Terms of Reference (ToR)
for
Appointment of Consulting Firm for
Feasibility Studies and Development of New Business Models for SolarParks at Two Sites in Bangladesh

1. Project Background

Electricity plays a pivotal role for the socio-economic development of a country. In the recent years Bangladesh has experienced booming economic growth, rapid urbanization and increased industrialization. Hon'ble Prime Minister has announced the 'Vision 2021' which encompasses the target of ensuring affordable and quality energy supply for all. The Government of Bangladesh has taken diversified fuel based power generation program to fulfil the vision and commitment of the government. Success within the last 9 years has been tremendous - generation capacity has reached to about 18,753 MW and peak generation has picked up to 11,387 MW.

To fulfil the GOB's vision and objectives of electrification, development of renewable energy resources will play a vital role. The government has taken appropriate measures for generating environment-friendly electricity from renewable energy sources. The Renewable Energy Policy has already been adopted with the target to produce 10% of electricity from renewable energy sources by 2021..

To meet the above mentioned targets, the government has set RE targets for different generating companies. Government has set a target to each generation company (BPDB, APSCL, CPGCBL, EGCB, RPCL and NWPGCL) to install at least 100 MW of solar and 100 MW of wind power plant in the country. Generating companies have identified sites to develop solar power. These sites are at various stages of development with regard to land allocation, resource assessment and pre-feasibility assessment. To apply for financing, detailed feasibility studies and safeguards assessments are required.

2. Purpose of the Assignment

The main objectives of this assignment are:

a) To assess the potential of solar energy at site;
b) To assist utilities in developing RE based power generation projects;
c) To attract investment;
d) To develop business model for the solar projects;
e) To popularize solar energy technology in the country;
f) To increase share of RE in the generation mix.

3. Duration and Location of the Services

The duration of this assignment will be 06 (six) months. The location of service will be Bangladesh.

4. Scope of Services

The scopes of services for the feasibility include the following. The consultants can propose some modifications in the scope of work to meet the objectives of the assignment.

- ***Review previous studies&pre-feasibility study reports for solar parks at two sites(To be mentioned in RFP)***

Review previous studies and pre-feasibility reports on different sites of solar parks.

- ***Plant Capacity***
  Depending on the land area available, recommend the plant capacity based on secondary solar irradiation data from established sources. Data collection is the responsibility of the consultant.

- ***Method of Implementation of the Project***
  Recommend the method of implementation of the project considering economical, financial, commercial aspect. The consultant will draft contract document and tender document reviewing the existing contract documents (PPA, IA, LA etc.) for private sector projects and tender document for public sector projects.

- ***Power Evacuation***
  Recommend on the method of power evacuation and the necessary agreement required with concerned utilities/PGCB. Identify key issues and provide solutions/ recommendations for grid stability to the utility to accommodate and integrate the solar power generated from the proposed plants.Identify additional investments and its cost estimates required for successful integration of the solar park. Study the existing power system and identify gaps, load centers to ensure that the renewable energy generated is fully utilized without any curtailment.

- ***Applicable Technology***
  Review the available technology in the market and recommend the best technology for the project and fix the efficiency level of the equipment.

- ***Test Soil Condition***
  Carry out soil testing at the site to assess the soil condition and load bearing capacity and recommend the kind of foundation required for the solar panels. The borehole layout plan should be shown in the Digital Topographical survey map in x, y, z Co-ordinate. The 'z' co-ordinate shall be in respect to SOB/PWD BM; Execution of Standard Penetration Test (SPT) at an interval of 1.5m depth with collection of disturbed soil samples upto final depth exploration of each boring; For each bore-hole, minimum depth of boring shall be 20m. If poor quality soil encountered (say SPT value<20) the depth shall be extended upto 30m or more. (Normally SPT is taken @1.5m interval, but SPT must be taken at 1m interval upto top 6m depth); If clayey soil is encountered at any depth during boring, undisturbed soil samples must be collected with the help of shelby tubes.

- ***Conduct Morphological, Geotechnical and Topography study of the site***
  Conduct detail topographic survey for the proposed area by Total Station (TS) and GPS at a grid of 25m x 25 m with reference to nearby established BM (3-D pillar) Pillar of Survey of Bangladesh (SoB); the topographic survey will cover X,Y, Z (RL) values of each and every Ground Control Point (GCP), structures and any other significant physical features exists above the surface, banklines of water bodies etc.; collect cadastral Mouza Maps (RS Maps) from Land office and to convert them into GIS database by superimposing those with proper geo-spatial reference; prepare Digital Terrain Model (DTM) and Digital Elevation Model (DEM) for the proposed project site including contour line generation at an interval of 1.0 m and 5.0 m; conduct detail cartographical mapping (on GIS platform) of surveyed data, elevation models (DTM and

DEM) with existing land uses, water bodies, cadastral mouza data and so on at a scale of 1:3960 or 1:1980, aiming to demarcate area with geo-reference to cadastral land documents.

- ***Financial & Economic Analysis***
  Carry out Cost-benefit analysis for different technological options for solar PV depending on module type, mounting options (fixed vs. tracking system), inverter type and potential use of electric storage and/or capacitors. Availability, inter-operability, reliability, scalability and maintenance aspects; defining communication, command and control systems, load consumption, system architecture definition and roadmap (including layout, modules, inverters, transformers, meters, etc.), relationship between the features, system output and performance should be taken into account.

  The cost estimates for development, construction and operation of the project and predicted revenue, based on the available resource data, as well as indicative quotes or comparison with similar projects.

  Financial and economic analysis for the technology suitable for commercial utility-scale grid connected solar power plants at each of the selected sites specifying the investment cost ($/kW), levelized cost of energy ($/kWh), subsidies, incentives (e.g. applied to the equipment's costs, etc.), energy tariffs, costs and benefits, total cost of ownership/life-cycle costs of plant, payback time, insurances costs, costs recovery, etc. should be taken into account.

- ***Conduct Flood/Cyclone Risk Assessment***
  Conduct a flood risk assessment of the site if the site is near a river. Based on secondary flood level data and documentation about flood in the region, the consultant will assess major geological structures in the area and geotechnical conditions likely to be encountered on site. The consultants will also asses the hydrology/hydrogeology of the area and potential risk of flooding as well as historical records or previous investigations, mining/landfill use, possible contamination sources etc.

- ***Assess Agriculture and Fisheries Prospect***
  Prepare prospective agricultural and fisheries plan considering the location and condition of land.

- ***Cost Estimation***
  Review all aspects of the project and prepare a detailed breakup of cost estimate of each component of the project.

- ***Environmental, Social, Disaster and RAP Issues***
  Review the existing environmental laws and regulations and recommend environmental issues that may arise as a result of the implementation of the project. Conduct assessment of social, disaster and environmental impacts of the project at the selected sites. The assessment shall include an analysis of current formal/informal land use in the project area as well as impacts associated to connecting the PV plants to the grids. Based on collected data, the environmental impacts and subsequent mitigation and

management required should be reflected in the EIA/ESIA report. Disaster impact assessment along with possible mitigation and management requires to be added in the DIA report. Institutional arrangement for environmental, social, disaster monitoring and management for the project should also be reflected in the report. Prepare a full EIA/ESIA, DIA and RAP report as per development partner agencies guidelines.

- ***Legal and Institutional Aspects***
  Review legal and institutional aspects of the land, environment and other issues for the proper implementation of the project.

- ***Review Previous Studies***
  Review the previous studies carried out near the sites or in that area.

- ***Review Tender Document and PPA***
  Review the existing tender document and will prepare a standard tender document for use of generating companies; the firm will also review the existing contract documents (PPA, IA, LLA etc.) for private sector projects and will prepare a standard contract documents (PPA, IA, LLA etc.). Will also review different documents and suggest new commercial models for solar PV based power plants in Bangladesh.

5. Detailed Outputs of the assignment (and applicable quality standards, where applicable)

5.1 Team Composition and Qualification Requirements for the Key Experts (and Any Other Requirements that Will Be Used for Evaluating the Key Experts under Data Sheet 21.1 of the ITC)

Consulting services are solicited from Renewable Energy Experts experienced in preparing a solar based power plant of minimum capacity of 50 MW. Consulting firms should have experience to perform the consultancy services, experience of similar assignments, experience in similar conditions, firm's capability, and availability of appropriate skills among key staff, availability of resources, relevant transactional experience. The Proposer is expected to engage the following categories of key experts for the Project and CVs shall be submitted accordingly:

- **Renewable Energy/Technical Expert (Team Leader) (Position-1International, 6 person months):** The Team Leader must have at least a Bachelor's degree in Engineering or Masters in Renewable Energy or any other relevant subject with minimum of 20 years of experience including minimum 5 years of experience in the field of solar energy technology He should preferably have experience of carrying out feasibility study of minimum of 50 MW solar plant. The solar expert should have good knowledge of PV standards and experience on resource assessment and calculation of energy yield for solar PV projects.

- **Power System Specialist (Position-1 National, 6 person months):**The Power System Specialist should have at least a Bachelor's degree in electrical engineering and 15 years of experience in the power sector including in power generation, transmission/distribution network analysis, grid integration of renewable energy-based generation.He should of knowledgeof integration of solar parks with the national grid as well as stability of the national grid. He should be able to estimate cost required for successful integration of the solar park.

- **Environmental Expert (Position-1 National, 3 person months):** The Environmental Expert must have at least a Master's degree in Environmental Science or any relevant subject. The expert must have a minimum of 5 years of experience in the field of environment and able to carry out detailed environmental study of solar sites.

- **Legal & Institutional Expert (Position-1 National, 3 person months):** The Legal Expert must have a Master's degree in Law from a recognized institute of higher learning. The expert must have a strong background and experience in Bangladesh law and legislation related to land management, environment and conservation and natural resource management. The expert must have a minimum of 5 years of relevant and practical experience. The expert must preferably have experience in drafting commercial documents.

- **Social Specialist (Position-1 International, 3 person months):** The Social Specialist will have at least a Master's Degree in Social Science and at least eight years of relevant work experience in social assessment and land acquisition/resettlement issues in infrastructure projects. Good knowledge of International standards, including development partner agencies safeguard policies, is also required.

- **Financial/Economic Analyst (Position-1 National, 3 person months):**The Financial/Economic Analyst must have a Masters in Economics/Finance/Business Administration or any relevant subject with a minimum of 5 years of experience in financial/economic analysis. The specialist shall be able to provide the cost benefit analysis of the solar park in financial and economic terms. Provide also a basis for solar PV development plan for Bangladesh based on the existing available generation and identify the benefits based on fall in solar PV prices , Storage price etc.
- **Bid Advisor/ Transaction Specialist (Position-1International, 3 person months t6):** The consultant should preferably have a degree in business administration, engineering or economics, and preferably 10 years of working experience in the energy sector, specifically on a competitive bidding framework in renewable energy. The specialist will prepare a competitive bidding framework for the private sector participation in wind/solar parks. The specialist will also prepare a solar business plan incorporating the existing and proposed plan for solar parks. The consultant will also analyse the prospects, viability and suitability of potential public-private partnership options in developing solar parks and identify optimal public-private partnership (PPP) bid package options.

5.2 Reporting Requirements and Time Schedule for Deliverables

- Inception Report within ten days of signing of contract
- Soil Test Report within two months of signing of contract
- EIA/ESIA, DIA, RAP report within four months of signing of contract
- Interim Report within two months of signing of contract
- Standard Tender Document within five months of signing of contract
- Standard PPA, IA, LLA Document within five months of signing of contract
- Draft Final Report within five months of signing of contract
- Two stakeholders meeting on Interim Report and Draft Final Report
- Training/Study tour during the duration of the study
- Final Report within six months incorporating comment from stakeholders

10(Ten) copies of each report has to be submitted along with a soft copy;

Person to receive the Report: Project Director, Power Division

The consulting firm will report to Project Director, Power Division for billing and contract management. For work execution purposes, the consulting firm will report to the concerned utility company.

5.3 Relevant background information or materials for the assignment*: Not applicable*

5.4Indication is downstream work is potentially considered: No downstream work is expected at the end of the feasibility study.

5.5Training and capacity building requirement*: M*anpower training:To enrich experience of project personnel and official of Power Division and Power Cell, **a**rrangement for a study tour of approximately 10-12 personnel has to be arranged to venues where such implementation of the project is underway

5.6Equipment procurement*: —Not applicable*

6. Client's Input and Counterpart Personnel

(a) Services, facilities and property to be made available to the Consultant by the Client:

Facilitation and Reporting

The utility company will ensure access to the available pertinent information to this assignment. Consultant will work in close association with Utility Company Project Office, Power Cell and other relevant utilities. A coordination mechanism will be set up to review progress, provide guidance and advice. The designated personnel of the entities will interact with the Consultants and provide data, arrange discussions and assistance as required. The Consultant will work under the guidance of Project Director and relevant Utility Company. The day to day work will be monitored by a representative of the Utility Company.

Logistics Support

Utility company will provide logistic support as far as possible. But office accommodation, site visits, secretarial service will have to be arranged by the consulting firm at their own costs.

(b) Professional and support counterpart personnel will be/not be assigned by Utility Company to the Consultant's team

(c) Selection of sites and concerned Utility: The final list of sites and the concerned utility under whose guidance the study will be carried out will be mentioned when RFP will be issued.

7.Client will provide the following inputs, project data and reports to facilitate preparation of the Proposals:

The consultant will have to collect relevant project data and reports from the respective departments as required to successfully completing the study.