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2. 署名したS/W
3. 事業事前評価表
4. 面談記録
5. 視察報告
6. 収集資料リスト

**MINUTES OF MEETING
FOR
THE STUDY ON BHERAMARA 450 MW COMBINED CYCLE
POWER STATION IN BANGLADESH
AGREED UPON BETWEEN AUTHORITIES CONCERNED OF
THE PEOPLE'S REPUBLIC OF BANGLADESH
AND
JAPAN INTERNATIONAL COOPERATION AGENCY**

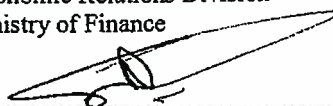
Dhaka, 6th November, 2007



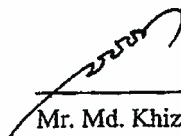
Dr. Akira Niwa
Team Leader
Project Formulation Study Team
Japan International Cooperation Agency



Ms. Nasreen Akhter Chowdhury
Deputy Secretary
Economic Relations Division
Ministry of Finance



Mr. S.M. Mesbahul Islam
Joint Secretary (Dev.)
Power Division
Ministry of Power, Energy and Mineral Resources



Mr. Md. Khizir Khan
Chairman
Bangladesh Power Development Board

The Government of the People's Republic of Bangladesh (hereinafter referred to as "the Government of Bangladesh") officially requested the Government of Japan to extend technical assistance for carrying out the Feasibility Study on Bheramara 450 MW Combined Cycle Power Station in Bangladesh (hereafter referred to as "the Study") in August 2007. In response to the request, the Project Formulation Study Team (hereafter referred to as "the Team") organized by the Japan International Cooperation Agency (hereafter referred to as "JICA") was dispatched and had a series of discussions with the Ministry of Power, Energy and Mineral Resources (hereinafter referred to as "MPEMR"), Bangladesh Power Development Board (hereinafter referred to as "BPDB"), Economic Relations Division, Ministry of Finance (hereinafter referred to as "ERD") and other authorities concerned with the Government of Bangladesh from 28th October to 6th November, 2007. (List of main discussants is shown in ANNEX 1.)

Discussions were conducted in a friendly and cordial atmosphere and both parties agreed to record the following points as summarized conclusion of the discussions.

1. Main Discussions

- a) MPEMR has assured that the transmission line will be connected to the site of Bheramara power station as and when required and confirmed that 85 percent of the construction of the Ishwardi to Khulna 230 KV transmission line has been completed.
- b) MPEMR has committed that they use only the land owned by BPDB as the construction site of Bheramara.
- c) MPEMR has informed the draft Coal Policy and draft Energy Policy will be completed as soon as possible. And the Power System Master Plan has been approved.
- d) Petrobangla has committed that they will provide natural gas for the new Bheramara Power Station well before the completion of the construction work.

2. Signing of the Scope of Work Agreed

After discussions and the basic agreement on the Draft Scope of Work shown in ANNEX 2, the Draft Scope of Work will be forwarded to relevant authorities for their final review. The comments from above mentioned organizations would be considered for incorporation into the Draft Scope of Work before finalization. Both sides have confirmed that JICA Headquarters will make the final decision on the Scope of Work, before signing the Scope of Work. After the final decision by JICA Headquarters, MPEMR, BPDB, ERD and JICA Bangladesh office will sign the Scope of Work.

3. Title of the Study

Both sides agreed that the title of this development study shall be "THE STUDY ON Bheramara 450 MW COMBINED CYCLE POWER STATION IN BANGLADESH".

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4. Implementation Schedule of the project

The Government of Bangladesh has asked Government of Japan to complete the construction of Bheramara Power station by 2012. JICA has acknowledged the request by the Government of Bangladesh. The team is expecting ODA Loan by Japan Bank for International Cooperation (JBIC) will be followed smoothly after the completion of the study and both sides make an endeavor to complete the construction of Beheramara Power Station (the project) by 2012. To conduct the project on the construction of Bheramara power station, the team has requested the Government of Bangladesh to make following arrangements.

a) Establishment of implementation entity

As described in Draft Scope of Work, the study will include various types of studies and require the person in charge of each component for the smooth study on time. Therefore Bangladesh shall assign relevant personnel including administrative staff and shall ask for the personnel across ministries and regions if any.

b) Environment and Social Considerations: ESCs

As a part of the study, ESCs such as EIA procedure, stakeholder meetings will be done in proper manner by the Government of Bangladesh with support of the study team based on the JICA Guidelines for Environmental Social Considerations.

c) The completion of relevant projects

Since it is necessary for the commencement of power plant to confirm the transmission lines and sufficient supply of energy, Bangladesh shall facilitate other donors to complete their projects by the commencement of Bheramara Power Station.

5. Implementation Mode of the Study

The study consists of two components i.e.1) Feasibility Study on Bheramara power station and 2) Technical Assistance for institutional building of North West Power Generating Company Ltd (NWPGCL). Each of final report by the study team will be published separately based on the schedule shown in Annex 2.

6. Establishment of Steering Committee

In order to promote successful implementation, the study requires smooth coordination among relevant organizations. Therefore a Steering Committee (SC) shall be formed during the study period. SC will be responsible for overall management of the study and be the platform to resolve the problems occurred and share the result of the study during the study period.

SC will be organized by MPEMR and chaired by the Secretary, Power Division, MPEMR.

SC will consist of MPEMR (overall coordinating), BPDB (implementation of F/S), Power Cell (Organization for Facilitating Reforms) NWPGCL (institution building), Ministry of Environment and Forest

(supporting EIA procedure), ERD (bilateral cooperation), Planning Commission (national development plan), Bangladesh Water Development Board (data provision about water affairs) JICA, Japan Bank for International Cooperation (JBIC) and Embassy of Japan. Necessary expenditure will be borne by the Government of Bangladesh.

7. Office space with necessary equipment

MPEMR and BPDB has agreed to provide JICA Study Team with adequate office space with modest furnishing, a telephone line and internet access that are needed to carry out the Study in Dhaka and Bheramara.

END

Annex 1: List of Discussants

2: Draft Scope of Work

List of Discussants

1. Government of People's Republic of Bangladesh

Ms. Nasreen Akhtar Chowdhury

Deputy Secretary, Economic Relations Division, Ministry of Finance

Dr. M. Fouzul Kabir Khan

Secretary, Ministry of Power, Energy and Mineral Resources

Mr. S. M. Mesbahul Islam

Joint Secretary (Dev.), Ministry of Power, Energy and Mineral Resources

Mr. Md. Showkat Ali

Member, Planning and Development, Bangladesh Power Development Board

Mr. Md. Emdadul Hoque

Joint Secretary, Energy and Mineral Resources Division

Mr. Md. Delwar Hossain

Director, Bangladesh Power Development Board

Mr. Kazi Matiur Rahman

Director, Electricity Generation Company of Bangladesh Ltd. (EGCB)

Mr. A.B.M. Harunur Rashid

Managing Director, Power Grid Company of Bangladesh Ltd. (PGCB)

Mr. Md. Quamrul Islam

Managing Director, Pashchimanchal Gas Company (PGCL)

Mr. Jalal Ahmed

Chairman, Bangladesh Oil, Gas & Mineral Corporation (Petrobangla)

Mr. Md. Muqtadir Ali

Director, Bangladesh Oil, Gas & Mineral Corporation (Petrobangla)

List of Discussants

**Project Formulation Study Team
for The Study on Bheramara 450MW Combined Cycle Power Station in
Bangladesh**

Dr. Akira Niwa

Team Leader, Project Formulation Study Team, Japan International Cooperation Agency

Mr. Koji Jitsukawa

Senior Program Officer, Japan International Cooperation Agency

Mr. Eisaku Matsumura

Senior Program Officer, Japan International Cooperation Agency

Mr. Akihiro Miyazaki

Senior program Officer, Japan International Cooperation Agency

Mr. Teizo Akitsuki

Consultant, Japan International Cooperation Agency

Mr. Kazunari Oshima

Consultant, Japan International Cooperation Agency

Mr. Kazuo Nishinoiri

Consultant, Japan International Cooperation Agency

Ms. Kimiko Iriya

Senior Country Officer, Japan Bank For International Cooperation

Japanese Resident Representatives in Bangladesh

Mr. Mitsuaki Suzuki

Deputy Resident Representative

Japan International Cooperation Agency, JICA Bangladesh Office

Mr. Seiichi Suzuki

JICA Expert (power Sector Advisor), Power Division Energy and Mineral Resources

Mr. Kunio Noda

Representative, Representative Office in Dhaka, Japan Bank for International Cooperation

(Draft)
SCOPE OF WORK
FOR
THE STUDY ON BHERAMARA 450MW COMBIBED CYCLE POWER
STATION
IN BANGLADESH
AGREED UPON BETWEEN AUTHORITIES CONCERNED OF THE
PEOPLE'S REPUBLIC OF BANGLADESH
AND
JAPAN INTERNATIONAL COOPERATION AGENCY

Dhaka, 2007

Ms. Nobuko Kayashima
Resident Representative
Japan International Cooperation Agency,
Bangladesh Office

Mr. Mohammad Mejbahuddin
Additional Secretary
Economic Relation Division
Ministry of Finance

Dr. M. Fouzul Kabir Khan
Secretary
Power Division
Ministry of Power, Energy and Mineral
Resources

Mr. Md. Khizir Khan
Chairman
Bangladesh Power Development Board

1. Introduction

In response to the request of the Government of People's Republic of Bangladesh (hereinafter referred to as "the Government of Bangladesh"), the Government of Japan decided to conduct the Feasibility Study on Bheramara 450 MW Combined Cycle Power Station in Bangladesh (hereinafter referred to as "the Study"), in accordance with the relevant laws and regulations in force in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, will undertake the Study in close cooperation with the authorities concerned of the Government of Bangladesh.

The present document sets forth the scope of work with regard to the Study.

2. Objectives of the Study

The objectives of the Study are to:

- 1) Conduct feasibility study on Bheramara 450MW combined cycle power station with transferring technology to Bangladesh counterpart personnel concerning the construction of power station,
- 2) .Design the Business Plan for Bheramara power station in addition to institional framework of the NWPGCL.

3. Study Area

The Study will cover the proposed area in Bheramara.

4. Scope of the Study

In order to achieve the above-mentioned objectives, the study will cover the followings.

4-1. Technical Design of Bheramara Power Station

(1) Analyze the Necessity of the Project

The Study Team, in jointly with Bangladesh Counterpart, shall evaluate main issues controlling the outcome of the proposed project by means of reviewing Development Project Proposal for Bheramara 450MW GCCPP (August 2000), other relevant document/information of national energy policy on gas and coal, the current conditions and future perspectives in the western region for power demand and supply, generation and transmission facilities, and supply of fuel gas and the current national plan on electricity supply.

(2) Site Investigation Works

The Study Team, in jointly with Bangladesh Counterpart, shall carry out the following site investigation

works:

a) Preparation of Site Investigation Works

Identify the site investigation works necessary for basic design of main equipment/machineries of the power station.

b) Land Survey

Ground survey works as necessary for studies of clearing out the existing gas turbine facility and preparation of land development plan for the proposed power station.

c) Soil Foundation Investigation

Sub-soil investigation works as necessary for studies of foundation and civil works for buildings, main equipment/machineries and other auxiliary facilities required for the proposed power station.

d) Hydrological Investigation

Hydrological investigation works as necessary for studies of Padma River at project area in determination of cooling water system and location of intake and discharge structures.

e) Others as required to implement the proposed Bheramara project.

(3) Preliminary Design of Bheramara Power Station

a) Selection of Development Scale

The Study Team, in jointly with Bangladesh Counterpart, shall study and select the principal features of the proposed Bheramara power station in conformity with the following requirements:

- Necessity for development of power plant in the western region;
- Assurance for the long-term supply of fuel gas;
- Connectivity to power network for evacuation of the generated power;
- Availability of land and water for plant layout and operational use;
- Social and environmental considerations;
- Others as required for development of power station.

b) Determination of Technical Specifications

The Study Team, in jointly with Bangladesh Counterpart, shall determine the configuration of main equipment/machineries and technical specification of gas turbine, generator, boiler, steam turbine, generator, and control/instrumentation and characteristics of fuel gas, etc.

c) Basic Design

The Study Team, in jointly with Bangladesh Counterpart, shall perform basic design for determination of performance specifications for electro-mechanical equipments, water treatment plant, cooling water system, fuel gas supply facilities, and transmission and substation facilities necessary for power evacuation.

(4) Planning Implementation Schedule

The Study Team, in jointly with Bangladesh Counterpart, shall prepare Implementation Schedule for the Project.

(5) Cost Estimation Analysis

The Study Team, in jointly with Bangladesh Counterpart, shall carry out cost estimation.

(6) Procurement Analysis

The Study Team, in jointly with Bangladesh Counterpart, shall carry out Procurement procedure including packaging

(7) Planning Operation and Maintenance System

The Study Team, in jointly with Bangladesh Counterpart, shall analyze the current OM situation of the power plants in western region and identify related issues and make a solutions for issues. Accordingly prepare operation and maintenance system of the proposed power plant including the training course curriculum and program.

(8) Economic and Financial Analyses

The Study Team, in jointly with Bangladesh Counterpart, shall carry out evaluation of economic and financial viabilities of the proposed project by the economic and financial analyses such as FIRR, EIRR and Annual Fund Requirement.

(9) Operation and Effect Indicators Preparation

The Study Team, in jointly with Bangladesh Counterpart, shall prepare the Operation and Effect Indicators to measure the benefit derived from the Project.

4-2. Environmental and Social Considerations

For compliance with environmental law and regulations stipulated in Bangladesh and of JICA Guidelines for Environmental and Social Considerations, the Study Team shall assist Bangladesh Counterpart in preparing Environmental Impact Assessment such as Environmental Protections measures, Environmental Management and Monitoring Plan, and Resettlement Plan, and conducting Stakeholder Meetings, and Information Disclosure.

4-3. Design of Corporate Rules for NWPGL

The Study Team works closely to design corporate rules for NWPGL (the "Corporate Rules") with Ministry of Power, Energy and Mineral Resources (MPEMR), BPDB, NWPGL and task team established by MPEMR, BPDB and NWPGL (the "NWPGL Management Task Team").

The Corporate Rules include, but not limited to, such rules as mentioned as below;

- a) Corporate management organization rule setting out corporate organization under the Board of NWPGL and duties and powers authorized to each organization
- b) Personnel management and employees service rules
- c) Job description
- d) Pay and remuneration structure rules
- e) Provident fund rules
- f) Financial rules

In addition to the Corporate Rules, a business plan to describe business activities and expected performances including financial projection for an adequate period shall be designed.

4-4. Business Plan of Bheramara Power Station

The Study Team works closely to design business plan for Bheramara Power Station to operate 450MW combined cycle power plant (the "Business Plan") with BPDB, NWPGL and task team established by BPDB and NWPGL (the "Bheramara Business Plan Task Team").

The Business Plan includes, but not limited to, such rules as mentioned as below;

- a) Organization as a part of NWPGL to ensure completion of the power plant in time and in performance as planned
- b) Design of work program and time schedule for completion of the power plant
- c) Financial projection during design, engineering and construction
- d) Organization as a part of NWPGL to ensure operation of the power plant as planned
- e) Personnel employment plan
- f) Subsidiary loan agreement, PPA, FSA, maintenance agreement and other core agreements and contracts
- g) Financial projection after completion during operation
- h) Bheramara Power Station rules under the Corporate Rules, if necessary

A draft report on a), b), d) and other information relating to principal policy of operation and maintenance of the Bheramara 450MW combined cycle power plant shall be presented in October 2008. A base business plan to describe key elements and issues including a preliminary financial projection shall be completed not later than 28 February 2009.

4-5. Financial Arrangement and Project Implementation Schedule

The Study Team, in jointly with Bangladesh Counterpart, shall set out financial arrangement and implementation schedule which starts from feasibility study and covers up to completion of the development of

Bheramara power station and institutional building of NWPGCL.

4-6. Workshop

The Study Team shall prepare and assist Bangladesh Counterpart for conducting workshops for obtaining consensus among participating stakeholders on the plan and outcomes of the project with respect to technical, economic, financial and social and environmental aspects.

5. Schedule of the Study

The Study will be carried out in accordance with Tentative Time Schedule as shown in APPENDIX I attached herewith.

6. Reports

JICA will prepare and submit the following reports in English to the Government of Bangladesh.

- (1) Inception Report (Ic/R): Ten (10) copies
- (2) Interim Report (It/R): Ten (10) copies
- (3) Draft Final Report (Df/R) a) F/S on Bheramara Power Station, b) Institutional Building: Each of Twenty (20) copies

The Government of Bangladesh shall present its comments to JICA within one month of receipt of the Draft Final Report.

- (4) Final Report and Summary (F/R): Thirty (30) copies

JICA will submit these reports within six (6) weeks after receiving the comments of the Government of Bangladesh on the Draft Final Report.

7. Undertakings of the Government of Bangladesh

- (1) In order to facilitate the smooth conduct of the Study, the Government of Bangladesh shall take necessary measures:
 - a) to permit the members of the JICA Study Team to enter, leave and sojourn in Bangladesh for the duration of their assignments therein, and exempt the members of the JICA Study Team from foreign registration requirements and consular fees;
 - b) to exempt the members of the JICA Study Team from taxes, duties and any other charges on equipment, machinery and other materials brought into and out of Bangladesh for the conduct of the Study;
 - c) to exempt the members of the JICA Study Team from income taxes and charges of any kind imposed on or in

- connection with any emoluments or allowances paid to the members of the JICA Study Team for their services in connection with the implementation of the Study;
- d) to provide necessary facilities to the JICA Study Team for remittances as well as for the utilization of funds introduced into Bangladesh from Japan in connection with the implementation of the Study;
- e) to facilitate prompt clearance through customs and inland transportation of equipment, materials and supplies required for the Study and of the personal effects of the members of the JICA Study Team.
- (2) The Government of Bangladesh shall bear claims, if any arises, against the members of the Team resulting from, occurring in the course of, or otherwise connected with the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the member of the JICA Study Team.
- (3) MPEMR shall be the responsible organization for the Study and also the coordinating body in relations with the other governmental and non-governmental organizations concerned for the smooth implementation of the Study. BPDP shall act as the counterpart agency to the JICA Study Team.
- (4) MPEMR and BPDP shall, at its own expense, provide the JICA Study Team with the following, in cooperation with other organizations concerned.
- a) security-related information on as well as measures to ensure the safety of the Japanese study team,
 - b) information on as well as support in obtaining medical services,
 - c) available data (including maps and photographs) and information related to the study,
 - d) counterpart personnel,
 - e) suitable office space with necessary equipment and facilities in ~~Jakarta~~ ^{Dhaka},
 - f) credentials or identification cards, and
 - g) communication facilities such as telephone, facsimile, E-mail, if necessary.

8. Effectuation of Scope of Work

Scope of Work of the Study will come into effect after completing necessary arrangement between Government of Japan and Government of Bangladesh.

9. Consultation

JICA and MPEMR will consult with each other in respect of any matter that may arise from or in connection with the Study.

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APPENDIX 1: Tentative Schedule

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Tentative Time Schedule

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---------------------------------------------------------------------|-----------|---|---|---|---|---|-----------|---|---|----|-----------|----------|----|----|----|
| 1. Technical Design of Bheramara Power Station | | | | | | | | | | | | | | | |
| 1-1 Review and Evaluate Relevant Documents and Information | | | | | | | | | | | | | | | |
| 1-2 Site Investigation Works | | | | | | | | | | | | | | | |
| 1-3 Preliminary Design of Bheramara Power Station | | | | | | | | | | | | | | | |
| 1-4 Basic Design | | | | | | | | | | | | | | | |
| 1-5 Plan for Operation & Management System | | | | | | | | | | | | | | | |
| 1-6 Cost Estimation and Economic and Financial Analysis | | | | | | | | | | | | | | | |
| 2. Social and Environmental Considerations | | | | | | | | | | | | | | | |
| 2-1 Environmental Impact Study | | | | | | | | | | | | | | | |
| 2-2 Social Considerations (Resettlement Plan, etc.) | | | | | | | | | | | | | | | |
| 3. Institutional Building of NWPGL | | | | | | | | | | | | | | | |
| 3-1 Design of Corporate Rules for NWPGL | | | | | | | | | | | | | | | |
| 3-2 Business Plan of Bheramara Power Station | | | | | | | | | | | | | | | |
| 4. Financial Arrangement and Project Implementation Schedule | | | | | | | | | | | | | | | |
| Reports (Technical Design) | ▲ Ic/R | | | | | | ▲ Ic/R | | | | ▲ Df/R | ▲ F/R | | | |
| Reports (Institutional Building) | ▲ Ic/R | | | | | | ▲ Ic/R | | | | ▲ Df/R | ▲ F/R | | | |
| Workshop Seminar for Technology Transfer | △ | | | | | | △ | | | | △ | | | □ | |

Reports: Ic/R: Inception Report
 Ic/R: Interim Report
 Df/R: Draft Final Report
 F/R: Final Report

Legend : ☐ Work period

**SCOPE OF WORK
FOR
THE STUDY ON BHERAMARA 450MW COMBINED CYCLE POWER
STATION
IN BANGLADESH
AGREED UPON BETWEEN
AUTHORITIES CONCERNED OF THE GOVERNMENT OF PEOPLE'S
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AND
JAPAN INTERNATIONAL COOPERATION AGENCY**

Dhaka, 2007

菅島 信子

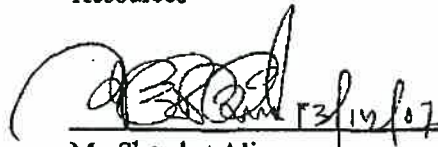
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Resident Representative
Japan International Cooperation Agency,
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Ministry of Finance



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Mr. Showkat Ali
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1. Introduction

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The present document sets forth the scope of work with regard to the Study.

2. Objectives of the Study

The objectives of the Study are :

- 1) To conduct feasibility study on Bheramara 450MW combined cycle power station with transferring technology to Bangladesh counterpart personnel concerning the construction of power station,
- 2) To design the Business Plan for Bheramara power station.

3. Study Area

The Study will cover the proposed area in Bheramara.

4. Scope of the Study

In order to achieve the above-mentioned objectives, the study will cover the followings.

4-1. Technical Design of Bheramara Power Station

(1) Necessity of the Project

The Study Team, jointly with Bangladesh Counterpart, shall evaluate main issues controlling the outcome of the proposed project by means of reviewing Development Project Proposal for Bheramara 450MW Combined Cycle Power Plant (CCPP) (August 2000), other relevant document/information of national energy policy on gas and coal, the current conditions and future perspectives in the western region for power demand and supply, generation and transmission facilities, and supply of fuel gas and the current national plan on electricity supply.

(2) Site Investigation Works

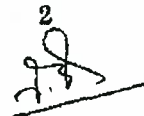
The Study Team, jointly with Bangladesh Counterpart, shall carry out the following site investigation works:

a) Preparation of Site Investigation Works

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Identifications of the site investigation works necessary for basic layout plan of main equipment/machineries of the power station

b) Land Survey

Ground survey works necessary for preparation of land development plan for the proposed power station

c) Soil Foundation Investigation

Sub-soil investigation works necessary for studies of foundation and civil works for buildings, main equipment/machineries and other auxiliary facilities required for the proposed power station

d) Hydrological Investigation

Hydrological investigation works necessary for studies of Padma River at project area in determination of cooling water system and location of intake and discharge structures

e) Others as required to implement the proposed Bheramara project.

(3) Preliminary Design of Bheramara Power Station

a) Selection of Development Scale

The Study Team, jointly with Bangladesh Counterpart, shall study and select the principal features of the proposed Bheramara power station in conformity with the following requirements:

- Necessity for development of power plant in the western region;
- Assurance for the long-term supply of fuel gas;
- Connectivity to power network for evacuation of the generated power;
- Availability of land and water for plant layout and operational use;
- Social and environmental considerations;
- Transportation of heavy equipment;
- Others as required for development of power station.

b) Determination of Technical Specifications

The Study Team, jointly with Bangladesh Counterpart, shall determine the configuration and layout plan of main equipment/machineries and characteristics of fuel gas, etc.

c) Basic Design

The Study Team, jointly with Bangladesh Counterpart, shall perform basic design for determination of performance specifications for electro-mechanical equipments, water treatment plant, cooling water system, fuel gas supply facilities, and transmission and substation facilities necessary for power evacuation.

(4) Planning Implementation Schedule

The Study Team, jointly with Bangladesh Counterpart, shall prepare Implementation Schedule for the Project.

(5) Cost Estimation Analysis

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The Study Team, jointly with Bangladesh Counterpart, shall carry out cost estimation.

(6) Procurement Analysis

The Study Team, jointly with Bangladesh Counterpart, shall carry out Procurement procedure including packaging

(7) Planning Operation and Maintenance System

The Study Team, jointly with Bangladesh Counterpart, shall analyze the current Operation and Maintenance situation of the power plants in Bangladesh and identify related issues and make solutions for issues. Accordingly prepare operation and maintenance system of the proposed power plant including the training course curriculum and program.

(8) Economic and Financial Analysis

The Study Team, jointly with Bangladesh Counterpart, shall carry out evaluation of economic and financial viabilities of the proposed project by the economic and financial analyses such as FIRR, EIRR and Annual Fund Requirement.

(9) Operation and Effect Indicators Preparation

The Study Team, jointly with Bangladesh Counterpart, shall prepare the Operation and Effect Indicators to measure the benefit derived from the Project.

4-2. Environmental and Social Considerations

For compliance with environmental law and regulations stipulated in Bangladesh and of JICA Guidelines for Environmental and Social Considerations, the Study Team jointly with Bangladesh counterpart will prepare Environmental Impact Assessment such as Environmental Protections measures, Environmental Management and Monitoring Plan, and Resettlement Plan, and conducting Stakeholder Meetings, and Information Disclosure.

4-3. Business Plan of Bheramara Power Station

The Study Team works closely to design business plan for Bheramara Power Station to operate 450MW combined cycle power plant (the "Business Plan") with Bangladesh Power Development Board (BPDB), North West Power Generation Company Limited (NWPGL) and task team established by BPDB and NWPGL (the "Bheramara Business Plan Task Team").

The Business Plan includes, but not limited to, such rules as mentioned as below;

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- a) Organization as a part of NWPGCL to ensure completion of the power plant in time and in performance as planned
- b) Design of work program and time schedule for completion of the power plant
- c) Financial projection during design, engineering and construction
- d) Organization as a part of NWPGCL to ensure operation of the power plant as planned
- e) Personnel employment plan
- f) Subsidiary loan agreement, Power Purchase Agreement (PPA), Full Service Agreement (FSA), maintenance agreement and other core agreements and contracts
- g) Financial projection after completion during operation
- h) Bheramara Power Station rules under the Corporate Rules, if necessary

4-4. Financial Arrangement and Project Implementation Schedule

The Study Team, jointly with Bangladesh Counterpart, shall set out financial arrangement and implementation schedule which starts from feasibility study and covers up to completion of the development of Bheramara power station.

4-5. Workshop

The Study Team shall prepare and assist Bangladesh Counterpart for conducting workshops for obtaining consensus among participating stakeholders on the plan and outcomes of the project with respect to technical, economic, financial and social and environmental aspects.

5. Schedule of the Study

The Study will be carried out in accordance with Tentative Time Schedule as shown in APPENDIX I attached herewith.

6. Reports

JICA will prepare and submit the following reports in English to the Government of Bangladesh.

- (1) Inception Report (Ic/R): Ten (10) copies
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The Government of Bangladesh shall present its comments to JICA within one and half months of receipt of

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the Draft Final Report.

(4) Final Report and Summary (F/R): Thirty (30) copies

JICA will submit these reports within one and half months after receiving the comments of the Government of Bangladesh on the Draft Final Report.

7. Undertakings of the Government of Bangladesh

(1) In order to facilitate the smooth conduct of the Study, the Government of Bangladesh shall take necessary measures:

- a) to permit the members of the JICA Study Team to enter, leave and sojourn in Bangladesh for the duration of their assignments therein, and exempt the members of the JICA Study Team from foreign registration requirements and consular fees;
- b) to exempt the members of the JICA Study Team from taxes, duties and any other charges on equipment, machinery and other materials brought into and out of Bangladesh for the conduct of the Study;
- c) to exempt the members of the JICA Study Team from income taxes and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the JICA Study Team for their services in connection with the implementation of the Study;
- d) to provide necessary facilities to the JICA Study Team for remittances as well as for the utilization of funds introduced into Bangladesh from Japan in connection with the implementation of the Study;
- e) to facilitate prompt clearance through customs and inland transportation of equipment, materials and supplies required for the Study and of the personal effects of the members of the JICA Study Team.

(2) The Government of Bangladesh shall bear claims, if any arises, against the members of the Team resulting from, occurring in the course of, or otherwise connected with the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the member of the JICA Study Team.

(3) Ministry of Power, Energy and Mineral Resources (MPEMR) shall be the responsible organization for the Study and also the coordinating body in relations with the other governmental and non-governmental organizations concerned for the smooth implementation of the Study. BPDB shall act as the counterpart agency to the JICA Study Team.

(4) MPEMR and BPDB shall, at its own expense, provide the JICA Study Team with the following, in cooperation with other organizations concerned.

- a) security-related information on as well as measures to ensure the safety of the Japanese study team,
- b) information on as well as support in obtaining medical services,
- c) available data (including maps and photographs) and information related to the study,

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- d) counterpart personnel,
- e) suitable office space with necessary equipment and facilities in Dhaka,
- f) credentials or identification cards, and
- g) communication facilities such as telephone, facsimile, E-mail, if necessary.

8. Effectuation of Scope of Work

Scope of Work of the Study will come into effect after completing necessary arrangement between JICA and the Government of Bangladesh.

9. Consultation

JICA and MPEMR will consult with each other in respect of any matter that may arise from or in connection with the Study.

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APPENDIX 1: Tentative Schedule

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APPENDIX I

Tentative Time Schedule

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---------------------------------------------------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| 1. Technical Design of Bheranara Power Station | | | | | | | | | | | | | | | |
| 1-1 Review and Evaluate Relevant Documents and Information | | | | | | | | | | | | | | | |
| 1-2 Site Investigation Works | | | | | | | | | | | | | | | |
| 1-3 Preliminary Design of Bheranara Power Station | | | | | | | | | | | | | | | |
| 1-4 Basic Design | | | | | | | | | | | | | | | |
| 1-5 Plan for Operation & Management System | | | | | | | | | | | | | | | |
| 1-6 Cost Estimation and Economic and Financial Analysis | | | | | | | | | | | | | | | |
| 2. Social and Environmental Considerations | | | | | | | | | | | | | | | |
| 2-1 Environmental Impact Study | | | | | | | | | | | | | | | |
| 2-2 Social Considerations/Resettlement Plan, etc.) | | | | | | | | | | | | | | | |
| 3. Institutional Building | | | | | | | | | | | | | | | |
| 4. Financial Arrangement and Project Implementation Schedule | | | | | | | | | | | | | | | |
| Reports (Technical Design) | ▲ | | | | | | ▲ | | | | ▲ | ▲ | | | |
| Reports (Institutional Building) | ▲ | | | | | | ▲ | | | | ▲ | ▲ | | | |
| Workshop | ▲ | | | | | | ▲ | | | | ▲ | ▲ | | | |
| Seminar for Technology Transfer | △ | | | | | | △ | | | | △ | △ | | | |

Legend : Work period

Reports : Ic/R: Inception Report
Ic/R: Interim Report
D/R: Draft Final Report
F/R: Final Report

Note: JICA and GoB will make efforts to shorten this time schedule for preparation of the Feasibility Study.

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3. 事業事前評価表

作成日：平成 19 年 12 月 17 日

担当グループ：経済開発部第二グループ

| |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. 案件名 |
| バングラデシュ国ベラマラ 450MW ガスタービン火力発電所建設計画調査 |
| 2. 協力概要 |
| <p>(1) 事業の目的</p> <p>バングラデシュ国（以下「バ国」）における電力供給力向上を目的に建設が予定されているベラマラ 450MW ガスタービン火力発電所建設に係る F/S を実施し、本調査機関中に現地カウンターパートに必要な技術移転を行う。併せて、同発電所を管轄する予定の北西部発電会社（North West Power Generation Company Limited : NWPGL）の経営体制に係る助言、同発電所の運営計画に係る支援を行う。</p> <p>(2) 調査期間</p> <p>2008 年 2 月～2009 年 1 月まで</p> <p>(3) 総調査費用</p> <p>1.9 億円</p> <p>(4) 協力相手先機関</p> <p>電力エネルギー省（MPEMR : Ministry of Power, Energy and Mineral Resources） バングラデシュ電力庁（BPDB : Bangladesh Power Development Board） 北西部発電会社（NWPGL）</p> <p>(5) 計画の対象（対象分野、対象規模等）</p> <p>対象分野：電力開発計画 対象地域：ベラマラ（およびその周辺）</p> |
| 3. 協力の必要性・位置付け |
| <p>(1) 現状及び問題点</p> <p>「バ」国では、2020 年までにすべての国民への電力供給を目標としているが、現状の電化率は 38% と低く、ピーク時電力需要約 4,700MW に対する最大発電可能容量も約 3,800MW にとどまり、電力供給不足により計画停電を余儀なくされている。今後の電力需要の伸びは年 8% と予想されており、増大する電力需要を満たすためには今後 5 年間で約 5,500MW の電源開発が必要とされている。</p> <p>また、「バ」国の国産一次エネルギーである天然ガスは東部地域に偏在しており、このため発電容量が東部地域に集中し、西部地域は発電容量が低く、かつコストの高いディーゼル発電が中心となっている。この発電容量の偏在により、西部地域での電力供給不足、東部から西部への送電ロス、電圧降下等を引き起こしている。一般的に「バ」国では西部地域の開発が遅れており、開発に取り残された同地域住民の底上げが急務となっている。</p> <p>(2) 相手国政府国家政策上の位置づけ</p> <p>「バ」国の上位開発計画である第 5 次 5 ヶ年計画（Fifth 5 Year Plan 2002）において、貧困撲滅を最重要課題として位置づけており、電化が貧困撲滅の重要な手段の一つとして取り上げられている。</p> <p>「バ」国の電力開発計画は「Power System Master Plan Update 2006 (PSMP)」としてまとめられ、2020 年までに全国の電化を達成することを目標に掲げている。PSMP では、今後の持続的な経済成長を考慮</p> |

し、2025 年までに新たに 20,495MW の電力供給を必要とし、相当する新たな設備拡充を計画している。本設備拡充計画に基づき、2025 年までに 69 箇所の発電所の建設を計画しているが、ベラマラ火力発電所は、2012 年に運転開始を目指した同拡充計画における最大級の発電所のひとつとして位置づけられている。

(3) 他国機関の関連事業との整合性

アジア開発銀行が「バ」国電力セクターへの援助を積極的に行っている。上述 PSMP 策定支援についての技術協力を行ったほか、PSMP の設備拡充計画に記載されている 2 つの発電所への資金援助も行っている。また、東部に偏在している天然ガスを西部に運搬し、西部地域への電力施設に供給すべく、現在ガスパイプラインの延伸プロジェクトを実施中である。

その他、世界銀行が電気事業体の分社化推進のための技術協力を行っている。

(4) 我が国援助政策との関連、JICA 国別事業実施計画上の位置づけ

本件はわが国の援助重点分野のひとつである「経済成長」分野のサブセクターである「電力」に位置づけられ、開発課題である電力の安定供給に資する案件である。

なお、現地 ODA タスクでの議論を通じて作成されたローリングプランにおいて、本開発調査実施後は、国際協力銀行（JBIC）による円借款の実施が見込まれる。

4. 協力の枠組み

(1) 調査項目と主な活動

1) 基本情報・計画の収集/確認

- ア) 電力需要予測
- イ) 裨益効果
- ウ) 燃料供給体制
- エ) 系統計画
- オ) 実施体制
- カ) 地点選定の妥当性

2) 建設用地に関する調査

- ア) 地形測量および構造物調査等の実施
- イ) 土質調査の実施
- ウ) 冷却方式の検討および水文調査の実施

3) 設備設計に関する調査

- ア) 発電施設の設計・必要機材の仕様確定
- イ) 事業費および資金計画の策定
- ウ) 必要機材の調達・搬入スケジュールの算定
- エ) 基本設計の実施
- オ) 施工計画の概略検討

4) ベラマラ発電所事業実施体制および運営・維持管理体制に係る提言

5) 経済財務分析および運用効果指標に関する調査

6) 環境社会配慮

- ア) 自然環境調査
- イ) 社会環境調査

- ウ) 公害対策調査
- エ) 影響予測・回避軽減策
- オ) 環境管理・モニタリング計画の策定
- カ) 住民移転計画の策定
- キ) ステークホルダー協議の支援
- 7) 発電会社の機能強化および発電所基盤整備への支援
 - ア) 北西部発電会社 (NWPGL) の組織体制確立への支援
 - イ) ベラマラ発電所ビジネスプラン策定への支援
- 8) 調査全体を通じた技術移転
- 9) ワークショップ

(2) アウトプット (成果)

- 1) ベラマラ 450MW ガスタービン火力発電所建設に係る F/S の実施
- 2) 北西部発電会社 (NWPGL) の組織機能強化
- 3) ベラマラ発電所ビジネスプランの策定
- 4) 火力発電所建設、電気事業経営に係る技術移転、人材育成

(3) インプット (投入) : 以下の投入による調査の実施

(a) コンサルタント (分野/人数)

- ア) 総括/電力開発・政策/1
 - イ) 火力発電計画/1
 - ウ) 燃料供給計画/1
 - エ) 機械設備/1
 - オ) 電気設備/1
 - カ) 運転保守/1
 - キ) 事業経営/組織制度/1
 - ク) 経済・財務分析/1
 - ケ) 環境社会配慮/1
- 合計9名

(b) その他 研修員受入れ

特になし。

5. 協力終了後に達成が期待される目標

(1) 提案計画の活用目標

- ・調査結果に基づき、JBIC 円借款により発電所建設がスタートする。

(2) 活用による達成目標

- ・同発電所から電力が安定供給され、バ国の電化率の向上に寄与する。
- ・北西部発電会社の経営プランおよびベラマラ発電所ビジネスプランに基づき自立的な電気事業経営が行われる。

6. 外部要因

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| <p>(1) 協力相手国内の事情 自然災害（サイクロン、洪水）による調査および建設スケジュールの遅れ。</p> <p>(2) 関連プロジェクトの遅れ アジア開発銀行によるガスパイプライン延伸プロジェクトの遅延によるガス供給の遅れ。</p> |
| <p>7. 貧困・ジェンダー・環境等への配慮（注）</p> <p>JICA 環境社会配慮ガイドラインによる本調査のカテゴリ分類は A であり、必要な情報公開を行うほか、審査員への諮問、現地ステークホルダーミーティング（調査中に 3 回）を行う。</p> |
| <p>8. 過去の類似案件からの教訓の活用（注）</p> <p>特になし。</p> |
| <p>9. 今後の評価計画</p> <p>(1) 事後評価に用いる指標</p> <p>(a) 活用の進捗度 本調査結果に基づく、JBIC 円借款供与に向けて必要な手続きの進捗状況（EIA の申請・許可、わが国への円借款供与の要請書の提出、LA の締結など）</p> <p>(b) 活用による達成目標の指標 電化率の向上 北西部発電会社の健全な財務状況</p> <p>(2) 上記（a）および（b）を評価する方法および時期</p> <p>(a) 2010 年 3 月（F/U 調査によるモニタリング）</p> <p>(b) 2018 年（F/U 調査によるモニタリング）</p> |

（注）調査にあたっての配慮事項