



## Invitation for Prequalification (IFP) of Consulting Firms for Study of Grid Integration with Wind Farms in Pakistan

The United Nations Development Program (UNDP) are implementing the "Sustainable Development of Utility-Scale Wind Power Generation- Phase I" Project (referred to as Wind Energy Project or WEP). The project is funded by the Global Environment Facility (GEF) and implemented through the Alternative Energy Development Board (AEDB) of the Government of Pakistan (GoP). As a part of its mandate to remove barriers to the development of wind energy projects in Pakistan, WEP is intending to conduct a study of issues related to the integration of wind farms with the national electrical grid, and to recommend strategies for the growth of wind energy within the national electrical grid system of Pakistan.

WEP is inviting interested consulting firms to send their qualifications for the purposes of shortlisting a group of selected consultants to whom WEP will send a Request for Proposal (RFP). Details of instructions for the submission are posted on the following URLs:

**[www.aedb.org/downloads](http://www.aedb.org/downloads) , [www.undp.org.pk/bids](http://www.undp.org.pk/bids)**

Alternatively, they can be requested from the project office by writing an e-mail to [WindEnergyProject@gmail.com](mailto:WindEnergyProject@gmail.com). The closing time for receiving required documents for this study is August 15, 2007 (1600 Hours-Pakistan Standard Time).

**National Project Manager, UNDP/GEF Wind Energy Project**  
House No. 02, Main Nazimuddin Road, Sector F-10/4  
Islamabad, Pakistan.

Ph: +92 51 22 15 690 to 92, FAX: +92 51 22 15 689  
E-mail: [WindEnergyProject@gmail.com](mailto:WindEnergyProject@gmail.com)



## **Invitation for Prequalification (IFP)**

UNDP/GEF Wind Energy Project (WEP)  
Office of the Project Manager

**IFP Number: WEP/0707/GIS**

**Title: Study of Grid Integration with Wind Farms in Pakistan**

The closing time for receiving prequalification documents for this study will be

**August 15, 2007 (1600 hrs Pakistan time)**

Hard copies of prequalification documents shall be couriered before August 15, 2007 (1600 PST) to the following address:

**Project Manager  
UNDP/GEF Wind Energy Project Pakistan  
House No. 02, Main Nazimuddin Road, Sector F-10/4  
Islamabad, Pakistan.**

**Phone Number: 92 (51) 2215690 to 92**

## Invitation for Prequalification (IFP) of Consulting Firms for “Study of Grid Integration with Wind Farms in Pakistan”

The United Nation Development Program (UNDP) are implementing the "Sustainable Development of Utility-Scale Wind Power Generation – Phase I” Project (referred to as Wind Energy Project or WEP). The project is funded by the Global Environment Facility (GEF) and implemented through Alternative Energy Development Board (AEDB) of the Government of Pakistan (GoP). As a part of its government institutional strengthening mandate, WEP is intending to conduct a study of the integration of grids with the proposed wind farms in the Gharo wind corridor in the Province of Sindh. Terms of Reference (ToRs) can be found in Annex I of this document.

WEP is inviting interested consulting firms to send their qualifications for the purposes of shortlisting a group of selected consultants to whom WEP will send a Request for Proposal (RFP). RFPs would be issued in August with the expectation of fielding a consulting team by September 2007.

Based on the information required, the prequalification shall be mainly based on the following criteria:

Criteria		Benchmarks
1	Years of establishment of firm	Minimum 6 years
2	Background experience	At least 5 years relevant experience in power projects preferably in wind power sector (wind farm design, consultancy services, wind resource assessment etc.)
3	Relevant experience	At least 4 significant projects on grid integration/ stability preferably with wind farm studies or similar studies for other power generation projects
4	Financial Soundness	Financial soundness of firm supported by audited account of firm for last 2 years`

**Please read the following instructions carefully. Failure to comply with these instructions may disqualify your prequalification.**

Prequalification response should be submitted by providing:

1. A synopsis of prequalification document **using Arial 11 pt font** that responds to the following requirements and written in concise language to be **no more than 8 pages in length**.
  - (a) A profile of the firm’s experience in carrying out technical and analytical studies for integrated power generation, transmission and distribution systems together with wind power interconnection to common electrical grid systems and capable to conduct relevant grid studies;
  - (b) A profile of the firm/s (local and/or international) that will enhance the overall quality of consulting consortium (if appropriate);

- (c) A brief description of your firm's proposed management of the project and its role in quality and budget control;
- (d) A concise approach and methodology based on the TORs attached in Annex I of this document;
- (e) A profile of the proposed team including relevant qualifications and a brief description of the role of each team member;
- (f) An estimate of the time period required to meet the study objectives;

2. Submissions shall be accompanied by following supporting documents

- I. Registered name of firm & address along with related registration documents.
- II. Minimum of 4 years of relevant experience with **contactable references**.
- III. Audited financial reports of the 2 years demonstrating the financial soundness of the organization
- IV. Organizational capacity and structure of firm(s).

**Please Note:**

- I. Based on nature of assignment it is expected that ideal combination of consultants will be a right mix of relevant international and local experts.
- II. No promotional material or CVs shall be submitted with the prequalification documents. However, the interested firm(s) may refer WEP to websites that may strengthen their submission.
- III. Issuance of this prequalification notice does not constitute a commitment on the part of WEP nor does it commit the WEP to pay for costs incurred in the preparation and submission of prequalification documents. WEP also reserves the right to reject any or all applications received. Applications are submitted at the risk of the applicant.
- IV. It should be noted that UNDP is not obliged to invite to participate in the subsequent bidding process any particular organization who had expressed expression of Interest in this project.
- V. The bidding document will only be sent to pre-qualified organizations.

Shortlisting of consultants is anticipated in August 2007.

## **Annex I: Summarized Terms of Reference (ToR)**

### **1. Introduction**

UNDP in collaboration with the Government of Pakistan (GoP) and funding from the Global Environment Facility (GEF) is implementing the project “Sustainable Development of Utility Scale Wind Power Production – Phase I”. The project falls under the GEFs Operational Program 6 (OP6) – “Promoting the Adoption of Renewable Energy by Removing Barriers and Reducing Implementation Costs”. The overall objectives of the full project are to avoid CO<sub>2</sub> emissions by removing barriers to utility-scale wind energy (WE) production in Pakistan. Phase I has been designed to remove policy and regulatory barriers and create an enabling investment environment for private sector for WE production. The Alternative Energy Development Board (AEDB) under the Ministry of Water and Power (MoWP) is acting as the executing agency.

### **2. Rationale of Assignment**

Most notably along its 900 km coastline and in a number of North West Frontier valleys, Pakistan possesses about 50,000 MW of economically exploitable wind-power potential. The potential of technical exploitable wind power exceeds 11,000 MW along the coastal regions of Sindh and Balochistan. As such, Pakistan has embarked on a long-term wind energy development plan under its 2006 Renewable Energy Policy. This includes development of 100-200 MW wind power by the year 2010, another 700 MW by 2015, and 9700 MW by 2030.

With the introduction of wind energy into Pakistan’s national grid managed by the National Transmission and Dispatch Center (NTDC) or the distribution network within Distribution Companies (DISCOs), senior grid managers as well as independent power producers (IPPs) are requesting assistance to improve their understanding of the impacts of utility-scale wind farms on grid stability. This issue relates not only to the first wind farms to commissioned in Pakistan in the next 2 years, but also until 2030 when wind farms will provide a significant proportion of Pakistan’s total power generation.

Public utility managers, network supervisors as well as personnel from IPPs will also need to be equipped with wind electrical models and wind analysis methods that will aid their analysis of potential wind integration problems with grid stability. Without the knowledge of the behavior of the national grid to small or large wind farms and the necessary tools to manage grid responses to wind farms, grid managers will have difficulties integrating ore wind power into the grid whether it be high voltage or at the distribution level network. Anticipated “frequently asked questions” would include:

- Will a wind farm survive a fault on the grid?;
- How far should the fault be from the wind farm to minimize the number of turbines disconnected from the grid?; and
- How do we assess ad manage the potential drop-off of a wind farm from the power grid?

With wind being an intermittent energy resource, a common base of understanding of grid integration issues with wind farms, the use of forecasting tools needs to be developed. This will prove to be valuable for operators, schedulers and dispatchers in uploading or disconnecting wind farms to meet demand or to maintain grid stability in the

event of a grid imbalance. As the share of wind energy generation into the grid increases, transmission system integration requirements will become more critical.

### **3. Objective of Assignment**

The overall objective of this assignment will be to provide a long-term strategy that will assist NTDC in mainstreaming wind energy into their system within the 2006 Renewable Energy Policy framework. The primary objectives of the assignment will be to:

- increase stakeholder knowledge of impacts on the national grid related to an increase of wind energy generation;
- provide tools for analyzing national grid responses to an increase in wind energy;
- adapt or strengthen existing grid and distribution codes to the growth of wind energy into the grid; and
- provide strategic advice on developing the ability of the national grid to absorb an increasing proportion of wind energy.

Outputs of the assignment will comprise a number of studies related to increasing wind farm generation into the national grid that includes:

- issues related the existing network capacity, grid integration of wind farms ranging from 50 MW to 11,000 MW (to be developed under the three planning frameworks of the 2006 Renewable Energy Policy);
- the impacts on the growth of wind power as it relates to power system quality, load management capability, the behavior and stability of the national transmission grid and the distribution network;
- wind turbine technology options and control systems that would maximize grid compatibility and communication between the grid control center and wind farms to maintain system stability;
- connection options for wind farms to different voltage design standards for transmission and distribution networks including:
  - 11 to 132 kV (DISCOs/KESC);
  - 220 to 500 kV (transmission networks such as NTDC and KESC); and
  - weak or overloaded networks for which no network extension or upgrading is proposed (i.e. viability of the existing network capacity to absorb wind power generation).
- grid extension requirements that cater to the additional capacity requirements of wind farm IPPs that will feed into the grid within the short to mid-term plan and beyond;
- standard operating procedures and technical limits of wind power integration in compliance with NEPRA grid and distribution codes, NTDC policy and system reliability criteria for various wind speed regimes, and capacity levels of wind turbine generators (WTGs) during the peak and off-peak load periods;
- measures for a network system protection regime through the analysis of potential network faults, short & open circuit events, sudden load ejection i.e. impacts on network or on WTGs, on-off load voltage, contribution of WTGs in

- restoring grid stability, and load balancing capability for both steady state and dynamic characteristics of WTGs;
- locations for isolating the system (running as independent electrical islanding) and providing interconnection points within the NTDC, KESC or DISCO systems with technically compatible MW injections;
- training workshops that effectively disseminate knowledge of this study; and
- strategies to build capacity for stakeholders, most notably NTDC, integrating wind farms with the grid.

#### **4. Scope of Work**

The assignment will be divided into four components. A set of subcomponents to be elaborated further is provided.

##### **Component 1: Review Potential Responses Existing Network Operations to Wind Energy:**

- Review existing information.
- Existing network analysis.
- Impacts evaluation of wind farms on grid network and existing infrastructure.

##### **Component 2: Assessment of Analytical Tools:**

- Software assessment.
- Impact analysis and simulation techniques.
- Models for grid stability.
- Formulation of wind power integration approaches.
- Steady state and dynamic response of WTGs.

##### **Component 3: Guidelines for WTG Operational Parameters and the Interconnected Grid:**

- Strengthening of technical specifications.
- Defining key connection criteria.

##### **Component 4: Grid Operation Integrated with Wind Farms:**

- Study of continuous mode of operation.
- Study of power quality terms and critical limits.
- Reactive power analysis.
- Strategic options for grid strengthening.
- Operational, planning and forecasting tools.