>4</sup> ADB. 2009. *Energy Outlook for Asia and the Pacific*. Manila.

in more efficient utilization of gas supplies. The government is also working on initiatives to source power from South Asia region.

5. In 1997, the Asian Development Bank (ADB) facilitated initial dialogue between Bangladesh and India to identify possible exchanges of electricity. However, the dialogue did not lead to definite results. In January 2010, a joint communiqué was signed heralding important breakthroughs in cooperation between the two countries. This initiative between the two prime ministers will enhance regional cooperation in South Asia, prioritizing grid connectivity and exchange of power. Against the backdrop of a growing power crisis in Bangladesh, connecting the two grids will demonstrate the substantial economic benefits that come from enhanced regional cooperation and help to address the energy gap in the region.<sup>5</sup>

6. The project is in line with the recommendation of a recent sector assessment program evaluation<sup>6</sup> that ADB should facilitate power transmission connectivity between India and Bangladesh, eventually enabling Bangladesh to harness regional energy resources, including eventual access to hydropower from Bhutan and Nepal. The project will support regional cooperation in South Asia and the regional cooperation and integration objectives under Strategy 2020.<sup>7</sup> ADB has been supporting dialogue on South Asia regional energy cooperation through the South Asian Association for Regional Cooperation (SAARC) regional energy trade study, which was concluded in early 2010<sup>8</sup>.

7. In India, the Central Electricity Authority reported a countrywide installed capacity of 156,780 MW as of January 2010. To meet growing domestic demand, India has plans to increase its capacity by 64,000 MW over the 11th Five Year Plan period (2007–2012) and 100,000 MW in the 12th Five Year Plan period (2012–2017). On 11 January 2010, the governments of Bangladesh and India entered into a memorandum of understanding to cooperate in the power sector for a period of at least 5 years. In further discussions to implement this memorandum of understanding, the Government of India has expressed its intent to make a minimum of 250 MW available for sale to the Bangladesh Power Development Board (BPDB)<sup>9</sup> by 2012.<sup>10</sup> An additional 250 MW could be sourced from the Indian electricity market, subject to applicable approvals. The proposed project will help BPDB to lower the existing deficit, improve the power supply, and reduce the dependence on inefficient and expensive captive and rental generation facilities. A more reliable power supply will benefit manufacturing and service industries in the western part of Bangladesh, including poor and vulnerable consumers who are often the hardest hit by inadequate and poor quality power supply.

## **B. Impact and Outcome**

8. The project impact will be enhanced regional cooperation in the power sector, contributing to economic development growth in Bangladesh. The project outcome will be the

<sup>5</sup> ADB. 2010. *Regional Cooperation Strategy and Program: South Asia 2006–2008*. Manila.

<sup>6</sup> ADB. 2009. *Sector Assessment Program Evaluation: Bangladesh Energy Sector*. Manila (para. 125).

<sup>7</sup> ADB. 2008. *Strategy 2020: The Long-Term Strategic Framework of the Asian Development Bank, 2008–2020*. Manila.

<sup>8</sup> The proposed project was identified as a recommended initiative under the SAARC regional energy trade study action plan.

<sup>9</sup> The BPDB currently operates all state-owned generating units and distribution in certain parts of the country. It is the bulk purchaser from the private generating companies in Bangladesh.

<sup>10</sup> Of the installed capacity of the central generating stations (about 40,000 MW), 15% is not permanently allocated to long-term beneficiaries and allocation occurs at the discretion of the Ministry of Power, Government of India. BPDB will pay the generation tariff for the identified station and applicable transmission charge and trading margin, determined by the Central Electricity Regulatory Commission, India.

successful development and operation of a power transmission link between Bangladesh and India. The project is expected to alleviate the growing power crisis in Bangladesh by making available up to 500 MW of additional power by 2012. This will partially meet the needs of existing and new consumers and support the achievement of the goal of electricity for all by 2020 in the National Energy Policy.

### C. Outputs

9. The physical outputs from the project will be a 40 km, 400 kV double circuit transmission line in Bangladesh, a 500 MW back-to-back HVDC substation (400 kV/230 kV) at Bheramara, and a 230 kV double circuit loop-in loop-out interconnection at Bheramara to link with the transmission network in Bangladesh. In addition to these physical outputs, the project will train staff of the Power Grid Company of Bangladesh (PGCB), the executing agency for the project, to manage grid operations efficiently following the installation of the HVDC system. It will also train staff of the BPDB, Power Division, and Bangladesh Energy Regulatory Commission on aspects of cross-border electricity trading.

### D. Investment and Financing Plans

10. The project is estimated to cost \$158.6 million. The tentative project investment plan is summarized in Table 1. The tentative financing plan for the proposed project is summarized in Table 2. It is proposed that the project be funded by ADB and the Government of Bangladesh. Infrastructure on the Indian side (a switching station and loop-in loop-out interconnection at Baharampur as well as 85 km of the 400 kV double circuit transmission line) will be funded, developed, and operated by India.<sup>11</sup>

**Table 1: Project Investment Plan**

Item	Amount <sup>a</sup> (\$ million)
<b>A. Base Cost<sup>b</sup></b>	
1. Civil works <sup>c</sup>	36.6
2. Equipment	84.5
3. Environment and social mitigation	0.1
4. Land acquisition and development costs	9.5
5. Consulting services (project implementation)	4.9
6. Freight and insurance	2.8
7. Overheads	1.1
<b>Subtotal (A)</b>	<b>139.5</b>
<b>B. Contingencies<sup>d</sup></b>	<b>13.5</b>
<b>C. Financing Charges During Implementation<sup>e</sup></b>	<b>5.6</b>
<b>Total (A+B+C)</b>	<b>158.6</b>

<sup>a</sup> In mid-2010 prices.

<sup>b</sup> Includes taxes and duties.

<sup>c</sup> Includes construction costs associated with foundation, erection, testing and commissioning of transmission line and substation.

<sup>d</sup> Physical contingencies computed at 1% of base cost. Price contingencies computed as per Asian Development Bank. 2005. *Financial Management and Analysis of Projects*. Manila.

<sup>e</sup> Includes interest during construction charges to be paid by Power Grid Company of Bangladesh.

Source: Government of Bangladesh. 2010. *Development Project Proforma*. Dhaka (May).

<sup>11</sup> The investment for the Indian portion of the interconnection is expected to be \$38.2 million.

11. The Government of Bangladesh has requested a loan in various currencies equivalent to SDR65,986,000 from ADB's Special Fund resources to help finance the project. The loan will have a 32-year term, including a grace period of 8 years, an interest rate of 1.0% per annum during the grace period and 1.5% per annum thereafter, and such other terms and conditions as set forth in the draft loan and project agreements. The proceeds of the loan will be lent to PGCB, under terms and conditions acceptable to ADB, which include a term of 20 years, inclusive of a grace period of 5 years and an interest rate of 4% per annum.

**Table 2: Project Financing Plan**

<b>Source</b>	<b>Amount (\$ million)</b>	<b>Share of Total (%)</b>
Asian Development Bank <sup>a</sup>	100.0	63
Government of Bangladesh	58.6	37
<b>Total</b>	<b>158.6</b>	<b>100</b>

<sup>a</sup> \$66.6 million is to be allocated from the subregional pool of Asian Development Fund resources while \$33.3 million is from Bangladesh's Asian Development Fund allocation.

Sources: Government of Bangladesh. 2010. *Development Project Proforma*. Dhaka (May 2010) and Asian Development Bank estimates.

## **E. Implementation Arrangements**

12. The PGCB is the executing agency and implementing agency for the project. It will be responsible for supervising implementation and monitoring of operational performance of the interconnection in Bangladesh. To ensure effective project implementation, the PGCB has established a project management unit, headed by a project director. A steering committee headed by the power secretary of Bangladesh will be constituted to review the progress and achievements of the project. A steering committee, chaired by the power secretaries of Bangladesh and India, is in place to review the overall progress of the cooperation agreements. A working group, chaired by the joint power secretaries of both countries, will monitor and coordinate the activities of the cooperation agreement and a technical team will manage the technical aspects of the interconnection.

13. Goods and works to be financed under the project will be procured in accordance with ADB's *Procurement Guidelines* (2010, as amended from time to time). Advance procurement action has been approved. The borrower and the PGCB have been advised that approval of advance procurement does not commit ADB to finance the project. The transmission lines and the substation will be procured following international competitive bidding procedures. Success of the project also depends on the timely implementation of the interconnection facilities in India and the negotiation of firm power purchase agreements. Bids for two packages for the interconnection facilities in India have been received and are under evaluation.

14. The implementation arrangements for the project are summarized in Table 3 and described in detail in the project administration manual (Appendix 2).



**Table 3: Implementation Arrangements**

Aspects		Arrangements	
Implementation period		1 February 2010–31 December 2012	
Estimated project completion date		30 June 2013	
Project management			
(i)	Oversight body	Steering committee chaired by secretary, Power Division, Ministry of Power, Energy and Mineral Resources, Government of Bangladesh	
(ii)	Executing agency	Power Grid Company of Bangladesh	
(iii)	Key implementing agency	Power Grid Company of Bangladesh	
(iv)	Project management unit	Bheramara in Kusthia District with 20 staff of PGCB	
(v)	Project safeguard measures	Independent monitoring mechanism	
(vi)	Coordination with India on construction of interconnection facilities and negotiation of power purchase agreements	Joint steering committee chaired by secretary, Power Division, Ministry of Power, Energy and Mineral Resources, Government of Bangladesh and secretary, Ministry of Power, India. A joint working group and technical team comprising representatives from both sides has been set up.	
Procurement	International competitive bidding	Two contracts	Total cost is \$123.9 million
Aspects		Arrangements	
Consulting services (project management)		Entirely financed by government	24 person-months \$ 4.9 million
Retroactive financing and advance contracting		All eligible contract packages and eligible expenditures agreed between ADB and the borrower.	
Disbursement		The loan proceeds will be disbursed in accordance with ADB's <i>Loan Disbursement Handbook</i> (2007, as amended from time to time) and detailed arrangements agreed upon between ADB and the borrower.	
ADB = Asian Development Bank, PGCB = Power Grid Company of Bangladesh.			
Source: Asian Development Bank.			

### III. TECHNICAL ASSISTANCE

15. A stand-alone small-scale capacity development technical assistance (TA) financed from the Technical Assistance Special Fund (TASF–IV) has been approved. The TA will finance the cost of engaging three international consultants for 5 person-months to advise the BPDB on cross-border power purchase contracts and capacity building of the staff of the BPDB to procure power from India, two safeguard specialists for 4 person-months for the review and implementation of the resettlement plan and environmental management plan (EMP), and working group consultations including those to finalize the operational management procedures.

### IV. DUE DILIGENCE

#### A. Technical

16. To facilitate exchange of electricity and to establish an efficient electrical grid interconnection between Bangladesh and India, two possible options were available. These were (i) connecting the northeastern region of India with the eastern region of Bangladesh, or (ii) connecting the eastern region of India with the western region of Bangladesh. A joint technical team comprising representatives from the power utilities of both countries concluded that the second option was more robust and would better facilitate the export of power to

Bangladesh from various generating stations in India as well as the export of power from Bangladesh to load centers in India, when feasible. The mode of interconnection at 400 kV could either be synchronous or asynchronous. If a synchronous interconnection is adopted, both grids would operate at the same frequency and careful regulation and management of the system between the two countries would be needed. However, an asynchronous interconnection would facilitate complete control of the exchange of power between the two countries in either direction, as well as independent operation of the two grids. This would obviate the need for additional upstream investment to protect assets from faults and surges in the other system. Accordingly, based on technical, operational, and economic considerations, an asynchronous interconnection with an HVDC back-to-back station terminal and a 400-kV double circuit transmission interconnection line between the two countries has been adopted.

## **B. Economic and Financial**

17. Financial analysis of the proposed project has been carried out in accordance with ADB's *Financial Management and Analysis of Projects*.<sup>12</sup> All financial costs and benefits have been expressed at constant 2010 prices. Financial viability was assessed by comparing the incremental costs and benefits of the project. The incremental benefits were calculated based on the PGCB's revenue stream. Costs used to determine the financial internal rate of return include capital investments, operation and maintenance costs, and taxes incurred to install and operate the project. The financial internal rate of return of the project is 6.0%, which compares favorably with the estimated weighted average cost of capital of 2.9%, indicating that the project will be financially viable.

18. Given that Bangladesh is currently facing a power deficit, cost savings due to prevented power outages are a direct tangible economic benefit of the project. The economic analysis conducted for the project considered only power generation cost savings using power imported from India over alternative sources. Least-cost analysis demonstrated the attractiveness of power imports. The project's economic feasibility was assessed both for the region and for Bangladesh. The project provided an economic internal rate of return (EIRR) of 31% for the region whereas it provided an EIRR of 27% for Bangladesh. These estimates were based on conservative assumptions of resource cost savings. A much higher EIRR would be achieved if prevented outage costs were used for economic analysis. The project provides an acceptable EIRR even if only 250 MW is delivered at the currently proposed rates. The project returns are stable against the relevant risk factors and the analysis clearly demonstrates the economic feasibility of the project.

## **C. Governance**

### **1. Anticorruption Policy and Governance Measures**

19. The government aims to create a corruption-free environment and in support of that objective it established the Anticorruption Commission in 2004. ADB has provided TA to help the government build capacity and provide support for an integrated anticorruption strategy.<sup>13</sup> Consistent with its commitment to good governance, accountability, and transparency, ADB reserves the right to investigate, directly or through its agents, any alleged corrupt, fraudulent, collusive, or coercive practices relating to the project. To support these efforts, relevant

<sup>12</sup> ADB. 2005. *Financial Management and Analysis of Projects*. Manila.

<sup>13</sup> ADB. 2003. *Technical Assistance to the People's Republic of Bangladesh for Supporting Good Governance*. Manila.

provisions of ADB's *Anticorruption Policy* (1998, as amended to date) are included in the loan regulations and the bidding documents for the project. In particular, all contracts financed by ADB in connection with the project will be subject to prior ADB approval and will include provisions specifying the right of ADB to audit and examine the records and accounts of the executing agencies and all contractors, suppliers, consultants, and other service providers as they relate to the project. The government will ensure that the PGCB and other power sector entities have operational autonomy and that no organizational changes are carried out that would affect their ability to perform their obligations under the project.

20. Table 4 summarizes major governance measures adopted for the project.

**Table 4: Governance Measures**

Area	Measures
Procurement	<ul style="list-style-type: none"> <li>(i) A project management unit has been established, headed by senior officers reporting directly to the managing director of the PGCB.</li> <li>(ii) Bid specifications and packaging have been prepared to ensure maximum competition under international competitive bidding procedures.</li> <li>(iii) Information on procurement will be disclosed on the PGCB website.</li> <li>(iv) Procurement capacity support will be available at the resident mission to expedite action on procurement issues.</li> </ul>
Financial management and audit	<ul style="list-style-type: none"> <li>(i) Measurable financial performance indicators for the PGCB have been established.</li> <li>(ii) Expenditures, other financial transactions, and safe custody of project-financed assets will be monitored by the accounting and control systems of the PGCB.</li> <li>(iii) The internal audit reports will be provided to the audit committee of PGCB's board.</li> <li>(iv) Financial statements will be audited by independent auditors acceptable to ADB and regularly published and reported to the shareholders.</li> </ul>
Institutional and corporate governance	The PGCB will independently file tariff petitions with the BERC.
Anticorruption	ADB will review and examine any alleged corrupt, fraudulent, collusive, or coercive practices relating to the project.
Grievance review	A grievance redress mechanism will be established to address issues relating to project implementation.

ADB = Asian Development Bank, BERC = Bangladesh Energy Regulatory Commission, BPDB = Bangladesh Power Development Board, PGCB = Power Grid Company of Bangladesh.  
Source: Asian Development Bank.

21. ADB's *Anticorruption Policy* (1998, as amended to date) was explained to and discussed with the government and the PGCB. The specific policy requirements and supplementary measures are described in the project administration manual.<sup>14</sup>

<sup>14</sup> Project Administration Manual (Appendix 2).

## D. Poverty and Social

22. Bangladesh is the seventh most populous country in the world. In 2006, its population was recorded as 156 million, with 116.2 million living in rural areas.<sup>15</sup> The mainstay of the economy is agriculture, which employs almost 60% of the labor force. The main agricultural products are rice and sugarcane. The other major sector is manufacturing which has been slowly growing and contributed 17% of the gross domestic product in 2007.<sup>16</sup>

23. Despite recent economic growth, Bangladesh remains one of the poorest countries in the world with nearly half of its population living below the \$1.25 poverty line. Natural factors such as floods, cyclones, and other natural calamities contribute to this, but so do institutional and governance factors. Lack of adequate and reliable energy sources, especially electricity, have played a vital role in perpetuating poverty. The consumption of commercial energy in Bangladesh is one of the lowest in the world at about 200 kilograms of oil equivalent per capita.<sup>17</sup> Only 47% of the population, most of whom live in the cities (refer footnote 1), has any access to electricity. Even with access to electricity, power cuts and irregular supply cause problems. All these factors have severely impacted the steady growth of industries, added to environmental pollution, affected the delivery of essential services, including health and education, and contributed to high poverty levels.

## E. Safeguards

24. The project will generate employment for local people during construction. Availability of reliable power supply will enhance the production capacity of existing industries and facilitate the initiation of new ones as well as create employment in agriculture, garments, and other businesses that depend on regular power supply. It is expected that this project will indirectly generate significant employment.

25. The risk of the project helping to spread HIV is minimal, but if potential threats are identified during project implementation, information dissemination campaigns will be carried out in the project areas.

26. From the environment standpoint, the project is classified as category B, as it is unlikely that it will lead to any adverse irreversible impacts. The PGCB has prepared an initial environmental examination (IEE), which analyzed data collected through reviews of reports, satellite photographs, discussions with stakeholders, and field visits to the project area. The IEE was prepared following the requirements of ADB's *Safeguard Policy Statement* (2010), the government's environmental impact assessment guidelines, and related national policies and legislation. It was well prepared and provides an environmental management plan (EMP) to address any impacts. Potential impacts will mostly be temporary. The Department of Environment has granted environmental clearance for the project. Adequate budgetary provisions for implementation of the EMP have been made. The EMP will form part of the bidding documents and the PGCB will supervise both the construction contracts and EMP implementation. Regular implementation progress reports will be submitted to ADB. In the event of any change of alignment or the identification of any unanticipated environmental impact during the course of project implementation, the PGCB will revise the EMP.

<sup>15</sup> International Fund for Agricultural Development. 2008.

<http://www.ruralpovertyportal.org/web/guest/country/statistics/tags/bangladesh>

<sup>16</sup> ADB. 2009. Evaluation Approach Paper for Country Assistance Program Evaluation for Bangladesh.

<http://www.adb.org/Documents/Evaluation/CAPES/BAN/CAPE-BAN-App1.pdf>

<sup>17</sup> CPR. 2000. National Gas Options for Bangladesh. <http://www.iubat.edu/cpr/pdfs/GasDetails.pdf>

27. With regard to involuntary resettlement, the project is category A. The total land required is 45.84 hectares of which only 0.22 hectares will be acquired from private owners. The remaining land belongs to Bangladesh Railways and the government. The project will require physical displacement of 12 dwelling units and one shop. In addition, 1,634 households will lose their crops and trees. People who are displaced will be given compensation for their affected assets, including crop compensation for the land at the tower locations, in accordance with the provisions in the resettlement plan. The project authorities will make arrangements for training the displaced people, including tailor-made programs for skills development. Care has been taken to disseminate all relevant information regarding the project and the views and opinions of the displaced persons were taken into consideration in developing the entitlement matrix. If, during implementation, additional aspects develop, suitable adjustments will be made in the entitlement matrix in consultation with the affected displaced persons. With regard to indigenous people, the project is categorized as category C.

28. The associated transmission component that will be installed in India by the Power Grid Corporation of India (PGCIL) is also subject to due diligence and must be implemented in a manner consistent with the requirements of the Safeguard Policy Statement. The PGCIL has developed its own environment and social safeguard policy which requires it to conduct due diligence and ensure implementation of all necessary mitigation measures. This policy document is acceptable to ADB. The PGCB will be requested to provide ADB with PGCIL's safeguard plans and monitoring reports for review.

## **F. Risks and Mitigating Measures**

29. A major risk relates to the fact that a legally binding power purchase agreement has not yet been signed or negotiated. Should the relevant implementing entities in India and Bangladesh fail to reach a legally binding agreement on the intended delivery of at least 250 MW at the current proposed rates, the economic value of the facilities constructed in Bangladesh and the project benefits might be severely affected. The same applies if the power sector cooperation agreement between the two countries is not extended beyond the initial period of 5 years. To mitigate this risk, it has been agreed that the relevant power sector entities in India and Bangladesh must enter into a memorandum of understanding on the key parameters of the proposed power purchase arrangements prior to any withdrawal of ADB loan proceeds and that a legally binding power purchase agreement must have been signed within 6 months thereafter, on terms and conditions acceptable to ADB. Major risks and mitigating measures are summarized in Table 5.

**Table 5: Summary of Risks and Mitigating Measures**

<b>Risks</b>	<b>Mitigating Measures</b>
Delay, failure to complete interconnection facilities in India	Bulk power transmission agreement was signed between PGCIL and BPDB for implementation and operation of interconnection facilities in India
Delay, failure to enter into binding power purchase agreements or non extension of the cooperation agreement after January 2015	The Government of Bangladesh is aware of this risk and expressed comfort with the documented political commitments made on the key parameters of the power sector cooperation by the two governments. Entering into a MOU, followed by legally enforceable long-term contracts between BPDB and Indian power utilities, will further mitigate this risk.
Limited HVDC technology implementation capacity in Bangladesh	This is mitigated by the decision to hire PGCIL as consultants to assist in project design, bidding support, and implementation support in Bangladesh. PGCIL's role as the executing agency on the Indian side

<b>Risks</b>	<b>Mitigating Measures</b>
	of the interconnection is expected to result in better coordination.
Increase in prices of raw materials	Adequate contingency amounts have been provided. The government will supplement any shortfall. Costs will be passed on to consumers through the transmission tariff to be determined by BERC.
Government of Bangladesh and BPDB have limited capacity in negotiating cross border electricity trading contracts	ADB will recruit experienced individual consultants under the small-scale capacity development TA to support the government and BPDB to negotiate the contracts.
Cost of power not competitive compared to options in Bangladesh	The government has initiated a review of its gas pricing policy which is likely to impact existing bulk and retail electricity tariffs. Further, most new power plants will be based on dual fuel technology and imported fuel would be comparatively more expensive than power to be procured from India under this arrangement.
Inadequate power available in eastern region of India	The eastern region of India is expected to add significant generation capacity over the next 5 years to meet growth in demand. It is expected that up to 500 MW will be available for supply to Bangladesh.

ADB = Asian Development Bank, BERC = Bangladesh Energy Regulatory Commission, BPDB = Bangladesh Power Development Board, HVDC = high voltage direct current, MW = megawatt, MOU = memorandum of understanding, PGCIL = Power Grid Corporation of India, TA = technical assistance.

Source: Asian Development Bank.

#### **IV. ASSURANCES**

30. The government and the PGCB have assured ADB that implementation of the project will conform to all applicable ADB policies, including those concerning anticorruption measures, safeguards, gender, procurement, consulting services, and disbursement as described in detail in the project administration manual and loan documents.

31. The government and the PGCB have agreed with ADB on certain covenants for the project, which are set forth in the loan agreement and project agreement. Effectiveness of the loan and project agreements is conditional upon submission of a subsidiary loan agreement, satisfactory to ADB, under which the loan proceeds are relent to PGCB. Furthermore, withdrawals from the loan account are conditional upon a memorandum of understanding between the relevant power sector entities in Bangladesh and India on the key parameters of the proposed power purchase arrangements.

#### **V. RECOMMENDATION**

32. I am satisfied that the proposed loan would comply with the Articles of Agreement of the Asian Development Bank (ADB) and recommend that the Board approve the loan in various currencies equivalent to SDR65,986,000 to the People's Republic of Bangladesh for the Bangladesh–India Electrical Grid Interconnection Project from ADB's Special Funds resources with an interest charge at the rate of 1.0% per annum during the grace period and 1.5% per annum thereafter; for a term of 32 years, including a grace period of 8 years; and such other terms and conditions as are substantially in accordance with those set forth in the draft loan and project agreements presented to the Board.

Date: 10 August 2010

Haruhiko Kuroda  
President

**DESIGN AND MONITORING FRAMEWORK**

<b>Design Summary</b>	<b>Performance Targets and Indicators with Baselines</b>	<b>Data Sources and Reporting Mechanisms</b>	<b>Assumptions and Risks</b>
<b>Impact</b>  Enhanced regional cooperation in the power sector, contributing to economic growth	Improvement in gross domestic product per capita in Bangladesh to more than 4% by 2015 (2008 baseline: \$574 per capita at current prices)  Power consumption in Bangladesh to improve by 2012 (2008 baseline: 159 kWh per capita in Bangladesh compared with approximately 300 kWh per capita in South Asia)  Access to power sources in the South Asia region (2009 baseline: no exchange with any other country)	Country economic outlook and government statistics  ADB Energy Outlook for Asia and the Pacific <sup>a</sup>  BPDB and annual energy sector reports for Bhutan, India, Maldives, Nepal, and Sri Lanka  BPDB annual reports	<b>Assumptions</b>  Successful development of the eastern electrical grid of India prepares the foundation for regional electricity interconnections and optimal power sourcing.  Political and operational agreements arrived at between South Asian countries on regional electricity trading  Additional investments in transmission capacity to facilitate such power flows
<b>Outcome</b>  Successful development and operation of a transmission link between Bangladesh and India	500 MW of power (1,152–3,456 GWh) available over the interconnection to Bangladesh commencing 2012 (2009 baseline: no transfer of power)	BPDB annual reports	<b>Assumptions</b>  Availability of 250-500 MW power generation capacity to Bangladesh on long-term basis from India  Power interconnection infrastructure and capacity building successfully completed by 2012  <b>Risks</b> Cost of delivered power is not competitive compared to options in Bangladesh.  Delay in entering into power purchase agreements  Inadequate power generation capacity in the eastern region of India





Activities with Milestones	Inputs
<p>400/230 kV substation</p> <p>1.1 Procurement of major equipment: Issuance of bidding documents by March 2010 and contract awards by October 2010</p> <p>1.2 Construction of substation started by November 2010</p> <p>1.3 Commission of substation by fourth quarter of 2012</p> <p>Transmission lines</p> <p>2.1 Procurement of major equipment: Issuance of bidding documents by March 2010 and contract awarded by August 2010</p> <p>2.2 Construction of transmission lines started by September 2010</p> <p>2.3 Commission of transmission lines by fourth quarter of 2012</p> <p>Consulting services (small-scale capacity development TA to review interconnection agreements, capacity building, and information sharing regarding interconnection)</p> <p>3.1 Commencement of staff consultant selection process by June 2010</p> <p>3.2 Consultant selection and mobilization in phases from July 2010</p> <p>3.3 Completion of services by April 2012</p>	<p>ADB (ADF): \$100 million</p> <p>Government of Bangladesh: \$59 million</p>

ADB = Asian Development Bank, ADF = Asian Development Fund, BERC = Bangladesh Energy Regulatory Commission, BPDB = Bangladesh Power Development Board, DC = double circuit, GWh = gigawatt per hour, HVDC = high voltage direct current, kWh = kilowatt hour, kV = kilovolt, PGCB = Power Grid Company of Bangladesh, LILO = loop-in loop-out, MW = megawatt, TA = technical assistance.

<sup>a</sup> ADB. 2009. *Energy Outlook for Asia and the Pacific*. Manila.

Source: PGCB. 2010. *Development Project Proforma*. Dhaka.

### **LIST OF LINKED DOCUMENTS**

<http://www.adb.org/Documents/RRPs/?id=44192-01-3>

1. Loan Agreement
2. Project Agreement
3. Summary Sector Assessment: Power
4. Project Administration Manual
5. Project Classification Summary
6. Contribution to the ADB Results Framework
7. Development Coordination
8. Economic and Financial Analysis
9. Country Economic Indicators
10. Summary Poverty Reduction and Social Strategy
11. Environmental Assessment and Measures
12. Involuntary Resettlement Assessment and Measures
13. Risk Assessment and Risk Management Plan