

**Terms of Reference (TOR)**  
**for**  
**Appointment of Individual Consultant for Supervision of Turnkey Contract (Owner's Engineer) for Municipal Solid Waste Based Grid Connected Pilot Power Project at Keraniganj, Dhaka**

**1. Background**

Bangladesh Government has given significant importance to generate electricity from Renewable Energy (RE). Govt. has already set a target to generate 10% of total electricity from RE. Accordingly RE resource-wise generation target has been set upto 2021. As part of RE, Govt. has taken initiatives to generate electricity using Municipal Solid Waste (MSW). Bangladesh Power Development Board (BPDB) is in the process of selection of EPC Contractor for Design, Supply, Construction, Testing & Commissioning for the pilot project for establishing Municipal Solid Waste based 1 MW  $\pm$  10% Grid connected Power Plant on Turnkey Basis. EPC contract is expected to be signed soon. Now BPDB requires Owner's Engineer for technical & financial evaluation and for the implementation of this Project. Construction period for this Project is 540 days from the date of opening of L/C and Warranty period is 24 months. This project will be implemented from the Revenue Fund of BPDB. On behalf of the Govt., Power Cell, Power Division, Ministry of Power, Energy, & Mineral Resources will appointment the individual consultants (Owner's Engineer) to this project and the appointment process will be financed by the World Bank under the ongoing Rural Electrification and Renewable Energy Development II (RERED II).

**2. Objective**

- i) Provide assurance that all steps have been undertaken properly for the implementation of the project;
- ii) Provide assurance that the completed plant will deliver performance, reliability and operational parameters as specified in the design;
- iii) Assist in technical and financial evaluation as well as approving the technical documents including design and drawing of the project, oversight of construction from the owner's perspective; and oversight of the testing and commissioning of the power plant from the owner's perspective.

**3. Scope of the Services**

The consultant's service has to consider the particular situation in which it would be rather difficult to put much influence on the design of the equipment ordered. However efforts will be put on the review of design and timely completion of the project and optimized operation of the power station. The consultant will arrange certain procedures with regard to communication, distribution of documents, numbering, etc. to be followed by all parties involved provided such procedure is approved by BPDB.

The scope of the proposed consultancy service shall include in the field of mechanical, electrical, instrumentation & control, civil and environment engineering but not be limited to the following:

- Assist BPDB in evaluation of technical and financial bids to be received against international tender for engagement of turnkey contractor, preparation of bid evaluation reports, contract negotiations and draft contract agreements;
- Checking and approval of design calculations, drawings and specifications submitted by the turnkey contractor in respect of all electrical, mechanical, instrumentation & control, civil works and ancillaries under the scope of turnkey contract;
- Assessing suitability/appropriateness of the proposed anaerobic reactor design for treatment of a specific waste in terms of organic loading rate, conversion efficiency, expected biogas production rate per tonne of waste/ m<sup>3</sup> of effluent, Hydraulic Retention Time (HRT), reactor operating temperatures and other conditions, feed preparation requirements, possibility of recycling of effluent / waste water, land and manpower requirements, energy and mass balance, source of technology, commitment of the technology supplier for plant performance, etc.;
- Assessing quantity and quality (characteristics) of the waste available and reasonableness of the capacity / size of the biogas plant and other units for gas utilization;
- Sharing of past experience of the technology (reactor design) for treatment of similar nature of waste, if any, in Bangladesh or elsewhere;
- Assessing the reasonableness of the output parameters committed in the offer of the EPC Contractor;
- Supervision of erection work of all electrical, mechanical, I&C and civil works;
- Evaluation, review and approval of the field test methods submitted by the turnkey contractor for electrical, mechanical, I & C, witnessing of the test at various phases of work;
- Witnessing of factory tests/to attend pre shipment inspection/to attend post landing inspection along with BPDB representatives, if any and submit the reports to the competent authority of Board;
- Examine and approve the method for testing, pre-commissioning, commissioning procedures (submitted by the Turnkey Contractor);
- Assisting BPDB testing and commissioning team, if such a team is constituted, during pre-commissioning/commissioning tests and preparing recommendations for Board's acceptance of the plant;
- Checking/witnessing of start-up and trial operation, initial commercial operation and performance tests of the power plant (to be carried out by the contractor) in association with BPDB engineers and submission of detailed report;
- Assisting BPDB in providing the contractor with provisional acceptance certificate;
- Providing necessary support to BPDB for issues arising during 02 years warranty period;
- Checking and approval of all electrical, mechanical, civil and I&C "As Built" drawings submitted by the turnkey contractor;
- Checking and approval of training documents submitted by turnkey contractor and advising BPDB relating to the suitability of the training documents as per programme;
- Checking various (technical, progress and test reports etc.) and similar documents to be prepared and submitted by the turnkey contractor during execution of the erection work and keeping BPDB informed of the actual progress of the work;

- Studying and submitting comments on operation and maintenance manuals of plant equipment submitted by Turnkey Contractor and correcting the manuals as necessary;
- Arranging periodical co-ordination meetings with BPDB and contractor and submitting the reports of the same to BPDB and Contractor;
- Checking the monthly/quarterly progress reports submitted by the Turnkey Contractor and preparing comments on them;
- Assisting all concerned agencies to ensure proper and timely completion of the civil, electrical, mechanical, I&C works as well as smooth commissioning of the plant;
- Assist BPDB on any matter relating to the power plant.

#### **4. Indicative Expertise, Qualification/Experience of Each Expert**

- 2 (Two) individual international consultants (Lead Expert-1 & Junior Expert-1) shall be appointed to support BPDB in project implementation and monitoring of the project;
- 1 (One) individual national consultant shall be appointed to support BPDB in project implementation and monitoring of the project;
- Individual international consultants shall form a JV firm before submitting the proposal;
- It is expected that consulting services will be needed from consultants in construction supervision through commissioning, with consultant expert in mechanical and electrical equipment, civil structures and commissioning.

##### **i) Lead Expert (International):**

- Candidates should have at least a Bachelor's degree in Engineering or a Master's degree in Science with 10 years relevant and proven experience. The candidate should also have as per items listed in the Scope of Work above, the ability to deliver the following for a variety of feedstock and processes/technologies:
- Ability to conduct Technical Due Diligence (TDD) check of the technology proposed to be used for the energy generation;
- Excellent knowledge on large biogas plants including a wide range of international technologies including at least three proven track records of involvement;
- Knowledge base to understand the input and output parameters and technical processes involved in various waste to energy processes and composting plant;
- Prior experience in design, supervising including testing & commissioning and managing similar dry box dry fermentation (in scale and scope) contracts involving the supply and installation of Waste To Energy projects and Composting plant;
- The aggregate duration of the assignment, during which he/she held the position of solely responsible as a manager or equivalent, must not be less than 4 years;

##### **ii) Junior Expert (International):**

- Candidates should have at least a Bachelor's degree in Engineering or a Master's degree in Science with 5 years relevant and proven experience. The candidate should also have, as per items listed in the Scope of Work above, the ability to deliver the following for a variety of feedstock and processes/technologies:
- Ability to conduct Technical Due Diligence (TDD) check of the technology proposed to be used for the energy generation;

- Excellent knowledge on large biogas plants (dry box dry fermentation) including a wide range of international technologies including at least three proven track records of involvement;
- Knowledge base to understand the input and output parameters and technical processes involved in various waste to energy processes and composting plant;
- Prior experience in design, supervising including testing & commissioning and managing similar dry box dry fermentation (in scale and scope) contracts involving the supply and installation of Waste to Energy projects and Composting plant;
- The aggregate duration of the assignment, during which he/she held the position of solely responsible as assistant manager or equivalent must not be less than 2 years.

**iii) Expert (National):**

- Candidates should have at least a Bachelor's degree in Engineering or a Master's degree in Science with 5 years relevant and proven experience. The expert shall have minimum 5 years of experience in design, testing & commissioning of renewable energy based projects involving the supply and installation of systems;
- The aggregate duration of the assignment, during which he/she held the position of Renewable energy based Systems Engineer must not be less than 3 years.

**5. Tasks for Each Expert**

**a) Lead Expert (International):**

- (i) Oversee the assignment and the consultant team, and act as the team's point of contact with BPDB and other stakeholders;
- (ii) Review the project management (including administration) procedures of BPDB for the implementation of the project and as appropriate recommend changes or new procedures in keeping with modern international practices;
- (iii) Assist BPDB in evaluation of technical and financial bids to be received against international tender for engagement of Turnkey Contractor, preparation of bid evaluation reports, contract negotiations and draft contract agreements;
- (iv) Complete the concept design for the project;
- (v) Review, check and certify suppliers' equipment design, and assist BPDB in approving the technical documents;
- (vi) Advise and assist BPDB to develop and maintain a project quality assurance plan, and monitor contractor's designs and works are executed in line with the plan and project requirements. As and when referred by BPDB speedily advise on acceptability of such designs and works, and suggest corrective measures to be undertaken;
- (vii) Assist BPDB in supervising the installation, testing and commissioning of the main and ancillary equipment, plant and utilities. Monitor project progress against plan, report on progress, and propose remedial measures as necessary;
- (viii) Assist in management of operation and maintenance activities;
- (ix) Review of hazard evaluation and Contractor safety procedure;
- (x) Review and certification of Testing and Commissioning Plan;
- (xi) Review of Operation Manuals;
- (xii) Report on findings during the implementation of the projects;

- (xiii) Assist BPDB in ensuring that its personnel receives adequate on-the-job training by the Contractor on all relevant aspects of projects so that BPDB's personnel can independently perform the operation and maintenance functions;
- (xiv) Delivering the required reports including final reports;
- (xv) Conduct other duties as reasonably requested by BPDB.

**b) Junior Expert (International):**

- (i) Assist Lead Expert (International) in the development of a comprehensive project work program and implementation schedule;
- (ii) Monitor project progress against plan, report on progress, and assist in the determination of remedial measures as necessary;
- (iii) Perform other functions as may be assigned or delegated by Lead Expert (International) from time to time during the time of assignment.

**c) Expert (National):**

- (i) Assist the International Experts; supervise the work progress against the tender scope and terms and conditions; review volume of works completed; review suppliers' equipment design and installation program;
- (ii) Assist in the development of a comprehensive project work program and implementation schedule;
- (iii) Monitor project progress against plan, report on progress, and assist in the determination of remedial measures as necessary;
- (iv) Perform other functions as may be assigned or delegated by Lead Expert (International) as well as Project Director from time to time during the contract period.

**6. Duration of Consultancy**

<b>Experts</b>	<b>Man-days</b>
Lead Expert (International)	60 Man-days (54 days stay in Bangladesh)
Junior Expert (International)	60 Man-days (54 days stay in Bangladesh)
<b>Total for International Consultants</b>	<b>120 Man-days</b>
Expert (National)	20 Man-months
<b>Total for National Consultant</b>	<b>20 Man-months</b>

**7. Evaluation Criteria for the Consultants**

The evaluation of recruitment of individual consultants will be done according to the categories mentioned below:

- Educational Qualification
- Overall Work Experience
- Relevant Work Experience
- Local/Regional Work Experience

## **8. *Reporting Requirement and Deliverables***

- The Consultants will prepare monthly and quarterly progress reports as applicable based on field data and preparation of progress reports in a format and detail acceptable to BPDB;
- The Consultants will maintain records documenting decisions made at meetings, progress on project implementation, financial records and changes to the contract plans;
- Site inspection report and provide expert opinion as and when necessary;
- All documents and reports would be made available in hard and soft copies to BPDB and Power Cell.

## **9. *Facilitation and Reporting***

The contract will be signed between Consultants and Power Cell. The consultants will work with BPDB. BPDB will assign and supervise the work of the consultants and recommend payment of the consultants along with invoice, log sheets etc. to the Power Cell.