Ex-ante Evaluation

1. Name of the Project

Country: The People's Republic of Bangladesh
Project: New Haripur Power Plant Development Project
(Loan Agreement: December 11, 2007; Loan Amount: 17,767 million yen; Borrower: The Government of People's Republic of Bangladesh)

2. Necessity and Relevance of JBIC's Assistance

1. Present state and issues facing the power sector in Bangladesh

In Bangladesh, the serious gap in the supply and demand of electricity has posed a bottleneck for economic growth. The power generation capacity is about 3,700 MW, which falls far short of the peak-hour demand of around 4,600 MW (as of 2005), thus forcing the government to carry out planned outages, mainly around peak hours. Going forward, the demand for electricity is projected to increase at 8–10% annually, and in its master plan, the Ministry of Power, Energy and Mineral Resources estimates that the power generation capacity of Bangladesh would have to be increased by 5,000 MW by the year 2012.

In order to eliminate the supply and demand gap, and thereby stabilize the supply of electricity, in addition to the development of new power sources, the big challenge is to improve the efficiency of the power sector as a whole by raising the availability factor of power plants and reducing the systemic loss of electricity. Specifically, this entails (i) raising the availability factor of power plants, (ii) creating an appropriate operation and maintenance system with the view to reducing unplanned outages at power plants, (iii) improving the financial standing of the power sector by charging reasonable electric power rates and securing funds for making capital investments, and (iv) expediting procurements for new projects.

2. Policies of the power sector in Bangladesh and the position of this project

In its Vision Statement on Power Sector Reforms (2000), the government of Bangladesh advocates the national goal of "providing access to affordable and reliable electricity to all by the year 2020." Toward this end, the government is tackling the issue of making capital investments. Concurrently, in addition to drafting the aforesaid sector reform plan, the government set up the Energy Regulatory Commission and is now implementing the gradual split up of the three divisions (generation, transmission and distribution) of the Bangladesh Power Development Board (BPDB) with a view to eliminating the government's excessive involvement in the power industry and promoting the streamlining of management of Bangladesh's electric power system.

3. JBIC's assistance policy for the power sector in Bangladesh and actual performance

In its Medium-Term Strategy for Overseas Economic Cooperation Operations (FY2005–2007), JBIC sets "assistance for improvement of the core economic infrastructure to raise income levels and promote economic growth" as its priority area for Bangladesh. This project aims to boost Bangladesh's power generation capacity and stabilize the supply of electricity by supporting the construction of a new base-load combined cycle thermal power plant and the streamlining of operation and maintenance of both new and existing power plants. Thus the project is consistent with JBIC's assistance policy, and JBIC's support for the project is highly necessary and relevant.

3. Project Objectives

The objective of this project is to meet the growing demand for electricity by constructing a new thermal power plant in Haripur of Narayanganj District, in the outskirts of Dhaka, and supporting the strengthening and streamlining of the operation and maintenance system of power plants as a whole, and thereby contribute to the enhancement of Bangladesh's industrial competitiveness and improvement of the people's livelihood.

4. Project Description

(1) Target Area

Haripur, Narayanganj District (outskirts of Dhaka)

(2) Project Outline

(a) Construction of a combined cycle thermal power plant (360 MW)
(b) Engineering consulting services (detailed design, bidding assistance, construction monitoring and supervision)
(c) Management consulting services (structural enhancement of Electricity Generation Company of Bangladesh [EGCB], support for the creation of an operation and maintenance system for Haripur power station, etc.)

(3) Total Project Cost / Loan Amount

54,409 million yen (Total Yen Loan Amount: 41,130 million yen, Yen Loan Amount for This Time: 17,767 million yen)

(4) Schedule

October 2007–September 2015 (96 months). The definition of project completion is "when Long Terms Service Agreement are completed."

(5) Implementation Structure

(a) Borrower: The Government of People's Republic of Bangladesh
(b) Executing Agency: Electricity Generation Company of Bangladesh Limited (EGCB)
(c) Operation and Maintenance System: Same as (b)

(6) Environmental and Social Consideration

(a) Environmental Effects / Land Acquisition and Resident Relocation

(i) Category: A

(ii) Reason for Categorization

This project falls into a thermal power sector project which is likely to have significant adverse impact on the environment under the "Japan Bank for International Cooperation Guidelines for Confirmation of Environmental and Social Considerations" (established in April 2002). Thus this project is classified as Category A.

(iii) Environmental Permit

Preparation of the Environmental Impact Assessment (EIA) report related to the project was approved by the Department of Environment (DOE) of the Ministry of the Environment and

Forest in September 2006.

(iv) Anti-Pollution Measures

This project is expected to meet the emission and environmental standards of Bangladesh by adopting various measures regarding air quality, water quality, noise and vibration, including installment of exhaust stacks, wastewater treatment facilities and noise absorption units. In addition, measures are expected to be taken to reduce the impact of warm water drainage on river systems at the time of detailed design.

(v) Natural Environment

This project will be implemented on the premises of existing power station, and there are no rare species or natural preserves in the vicinity of the project site. Thus the adverse impact on the natural environment is assumed to be minimal.

(vi) Social Environment

This project will be implemented on the premises of existing power station, and so it does not involve land acquisition or resident relocation.

(vii) Other/Monitoring

In this project, the executing agency will monitor the air quality, water quality, noise, etc.

(b) Promotion of Poverty Reduction

None

(c) Promotion of Social Development (e.g. Gender Perspective, Measures for Infectious Diseases including AIDS, Participatory Development, Consideration for the Handicapped, etc.)

During the construction period, in cooperation with local NGOs, HIV/AIDS education and training will be provided for workers.

(7) Other Important Issues

In order to enhance the sustainability of the project, “Long Terms Service Agreement” will be introduced in the operation and maintenance of the new thermal power plant. In addition to the steady supply of hard-to-find parts such as hot spare parts produced by gas turbine manufacturers, personnel at the new Haripur power plant will be given guidance on the operation and maintenance of the plant. Moreover, the existing and new power plants in Haripur will be regarded as profit centers that have the rights and responsibilities of both profits and expenditures of these plants (strategic business unit system). A management consultant will be hired to support the streamlining and revitalization of the operation and maintenance of both power plants.

5. Outcome Targets

(1) Evaluation Indicators (Operation and Effect Indicator)

Indicator	Target (2015, 3 years after completion)
Maximum output (MW)	360
Plant load factor (%)	70
Availability factor (%) [Note]	86.3
Auxiliary power ratio (%)	5
Gross thermal efficiency (%)	50

Outage hours by cause (hours/year)	Human error	0
	Machine failure	0
	Planned outage	1,200
Outage times by cause (no./year)	Human error	0
	Machine failure	0
	Planned outage	1
Net electric energy production (GWh/year)		2,097

Note: In the case of power plants for base power source use, about 50 days per year of planned outage are necessary for implementing periodic inspections. Thus an availability factor of 86% or so should be considered reasonable.

(2) Internal Rate of Return (Financial and Economic Internal Rate of Return)

Based on the following conditions, the economic internal rate of return (EIRR) of the project is 20.7%; the financial internal rate of return (FIRR) is 6.6%.

[FIRR]

(a) Cost: Project cost, operation and maintenance expenses
(b) Benefit: Earnings from selling electricity
(c) Project Life: 25 years

[EIRR]

(a) Cost: Project cost (excluding tax), operation and maintenance expenses
(b) Benefit: Earnings from the selling of electricity based on the assumed wholesale price of electricity
(c) Project Life: 25 years

6. External Risk Factors

Delays in construction work due to flooding and other natural disasters.

Delays in a main gas pipe construction project supported by the World Bank to which this project plans to hook up a gas pipe line as a feeder.

7. Lessons Learned from Findings of Similar Projects Undertaken in the Past

In the ex-post evaluations of similar past projects, the lesson learned is that to ensure the success and sustainability of projects, strengthening of the operation and maintenance system of the executing agency is indispensable. In this project, in addition to hiring a management consultant to support the said system, long-term maintenance services will be introduced including technology transfer, thereby reinforcing the actual activities of the project.

8. Plans for Future Evaluation

(1) Indicators for Future Evaluation

(a) Maximum output (MW)
(b) Plant load factor (%)
(c) Availability factor (%)
(d) Auxiliary power ratio (%)
(e) Gross thermal efficiency (%)
(f) Outage hours by cause (hours/year)

(g) Outage times by cause (no./year)
(h) Net electric energy production (GWh/year)

(2) Timing of Next Evaluation
Three years after project completion