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Terms of Reference: Technical Due Diligence Wind Power Project

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Technical Due Diligence Wind Power Project

Presentation by the IFC on Technical Due Diligence for Wind Energy Projects

I. Project Background

1.1 The [*Lender*](“LENDER”) is considering providing limited recourse long term financing for the development, construction and operation of a 65 MW wind farm (the “Project”).

1.2 The Project is been developed by [*] (the “Sponsor”) which has established a special purpose company (“Project Company”) for the sole purpose of owning and operating the Project.

1.3 Project Company has entered into three separate 20-year power purchase agreements [1] (“PPA”) with the *National Electricity Company*(“OFFTAKER”), the state-owned, vertically integrated electricity company for selling all energy produced by the Project.

1.4 Project Company is expected to enter into an EPC Contract with [*] (the “EPC Contractor”) for the construction of the Project and into an Operation and Maintenance Contract with [*] (the “O&M Contractor”). EPC Contractor and O&M Contractor are both controlled by the Sponsor. For additional information about the expected contractual structure refer to Annex A of this TOR.

1.5 The Project will consist of 44 - 1,5 MW wind turbines, which will be produced by EPC Contractor in its manufacturing facilities.

1.6 At this point, the LENDER is seeking proposals from consulting firms to provide customary services in connection with the technical due diligence prior to financial closing following the scope of work described below. The consulting firm will serve as technical advisor for the LENDER and the other lenders (together the “Lenders”) in conducting a review of the Project prior to financing.

1.7 The consulting firm (“Independent Engineer or “IE”) is expected to be appointed in [Date] and to perform the activities contemplated in this TOR before the end of the year. Financial closing is expected to occur during the first quarter of [year or time period].

1.8 In broad terms, the IE will agree to provide the usual and customary independent engineer consulting due diligence services provided to lenders of projects of this nature which will be performed in two phases:

- a. Phase I: Initial project review and technical due diligence prior to financial closing.
- b. Phase II: Construction and performance test monitoring and operations monitoring during commercial operation and after financial closing.

1.9 The Scope of Work outlined under Phase II is not authorized and it will not be contracted at this time. However, the LENDER is asking the IE to provide indicative pricing and conditions for Phase II, which will

be taken into consideration during selection process of the works for Phase I.

1.10 The technical teams of the Sponsor will be available to the IE in order to review the studies and other documentation as well as to test the assumptions underlying the various aspects of the technical and operational fundamentals of the Project.

1.11 The IE will perform all tasks within the scope of work with high professional skill based on its due diligence and experience. The IE will perform the work in an efficient manner and will avoid unnecessary expenses by assigning appropriate personnel, utilizing appropriate means of communication, optimizing travel schedules and through other appropriate means without compromising the thoroughness or quality of the work.

1.12 The IE will be available to attend meetings with the Lenders on an as-needed basis and to make various presentations, if required.

1.13 The IE will cooperate with other independent consultants, as necessary, for those subjects to be reviewed by them that may pertain to the scope of work of the IE.

1.14 The IE shall prepare a complete Technical Evaluation Report (the "Report") that will be used by the Lenders in their credit approval activities. The IE should be prepared to review documents and conduct meetings in both Spanish and English and shall produce reports in English.

1.15 The work will include trips to the project site during the initial project review (Phase I) and the construction period (Phase II); such trips are to be agreed with the LENDER. Trip costs will be incorporated in the overall budget to be included in the Consultant Service Agreement (Phase I) and later in the Monitoring Agreement (Phase II).

II. Scope of Work

A. Phase I – Technical Due Diligence

1. Basic Design and Planning Review of the Wind Farm

2.1 Review and opine on:

a. Quality of construction work, O&M plan and man-power availability.

b. Review and opine on all Project investment costs.

c. Review and opine on wind farm design, including review of macro and micro siting, wake effects, and potential upwind development effects;

d. Review and opine on foundation design and its suitability for the site (taking into account the seismic characteristics of the area)

e. Weather conditions at the Project site (which could impact the construction phase)

2. Wind Conditions

2.2 Elaborate a wind assessment and energy yield calculation for the Project, including explanation of loss factors and quantification of uncertainty levels (*the IE will assess the thoroughness of this analysis according to the data at hand from the wind reports performed by Sponsor and its methodology of calculation*);

2.3 Projection of energy production by a state-of-the-art model used in the industry (Wasp, Windfarmer, WindSim). Estimate of gross and net energy production for P50, P75, P90, P95, and P99 conditions. In performing this task, the IE will:

a. Process wind data measurements from Project site.

b. Perform quality checks on site wind datasets.

c. Review instrument calibration certificates and cross check with data.

d. Clean and perform quality checks of purchased long term data, particularly from nearby meteorological stations;

e. Prepare elevation model using available dataset.

f. Digitize roughness using aerial photographs (if available) and data collected from site.

g. Review terrain models.

h. Perform long-term correlation using data that is available

i. Prepare long-term frequency tables for each measurement position at measurement height and at proposed hub height.

j. Prepare wind shear analysis based on site data.

k. Prepare turbulence analysis based on site data.

l. Prepare extreme wind speed evaluation (50y) based on measured raw data.

m. Present summary of turbine specific mean wind speed, ambient turbulence, wake turbulence.

3. Technical Evaluation of the Wind Turbines Design and Manufacturer

2.4 Review and opine on:

a. The conceptual design, adequacy and performance characteristics of the selected turbine for the wind and weather conditions at the Project site;

b. Adequacy of the turbine manufacturer's engineering and design standards and procedures;

c. Origin of the different components of the wind turbines;

d. Track record of utilized wind turbines and its manufacturer, including past performance of the wind turbine under similar weather conditions, serial defects, etc.;

e. Review of performance guarantees (availability, power curve), including guarantees provided by the turbine and other equipment manufacturer;

f. The load analysis prepared by the turbine manufacturer. Assess and estimate basic lifetime calculations for all major components of the wind turbine. Independently verify the expected key component load exceedance percentages based on the site specific conditions;

g. Assess and opine on the monitoring program and the preventative and major maintenance program required/recommended for the turbine and other components of the Project;

h. Status of the wind turbine certificate;

i. To the extent required by the IE, assess the need to perform a more detailed evaluation of certain components of the wind turbines.[2]

4. Technical Review of Grid Connection and Other Electrical Matters

2.5 Review and opine on:

a. Ability of the wind farm to comply with grid code requirements;

b. The conceptual design and the capability of the selected grid connection and other electrical equipment, especially for application to the wind turbine and its characteristics;

c. Origin of major electrical equipment to be used in the Project;

d. Power transmission characteristics and network offtake capacity and technical conditions, behavior and operation of the wind farms and individual wind turbine (verify reactive power requirements);

e. Track record, operational experiences, and quality control of utilized equipment;

f. SCADA system

5. Project Documentation and Contractual Provisions

2.6 Review project contracts and opine on technical adequacy, consistency among the contracts and their suitability to achieve Project scope and cash flow projections. It is expected that the main Project contracts will include:

a. EPC Contract between Project Company and EPC Contractor;

b. Turbine Supply Agreement between Project Company and EPC Contractor;

c. O&M Contract between Project Company and O&M Contractor;

d. PPA Contract between Project Company and OFFTAKER and any other agreements between Project Company and OFFTAKER related to interconnection and transmission;

e. Civil Works Contract between Project Company, EPC Contractor and the civil works contractor (TBD);

f. Others

2.7 Review of the EPC contract(s), including civil works contractor and other subcontractors, and opine on:

a. Conformity with good engineering and construction standards and industry practices;

b. Contractors’ and/or the Sponsors' experience and their ability to meet contractual requirements, and risk allocation;

c. Performance testing and acceptance criteria for the wind farm and each of the individual wind turbines,

d. Adequacy of liquidated damages, guarantees, warrantees and indemnities, performance guarantees, bonuses, contract price, and contingencies.

2.8 Review Power Purchase Agreements and other contracts such as the project concession and grid connection agreement (if any) and opine on:

a. Reasonableness of tariff adjustment mechanism;

b. Payment terms, including impact of potential shortfalls in energy production;

c. Reasonableness of measuring and maintenance provisions under the PPA;

d. Performance testing and acceptance criteria for the wind farm;

e. Liquidated damages, payment adjustments, force majeure;

f. Reasonableness of the termination and/or buy-out provisions.

6. Construction and Start-up

2.9 Review and opine on:

a. Construction schedule including construction and payment milestones and contractors' and subcontractors' execution plans;

b. Assessment of reasonableness of Project Cost estimation (including potential scenarios of cost overruns), including spare parts;

c. Safety assurance program;

d. Site conditions, including site accessibility as well as adequacy of the available infrastructure (ports, roads, vehicles) to transport to the Project site the different components of the wind farm including the turbines;

e. Review of the commissioning and start-up plan including performance testing and acceptance criteria for the wind farm. The IE should plan to observe and attend the full plant commissioning.

f. The IE shall provide an independent estimation of the Project completion date as well as recommendation for delay contingencies.

7. O&M Program

2.10 Review and opine on:

a. The O&M program, including routine and unscheduled maintenance, and review and opine on O&M costs;

b. Staffing, start-up, training program, labour management;

c. Key staff qualifications, capability and experience, including international exposure/ capabilities and track record;

d. Spare parts inventory and availability/risk of shortage (logistical issues);

e. Expected major maintenance requirements for the wind farm;

f. Construction Contractors support, post completion technical risks;

g. Adequacy of turbine availability guarantee.

8. Financial Model

2.11 Review and opine on:

a. Technical data inputs and calculations for accuracy, reasonableness and consistency with projection of energy production, project contracts and permits;

b. Reasonableness and adequacy of parameters of the financial model sensitivity scenarios (including suggesting potential scenarios of turbine availability related to the probability of major maintenance / turbine defects);

c. The adequacy of the working capital, major maintenance requirements, turbine O&M, inventory of spare parts, projected operating budget for the Project, and other relevant technical aspects that should be considered in the financial model.

9. Permits and Licenses

2.12 Review and opine on:

a. Use of soil and construction permits;

b. Building permit;

c. Environmental permits;

d. Other required permits and licenses.

B. Scope of Work – Phase II

2.13 The IE will serve as a technical adviser to the Lenders throughout the construction period, related to any facets of the Project that may need to rely on the IE's expertise, including such factors as schedule, cost, construction quality, and performance. The IE will help the Lenders verify that the terms of the loan agreement are being met as the Project is built. Work by the IE during the construction phase of the Project will involve monitoring of both the Sponsor's engineering and the contractor's design engineering efforts and the contractor's execution of the construction contract (which includes major equipment procurement, fabrication, transportation and installation) and reporting to the Lenders on construction progress. In addition to receiving and reviewing monthly written progress reports from the Sponsor (and/or contractor), the IE will provide part-time observation on site (level depends on the needs of the Lenders and on the recommendation of the IE), review results of quality control testing, provide on-site monitoring of equipment testing, and provide independent certification of turbine-generator acceptance test results.

2.14 The IE will typically receive and review detailed progress reports and loan disbursement requests. Monthly or quarterly disbursement requests along with supporting invoice documentation will be reviewed and, if found acceptable, will be certified by the IE for release of payments. Among other items of a business nature, the certificates verify for the Lenders the following:

a. contractor's actual progress versus reported progress for the period reported;

b. actual construction progress versus scheduled progress per the loan agreement;

c. status of final design or design changes;

d. compliance of construction work with permits and with LENDER environmental guidelines;

e. that disbursements are consistent with actual observed progress;

f. that construction is in accordance with contract requirements.

2.15 The IE will have responsibility for advising the Lenders on any situation that might arise that could impact successful completion of the Project.

2.16 For each periodic review of the Project, the Independent Engineer will:

a. conduct an on-site inspection to assess the quality of the work completed to date;

b. review the EPC contractor's periodic progress report;

c. evaluate the actual quality control procedures implemented and advise if, in its opinion, the Quality Control/Quality Assurance program of the EPC contractor is appropriate and adequate with respect to Project site conditions and typical of industry practice;

d. review and attest to the veracity of the loan disbursement requests and actual invoices;

e. review and assess Project change orders;

f. review the status of the construction completion schedule and budget;

g. review the status of the Project compliance with applicable permits and licenses;

h. review other items listed in the Terms of Reference.

2.17 The IE will provide a letter report addressing each of the above items after each site visit, along with any disbursement request approvals desired by the LENDER.

2.18 During the start-up and acceptance testing of the Project, the IE will typically report to the Lenders regarding the contractors' adherence to performance tests as stated in the construction contract. Additionally, the IE will review results as compared to contract guarantees and will certify test results and determine the validity of any buy-down amounts that may be applicable. Upon completion of construction, the IE will conduct an on-site review, and if found acceptable, certify final project completion.

2.19 For the Project, the IE will perform the following services on behalf of the LENDER:

a. Verify that Project construction and equipment installation is substantially complete. At this point of construction, only generating unit start-up and testing activities will remain. This verification will coincide following the witness of start-up and testing of the final unit and completion of the punch list.

b. Witness-start-up and testing of the units. For the first unit, during the site visit, the IE will evaluate the testing procedure for adequacy and verification of unit performance guarantees, as well as witness the testing of the first unit.

c. Evaluate test results for comparison with the unit and Project performance guarantees. This typically will include maximum unit generating capacity, and generating unit efficiency under different wind speeds. This will be accomplished in two steps; the test results of the first unit will be evaluated after the site visit, and the test results of the other unit will be evaluated upon completion of its tests. Evaluate other tests if applicable.

d. Verify that all major permits have been obtained and are in full force and effect and identify what major permits have not been obtained, if any, and comment, from a technical perspective, on the likelihood that they may or may not be able to be obtained in a timely manner

e. Recommend Project Acceptance, based on verification of the completion of construction, and the results of the testing. A letter report will be prepared providing the IE's evaluation of the test results and recommendations for Project acceptance.

2.20 During the construction period, it is estimated that the IE will need to visit the Project site on three occasions as follow:

a. During construction of turbine foundations;

b. During installation and commissioning of wind turbines;

c. At commissioning to the Project under the PPA.

2.8 Following completion of the initial year of operation after construction, the IE will conduct annual operational review of the Project on behalf of the Lenders. The operation review will include:

· obtain and review basic Project O&M costs and data from the Project's owner and operator;

· conduct an on-site inspection of the Project and review O&M procedures, activities, and eventual problems with Project operators;

· evaluate Project energy production, comparing actual versus expected performance;

· evaluate Project annual O&M budgets, comparing actual costs versus expected costs, and the reasons for any differences;

· provide a letter report with the results of the operation review, including observations, assessments, recommendations and conclusions;

· verify that all major permits have been obtained and are in full force and effect and identify what major permits have not been obtained, if any, and comment, from a technical perspective, on the likelihood that they may or may not be able to be obtained in a timely manner;

· Other items to be included as part of the terms of the loan.

2.9 The LENDER reserves the right to modify the scope of work for Phase II as a result of the work performed under Phase I.

III. Reports to be delivered by the independent engineer

3.1 Phase I—Technical Due Diligence

· Draft Technical Evaluation Report

· Final Technical Evaluation Report .

3.2 Phase II—Construction Monitoring and Project Completion Verification

· Construction Progress Reports

· Project Completion Verification

· Monitoring During Operation Period through the term of the loan

3.3 In addition to the above, there will be Engineering certificates issued at:

· each loan disbursement

· at commercial acceptance of the Project

IV. Schedule

4.1 The IE's work under Phase I must be completed within a period not to exceed 9 weeks. The schedule, based on a notice-to-proceed, is as follows:

a. On the earliest of the signature of the CSA [3] or reception of notice-to-proceed by LENDER, the IE will submit a list of required information to the Sponsor (with cc to LENDER) (to accelerate the compilation of information, the LENDER suggest to submit a preliminary list of typical information that is required to conduct these activities together with the proposal)

b. The Sponsor shall assemble and the IE shall review the existing information during weeks 1, 2 and 3.

c. The IE is expected to visit the site during week 4.

d. The IE shall submit a Draft Report to the LENDER in week 7 for review and comments by the Lenders and which will contain at least, the following elements:

- Executive Summary that will highlight key risks/issues identified and provide actions and/or recommendations for the Lenders to consider;
- Review of all tasks outlined in Section A – Scope of Work of this TOR;
- Identification of any areas of concern or new areas that the IE feels should be addressed.

4.2 The IE shall submit a Final Report in week 9 reflecting as appropriate comments received on the Draft Report. The Final Report shall be issued to support financial closing. The Executive Summary of such report will highlight outstanding issues or items, which the IE or the Lenders deem particularly pertinent. The main sections will provide the details to support these summary items. Before and/or after financial closing, file copies may be issued to the appropriate financial institutions and will reflect any last minute resolutions that may occur prior to financial closing.

4.3 All Reports shall be in the English language and should be prepared in MS Word or PDF format and MS EXCEL, as required. All Reports should be submitted by e-mail, to the following addresses:

[Lender contact points]

4.4 In addition, two (2) hard copies of the Final Technical Evaluation Report should be sent to:

[Lender contact points]

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[1]One PPA for 50MW and another two PPA for 7.5MW each.

[2]This may provide IE an opportunity to increase IE's scope of work at IE's discretion.

[3]CSA: Consulting Services Agreement

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- **Sample TORs by Project**

- **Appointing and Managing Advisors**

- **Checklist: Drafting TORs for Advisors**

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- Guidelines & Tools
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