



B-R POWERGEN LIMITED (BRPL)

(A govt. owned power generation organization)

Request for Expression of Interests (REOI) for Appointment of Consultancy service for Detailed Feasibility Study, Environmental Impact Assessment (EIA) and Social Impact Assessment (SIA) for Construction of 400 ($\pm 10\%$) MW Combined Cycle Gas/LNG based Power Plant Project at Char Ishwardia mouza under Sadar upazila of Mymensingh District, Bangladesh.

November-2021

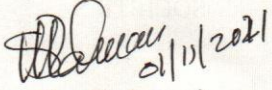
INSTRUCTION TO THE APPLICANTS

1. Application of the interested firms must include:

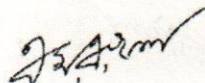
- i) Name of the Principal Firm with complete address, Cable, Fax, Telephone Nos. E-mail address etc.
- ii) Name of the Associated Firm (if any) with complete address, Cable, Fax, Telephone Nos., E-mail address etc.
- iii) Notarized Joint Venture/Consortium/Association Agreement (JVCA) on Non-Judicial Stamp of the firms (in case of Joint Venture/Association with another firm) for the said consulting service. The value of Non-Judicial Stamp should be Tk. 300.00 (Tk. Three hundred).
- iv) The name of the employees/owner(s) of the firms and corporate profile of the firms.
- v) The name and qualification of the Management/Administrative Personnel.
- vi) List and qualification of the key-personnel likely to be involved in the proposed consulting service. The proposed fields of expertise for the said consulting service would be at least the following:

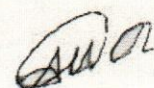
Sl. No.	Required expertise/Position	Number of Experts	Estimated Men-Months
1	Power Plant Expert (Team Leader)	1	6.0
2	Mechanical Engineer (GT)	1	4.0
3	Mechanical Engineer (ST & HRSG)	1	3.0
4	Electrical Engineer (Power Plant)	1	3.0
5	Protection, Instrumentation & Control Expert	1	3.0
6	Civil Engineer	1	4.0
7	Environmental Specialist	1	4.0
8	Water Resources Expert	1	2.0
9	Geotechnical Specialist	1	3.0
10	CCPP Operation and Maintenance Expert	1	2.0
11	Ecologist, Social & Resettlement Specialist	1	2.0
12	Lead architect	1	2.0
13	Primary Fuel (Gas /LNG) Transportation Expert	1	2.0
14	GIS, RS and Auto CAD Specialist	1	2.0
15	Financial Analyst and Economist	1	2.0
16	Legal Expert	1	1.0
Total		16	45.0

- vii) Identity, Structure, Organization of the firms(s) including copies of the documents defining the constitution or legal status, place of registration and principal places of business and/or principal offices of the company/firm.
 - viii) Details of vehicles, instruments & office equipment the firm owns.
 - ix) Audited Financial Statements of the firm for the last five fiscal years.
 - x) Experience of the firms along with a list of similar work at hand or carried out since 2003. The Consultant must submit the end user certificate in support of experience.
 - xi) The Consultant should submit the signed CV by the proposed professional staff.
2. Applicant must submit information using the attached table/format [Annexure-1 to 6] with the document. The submitted document must be sealed and signed by a person duly authorized by the consulting firm.


(Md. Sharifur Rahman)
Executive Director (Engineering)
(Addl. Ch.)
B-R Powergen Limited.







Photo

Curriculum Vitae (CV) for Each Proposed Professional Staff

Name of the Consultant	
RFP IDENTIFICATION NO:	
Name of the Client	

1	PROPOSED POSITION FOR THIS PROJECT	<i>[From the Terms of Reference, state the position which the Consultant will be engaged. Only one candidate shall be nominated for each position]</i>			
2	NAME OF STAFF	<i>[state full name]</i>			
3	DATE OF BIRTH				
4	NATIONALITY				
5	MEMBERSHIP IN PROFESSIONAL SOCIETIES	<i>[state rank and name of society and year of attaining that rank]</i>			
6	EDUCATION:	<i>[list all the colleges/universities which the consultant attended, stating degrees obtained, and dates, and list any other specialised education of the consultant]</i>			
7	OTHER TRAINING	<i>[indicate significant training since degrees under EDUCATION were obtained, which is pertinent to the proposed tasks of the Consultant]</i>			
8	LANGUAGES & DEGREE OF PROFICIENCY	<u>Language</u>	<u>Speaking</u>	<u>Reading</u>	<u>Writing</u>
		<i>e.g. English</i>	<i>Fluent</i>	<i>Excellent</i>	<i>Excellent</i>
9	COUNTRIES OF WORK EXPERIENCE				

10	EMPLOYMENT RECORD <i>[starting with position list in reverse order <u>every employment held and state the start and end dates of each employment</u>]</i>	<i>[The Consultant should clearly distinguish whether as an "employee" of the firm or as a "Consultant" or "Advisor" of the firm]</i> <i>[The Consultant should clearly indicate the Position held and give a brief description of the duties in which the Consultant was involved]</i>	
	EMPLOYER 1	FROM: <i>[e.g. January 1999]</i>	TO: <i>[e.g. December 2001]</i>
	EMPLOYER 2	FROM:	TO:
	EMPLOYER 3	FROM:	TO:
	EMPLOYER 4	FROM:	TO:
	(etc)		
11	WORK UNDERTAKEN THAT BEST ILLUSTRATES YOUR CAPABILITY TO HANDLE THIS ASSIGNMENT	<i>[give an outline of experience and training most pertinent to tasks on this assignment, with degree of responsibility held]</i>	
12	COMPUTER SKILLS	<i>[give details of knowledge and skills]</i>	

CERTIFICATION *[do not amend this certification]*

I, the undersigned, certify that (i) I was not a former employee of the Client immediately before submission of this Proposal, (ii) I have not offered my CV to be proposed by a Firm other than this Consultant for this assignment and, (iii) to the best of my knowledge and belief, this CV correctly describes myself, my qualifications, and my experience. I also understand that any wilful mis-statement described herein may lead to my disqualification or dismissal, if engaged.

I have been employed by *[name of the Consultant]* continuously for the last twelve (12) months as regular full time staff. Indicate "Yes" or "No" in the boxes below:

YES

 NO

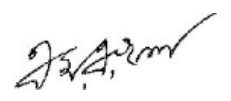
Signature

Date of Signing

Day / Month / Year

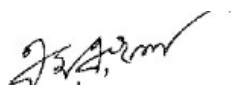
Name and Qualification of Management/Administrative Personnel

Serial No	Name of the Personnel	Position at the Firm	Temporary/Permanent	Educational Qualification	Experience in years



Financial Statement**Summary of Assets & Liabilities:**

Sl. No.	Year	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
1	Total Asset					
2	Total Liabilities payment					
3	Total investment					
4	Operative Expenditure					
5	Taxes Paid					
6	Profit after payment of Taxes					
7	Turnover [Sl. No. 2+3+4+5+6]					



Details of Vehicles, Instrument and Office Equipment

Sl. No.	Name, Brand of the Vehicles/Equipment, Year of Manufacture	Model No., Serial No./Registration No.	Present Condition

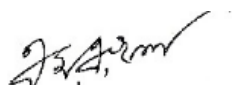
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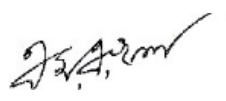
Specimen form for Similar Experience of the Firm

Sl. No.	Name, Brand of the Vehicles/Equipment, Year of Manufacture	Model No., Serial No./Registration No.	Present Condition



Experience of the firm in other works

Sl. No.	Name of Services	Name of Client with address and Contact number	Contract amount	Start date	Completion time



Draft Terms of Reference (TOR)

For

Consultancy service for Detailed Feasibility Study, Environmental Impact Assessment (EIA) and Social Impact Assessment (SIA) for Construction of 400 ($\pm 10\%$) MW Combined Cycle Gas/LNG based Power Plant Project at Char Ishwardia mouza under Sadar upazila of Mymensingh District, Bangladesh.

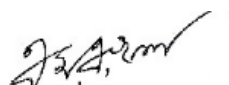


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1. Background

Electricity is the driving force of modern civilization as well as the back-bone of all development activities of the country. To secure continuous growth of electricity for sustainable development, Bangladesh Government has committed through its National Energy Policy to provide affordable, reliable and quality power supply to all.

Present generation capacity of the country is not sufficient to meet the prevailing load demand of the country. Furthermore, the load demand is increasing at a faster rate. To cope up with the growing load demand, the Government made a plan to increase its generation capacity. Target of generation capacity is 40,000 MW and 60,000 MW by 2030 and 2041 respectively. In compliance to reach the target, B-R Powergen Ltd. has been given to increase its capacity with 400 ($\pm 10\%$) MW by installing the Combine Cycle Power Plant Project at Mymensingh Zone.

As a part of the generation target of Bangladesh Government, B-R Powergen Ltd. has selected about 40 Acres of land located at Char-Ishwardia mouza under Sadar upazila of Mymensingh District, Bangladesh for development of the large base load power station. Earlier, B-R Powergen Ltd. conducted a Pre-feasibility Study for setting up of 400 ($\pm 10\%$) MW Gas based Power Plant at that site. Now, a detailed impact analysis is required for the Feasibility study, Environmental Impact Assessment (EIA) and Social Impact Assessment (SIA) are required for smooth function of this project.

2. Project Location

The project is located at Char-Ishwardia mouza under Sadar upazila of Mymensingh District, Bangladesh. The Latitude and Longitude of the project area are given below:

<u>Latitude</u>	<u>Longitude</u>
24.726105	90.447159
24.725254	90.447662
24.725045	90.447949
24.725022	90.448252
24.724987	90.448730
24.725442	90.448410
24.725862	90.448423
24.726352	90.448204
24.726497	90.448536

3. Objective

The purpose of this study is to assess the technical, economic, and financial feasibility of the project along with environmental and social assessments complying relevant policies and guidelines.

4. Scope of Services

The scope of this service includes

1. Detailed Feasibility Study
2. Environmental Impact Assessment (EIA)
3. Social Impact Assessment (SIA)

for 400 ($\pm 10\%$) MW Gas/LNG based Combined Cycle power plant project at Char-Ishwardia mouza under Sadar upazila of Mymensingh District, Bangladesh.

4.1. Scope of Feasibility Study

The consultants will conduct the detail Feasibility Study for 400 ($\pm 10\%$) MW Gas/LNG based Combined Cycle power plant project at Char-Ishwardia mouza under Sadar upazila of Mymensingh District, Bangladesh which will include the following (but not limited to):

1. Executive Summary
2. Basic Information of the project
3. Introduction
4. Market / Demand Analysis
5. Assessment, Requirements and Justification of the Project
6. Fuel transportation & Fuel Supply Plan
7. Technical/Technological & Engineering Analysis
8. Power Evacuation System
9. Environmental and Climate analysis
10. Cost-Benefit Analysis
11. Social Analysis
12. Human Resources and Administrative Support analysis
13. Institutional and Legal analysis
14. Risk (Uncertainty) and Sensitivity Analysis
15. Safety and Security Plan
16. Monitoring and Mitigation Plan
17. Preparation of Tender Document
18. Preparation of Project Construction and O&M Plan
19. Alternative/Options Analysis
20. Recommendation and Conclusion

Detailed Scope of Feasibility Study is elaborated in **Attachment-1**.

4.2. Scope of Environmental Impact Assessment (EIA)

Environmental Impact Assessment (EIA) study has to be made for a 400 ($\pm 10\%$) MW Gas/LNG based Combined Cycle power plant project at Char-Ishwardia mouza under Sadar upazila of Mymensingh District, Bangladesh.

1. The consultants will conduct the Environmental Impact Assessment (EIA) based on guideline of Department of Environment (DOE), Bangladesh.
2. On behalf of the project owner, the consultants shall prepare a final TOR for EIA which shall be submitted to DOE and will arrange and take all necessary actions for the approval of ToR from DOE.
3. The consultants shall submit a comprehensive EIA report considering the overall activity of the said Project in accordance with DOE approved TOR and time schedule indicated in this document.
4. Consultant will incorporate all suggestions, observations, modifications, supplementary reports, presentations etc. required for obtaining approval on submitted EIA.
5. On behalf of the project owner, consultant will arrange and take all necessary actions for the approval of EIA and LCC (Location Clearance Certificate) from DOE.

Detailed draft Scope of Environmental Impact Assessment (EIA) is elaborated in **Attachment-2**.

4.3. Scope of Social Impact Assessment (SIA)

The consultant will conduct Socio-economic baseline study/survey to identify and assess social risks & impacts as well as propose mitigation measures/plan and Social Management System (both for construction and operation phase) for 400 ($\pm 10\%$) MW Gas/LNG based Combined Cycle power plant project at Char-Ishwardia mouza under Sadar upazila of Mymensingh District, Bangladesh.

The consultants will conduct the detail Social Impact Assessment (SIA) which will include the following (but not limited to):

1. Executive summary
2. Approach and Methodology
3. Policy, Legal, Administrative Framework & implementation Schedule
4. Socio-economic baseline study/Survey
5. Social risks & impacts assessment and mitigation plan
6. Social Management System
7. Land acquisition and Resettlement action & Livelihood Restoration plan
8. Consultation, participation and Stakeholder engagement;
9. Information Disclosure system
10. Grievance redresses mechanisms;
11. Emergency preparedness and response;
12. Social Management programs, Monitoring, Audit and Review.

Detailed Scope of Social Impact Assessments (SIA), is elaborated in **Attachment-3**.

5. Time period and Reporting

The reports of the said assignment [Consultancy service for Detailed Feasibility Study(DFS), Environmental Impact Assessment (EIA) and Social Impact Assessment (SIA) for Construction of 400 ($\pm 10\%$) MW Combined Cycle Gas/LNG based Power Plant Project at Char Ishwardia mouza under Sadar upazila of Mymensingh District, Bangladesh] is required to be prepared by the consultant and to be submitted to the Project Director. The consultant shall work under the direct supervision of the Project owner.

- a) The assignment is single phased and the consultant shall to complete all the tasks and submit all reports within 6 (six) months as per following schedule:

Table 1: Reporting schedule

	Service	Report submission (from the date of contract signing i.e. from the date of commencement of the study)
a.	Inception report:	Within 15 days.
b.	Interim progress report:	Within 90 (ninety) days.
c.	Draft final report:	
	EIA:	Within 120 (one hundred twenty) days.
	Feasibility study:	Within of 150 (one hundred fifty) days.
	SIA:	Within 90 (ninety) days.
d.	Approved final report:	
	Feasibility study:	Within 180 (One hundred eighty) days.
	EIA:	Within 165 (One hundred sixty-five) days.
	SIA:	Within 120 (one hundred twenty) days.

- b) All the reports must be prepared as per relevant standards which acceptable to the owner (B-R Powergen limited) and prospective lender.

- c) All reports shall be written in English language. Moreover, the Executive summary of the Environmental Impact Assessment (EIA) and Social Impact Assessment (SIA) documents is to be translated into Bengali for public disclosure and wide spread understanding of the local people. Also, all documents and reports will be made available in hard copy and also in electronic format to B-R Powergen Ltd. and must follow applicable relevant policies and guidelines.
- d) Consultant may have to present any of the relevant reports as needed and requested by the Organization and/or Ministry.
- e) The consultant shall have to organize discussion meetings, seminars, workshops on different draft reports/documents (prepared by Consultant) and shall have to revise on the basis of comments/outcome of discussion meetings, seminars, workshops in the final reports/documents.
- f) Reports of the tasks (DFS, EIA, SIA) shall be printed and submitted as each separate sets of individual documents. All sets of reports are to be submitted in 5 (five) sets in original hard copies and 01 (one) soft copy (in pdf and editable format).
- g) Consultant have to maintain the confidentiality agreement on non-disclosure of any information to the third party or use of study data in other purpose without concern of project owner.
- h) The consultants shall carry out the study with the successful realization of the project for the best interest of the client (B-R Powergen Ltd.) with all reasonable care, skill sound engineering, administrative and financial practices. The consultants shall be responsible to the Company for discharge of responsibilities.

6. Staffing Requirement

Considering the above scope of work and 6 months of duration of the project, a total of 45 person-months of consulting services will be required. Table-2 below gives the Key Experts required. The consulting firms can propose allocation of man-months as they feel appropriate to deliver the project study report in-time (within stipulated allocation of total man months).

Table 2: Personnel Required

SI. No.	Required expertise/Position	Number of Experts	Estimated Men-Months
1	Power Plant Expert (Team Leader)	1	6.0
2	Mechanical Engineer (GT)	1	4.0
3	Mechanical Engineer (ST & HRSG)	1	3.0
4	Electrical Engineer (Power Plant)	1	3.0
5	Protection, Instrumentation & Control Expert	1	3.0
6	Civil Engineer	1	4.0
7	Environmental Specialist	1	4.0
8	Water Resources Expert	1	2.0
9	Geotechnical Specialist	1	3.0
10	CCPP Operation and Maintenance Expert	1	2.0
11	Ecologist, Social & Resettlement Specialist	1	2.0
12	Lead architect	1	2.0
13	Primary Fuel (Gas /LNG) Transportation Expert	1	2.0
14	GIS, RS and Auto CAD Specialist	1	2.0
15	Financial Analyst and Economist	1	2.0
16	Legal Expert	1	1.0
Total		16	45.0

Qualifications and Experience required for Key Experts

Sl.	Expertise of the field	Required Qualification & Experience
1)	Power Plant Expert (Team Leader)	<p><u>Education:</u> Bachelor /Equivalent degree in Mechanical /Electrical Engineering.</p> <p><u>Experience:</u></p> <ol style="list-style-type: none"> 1. 20 years of job experience. 2. 15 years of experience in the field of Consultancy in Power sector. 3. Experience as Team Leader/Project Manager in 04 nos. of Consultancy projects. 4. Experience in conducting detail Feasibility study of 03 nos. of NG/LNG based Combined Cycle Power Plant Projects having capacity not less than 225 MW each. 5. Experience in conducting detail Feasibility study of 03 nos. NG/LNG based thermal power plant project having capacity not less than 300 MW (Single Unit).
2)	Mechanical Engineer (Gas Turbine)	<p><u>Education:</u> Bachelor /Equivalent degree in Mechanical Engineering.</p> <p><u>Experience:</u></p> <ol style="list-style-type: none"> 1. 15 years of job experience. 2. 10 years of experience in the field of Consultancy in Power sector. 3. Experience in conducting detail Feasibility study of 02 nos. of NG/LNG Combined Cycle Power Plant having capacity not less than GT-150 MW / GT&ST-225 MW each. 4. 05 years of experience in Gas Turbine and 02 years of experience in Steam Turbine in design specification, installation, maintenance etc. both for Gas Turbine and Steam Turbine in power plant or only 07 years of experience in the Gas Turbine Power Plant.
3)	Mechanical Engineer- 2 (Steam Turbine and HRSG)	<p><u>Education:</u> Bachelor /Equivalent degree in Mechanical Engineering.</p> <p><u>Experience:</u></p> <ol style="list-style-type: none"> 1. 15 years of job experience. 2. 10 years of experience in the field of Consultancy in Power sector. 3. Experience in conducting detail Feasibility study of 02 nos. of NG/LNG based thermal power plant project having capacity not less than 225MW (Single Unit). 4. 07 years of experience in Steam Turbine and Heat Recovery Steam Generator in design specification, installation, maintenance etc. for Steam Turbine in power plant.

Sl.	Expertise of the field	Required Qualification & Experience
4)	Electrical Engineer (PowerPlant)	<p><u>Education:</u> Bachelor /Equivalent degree in Electrical Engineering.</p> <p><u>Experience:</u></p> <ol style="list-style-type: none"> 1. 15 years of job experience. 2. 10 years of experience in the field of Consultancy in Power sector. 3. Experience in conducting detail Feasibility study of 02 nos. of Combined Cycle Power Plant Projects having capacity not less than 225 MW each. 4. Experience in conducting detail Feasibility study of 02 nos. of thermal power plant project having capacity not less than 300 MW (Single Unit). 5. 07 years of experience in operation /maintenance /design /erection / commission /manufacture /consultancy etc. of electrical system i.e. substation, switchgear, power evacuation facility etc. of power plant not less than 225 MW Combined Cycle Power Plant or 300 MW Thermal Power Plant.
5)	Instrumentation & Control Engineer	<p><u>Education:</u> Bachelor /Equivalent degree in Electrical Engineering.</p> <p><u>Experience:</u></p> <ol style="list-style-type: none"> 1. 15 years of job experience. 2. 05 years of experience in the field of Consultancy in Power sector. 3. Experience in conducting detail Feasibility study of 02 nos. of Combined Cycle Power Plant Projects (Gas or Liquid Fuel or Dual Fuel based) having capacity not less than 225 MW each. 4. Experience in conducting detail Feasibility study of 01 nos. of thermal power plant project having capacity not less than 300 MW (Single Unit). 5. 05 years of experience in the field of Instrumentation & Control system of NG/LNG Fired Combined Cycle Power Plant.
6)	Civil Engineer	<p><u>Education:</u> Bachelor /Equivalent degree in Civil Engineering.</p> <p><u>Experience:</u></p> <ol style="list-style-type: none"> 1) 20 years of job experience. 2) 05 years of experience in the field of Consultancy in Power sector. 3) Experience in conducting detail Feasibility study of 01 no. of Combined Cycle Power Plant Projects having capacity not less than 225 MW each. 4) Experience in conducting detail Feasibility study of 01 no. of thermal power plant project having capacity not less than 300 MW (Single Unit). 5) 10 years of experience in civil works related to construction, erection, installation, design etc. of Combined Cycle Power Plant.

Sl.	Expertise of the field	Required Qualification & Experience
7)	Environmental Specialist	<p><u>Education:</u> Master degree /Equivalent in Environmental Science /Engineering.</p> <p><u>Experience:</u></p> <ol style="list-style-type: none"> 1. 15 years of job experience. 2. 10 years of experience in the field of Consultancy addressing environmental issues. 3. Experience in conducting Environmental Impact Assessment (EIA) of 02 nos. of Combined Cycle Power Plant Projects having capacity not less than 225 MW each.
8)	Water resource expert	<p><u>Education:</u> Bachelor /Equivalent degree in Civil/Geo-technical /Water Resources Engineering /Geology /Hydrology or related field.</p> <p><u>Experience:</u></p> <ol style="list-style-type: none"> 1. 15 years of job experience. 2. 10 years of experience in the field of Consultancy addressing water resource and quality issues. 3. Experience in conducting Environmental Impact Assessment (EIA) of 02 nos. of Combined Cycle Power Plant Projects having capacity not less than 225 MW each.
9)	Geo-Technical Specialist	<p><u>Education:</u> Bachelor /Equivalent degree in Civil/Geo-technical/Water Resources Engineering or related field.</p> <p><u>Experience:</u></p> <ol style="list-style-type: none"> 1. 10 years of job experience. 2. 5 years of experience in geo-technical investigation for development of large power plant/industries/bridges etc.
10)	Operation and Maintenance Expert	<p><u>Education:</u> Bachelor degree/Equivalent in Electrical/Mechanical Engineering.</p> <p><u>Experience:</u></p> <ol style="list-style-type: none"> 1. 15 years of job experience. 2. 05 years of experience in the field of Consultancy in Power sector. 3. Experience in conducting detail Feasibility study of 02 nos. of Combined Cycle Power Plant Projects having capacity not less than 225 MW each. 4. Experience in conducting detail Feasibility study of 02 nos. of gas based thermal power plant project having capacity not less than 300 MW (Single Unit). 5. 10 years of experience in Operation and Maintenance of NG/LNG Fired Thermal or Dual Fuel Combined Cycle Power Plant.
11)	Ecologist, Social & Resettlement Specialist	<p><u>Education:</u> Master's /Equivalent degree in Social Science /Sociology /Geography /Botany /Zoology.</p> <p><u>Experience:</u></p>

Sl.	Expertise of the field	Required Qualification & Experience
		<ol style="list-style-type: none"> 15 years of job experience. Experience in conducting Social Impact Assessment (SIA) of 02 nos. of any project. Experience in conducting Resettlement Action Plan (RAP) of 02 nos. of any project. 10 years of experience in conducting Social Impact Assessment (SIA), 05 years of experience in ecology/bio-diversity assessment. Socio-economic assessment, preparing Resettlement Action Plan (RAP) and Project Complaint Mechanism (PCM), management of resettled inhabitants etc.
12)	Lead architect	<p><u>Education:</u> Bachelor /Equivalent degree in architecture.</p> <p><u>Experience:</u></p> <ol style="list-style-type: none"> 10 years of job experience. 10 years of experience in architecture, engineering, planning and design of infrastructure.
13)	Primary Fuel (Gas /LNG) Transportation Expert	<p><u>Education:</u> Bachelor degree/Equivalent in Engineering.</p> <p><u>Experience:</u></p> <ol style="list-style-type: none"> 15 years of job experience. 10 Years in planning/design of Liquid Fuel/LNG Handling & Unloading Systems for Power Plant.
14)	GIS, RS and Auto CAD Specialist	<p><u>Education:</u> Bachelor/Equivalent degree in Engineering.</p> <p><u>Experience:</u></p> <ol style="list-style-type: none"> 12 years of job experience. 07 Years in GIS/ RS and Auto CAD for Power Plant.
15)	Financial Analyst and Economist	<p><u>Education:</u> Bachelor/Equivalent degree in Finance/business-related field.</p> <p><u>Experience:</u></p> <ol style="list-style-type: none"> 10 years of job experience. 05 yearsof experience in economic and financial analysis of Combined Cycle/Thermal Power Plant Project.
16)	Legal Advisor	<p><u>Education:</u> Bachelor degree/Equivalent in Law (LLB).</p> <p><u>Experience:</u></p> <ol style="list-style-type: none"> 15 years of job experience. 10 years of experience as legal advisor/law practitioner on legal issuesrelated to installation of large power plants /industries /bridges etc.

Attachment-1

Terms of Reference (TOR) of Consultancy Service for Detailed Feasibility Study of the 400 ($\pm 10\%$)MW Gas/LNG Based Combined Cycle Power Plant Project at Char-Ishwardia, Mymensingh.

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Detailed Feasibility Study

The consultants will conduct the detailed feasibility study which will include the following (but not limited to):

1. Executive Summary

The Consultant will summarise the key findings of the Feasibility Study of the Mymensingh 400 ($\pm 10\%$) MW Gas/LNG based Combined Cycle Power Plant Project that will include:

- a. Introduction and description of the project, its purpose.
- b. Market/Demand: Prevailing market, Future market growth, potential customers, Projection of sales etc.
- c. Technical/Technological & Engineering Considerations,
- d. Financial considerations: Initial investment, Source of fund, Return on investment, Cost-Benefit etc.
- e. Suitability of the Site, Transportation,
- f. Organizational structure / Human resource and Administrative support,
- g. Institutional and Legal considerations,
- h. Environmental and Climate considerations,
- i. Social considerations,
- j. Risk and Sensitivity
- k. Alternative/Options
- l. Recommendations aimed at high-level decision makers.

2. Basic Information of the project

- a. Name of the Project
- b. (i) Sponsoring Ministry /Division
(ii) Implementing Agency
- c. Project Objectives
- d. Estimated Project cost (In Lac Taka)
- e. Sector & Subsector
- f. Project Category
- g. (i) Project location
(ii) Latitude & Longitude
(iii) Nearby river/cannel
(iv) Nearby road
- h. Project Boundary (South-North-East-West)
- i. Project land (Total)
(i) Land covered by installations
(ii) For land development
(iii) Land for greening zone & others
- j. Fuel requirement & Source (for both Construction & Operation phase)
- k. Water requirement & Source (both Construction & Operation phase)
- l. Power requirement & Source (both Construction & Operation phase)
- m. Power generation capacity
- n. Project Duration

3. Introduction

Consultant will describe the following:

- a) Project Background: Rationale and genesis
- b) Objectives and Duration of the feasibility Study
- c) Approach and methodology of the study
- d) Organization of the feasibility study
- e) Assignment of the feasibility study team; Flow Chart of the Study
- f) Review of Pre-feasibility Study done by the B-R Powergen Ltd. on the proposed project.

4. Market / Demand Analysis:

Consultant will assess the need for public investments and involves the elements listed below (but not limited to):

- a) **Problem Statement:** Provide an explicit definition of the problem to be addressed, identify the likely causes (both direct and indirect) of the problem and give a brief insight of the likely consequences if no government intervention is made.
- b) **Relevance of the Project Idea:** Justify the need for the proposed project by linking the project(s) goal outcomes to Global/National Development Plans and Sector strategic objectives.
- c) **Proposed Project Interventions:** Describe the interventions (project investments and outputs) that need to be undertaken by the government through the proposed project to address the problem, describe the interventions undertaken earlier to solve this problem by this organization or other organizations (if any).
- d) **Stakeholders:** Identify the key stakeholders that are likely to be associated with the project interventions.
- e) **Demand Analysis:** Identifies the need for public investment by assessing:
 - (i) Current demand (based on statistics provided by service suppliers/regulators/ ministries/ national and regional statistical offices for the various types of users);
 - (ii) Future demand (based on reliable demand forecasting models) in both the scenarios with and without the project and
 - (iii) Various factors and that are constraining demand including government regulations, technological developments etc.
- f) **SWOT Analysis:** Identify the Strengths, Weaknesses, Opportunities and Threats to the project.

5. Assessment, Requirements and Justification of the Project:

5.1. Country assessment: The consultants will assess the current Power Generation Situation of Bangladesh and the justification of the Project towards the achievement of SDG, which will include the following (but not limited to):

- a) Outline of Bangladesh: Topography, Climate, morphology, hydro-geology, geo-technological studies, Geography and population, Political system and government structure, Agro fisheries, Socio- economic overview of Bangladesh.
- b) Overview of PSMP 2016 (revisiting).
- c) Existing acts, rules and regulations of power sector of Bangladesh
- d) Brief information and policies of Power Sector in Bangladesh including fuel mix option.
- e) Organizations under Power Division in Bangladesh including their mandate.

- f) Energy balance and power development scenario.
- g) Comparison of Energy Options for power generation in Bangladesh projecting the proposed gas-based large power plant development plan including rationalization of sourcing of gas.
- h) Comparison of using Domestic Gas/ Imported LNG / Liquid Fuel / Dual Fuel for this proposed power plant.
- i) Possible economically and technically viable Unit Capacity and their subsequent impact on Macro and Micro Economy of the country.
- j) Power system reliability and grid stability.

5.2. Site Assessment & its Suitability justification:

The consultants will assess the Project Site and justify its suitability, which will include the following (but not limited to):

- a) Assessment of major installations (e.g. Wetlands, Natural waterways, Flood control dam & reservoirs, Forest, Park & Playground, Hills & monticules, Residential area, Military installations, Historically important sites, Ecological Critical Areas, Key Point Installation, Hospital/Clinic, Educational Institute, Reserved area, Industries, others) within half kilometer (500m), one kilometer (1km) as well as ten kilometer (10km) of the project sites.
- b) Global position & Location of the site (Project Area).
- c) Assessment of Fuel (Gas/LNG) demand, supply & transmission system capability. Detail fuel supply plan is to be presented as in *Section:6* of this document.
- d) Estimation of potential settlements of land due to the applied load of the superstructure considering total construction processes including the time span for each construction step through a fully coupled numerical analysis with a constitutive model.
- e) Survey, assessment and analysis of the site and also propose suggestions projecting up to 30 years and above, which will include the following:
 - (i) Topography, Geological and stratigraphy studies of the proposed site.
 - (ii) Geotechnical studies, soil structures and land information using bore hole data. Investigation of soil at project site considering at least 100 m below the earth surface subject to finding load bearing subsoil layer and taking at least 10 locations under consideration; Execution of Standard Penetration Test (SPT), collection of disturbed samples at specified depths under consideration and a record of ground water levels, etc. All the field investigation has subsequently been followed up by the laboratory tests.
 - (iii) Storm and other natural disaster of last 100 years wind data from the earth surface projecting up to Chimney height.
 - (iv) Seasonal flooding pattern and flood vulnerability along with drainage characteristics in and around the proposed project area using last 100 years data.
 - (v) Seismic effects and subsequent trend of Tsunami etc. considering 50 years onwards.
 - (vi) Considering seasonal variation, possible sources of water for production process, cooling activities, washing activities, domestic activities and others purposes of different system.
 - (vii) River water, Surface water and Ground water quality including detail information of underground water table reflecting the water requirement.
 - (viii) Bathymetric survey and hydro-morphological studies/models/behavior (with respect to flow discharge and sediment transportation). Future trend of the morphological changes of surrounding rivers.
 - (ix) Navigability (with respect to depth of water) of the river.
 - (x) River bank stability; trend of sedimentation and erosion prone and river

erosion of last few decades. Vulnerable erosion/accretion prone locations around the proposed project area.

- (xi) River embankment, anti-inundation measures, dredging and protection requirement around the plant location including cost analysis.
- (xii) Existing facility and Civil construction requirements for fuel/oil transportation facilities of different options (road and river transportation system).
- f) Baseline Environmental Situation.
- g) Meteorological data and future trend of Climate forecast for safe movement of cargo vessels considering seasonal variation.
- h) Existing PWD reference of the proposed site including assessment, sourcing and costing of land fill material (soil, sand or others) requirement considering the geotechnical stability and continental slope of the project impact area.

5.3. Site requirements:

For both construction and operation phase, the consultants will prepare qualitative & quantitative assessment (with detail calculation), sources and analysis of the following requirements as well as by-products/wastes generated from the power plant:

- a) Land requirement
- b) Water requirement including production process, washing activities, cooling activities, domestic activities, recycling process and others.
- c) Fuel (Gas/LNG) requirement
- d) Lube oil requirement
- e) Chemical compound (for water treatment, effluent treatment, fire safety, washing, cleaning etc.) requirements.
- f) Auxiliary power requirement
- g) Volume and source of Sand/Soil filling for land development including sand/soil settlement and protection requirement.
- h) Manpower requirement.
- i) Requirement of the road and river communication systems.
- j) Storage capacity requirement of Raw water tank, Demineralized water tank, Chemical storage tank, Fire water tank, Zero Discharge pond etc.
- k) Volume and source of Solid waste, Liquid waste, Exhaust emission (flue gas) Hazardous waste, Human waste, Domestic waste, Waste water, Biodegradable & Non-biodegradable wastes, Waste recycling, Rain water discharge and others.

6. Fuel transportation & Fuel Supply Plan

Both the qualitative and quantitative perspective, the consultant shall analyze the real scenario and availability of NG/LNG/Dual Fuel at the site. Also, the consultants will design and prepare fuel supply plan for the proposed power plant project, which will include the following (but not limited to):

- a) Objective.
- b) Review of legal and regulatory framework.
- c) Analysis of Gas Sector Master Plan and Short-Medium-Long term supply and demand Strategy Bangladesh.
- d) Collection of relevant secondary data and analysis.
- e) National Gas/LNG sector Demand and Supply Scenario including
 - (i) Gas reserve and production.
 - (ii) Supply Growth Rate
 - (iii) Sector wise Gas demand forecast and analysis
 - (iv) Projected demand and supply gap
 - (v) Supply augmentation from producing fields.
 - (vi) Supply limitations.

- f) Regional Gas network and demand forecast.
- g) Status of regional Gas based Power Plants (Running, Under Construction, Under Process and Planned).
- h) Availability of Adequate Gas/LNG at Mymensingh for the proposed 400 ($\pm 10\%$) MW Combined cycle power plant.
- i) Gas transmission network simulation. Study and assessment of Natural Gas Transmission Network. Lay out is to be presented as in *Section:7.2(ix)* of this document.
- j) Optimization of detailed gas handling system at the site which should include Capacity of RMS and gas transmission pipelines from GTCL/ TGTDCCL.
- k) Gas allocation and Indicative Gas/LNG price - Gas/LNG tariff, eventual fuel costs and market enquiry. Study of international and local Gas/LNG markets information, Gas/LNG specifications, quality & quantity and possible sourcing availability. Finalization of the fuel specifications with BRPL before GT & ST, HRSG design related studies.
- l) Gas/LNG import as well as Gas transmission infrastructure for transportation of imported gas.
- m) Establishment of communication plan to engage Gas/LNG suppliers (GTCL or TGTDCCL).
- n) Detailed gas transmission line plan for required amount of Gas/LNG.
- o) Assessment of Gas/LNG handling, safety and other management and reporting plan.
- p) Develop general layout of the plant with major components of gas circuit, gas logistics, estimated requirement, handling and storage facilities.
- q) Gas/LNG procurement and freight strategy.
- r) Analysis of alternative sources of fuel (HFO/Oil/Coal/others) suitable for the proposed power plant;

7. Technical/Technological & Engineering Analysis

7.1. Location of site (Project Area)

- (i) Description of the location of the project including a graphical illustration (Layout map & Satellite image).
- (ii) Description and availability of the project land; evidence should be provided that the land is owned or can be accessed by B-R Powergen Ltd. which has to be purchased through acquisition process.

7.2. Detail Layout

Consultant will develop the following layout plan:

(i) General Layout:

As described in the conceptual design at section 6.4.1. of this document, the consultant shall prepare a layout design for the power plant, including all necessary components, equipment, environmental control technology, facilities, utility supplies, auxiliary systems, employee accommodation and Township layout.

The detail layout of the plant shall include major areas such as GT building, GT generator, ST building, ST generator, HRSG building, Air and Gas building, HRSG feed pump shelter, Stacks, GT generator transformer, ST generator transformer, Auxiliary transformers, Emergency D. Generator building, Black-start house, Condenser, Cooling water pump house, Fire water pump house, Chlorination house, Laboratory house, Fuel logistics, Lube-oil logistics, handling and storage facilities, Raw water tank, Demineralized water tank, Chemical storage tank, Fire water tank, N₂ Gas bottle shelter, Gas Duct, Instrumentation and Central Control building, Substation, Substation Control building, Workshop, Warehouse, Administrative building, Rest house, Security house, Watch towers, Ansar/Police shed, Dormitory building, Residential

buildings, Guest room, Parking sunshade, Playground, Internal service roads, Canteen, Toilets, Water treatment building, Waste water / Effluent treatment plant, Hazardous waste storage, Solid waste storage, Zero discharge pond, Green zones, Reserved areas, and all other plant infrastructure as required.

Assuming standard structural dimensions, equipment sizes and specifications, all the areas of the layout of the proposed power plant shall be marked and dimensioned on the scale.

Consultant will develop a comparative study of different orientation of plants layout considering meteorological, social, environmental and disaster issues etc.

- (ii) **Production process and Process flow:** Consultant will develop a detail Process flow diagram of the power plant describing the process description and plant activities.
- (iii) **Internal Drainage system:** Detail layout of the power plant internal Drainage system for both rainy water & waste water system.
- (iv) **External Drainage system:** Layout of the rainy water discharge to public drainage and/or external lake/cannel/river.
- (v) **Effluent treatment system:** Detail layout and complete plan of Effluent treatment plant (ETP) of the proposed power plant.
- (vi) **Zero Liquid Discharge system:** Detail layout, justification and complete plan of Zero Liquid Discharge system of the proposed power plant.
- (vii) **Surrounding area and transportation system layout:** Layout of the surrounding area of the proposed power plant showing the distance of key installations and transportation system.
- (viii) **Electrical line diagrams:** Power evacuation (transmission line) layout & Single line diagram of the substation.
- (ix) **Gas transmission:** Layout of the Gas transmission pipeline from Dhanua-Mymensingh to the gas RMS at the power plant project site.

7.3. Detail transportation system

Detail of the technical & engineering design and analysis of the transportation system for movement of heavy equipment during construction, operation & maintenance of proposed power plant project shall be presented.

7.4. Technical design

Prototype design

The consultant shall prepare and submit power plant prototypes designs including detailed technical and engineering designs.

A summary of the technical/technological & engineering design and analysis of the proposed project as well as description of the main components, technology adopted, design, standards and specifications shall be presented. Key output indicators should be defined as the main physical quantities produced (meters/sq. meters, kilometers, numbers, man months, etc.) should be provided.

Conceptual Design and Optimization

The consultant shall establish the design parameters of the main plant components, major equipment & auxiliary equipment including necessary architecture, civil and structural works, environmental control technology, connection to the electrical power transmission system, facilities, utilities, auxiliary systems, cooling system, waste water treatment systems, fuel-oil systems, employee accommodation, township layout and others as required.

The design consideration, design criteria and design optimization shall be prepared for the following (but not be limited to):

- a. Preparation of Master Plan for NG/LNG/Oil Fired Power Plant at Mymensingh.

   7

- b.** Outline of the project.
- c.** Codes, standards, material, structural dimensions, equipment sizes, Conceptual design and optimization, specifications and equipment configuration of main components, equipment and major system of the proposed power plant, such as:
 - (i) GT, ST, GT generator, ST generator, Heat Recovery Steam Generator (HRSG),
 - (ii) GT generator transformer, ST generator transformer, Auxiliary transformers,
 - (iii) Emergency D. Generator, Black-start house,
 - (iv) Electrical system, Electrical Equipment, Switchyard/Substation facilities, Instrumentation and Control System.
 - (v) Fuel (Gas/LNG)-Oil logistics, handling and storage facilities, Gas RMS,
 - (vi) Raw water supply and treatment system,
 - (vii) Cooling tower, Cooling water system, water intake and discharge facilities.
 - (viii) Exhaust handling system with environmental control technologies such as Flue Gas Treatment Facilities, SCR, ESP, Flue Gas De-Sulfurization (FGD) system, NOx reduction etc.
 - (ix) Drainage system, Rainy water discharge System.
 - (x) Waste water/effluent treatment system,
 - (xi) Zero Liquid Discharge System,
 - (xii) Solid and liquid waste, Oil sludge disposal system.
 - (xiii) Access road construction from nearest highway to project site
 - (xiv) Riverside protection, Fire detection and subsequent Fire Fighting System etc.
- d.** Steam cycles and combined cycle including expected Performance, Economic evaluation, Cost effective highly efficient technology.
- e.** Develop optimum sizing of the proposed power plant considering world market availability, economy, efficiency, gas availability, site condition etc.
- f.** The optimum unit capacity should be determined via a comparison of unit size, scale and construction costs taking in account the stability of the power grid.
- g.** To identify size and nos. of residential and non-residential building/units for township of proposed site.
- h.** Heat-mass balance diagram
- i.** Energy Storage System (ESS) Solutions. Combined Cycle Gas Turbine (CCGT) power plant integration with or without Adiabatic Compressed Air Energy Storage (ACAES).
- j.** Applicable codes, standards control technologies (SCR, ESP, FGD etc.) with procedures as well as technology for reduction of exhaust emission (SOx, NOx, PM, CO etc.) for plant operation.
- k.** Selection of water intake and discharge system, including specifications of discharge tunnel, circulating water pipe and pump pit.
- l.** Appropriate closed loop Water-Cooling system. Optimum condenser cooling system considering the availability and usability of river water and underground water.
- m.** Oil supply system; intake and outlet projecting on loading & unloading facilities. Alternative Technical, Environmental, Social, Disaster and Economic Study of heavy equipment and/or Fuel-Oil unloading system.
- n.** Design Condition of the proposed Jetty for heavy weight equipment unloading for the Power Plant project activities.
- o.** Considering the sustainability of the navigation routes, Plan, design and determination of volume of Capital dredging and frequency of Maintenance dredging including cost and management of dredged material to keep navigability of the entire route round the year.
- p.** Possible use of exhaust gas/bottom deposits/oil sludge.

- q. Operation and maintenance requirements, safety management and projecting downtimes due to maintenance works.
- r. Environmental, Social and Disaster Components.
- s. Prepare a transportation system of heavy equipment and materials during construction and O & M of the power plant.
- t. Civil Construction Work: As per assessment described in section:5.2(e) of this document, based on soil investigation result, historical (last 100 years) data of wind, storm, flooding pattern, seismic effects and other natural disaster around the proposed project, the consultants will conduct study on civil works, which will include design and management of pilling requirement, dredging works etc.

7.5. Output plan: Description of the output and the expected utilization rate in the context of the forecasted demand.

7.6. Costs estimates: Estimation of the financial needs for project design, implementation and operations, component wise cost estimates should be provided based on evidence. Preparation of detailed cost estimates shall include the followings:

- (i) Economic and financial assessments and analysis.
- (ii) Detailed cost of technology, major components, instrumentation and controls, commissioning, erection and key elements of the power plant including environmental, resettlement, rehabilitation and social aspects.
- (iii) Detail of construction costs, civil works, residential/non-residential units including road, water, sewage, electrical systems of Township.
- (iv) Detailed breakdown of time and materials for all major components, balance of plant, instrumentation and controls, water & waste treatment and other key elements of the power plant.

7.7. Implementation timeline: A realistic project timeline along with the implementation schedule (a Gantt Chart with the work plan) should be provided.

8. Power Evacuation System

Conduct load flow studies with proposed transmission plans which include engineering studies, their subsequent design, layout, rating, sizing, insulation, protection, short circuit analysis for Power Evacuation arrangement from the proposed power plant. In addition, alternate analysis of power evacuation as well as the following are also requiring to be addressed in appropriate manner during study (but not limited to);

- a) Power system, Power/Load flow Analysis.
- b) Transient Stability Analysis
- c) N-1 Contingency Analysis
- d) Analysis of Capacity and voltage level of existing Transmission Line and Grid Substation.
- e) **Transmission Line:**
 - Outline of Transmission Line up to the nearest substation or in-out arrangement of nearby transmission line,
 - Capacity and voltage level of Transmission Line.
 - Transmission Line Route.
 - Required number of circuits, number of towers and their subsequent design.
 - Conceptual design of the Transmission Line.
 - Conductor Selection.
- f) **Substation:**
 - Outline, Capacity, voltage level, nearby connection point with the existing network.
 - Substation layout

- Single line diagram
- Required rating of Transformer, circuit breaker, CT, PT etc,
- Conceptual design of the Substation.
- g) Analysis of requirement of VAR compensation using Capacitor Bank or Shunt reactor or any other feasible technology.
- h) Fault current, Short circuit and Protection scheme analysis of the proposed power transmission plan.
- i) Total cost estimation of the Transmission Line and Substation including Bay extension cost of the nearby 400kV Substation.
- j) Overall transmission loss and optimization for power evacuation process.
- k) SCADA integration, FGMO, AGC control and tertiary control.
- l) Power system reliability and grid stability considering accidental grid failure.

9. Environmental and Climate analysis:

Describe and specify the economic effects/impacts of environmental effects/impacts and possible compensations for ecological damages. Key issues to be addressed:

- (a) Type of assessments are required for the project (e.g. EIA, SIA, RAP etc.).
- (b) Potential environmental/climate impacts or risks from the project.
- (c) Actions and technical measures that need to be taken to reduce/mitigate negative impacts.
- (d) The cost for reducing/mitigating the negative impacts.
- (e) Analysis of costs of alternatives without incurring these environmental costs.
- (f) Provide resettlement modality in brief.

10. Cost-Benefit Analysis

10.1. Financial Analysis

Describe the components of costs and benefits at market prices to check the balance of investment and the sustainability of project including option analysis.

- (a) Identify the components of cost & benefit;
- (b) Transfer them in monetary value;
- (c) Construct cash flow;
- (d) Identify the Key Assumptions considered in exercises; then
- (e) Compute the following indicators and interpret the results:
 - (i) Net Present Value (NPV)
 - (ii) Benefit Cost Ratio (BCR)
 - (iii) Internal Rate of Return (IRR)
- (f) Development of detailed financial model for Investment structure.
- (g) Summary project financial statements, returns, Debt-Service Coverage Ratio (DSCR) profile, etc.
- (h) Development of long-term project financing and working capital term sheets including indicative terms and due diligence/compliance requirements.

10.2. Economic Analysis

Economic adjustments from financial data using Standard Conversion Factor (SCF); after that costs and benefits are appraised from the point of view of the entire economy.

- (a) Identify the direct, indirect and associated cost and benefit components;
- (b) Adjust them where necessary;
- (c) Convert the value of cost and benefit components into economic price by using SCF;
- (d) Construct the cash flow;
- (e) Mention the Assumption;
- (f) All possible financing arrangements with sourcing;
- (g) Compute the following indicators and interpret the results:

- (i) Economic Net Present Value (ENPV)
- (ii) Economic Benefit Cost Ratio (EBCR)
- (iii) Economic Internal Rate of Return (EIRR)

Consultant shall prepare and submit detailed Financial and Economic models.

10.3. Assessment of Tariff and tariff modality

- (a) Identifying elements in financial model which will undergo "discovery" process, e.g. EPC price through competitive bidding, EPC drawdown curve, financing terms and conditions procured from market, LIBOR and swap costs, etc.
- (b) Agreeing on discovery process for open variables and tariff formulas.
- (c) Deriving annual and Levelized power tariff range for 22 years considering different assumptions.
- (d) Benchmarking of indicative tariff with similar international projects.
- (e) Assessment of affordability of indicative tariff by the BPDB rate base.

10.4. Scenario analysis, Key Performance Indicators and Project Costs analysis using different methods of calculation.

11. Social Analysis

- (a) Illustrate the social cost-benefit of the project and point out the net benefits that the project would bring to the society.
- (b) Illustrate the cost-effectiveness analysis, how the cost of outcomes/effects of two or more courses of action compared.
- (c) Describe how do the net costs of the project compare to the outcomes/benefits generated;
- (d) Identify the results and implications of the multi-criteria decision analysis.

12. Human Resources and Administrative Support analysis

In terms of both Technical & Financial requirement for implementation and operational stages of the project, the consultant shall point out the functional structure and institutional capacity of the B-R Powergen Ltd. Also, the sources of the workforce are needed to be identified. Key issues that need to be addressed are:

- (a) What types of managerial and skilled workforces are needed for the project? Specify the manpower requirements by category are reconciled with availabilities during project timeline.
- (b) Does the project entity have ability to provide the managerial and skilled workforces needed for implementation of the project? If not, provide suggestions specifically.
- (c) Is the project implementing agency is capable to continue the project outputs?
- (d) Is the B-R Powergen Ltd. supposed to manage the project properly organized and its management adequately equipped to handle the Project (including post implementation stage)?
- (e) Is timing of project consistent with organizational capacity (in terms of quantity and other)?

13. Institutional and Legal analysis

Illustrate the legal restrictions (if any) that may obstruct or impede the project during its implementation and functional stage of the project outputs. Key issues that need to be answered are:

- (a) Are the capabilities and facilities being properly utilized?
- (b) Is there any need for adjustment (reforms) in the policy and/or institutional set up?
- (c) What adjustments may be required before the project is implemented?
- (d) Do the institutions have suitable skills and capacity in line with the project

- requirements?
- (e) Are there incentives or penalties in place to ensure project delivery on time and within the budget?
 - (f) Are there any critical governance issues that may affect implementation? If yes, state briefly.

14. Risk (Uncertainty) and Sensitivity Analysis

The flow of costs and benefits throughout the project life is uncertain. Given that uncertainty, Considerations have to be given to the costs that risks imply. The objective of this module is to simulate various scenarios and generate guidance on how to reduce the risk exposure through relevant contractual clauses. The questions that need to be answered are:

- (a) What are the major risks that may affect project?
- (b) How will the project be affected if the risk event materialized?
- (c) What are the possible mitigation measures needed?
- (d) How sensitive are the assumptions used in the financial and economic models in an environment that differs significantly?
- (e) What are the risks, legal and regulatory obligations that could increase costs or decrease the benefits?

15. Safety and Security Plan

The Construction Safety & Security Plan, Early Works has to be prepared (for both construction and operation phase) for Occupational Health and Safety (OSHA) management system, which will include the following (but not limited to):

- (a) Safety Plan
 - (i) Workplace / Work zone Safety
 - (ii) Safe work practices
 - (iii) Hazard assessment
 - (iv) Hazard Communication
 - (v) Contractor safety prequalification
 - (vi) Contractor Safety Program, Practices and Procedures
 - (vii) Eating, Drinking, Washing and Sanitation Facilities
 - (viii) Protective measures, Hazard & Risk mitigation.
 - (ix) Fire Prevention and Protection
 - (x) Traffic Control
 - (xi) Training Requirements for Activities
 - (xii) Safety monitoring
 - (xiii) Incident, injury and illness reporting.
- (b) Security Plan

16. Environmental Monitoring and Mitigation Plan

- (a) Environmental impacts assessment
- (b) Mitigation Measures
- (c) Budgeting information
- (d) Environmental mitigation & Monitoring plan
- (e) Monitoring Log/table indicating
 - (i) Environmental Impact/ Issues
 - (ii) Mitigation Measures
 - (iii) Monitoring Indicators/ Criteria
 - (iv) Timing, frequency

- (v) Responsible organization and person.
Where all possible environmental hazard shall be described.
- (f) Reporting, review and audits.

17. Preparation of Tender Document

The consultants will prepare and finalize of Tender Document for Engineering, Procurement and Construction (EPC) Contractor, which will include (but not limited to):

- (a) Preparation of complete bidding document for the selection of EPC Contractor(s) with ECA financing for Land development, Township and Project implementation of Gas/LNG Fired Combined Cycle Power Plant (but not limited to).
- (b) Develop multi-sourcing strategy and ECA sourcing for possible EPC contractors. Also, discussions with leading Original Equipment Manufacturer (OEM) and EPC export credit agencies, finance institutions, international and domestic commercial banks to develop an optimal finance plan.
- (c) Development of Procurement procedure, Bidding method and for EPC Contractor. Also, Evaluation strategy of different project financing proposals.
- (d) Preparation of Pre-qualification criteria and Scope of Service of the Owner's engineer.
- (e) Preparation of complete bidding document for the selection of Owner's Engineer, for consulting services of the proposed CCPP.
- (f) Sub-divisions of total works into different lots e.g. land development, civil construction & power plant development, fuel transportation, fuel infrastructure, jetty, transmission, power evacuation, ash/sludge/waste handling system, water requirement, water treatment, effluent treatment and waste management etc. or the power Plant development projects may be scheduled in one big lot comprising all above mentioned components.

18. Preparation of Project Construction and O&M Plan

The consultants will prepare the Project Construction Plan as well as Operation and Maintenance Management Plan which will include but not limited to:

- (a) Preparation of Critical Path Method (CPM) for the project.
 - (i) Project Implementation Schedule.
 - (ii) Investment schedule.
 - (iii) Construction Schedule.
- (b) Manpower setup according to standard practice and requirement for Operation and maintenance of the proposed CCPP. Organizational chart and Job description for probable engaged O&M personnel.
- (c) Suggest the different module and methods of training in relevant field that is required for the engineers and others who will work in Power Plant operation and maintenance.
- (d) Preparation of Project Implementation/Execution Plan.
 - (i) Develop work plan, project schedule and project development budget up to financial close.
 - (ii) Activities for Financial Close.
 - (iii) PMT philosophy, organization, costing and implementation plan.
 - (iv) Detailed risk matrix.
- (e) Operations, Maintenance and Management procedures for O&M operator.
- (f) Direction of Safety Management System during Construction and O&M Period.
- (g) Long-term Maintenance Plan for this power plant project.

19. Alternative/Options Analysis

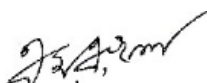
Option Analysis with recommendation & justifications. The consultants will optimize the design parameters with the analysis of alternatives and comparative advantages and disadvantages of available technology options.

The consultant will conduct the analysis of the suitability of different alternatives considering available technology and also recommend the best proven technology for Power Plant Development Project at that site. The analysis shall be performed, among other approaches, presenting the suitability of the following options:

- a. Site alternatives
- b. Design alternatives.
- c. Technology alternatives.
- d. Fuel alternatives (NG/LNG/HFO/Liquid fuel/Dual Fuel)
- e. Construction techniques

20. Recommendation and Conclusion

Recommendations aimed at high-level decision makers.



Attachment-2

Terms of Reference (TOR) of Consultancy Service for Environmental Impact Assessment (EIA) of the 400 ($\pm 10\%$) MW Gas/LNG Based Combined Cycle Power Plant Project at Char-Ishwardia, Mymensingh.

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Environmental Impact Assessment (EIA)

The consultants will conduct the Environmental Impact Assessment (EIA) in accordance with EIA Guideline of Department of Environment (DOE) of GoB, with DOE approved TOR. The assigned task will include the following (but not limited to) which need to take approval from DOE:

1. Executive Summary

The Executive summary of Environmental Impact Assessment (EIA) report has to be written in English as well as it has to be translated into Bengali for public disclosure and wide spread understanding of the local people.

2. Objective/Goals and Policy of the Project

3. Introduction

- 3.1. Background.
- 3.2. Steps in EIA process, Period of study and methodology adopted.
- 3.3. Purpose of the Study.
- 3.4. Need of the Project
- 3.5. Importance of the Project
- 3.6. Cost of the project.
- 3.7. Applicable legislation and their status.
- 3.8. Period of study and methodology adopted.
- 3.9. Scope & limitation of EIA Study
- 3.10. EIA Team, Consultant's background and experts involved in the EIA.
Etc.

4. Legal and Legislative Framework, Regulations and Policy Considerations

- a) Cover the potential legal, administrative, planning and policy framework within which the EIA will be prepared.
- b) List of all National Environment Policies, Legislations, Plans and Guidelines mentioning the principal provisions in them.
- c) Resources protection and Conservation Policies and Legislations mentioning the principal provisions in them. It should include matters such as forest, fisheries, wild flora and fauna, water, open space protection and river zone protection and management.
- d) Community and Occupational Safety & Health Legislations mentioning the principal provisions in them.
- e) Legislation on Environmental Approval Process and Procedures.

5. Scoping

- a) Select boundaries for study
- b) Identifying Major/sensitive installations profile (within as well as around 500m, 1km and 10km of the project sites.) including
 - (i) Cultural Heritage,
 - (ii) Ecological Critical Areas,
 - (iii) Key Point Installation,
 - (iv) Historically important sites,
 - (v) Hills & monticules
 - (vi) River, lake, cannels and other water bodies.
 - (vii) Holy places (mosque, temple etc.), Park & Playground, Hospital/Clinic, Educational institute, Residential area, Buffer zone and reserved areas, Industries etc.
- c) Identifying Significant of Impacts and Risks, Impact Receptors and priority setting.
- d) Project components/activities and resources
- e) Degree of mitigating impacts.

- f) Scoping Checklist, which will include (but not limited to) the following:
- (i) Physico-Chemical: Land, Surface Water, Groundwater, Atmosphere, Noise;
 - (ii) Biological : Species and Populations, Habitats and Communities ;
 - (iii) Human : Community and OHS, Social and Economic, Aesthetic and Cultural Land Forms ; Labor and employment issues,
 - (iv) Efficiency in the use of resources,
 - (v) Land acquisition, Property damage, Displacement of homes and livelihood,
 - (vi) Indigenous people rights and/or minority rights issues, Impacts on other vulnerable communities,
 - (vii) Cultural heritage sites, Ecological Critical Areas, Key Point Installations, Historically important sites, River, lake, cannels & other water bodies, Holy places (mosque, temple etc.), Park & Playground, Hospital/Clinic, Educational institute, Residential area, Buffer zone and reserved areas, Industries etc.

6. Project and Process Description

6.1. Brief description of Project

- a) Project Proponent,
- b) Project location and area, maps specifying location of the project
- c) Nature and Size of the Project
- d) Project Concept
- e) Project Components
- f) Project Activities
- g) Capacity of the project
- h) Project schedule and its life

6.2. Resources and utilities types, sources, demand and transportation

- a) Type of raw materials, its handling and consumption.
- b) Sources of Primary Fuels and all other raw materials.
- c) Transportation of primary Fuel and all other raw materials
- d) Land Requirement.
- e) Fuel Requirement
- f) Water Requirement
- g) Power sourcing and requirement.
- h) Energy/ thermal/steam balance.
- i) Workforce potential during construction and operational stage.

6.3. Project site and surroundings.

6.4. Site accessibility in terms of roads, rail and other infrastructure etc.

6.5. Technology Selection and Process details, product and by-product.

6.6. Description of Major System

6.7. Mass balance and emissions potential.

6.8. Description, potential sources, characteristic, daily consumption and storage methods Pollutants/ hazardous wastes

- a) Solid wastes.
- b) Hazardous chemicals,
- c) Liquids (fuels, oils, etc.) wastes.
- d) Waste water pollutants.

- e) Air pollutants and emissions.
- 6.9.** Potential sources of Noise
 - a) Operational stage
 - b) Construction stage.
- 6.10.** Potential sources of Occupational and Community Health and Safety Hazards
 - a) Operational stage
 - b) Construction stage.
- 6.11.** Maps, Lay-out and Flow Diagrams
 - a) A map marking the sensitive zones in the study area.
 - b) Contour map of project site and study area.
 - c) Satellite imagery of the study area with explanatory notes.
 - d) Diagrammatic sketch and layout of the effluent treatment plant and the sewage treatment plants.
 - e) Zero Discharge Plan Layout.
 - f) Sketch map showing the wastewater discharge points.
 - g) Map showing the locations of various monitoring stations.
 - h) Map specifying the project site or adjoining areas vulnerable to floods.
 - i) Map showing Presence of other air and water polluting sources within the study area.
 - j) Map specifying the land use patterns,
 - k) Map specifying drainage patterns,
 - l) Map specifying locations of human settlements.
 - m) Layout map showing
 - (i) the manufacturing process,
 - (ii) warehouses of raw materials and products,
 - (iii) wastes storage,
 - (iv) colony, administrative buildings,
 - (v) proposed green belt,
 - (vi) ponds, roads, parking spaces etc.

7. Analysis of suitability and Different Alternatives

The analysis shall be performed, among other approaches, in a GIS based Spatial Decision Support System (SDSS) presenting the suitability of different options.

- a) Site alternatives
- b) Design alternatives.
- c) Technology alternatives.
- d) Construction techniques.

8. Detail description of the land cover/land use (with all the existing resource classes along with area coverage shall be shown in the respective maps derived from updated image of proper spatial and spectral resolution. Basic information (name of satellite, date and time of acquisition with atmospheric condition, spatial resolution,color composite etc.) of the image data to be used for making land use/land cover maps shall be mentioned)

9. Stakeholder Participation

9.1. The Consultant should clearly identify all the likely stakeholders.

- a. The stakeholder engagement/participation process should be adequately documented in the EIA report.
- b. The surrogate approach can be considered acceptable only if where the affected public is not able to present their concerns effectively.
- c. The principles of public involvement shall be based on the following tenets:
 - (i) Inclusive – covers all stakeholders;
 - (ii) Open and transparent;

- (iii) Relevant – focused on the issues that matter;
 - (iv) Fair – conducted impartially and without bias toward any stakeholder;
 - (v) Responsive – to stakeholder requirements and inputs;
 - (vi) Credible – builds confidence and trust.
- d. The identification of members of the public whose participation in the EIA process is recommended to include such as:
 - (i) Those directly affected by the project as a result of acquisition of their land or property;
 - (ii) Those directly and indirectly affected as a result of the effects of the project;
 - (iii) Those that are exposed to risk due to potential for fire and explosion, or to toxic emissions; and
 - (iv) Those whose livelihood and way of life are likely to be adversely affected by the impacts due to the project. These include, the loss of income, loss of job or job opportunities, increased cost (such as longer travel distances), and others.
 - e. Following is a discussion as to the methods that may be adopted for public consultation.
 - (i) Public Briefings
 - (ii) Focused group dialogue (FGD)
 - (iii) Project Information Kit
 - (iv) Questionnaire Surveys
 - (v) One-to-one unstructured interviews
 - f. The public participation process should be adequately documented in the EIA report. At minimum, the information to be included are:
 - (i) List of Public Briefing/Perception Survey/Stakeholder Dialogues held stating the venue, date and programme
 - (ii) Survey Form
 - (iii) Findings of the survey/briefing/dialogues - this may include the main issues discussed and key questions asked
 - (iv) List of attendees/participants
 - g. The records of stakeholder engagement in are to be included in the Appendix. Only the gist of the findings should be discussed in the main report.
- 9.2. Description, roles and responsibility of the following stakeholders shall be identified:**
- a. Project Proponent
 - b. EIA Consultant / Assessor
 - c. Department of Environment (DOE)
 - d. The Related Government Agencies
 - e. The Host Communities and General Public
 - f. Other Interest Groups, NGOs, Community Based Organizations, Non-Governmental Organizations, Business Unions, Farmers' Unions, etc.

10. Present Environmental Scenario

- (a) Establishing environmental baseline data needs
 - (i) Data on physical environment
 - (ii) Data on biodiversity and natural habitat
 - (iii) Baseline social and economic data
 - (iv) Others baseline data and information
- (b) Considerations in data collection
- (c) Defining Study Area, Period, component and methodology (Seasonal Variation Should be covered)
- (d) Water availability, Sorbent availability
- (e) Hydrogeology and drainage pattern,
- (f) Meteorology of the study area,
- (g) Ambient Air Quality
- (h) Ambient Noise Quality and traffic density
- (i) Surface & Ground Water Quality including dependency

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- (j) Aquatic monitoring
- (k) Topography and Soil Quality,
- (l) Biological diversity, Ecology (Forests, Flora, Fauna and their distribution)
- (m) Demography profile and Occupational Pattern
- (n) Land use and cropping pattern of the project site and study areas.
- (o) Socio-economic Scenario
- (p) Distance to urban and rural communities.
- (q) Transmission capacity/options for linking grid
- (r) Distance to existing infrastructure such as roads, ports, rail etc.
- (s) Surrounding land use and associated communities.
- (t) Sensitive Receptors
- (u) Ecologically critical area
- (v) Geology / geomorphology of the study area,
- (w) Flood plain boundary and flood ability of the area
- (x) Existing level of pollution or industrial stress in the study area.
- (y) Health profile of host communities (diseases, healthcare systems, population demographics, etc.)

11. Environmental Impacts

Impact assessment for an EIA will involve three main phases:

- (i) *Identifying* the impacts;
- (ii) *Predicting* the characteristics of the main impacts in terms its nature, magnitude, extent and duration; and
- (iii) *Evaluating* the significance of the residual impacts that cannot be mitigated.

11.1. Identification of Impacts:

A logical and systematic approach is recommended. All the important environmental/project impacts and interactions must be taken into account. At the same time, ensure that indirect and cumulative effects which may be potentially significant are not inadvertently omitted. The identified impacts may require detailed analysis and evaluation. However, there is no need to address every issue identified with the same level of details. The levels of details should be appropriate to the scale, sensitivity and complexity of the issue. Choice of chosen methodologies should reflect these criteria.

11.1.1. Prediction the characteristics of the main impacts:

Impact assessment can be facilitated using a range of prediction tools available. The following formal qualitative and semi-quantitative prediction tools may be used in the impact assessment:

- a. Expert Opinion
- b. Consultations and Questionnaires
- c. Checklists
- d. Spatial Analysis
- e. Network and Systems Analysis
- f. Risk Matrices
- g. Carrying Capacity Analysis

11.1.2. Evaluation of Impacts

The impacts should be evaluated in terms of their local, regional and national importance. The impact should be assessed in terms of the magnitude, significance, frequency of the occurrence, duration and probability. The confidence level in the prediction must be stated. The judgment of significance of impacts can be based on one or more of the following, depending on the environmental factor being evaluated. These are:

- a. comparison with laws, regulation or accepted national or international standards
- b. reference to pre-set criteria such as conservation or protected status of a site, feature or species
- c. consistency with pre-set policy objectives
- d. consultation and acceptability with the relevant decision makers, civil society, local community or the general public

11.1.2.1. Pre-Construction and Development Stage Impact evaluation but not limited to:

- (a) The sites from where material would be collected
- (b) Landform
- (c) Natural Resources
- (d) Ecosystems and biological diversity
- (e) Ambient Air
- (f) Ambient Noise
- (g) Water Bodies
- (h) Soil
- (i) Community and occupation health & safety
- (j) Key Point Installations & Others
- (k) Solid Waste Disposal
- (l) Transportation of raw materials
- (m) Protected areas and designated sites of scientific, historical and cultural significance
- (n) Heritage, recreation and amenity assets
- (o) Livelihood, lifestyle and well-being

11.1.2.2. Construction Stage Impact prediction and evaluation but not limited to:

- (a) Landform
- (b) Natural Resources
- (c) Ecosystems and biological diversity
- (d) Ambient Air
- (e) Ambient Noise
- (f) Water Bodies
- (g) Soil
- (h) Community and occupation health & safety
- (i) Key Point Installations & Others
- (j) Solid Waste Disposal
- (k) Social Impact due to industrial setup and harnessing of gas and other resources locally (if any)
- (l) Transportation of raw materials
- (m) Climate
- (n) Protected areas and designated sites of scientific, historical and cultural significance
- (o) Heritage, recreation and amenity assets
- (p) Livelihood, lifestyle and well-being

11.1.2.3. Operation stage impact prediction but not limited to:

- (a) Natural resources
- (b) Ecosystems and biological diversity
- (c) Collection of Resources from Local Sources within the Country (if any)
- (d) Ambient Air

- (e) Ambient Noise
- (f) Water Bodies (both surface & ground)
- (g) Solid Waste Disposal
- (h) Soil and Agriculture
- (i) Ground Water
- (j) Community and occupational health & safety
- (k) Traffic Movement
- (l) Social Impact
- (m) Tourism
- (n) Transportation of primary fuels
- (o) Climate
- (p) Protected areas and designated sites of scientific, historical and cultural significance
- (q) Heritage, recreation and amenity assets
- (r) Livelihood, lifestyle and well-being.

Mathematical and statistical modelling tools shall be used as directed in the EIA Guideline of Department of Environment of Government of the People's Republic of Bangladesh.

12. ENVIRONMENTAL MONITORING & MITIGATION

12.1. ENVIRONMENTAL MONITORING

- i. Environmental monitoring plan shall be prepared for the systematic collection of data to:
 - a. measure the impacts that occur during project construction and operation;
 - b. check their compliance with agreed conditions and standards or with regulatory standards;
 - c. facilitate impact management;
 - d. provide database of short and long environmental effects associated with the project activities; and
 - e. Determine the accuracy of impact predictions and the effectiveness of mitigation measures.
 - f. The monitoring plan shall take into account several factors, include:
 - g. The nature of the effect that is required to be monitored (whether chemical, physical, social, biological or ecological, human health, etc.); and
 - h. The extent to which the effect has to be monitored (for example, pollutant in the atmosphere, river, sea, land, food chain, and others).

- ii. Areas for Monitoring Programme not limited to the followings:
 - a. Air Pollutants/ Air Quality
 - b. Water Pollutants/ Water Quality
 - c. Waste Management (solid and hazardous)
 - d. Soil and Groundwater
 - e. Social and Human
 - (i) Changes in occupation,
 - (ii) Changes in crop production,
 - (iii) Shifts in population,
 - (iv) Changes in income distribution, Lifestyle changes etc.
 - f. Occupational Health and Safety
 - g. Workplace accident, incident, injury, illness, first aid and near-miss,
 - h. Legal compliance including new policies, acts, etc.
 - i. Regulatory violations, citations, inspections, investigations, visits, etc.
 - j. Training and competency requirements
 - k. Occupational hygiene exposure monitoring and exceedances to legal exposure or emission standards should be recorded, reported and investigated
 - l. Grievances, complaints, suggestions from workers

- m. Safety work permits, risk assessments, job hazard analysis etc.
- n. Maintenance, service and inspection records of operation control safety equipment and protection
- o. Internal and external audits including closure of findings
- p. Health and medical surveillance for workers
- q. Public/Community Health and Safety
- r. Facilities/building design structure including fire safety and natural disasters (earthquakes, floods)
- s. Dust, fumes, noxious odours
- t. Wastewater discharges
- u. Road/ traffic safety and accidents
- v. Noise pollution
- w. Communicable diseases
- x. Grievances and complaints from community members
- y. Security and crime
- z. Ecological and Biological
- aa. Stack Emission
- bb. Equipment and Ambient Noise
- cc. Surface Water & Waste Water
- dd. Action During Abnormal Operating conditions

12.2. MITIGATION MEASURES

The mitigation measures should be described clearly in the EIA report in terms of:

- a) The impact it is designed to mitigate;
- b) The expected effectiveness in terms of reducing or preventing impacts;
- c) The alternative measure(s) that is next best; its cost (as needed) and appropriateness for adoption;
- d) The implementation plan for putting the measure into practice.
- e) Process change/raw materials change, technical changes etc.
- f) Rehabilitation and resettlement plan.
- g) A plan for socio-economic development of the area
- h) Measures in terms of technology change
- i) Mitigation plan for the control of air and water pollution.
- j) Resource/energy conservation measures.
- k) Noise abatement and control.
- l) Use of low and non-waste technology.
- m) Solid/hazardous wastes management plan.
- n) Risk assessment and management plan
- o) Mitigation plan for hazardous chemicals and wastes.
- p) Measures to ensure safety, health and hygiene at the workplace.
- q) 3R application
- r) Waste and energy audit
- s) A plan for green belt development.
- t) Groundwater augmentation plan, Flood management plan.
- u) A healthcare plan for workers and the communities.
- v) A plan for the provision of canteen, rest rooms and other amenities for employees.
- w) Mitigation plans for traffic mobility and associated items such as parking and road safety.
- x) Health and Safety Measures at Construction
- y) Health and Safety Measures during Operations
- z) Community Health and Safety Surveillance
- aa) Emergency preparedness.
- bb) Plan to compensate residual/unavoidable impacts.

- cc) Public consultation
- dd) Decommissioning
- ee) Mitigation hierarchy of actions shall be applied as below:
 - First* – Avoidance;
 - Second*– Minimization:
 - Third* – Residual Impacts and Risks.
 The priority hierarchy of minimization should be established as
 - (i) Elimination,
 - (ii) Substitution,
 - (iii) Engineering controls,
 - (iv) Administrative controls,
 - (v) Personal protection equipment (PPE)
- ff) Mitigation can be carried out by:
 - (i) structural measures, such as design or location changes, engineering modifications and landscape or site treatment; and
 - (ii) non-structural measures, such as economic incentives, legal, institutional and policy instruments, provision of community services and training and capacity building.
- gg) Mitigation can be achieved by scaling down the project, relocating or reorientation of facilities, redesigning elements of the project, phasing construction and operation, adoption of end-of-pipe control technologies, landscaping, transport routes, disposal routes or locations, timing or engineering design, pollution controls, waste treatment, engineering measures, social services or public education, compensation to restore, relocate or provision of concession for damage, monitoring and auditing, etc.;

13. ENVIRONMENT MANAGEMENT PLAN

Well-structured “Environmental Management Plan” or EMP shall be prepared that covers all phases of the project (pre-construction, construction and operation phase), as well as requirement for monitoring & auditing.

Environmental monitoring must be designed to provide information on the activity’s actual impacts, compliance with environmental operating conditions, and the effectiveness of environmental mitigation measures.

EMP document will contain but not limited to the following:

- a) Environmental policy and objectives;
- b) Potential impacts
- c) Organizational Capacity assessment and Capacity Building as well as responsibilities
- d) Greenbelt Development Plan
- e) Rain Water Harvesting Plan
- f) Rehabilitation and Resettlement Plan
- g) Thermal pollution management
- h) CDM (Clean Development Mechanism) Intent
- i) Annual environmental budgetary provisions
- j) Contingency Plans
- k) Monitoring schedules, parameters, reporting, reviewing and auditing formats.
- l) Zero Liquid Discharge Plan
- m) EMP during Preparation Phase
 - (i) Land Development
 - (ii) Location and Sources of Soil and Other Material for Development
 - (iii) Transport of Soil and Other Material
 - (iv) Method and Equipment for Collection of Soil and Other Material
 - (v) Closing of Sites of Sources of Soil and Other Material for Development
- n) EMP during Construction Phase
 - (i) Site Preparation

- (ii) Infrastructure Services
- (iii) Construction Equipment
- (iv) Safety Measures
- o) EMP during Operation Phase
 - (i) Air Pollution Management
 - (ii) Transportation and handling of raw materials
 - (iii) Noise Management
 - (iv) Waste Management
 - (v) House Keeping
 - (vi) Safety and Occupational Health

13.1. Safety and Security Plan

The Construction Safety & Security Plan, Early Works has to be prepared (for both construction and operation phase) for Occupational Health and Safety (OSHA) management system, which will include the following (but not limited to):

- (a) Safety Plan
 - (i) Workplace / Work zone Safety
 - (ii) Safe work practices
 - (iii) Hazard assessment
 - (iv) Hazard Communication
 - (v) Contractor safety prequalification
 - (vi) Occupational Health and Safety Audit Checklists.
 - (vii) Community Health Surveillance Checklists
 - (viii) Contractor Safety Program, Practices and Procedures
 - (ix) Eating, Drinking, Washing and Sanitation Facilities
 - (x) Protective measures, Hazard & Risk mitigation.
 - (xi) Fire Prevention and Protection
 - (xii) Traffic Control
 - (xiii) Training Requirements for Activities
 - (xiv) Safety monitoring
 - (xv) Incident, injury and illness reporting.
- (b) Security Plan

13.2. RISK REDUCTION AND MANAGEMENT PLAN

Risk Reduction and Management Plan shall be prepared to meet the most widely accepted international standard for an Environmental Management System, ISO 14001:2004 (EMS standard) as well as Occupational health and safety management systems, ISO 45001:2018 (Occupational Health and Safety Management Systems).

- (a) Risk Assessment
- (b) Consequence Analysis
- (c) Risk Mitigation Measures

13.3. EMERGENCY RESPONSE PLAN

Emergency Response Plan shall be prepared where all possible emergencies shall take into account. Example of several factors (but not limited to) are fires, explosions, chemical spills, gas leak/releases, disease outbreak, epidemic or pandemic, natural disasters such as storms, cyclones, landslides, tsunamis, earthquakes, floods, extent of injuries, illnesses, equipment damage, material damage, property damage, sabotage, bomb threat and other events that may occur during project implementation and operation.

14. AUDIT and REPORTING PLAN

14.1. ENVIRONMENTAL AUDIT PLAN

Post EIA Environmental auditing plan shall be prepared as a post-EIA evaluation process to determine the effectiveness and performance of the proposed mitigation measures.

14.2. ENVIRONMENTAL REPORTING PLAN

Post EIA Environmental Reporting Plan shall be prepared as a post-EIA review process.

14.3. ENVIRONMENTAL MODELING

- a) Air quality modeling for stack/chimney emissions (i.e. nitrogen oxides, carbon monoxide and carbon dioxide) using regulatory air quality dispersion model (i.e., AERMOD or other internationally used environmental modeling software), including assessment of the cumulative effect of major sources in the air shed.
- b) Sensitivity analysis for various stack/chimney heights.
- c) Water quality modeling for all potential waste streams produced from the power plant, including thermal plume modeling.
- d) Noise impact assessment and modeling for the proposed project.

15. Recommendation for EIA Reporting

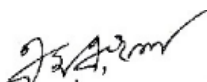
- a) Recommendations is required aimed at high-level decision makers.
- b) All statements, conclusions, and decisions in the EIA report needs to be well organized and clearly written and defensible, with evidence from the project design, project site, and primary and secondary data; all statements appear to be sound and relevant supporting evidence and intuitively.
- c) EIA report should be complete, easily understood, objective, factual and internally consistent.
- d) Plant closure, site remediation or rehabilitation, eventual public access, and any other features related to the closure of the project shall be clearly identified and addressed as environmental and social enhancements;
- e) On behalf of the project authority, the consultant shall submit the EIA along with a filled-in application for Environmental Clearance in prescribed form, the feasibility report, the No Objection Certificate (NOC) from forest department (if required), NOCs from other relevant agencies and other necessary documents to the Mymensingh Divisional Office of DOE with a copy to the Head Office of DOE in Dhaka.
- f) A soft copy of the image data as well as the maps to be generated from the image shall be submitted to DOE Head Office along with the EIA.
- g) The consultants will conduct the Environmental Impact Assessment (EIA) based on guideline of Department of Environment (DOE), Bangladesh.
- h) On behalf of the project owner, the consultants shall prepare a final TOR for EIA which shall be submitted to DOE and will arrange and take all necessary actions for the approval of ToR from DOE.
- i) The consultants shall submit a comprehensive EIA report considering the overall activity of the said Project in accordance with DOE approved TOR and time schedule indicated in this document.
- j) Consultant will incorporate all suggestions, observations, modifications, supplementary reports, presentations etc. required for obtaining approval on submitted EIA.
- k) On behalf of the project owner, consultant will arrange and take all necessary actions for the approval of EIA and LCC (Location Clearance Certificate) from DOE.
- l) In addition to the above issues, the Consultant will also follow the WB/Equator Principles/ADB/JICA's relevant guidelines (if required) for comprehensive reporting.

Attachment-3

Terms of Reference (TOR) of Consultancy Service for Social Impact Assessment (SIA) of the 400 ($\pm 10\%$) MW Gas/LNG Based Combined Cycle Power Plant Project at Char-Ishwardia, Mymensingh.

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Social Impact Assessment (SIA)

The social impact assessment, proposed plan and Social Management System will include the following (but not limited to):

1. **Executive summary**

The Consultant will summarise the key findings of the Social Impact Assessment (SIA) of the Mymensingh 400 ($\pm 10\%$) MW Gas/LNG based Combined Cycle Power Plant Project that will include:

- a) Socio-economic baseline profile.
- b) Critical social issues & impacts assessment and its mitigation measures/plan.
- c) Social Management System.
- d) Land acquisition procedure as well as Resettlement & Livelihood Restoration budget and schedule for land and assets loss of affected communities as per *Acquisition and Requisition of Immovable property Act, 2017* (ARIPA-2017) and *IFC performance standard on Environmental and Social Sustainability*.
- e) Stakeholder Engagement procedure.
- f) Grievance redresses mechanism.
- g) Information Disclosure system.
- h) Monitoring plan of Critical social issues & impacts.
etc.

The Executive summary of SIA report has to be written in English as well as it has to be translated into Bengali for public disclosure and wide spread understanding of the local people.

2. **Approach and Methodology**

To achieve the goal of positive social outcomes, eliminate any possible negative effects and wellbeing of individuals, the consultant shall follow a standard methodology / procedure supported by the GoB laws & policies (e.g. ARIPA-2017 and others) as well as the requirement of *IFC performance standard on Environmental and Social Sustainability* guideline.

3. **Policy, Legal, Administrative Framework & implementation Schedule**

Cover the applicable potential legal, administrative, planning and policy framework within the study area will be prepared.

Implementation schedule for Land acquisition, Resettlement action & Livelihood Restoration as well as effective Social Management System shall be clearly identified.

4. **Socio-economic baseline study/Survey**

With collaboration & maintaining liaison with the relevant governmental authorities and the client (B-R Powergen Ltd.), the consultant will conduct Site visit and reconnaissance survey for the preparation of

- a) Administrative profile
- b) Demographic profile
- c) Gender issues and ratios
- d) Social Classification
- e) Education and literacy
- f) Vulnerability Classification,
- g) Indigenous people and ethnic group
- h) Livelihood and Economic Profiles
 - (i) Local Employment
 - (ii) Local Economy
 - Agriculture
 - Fisheries
 - Livestock and Poultry

- i) Major/sensitive installations profile (within as well as around 1km and 10km of the project sites.) including
 - (i) Cultural Heritage,
 - (ii) Ecological Critical Areas,
 - (iii) Key Point Installation,
 - (iv) Historically important sites,
 - (v) Hills & monticules
 - (vi) Holy places (mosque, temple etc.), Park & Playground, Hospital/Clinic, Educational institute, Residential area, Buffer zone and reserved areas, Industries etc.
- j) Identification of Critical Issues for
 - (i) Environmental
 - (ii) Social
 - (iii) Economic
 - (iv) Resettlement/ Rehabilitation (Long-term/ short term)
 - (v) Immediate Community Assistance
 - (vi) Incorporation of gender issues
- k) Access to Infrastructure
- l) Existing Service and Utilities
 - (i) Electricity and Source of Drinking water
 - (ii) Health care infrastructures
 - (iii) Sanitation Facilities
- m) Prevalence of COVID-19, HIV/AIDS and prevention program
- n) Land Acquisition and Resettlement Impacts
- o) Potential benefits of the project, including economic development outcomes.

5. Social risks & impacts assessment and mitigation plan

Based on Socio-economic baseline study/survey data, the consultant will identify and assess the social risks and impacts as well as propose mitigation measures/plan for positive social outcomes, eliminate any possible negative effects and wellbeing of individuals. Where avoidance is not possible to minimize adverse social and economic impacts, consultant shall estimate for appropriate compensation that should be provided by the client to the affected communities as per GoB laws & policies (e.g. ARIPA-2017) and IFC performance standard, ensuring appropriate disclosure of information, consultation and the participation of those affected communities.

6. Social Management System

In addition to the Social Impact Assessment (SIA) and mitigation plan, the consultant shall also prepare and submit plans and procedures to establish/develop a complete Social Management System for the said power plant project (both for construction and operation phase), which will incorporate the following elements (but not limited to):

- (i) Policy; Legal & Administrative Framework, Organizational capacity & competency;
- (ii) Land acquisition and Resettlement action & Livelihood Restoration plan
- (iii) Consultation, participation and Stakeholder engagement;
- (iv) Information Disclosure system
- (v) Grievance redresses mechanisms;
- (vi) Emergency preparedness and response;
- (vii) Social Management programs, Monitoring, Audit and Review.

Both for the construction and operation phase of the said power plant and power plant project, the consultant will identify the Organizational capacity and competency requirement as well as cover the applicable potential legal, administrative, planning and policy framework within the study area will be prepared.

7. Land acquisition and Resettlement action & Livelihood Restoration plan

The consultant will identify and describe a detail Land acquisition procedure and Resettlement & Livelihood Restoration plan as per GoB laws & policies (e.g. ARIPA-2017) as well as IFC performance standard on Environmental and Social Sustainability.

In collaboration with relevant Government Authority and considering the land loss, asset loss, economic loss, opportunity loss and any other relevant loss of the affected communities, a detail compensation budget and schedule has to be prepared as per ARIPA-2017.

Also, examines the key gaps between IFC Standards and GoB laws & policies. If the government procedure does not satisfy anything of the IFC standard, the consultant shall carry out census to collect appropriate socio-economic baseline data and determine who will be eligible for additional compensation and assistance.

8. Consultation, participation and Stakeholder Engagement

The consultant will prepare a stakeholder engagement plan both for the construction and operation phase of the said power plant and power plant project risks and implications. Also outline general policies and strategies for identifying affected communities and other relevant stakeholders.

The Consultant will arrange and conduct at least four (04) Focus Group Discussions (FGD) and two (02) public consultation meetings. FGD and public consultations shall involve engagement between the client (BRPL), affected communities and other stakeholders including relevant GOB authorities, neighboring projects, and/or nongovernmental organizations.

All the discussions and public consultations shall be duly documented as well as open and transparent disclosure of information.

9. Information Disclosure System

Right to Information for ensuring improved livelihood of the marginalized and affected communities, it is committed to open and transparent disclosure of information. The consultant will prepare Information Disclosure System both for the construction and operation phase of the said power plant and power plant project.

10. Grievance redresses mechanisms

Both for the construction and operation phase of the said power plant and power plant project, the consultant will prepare a complete guideline/plan of Grievance Redresses Mechanism (GRM) supported by the management to ensure grievances from affected communities and from other stakeholders are responded and managed appropriately.

11. Emergency Preparedness and Response

The consultant will prepare Emergency Preparedness and Response Plan for the proposed Power plant (both for construction and operation phase) to respond to accidental and emergency situations in a manner appropriate to prevent and mitigate any harm to people and/or the environment. This will include the identification of areas where accidents and emergency situations may occur, communities and individuals that may be impacted, response procedures, provision of equipment and resources, designation of responsibilities, communication, including that with potentially Affected Communities and periodic training to ensure effective response.

12. Social Management programs, Monitoring, Audit and Review

Both for the construction and operation phase of the said power plant and power plant project, the consultant will prepare plans and procedures of Social Management programs, Monitoring, Audit and Review to monitor and measure the effectiveness of the management program, as well as compliance with any related legal and/or contractual obligations and regulatory requirements.