VALIDATION OF 49.5 MW WIND POWER PROJECT BY MASTER WIND ENERGY LIMITED IN PAKISTAN

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Summary:

Bureau Veritas Certification was appointed by M/s Master Wind Energy Limited to conduct the validation of the "49.5 MW Wind Power Project by Master Wind Energy Limited in Pakistan" located at Jhimpir, District Thatta, Sindh, Pakistan. The validation is conducted on the basis of Verified Carbon Standard Version 3 (VCS Standard Ver 3.6 issued on 19/10/2016), as well as criteria given to provide for consistent project operations, monitoring and reporting. Validation team also referred to VCS Validation and Verification Manual, Ver 3.2 issued on 19/10/2016 as guidance document for the VVBs in conducting validation and verification of GHG projects.

The validation scope is defined as an independent review and ex-ante determination by the Designated Operational Entity of the additionality of the project and application of consistent and most appropriate baseline scenario as per applied methodology. It consisted of the following three phases:

i) Desk review of the project design, baseline and monitoring plan, project technical details along with review of stakeholders consultation documents;
ii) Follow-up interviews with project stakeholders;
iii) Resolution of outstanding issues and the issuance of the final validation report and opinion. The overall validation, from Contract Review to Validation Report & Opinion, was conducted using Bureau Veritas Certification internal procedures.

The project activity is to generate power (electrical energy) from renewable energy (wind energy), which displaces power generation from fossil fuel in the grid connected power plants; that would have been the scenario in absence of the project activity, thus achieve GHG emission reduction due to utilization of renewable energy.

The validation is based on the documents like VCS-PD, Emission Reduction calculations, Investment Analysis, Grid Emission Factor Calculation and other supporting documents provided to the validation team. This validation is carried out in accordance with VCS Standard version 3.6, dated 19th October 2016 and VCS Program Guide version 3.6 dated 19th October 2016.

In summary, Bureau Veritas Certification confirms that the project is implemented as planned and described in VCS project design. The identified baseline scenario to the project activity is in line with the applied CDM methodology ACM0002 / Version 17.0. Project participant demonstrated the additionality of the project by investment analysis. Validation team confirms that the emissions reductions that will be generated from the project are additional to the identified baseline scenario and project will remain additional during crediting period. Hence Bureau Veritas Certification (BVCH) recommends the project activity for registration under Verified Carbon Standard Ver. 3.6 mechanism.

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Abbreviations:

VCS	VERIFIED CARBON STANDARD
VCU	Verified Carbon Unit
VVB	Validation/ Verification Body
PP	Project Proponent
CAR	Corrective Action Request
CL	Clarification Request
FAR	Forward Action Request
MWEL	Master Wind Energy Limited
CO_2	Carbon Dioxide
DOE	Designated Operational Entity
DR	Document Review
GHG	Green House Gases
MV	Means of Verification
MP	Monitoring Plan
VCS-PD	Verified Carbon Standard -Project Description
kWh	Kilowatt-hour
MWh	Megawatt-hour
GWh	Gigawatt-hour
EF	Emission factor
EPA	Energy Purchase Agreement
JMR	Joint Meter Reading
WTG	Wind Turbine Generator

1 INTRODUCTION

1.1 Objective

The validation serves as project design verification and is a requirement of all projects. The objective of a validation is to provide a thorough and independent third party assessment of the project design. In particular, the project's baseline, the monitoring plan, and the project's compliance with relevant VCS rules and host country criteria are validated in order to confirm that the project design, as documented, is sound and reasonable, and meets the applicable VCS requirements and the identified criteria. Validation is a requirement for all VCS projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of verified carbon units (VCUs).

1.2 Scope and Criteria

The validation scope is defined as an independent and objective review of the project design document, the project's baseline study and monitoring plan and other relevant documents. The information in these documents is reviewed against VCS rules and guidance along with associated interpretations. The validation is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the project design.

1.3 Level of Assurance

Based on the process and procedures conducted, it can be concluded that the GHG assertion is materially correct and is a fair representation of GHG data and information. The level of assurance of the validation is reasonable. Validation team has checked the information wherever required during validation and confirms the validation assessment as per reasonable level of assurance.

1.4 Summary Description of the Project

The project activity is renewable power generation from wind and supply of the power to the grid. The total installed capacity of the project activity is 52.8 MW equipped with 33 WTGs of 1.6 MW installed capacity each. The project is located at Jhimpir, District Thatta, Sindh, Pakistan. Although, the project was initially planned for 49.5 MW as mentioned in the title of VCS-PD, however, the final nameplate capacity of the project is 52.8 MW. This scenario has been discussed in detail in Section 3.1 of the Validation Report.

The project activity harnesses wind energy to generate and supply electricity to the grid. The conversion process utilizes aerodynamic forces (lift and/or drag) to produce a net positive turning moment on a shaft, resulting in the production of mechanical power which can be converted to electrical power. The employed WTGs can only convert wind energy into electrical energy and do not use any other fuel as input for electricity generation. The operation of WTGs is emission free and no GHG emissions are produced during the lifetime of the project activity.

The power generated by wind power plant station is evacuated by 132 kV transmission lines to National Transmission & Despatch Company (NTDC) Limited as per the Energy Purchase Agreement (EPA) signed between the PP & NTDC.

Validation team during site visit confirmed the technical specifications of turbine and generator along with technical specifications of all other equipment used up to power evacuation to NTDC. The project generates renewable electricity (wind power) and exports it to national grid of Pakistan. Hence, it reduces the dependency on fossils fuels which are pre-dominantly used for electricity generation in Pakistan and helps in reduction of greenhouse gas emissions.

As per generation license, the project activity shall generate 151.6 GWh electricity and shall result in emission reductions of 105,255 tCO2e per year of operation and hence a total of 1,052,550 tCO2e emission reductions over the 10-year crediting period.

2 VALIDATION PROCESS

2.1 Method and Criteria

The overall validation, from Contract Review to Validation Report & Opinion, was conducted using Bureau Veritas Certification internal procedures.

In order to ensure transparency, a list of CARs and CLs along with detailed response from project participant is provided in tabular format in Appendix -1 of this report. The validation findings in forms of CARs, CLs and FARs were raised by validation team by referring the guidance notes provided in VCS-PD template which is available on VCS web site. The VCS Project Description template ver 3.3 dated 19th October 2016 provides the detailed instructions on how to complete each section of VCS-PD documents. It shows, in a transparent manner, criteria (requirements) to be followed and clear description on how to complete the VCS-PD document.

Validation team carried out validation activity by referring to requirements of VCS-PD along with VCS Standard ver 3.6 dated 19th October 2016. VCS Standard provides the requirement for developing projects, program and methodologies as well as requirements for validation, monitoring and verification of projects. Validation team also referred to Validation and Verification Manual ver 3.2 dated 19th October 2016. It provides guidance to increase the consistency, quality and transparency of validation and verification of projects under the VCS Program. This is referred in combination with ISO 14064-3 which sets out program-neutral requirements for validation and verification, the means of validation and the results from validating the identified criteria.

2.2 Document Review

The validation team was provided with VCS Project Document along with other relevant documents for supporting the facts and description provided in VCS-PD like commissioning certificate, technical specifications, power evacuation arrangement, PPA etc. The documents were reviewed off-site and on-site assessment of the VCS PD and other related documents was carried out from 26-August-2016 to 27-August-2016. The documents provided by Master Wind Energy Limited (project proponent) including VCS PD and additional background documents related to VCS PD, guidelines for completing VCS PD (VCS Version 3 dated 19th October 2016 v3.3), CDM approved

methodology ACM0002 / Version 17.0; clarifications on validation requirements to be checked by Validation Body were reviewed. To address, Bureau Veritas Certification raised corrective action and clarification requests, MWEL revised the VCS-PD and resubmitted Version 1.5 of VCS Project Description on 18/04/2017. The validation findings presented in this report relate to the project as described in the VCS Project Description (VCS-PD), Version 1.5, dated 18/04/2017. This version of the Project Document is in line with the latest format for the VCS PD and guidance for completion of the VCS PD as provided by VCS Version 3.

2.3 Interviews

On 26/08/2016 & 27/08/2016 Bureau Veritas Certification made a site visit and performed interviews with project stakeholders to confirm selected information and to discuss issues identified in the document review. Representatives of Master Wind Energy Limited and local stakeholders were interviewed (see Appendix-4 at end of the report). The main topics of the interviews are summarized in Table 1.

Table 1: Interview topics

Interviewed organization	Interview topics
Master Energy Limited (the Project Owner)	➢ Project background information and project implementation process. ➢ Project technology, operation and maintenance. ➢ Project approval and implementation status. ➢ Project management and monitoring plan. ➢ Government policies related to the project activity. ➢ Parameters of Investment Analysis
Local Stakeholders	➢ Project background in details ➢ Stakeholder comments ➢ Social and environmental impact of the project
Emergent Ventures International Pte. Ltd. (EVI) (Project Consultant)	➢ Applicability of selected methodology. ➢ Baseline determination. ➢ Project additionality demonstration ➢ Investment analysis ➢ Emission reductions calculation. ➢ Grid Emission Factor Calculation ➢ Emission reduction monitoring plan.

2.4 Site Inspections

The validation team visited the project site on 26/08/2016 & 27/08/2016 as per initial Validation /Verification site visit plan shared with project participant. Bureau Veritas certification as a standard part of validation and verification activity sends the Validation /Verification plan prior to site visit. As per the plan competent team of verifiers is sent to project site for carrying out validation/ verification activity. The validation plan provides detailed validation plan consisting of audit process and timings of the day during which specific events are audited. The plan is made flexible to accommodate site specific requirements during actual audit process. During validation of wind power project by MWEL, the on-site inspection process involved brief opening meeting with site personnel about validation and verification agenda for the day. It was followed by review of documents like VCS-PD, ER sheet, investment analysis and other site specific available documents. The site visit round

was taken for interaction with project participants and power plant operation and maintenance team to understand the monitoring of GHG emission parameters at site. During physical site inspection, validation team visited each WTG installed at the power plant. The power evacuation arrangement was also checked and validated as per description in VCS-PD. The power is evacuated through main and check meters installed at the project site.

2.5 Resolution of Findings

The objective of this phase of the validation is to resolve issues that require further elaboration, research or expansion prior to Bureau Veritas Certification's positive conclusion on the project design.

A Corrective Action Request (CAR) is raised, if one of the following situations occurs:

(a) The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable, verifiable and additional emission reductions;

(b) The applicable VCS and methodology requirements have not been met;

(c) There is a risk that emission reductions cannot be monitored or calculated.

A Clarification Request (CL) is raised, if information is insufficient or not clear enough to determine whether the applicable VCS requirements have been met.

A Forward Action Request (FAR) may also be raised during validation, to identify issues related to project implementation that require review during the first verification of the project activity.

To guarantee the transparency of the validation process, the issues raised, the responses provided by the project participants, the means of validation of such responses and references to any resulting changes in the VCS-PD or supporting annexes are documented in the Validation findings in Appendix 1 and other additional Appendix to this report.

In the following sections, the conclusions of the validation are stated. The findings from the desk review of the original project design documents and the findings from interviews during the follow up visit are described in the Validation Findings in Appendix 1.

The Clarification, Corrective and Forward Action Requests are stated, where applicable, in the following sections. The validation of the Project resulted in 11 CARs i.e. Corrective Action Requests and 16 CLs i.e. Clarification Requests.

The CARs and CLs were closed out based on adequate responses from the Project Participant(s) which meet the applicable requirements. They have been reassessed before their formal acceptance and closure.

2.6 Forward Action Requests

During validation of project activity, no forward action requests were raised since project activity was already implemented and commissioned during course of validation. Hence monitoring plan was in line in VCS-PD as per monitoring practice followed at site.

3 VALIDATION FINDINGS

3.1 Project Details

The project activity is renewable power generation from wind and supply of the power to the grid. The total installed capacity of the project activity is 52.8 MW equipped with 33 WTGs of 1.6 MW installed capacity each. The project is located at Jhimpir, District Thatta, Sindh, Pakistan.

Project activity is renewable energy project and applies CDM methodology ACM0002 / Version 17.0. The project activity is 52.8 MW wind power generation supplying electricity to the national grid i.e. NTDC. Hence the methodology ACM0002 is applicable for the project activity. Validation team confirmed the sectoral scope and project type which is provided on the UNFCCC website http://cdm.unfccc.int/methodologies/PAmethodologies/approved. The sectoral scope for the project activity is 1 (Energy industries (renewable / non renewable sources)). Since the project activity involves electricity generation through renewable source (wind), therefore, validation team confirms sectoral scope and project type mentioned in VCS-PD.

VCS-PD version 1.1 mentioned capacity of each WTG as 1.5 MW using GE Make 1.5 XLE model of WTG, therefore total capacity of the wind farm was reported as 49.5 MW. During validation, it was found that project is actually using GE make 1.6 XLE model of WTG of capacity 1.6 MW each resulting in total capacity of plant as 52.8 MW. Therefore validation team raised CAR to get correct details of project capacity. In response to CAR raised, PP updated the VCS-PD section and corrected the capacity details. Validation team has confirmed that capacity 52.8 MW provided in the VCS-PD is correct in the latest version 1.5 of the VCS-PD. The Project Coordination Agreement between Master Wind Energy Limited and Contractors gives a provision for changing the WTG model from 1.5 XLE to 1.6 XLE which doesn't require any physical change in WTG. Moreover, energy purchase agreement, modified generation license, revised environmental approval confirm that enhancement in capacity from 49.5 MW to 52.8 MW is achieved after obtaining relevant approvals from regulatory agencies.

Validation team during site visit and from the review of the project approvals and generation licence confirms that the project activity is owned and operated by M/s Master Wind Energy Limited. Hence only MWEL is involved as project participant in the project.

As per para 3.7.1 of VCS Standard Version 3.6, the project start date is the date on which the project began generating GHG emission reductions or removals. Project activity achieved commercial operation date (COD) on 14/10/2016. Validation team reviewed the COD letter issued by Central Power Purchasing Agency Limited (CPPA). Hence validation team confirms the project start date as 14/10/2016.

Project participant has selected renewable crediting period with first crediting period of 10 years starting from commissioning date i.e. 14/10/2016 to 13/10/2026. Validation team confirmed the project start date as stated in above paragraph.

The section 1.7 of VCS-PD requires confirming the project scale and estimated emission reductions from the project activity. The project activity is expected to export net power of 151.6 GWh to NTDC

each year and total emission reductions estimated equal to 105,255 tCO_2e per year. Hence, a total of 1,052,550 tCO_2e emission reductions over the 10 year crediting period. Validation team referred to the paragraph 3.9.1 of VCS standard, according to which the project will be categorised under "Project" category if it results in net reduction of estimated emissions less than or equal to 300,000 tonnes of CO_2 per year. Hence scale of the project selected by PP is under "Project" category and accepted by validation team. The emission reductions have been estimated by considering the generation and net export units specified in Generation License for the project activity. The project activity is expected to generate 151.6 GWh energy to National Transmission and Despatch Company (NTDC) Grid for each year. This translates into a gross Plant load factor (PLF) of 32.7%. Hence validation team accepted the net power export figures considered for emission reduction calculation ex-ante. The emission factor is estimated ex-ante by considering the OM and BM values as per Pakistan Energy Year Books. The grid emission factor is calculated as 0.6943 tCO_2/MWh as per tool to calculate the emission factor for an electricity system version 5. Pakistan Energy Year Book 2015 is the latest database available for emission factor calculation at the time of submission of project activity for validation as per emission factor tool. Therefore validation team confirms that the emission reductions estimated by the project participant is correct.

Project location is indicated by PP in section 1.9 of VCS-PD. Validation team checked the project location through onsite validation visit and found that geographical coordinates of two WTGs were incorrectly reported. Therefore validation team raised CAR to get correct micro siting details. In response to CAR raised, PP updated the VCS-PD section 1.9 and corrected the geographical coordinates of two WTGs. Validation team has independently checked the location of wind farm and each WTG using GPS during onsite validation visit and confirmed that geographical coordinates provided in the VCS-PD are correct in the latest version 1.5 of the VCS-PD.

The project activity conforms to all the applicable laws and regulations in Pakistan. Power generation using wind energy is not a legal requirement or a mandatory option. There are state and sectoral policies, framed primarily to encourage wind power projects. These policies have also been drafted realizing the extent of risks involved in the projects and to attract private investments. There is no legal requirement on the choice of a particular technology for power generation. Hence validation team conforms to the fact that project activity complies with all applicable laws, statutory and regulatory framework applicable in host country Pakistan.

The section 1.12.1 requires confirming the Project Ownership for the project activity. Project participant provided the land documents in the favor of PP, Letter of Intent issued by Alternate Energy Development Board (AEDB) Pakistan, EPC Contract for wind farm project, and Generation License issued by NEPRA which is electricity regulating authority of Pakistan. Validation team reviewed all above documents and hence all these documents confirm the ownership of project activity in the name of M/s Master Wind Energy Limited. Moreover validation team reviewed the letter for commercial operation of the project which is provided by the Central Power Purchasing Agency Limited. All these documents have been issued by the competent and applicable government authorities. In addition to this, validation team also physically inspected the arrangement for Joint Meter Readings to be taken by representatives of NTDC and MWEL for sale of power as per energy purchase agreement (EPA). Based on these readings, MWEL raises the invoice to NTDC for the power generated and sold to NTDC from the project activity. Hence it is confirmed that the ownership of the project activity lies with M/s Master Wind Energy Limited. This also fulfills the criteria under section 3.11.1 (3) of VCS Standard.

In sections 1.12.2, 1.12.3 and section 1.12.4 of VCS-PD, project participant confirmed that the project activity has not taken any part in other GHG programme or will not be issuing GHG credits under any other GHG programme during the crediting period. Project participant provided undertaking letter to validation team dated 09/12/2016, stating that the project activity is not registered or seeking any registration under any other GHG program except VCS program.

Section 1.13 of VCS-PD mentioned the additional information relevant to the project activity wherein project participant has confirmed that the project activity is not a grouped project and it is owned by a single project participant. Also project participant has confirmed that there is no commercially sensitive information regarding the project activity which has been excluded from the public version of project description. The project activity is applying the ACM0002 / Version 17.0 methodology as per which leakage emissions are neglected.

VCS-PD also declares that Master Wind Energy Limited does not have any commercial sensitive information which is to be excluded from the public version of VCS-PD. Validation team agrees with all above description and accepted the revised information provided in VCS-PD version 1.5 dated 18/04/2017. Therefore validation team is of the opinion that project activity fulfills the applicable VCS criteria and all requirements.

3.2 Application of Methodology

3.2.1 Title and Reference

Project activity is 52.8 MW wind power generation renewable energy project. Hence applied methodology for the project activity is ACM0002. PP has used latest available version of ACM0002 as per CDM website i.e. version 17.0.

Methodology	**:**	ACM0002
Version	**:**	17.0
Title	**:**	Grid-connected electricity generation from renewable sources
Sectoral Scope	**:**	01 – Energy industries (renewable / non renewable sources)

Methodological Tools:

“Tool for the demonstration and assessment of additionality” / Version 07.0.0

“Tool to calculate the emission factor for an electricity system” / Version 05.0

“Methodological tool – Investment analysis” / Version 06.0

“Methodological tool – Common practice” / Version 03.1

Validation team checked all specified tools above and version of the methodology to be valid on CDM website.

3.2.2 Applicability

The proposed VCS project activity titled "49.5 MW Wind Power Project by Master Wind Energy Limited in Pakistan" uses an approved consolidated methodology ACM0002 / Version 17.0. The steps taken to assess the relevant information contained in the VCS-PD against each applicability condition, as stated in ACM0002 / Version 17.0, are described below.

Applicability Condition-1 (Para 3 of methodology):

This methodology is applicable to grid-connected renewable energy power generation project activities that:

(a) Install a Greenfield power plant;
(b) Involve a capacity addition to (an) existing plant(s);
(c) Involve a retrofit of (an) existing operating plants/units;
(d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or
(e) Involve a replacement of (an) existing plant(s)/unit(s).

The project activity is installation of a new grid connected wind power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfield plant). Through physical inspection of the area, Contract with EPC Contractor, Energy Purchase Agreement with NTDC it was confirmed by validation team that project activity is a Greenfield project involving renewable energy generation for export to national grid. Hence applicability condition is met.

Applicability Condition-2 (Para 4(a) of methodology): *The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit.*

The proposed project activity is an installation of a new grid connected wind power plant and hence this condition is met.

Applicability Condition-3 (Para 4(b) of methodology): *In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.*

The project does not involve any capacity additions, retrofits or replacements but it is a Greenfield project involving wind energy, therefore this condition is not applicable.

Applicability Condition-4 (Para 5 of methodology):

In case of hydro power plants, one of the following conditions shall apply:

(a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or

(b) The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density calculated using equation (3), is greater than 4 W/m2; or

(c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m2; or

(d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (3), is lower than or equal to 4 W/m2, all of the following conditions shall apply:

i. The power density calculated using the total installed capacity of the integrated project, as per equation (4), is greater than 4 W/m2;

ii. Water flow between reservoirs is not used by any other hydro power unit which is not a part of the project activity;

iii. Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m2 shall be:

a. Lower than or equal to 15 MW; and

b. Less than 10 per cent of the total installed capacity of integrated hydro power project.

The project activity is a grid connected wind power project and not a hydro power plant. Therefore, these criteria are not applicable for the project activity.

Applicability Condition-5 (Para 6, 7 & 8 of methodology):

In the case of integrated hydro power projects, project proponent shall:

(a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or

(b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of

specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.

The project activity is a grid connected wind power project and not a hydro power plant. Therefore, these criteria are not relevant to the project activity.

Applicability Condition-6 (Para 9 of methodology):

The methodology is not applicable to:

(a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;

(b) Biomass fired power plants/units.

The project activity is a Greenfield wind farm project and doesn't involve any fossil fuel or biomass, therefore this condition is not applicable to the project activity.

Applicability Condition-7 (Para 10 of methodology): *In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance".*

The project activity is a new grid connected wind power plant and not a retrofits, replacement or capacity additions and therefore this criterion is not applicable to the project activity.

Project participant has clearly demonstrated each of the applicability conditions in line with methodology ACM0002 / version 17.0.

The Validation team, based on above assessment, hereby confirms that the selected methodology ACM0002 / Version 17.0, Tool for the demonstration and assessment of additionality" / Version 07.0.0, and Tool to calculate emission factor for an electricity system, Version 05.0 is previously approved by the CDM Executive Board, and is applicable to the proposed VCS project activity, which, complies with all the relevant applicability conditions therein.

The Validation team hereby confirms that, as a result of the implementation of the project activity, there are no greenhouse gas emissions occurring within the project activity boundary, which are expected to contribute more than 1% of the overall expected average annual emissions reductions, which are not addressed by the applied methodology.

3.2.3 Project Boundary

The project boundary was validated as per applied methodology ACM0002 / Version 17.0 in the following manner:

The spatial extent of the project boundary includes the project wind power generation units and all power plants connected physically to grid that the project wind power generation units are connected to.

The validation team confirmed from its site visit that the project activity comprises of the same elements described in the project boundary diagram in section 2.3 of the VCS-PD.

The baseline for this project activity is the continued generation of power in fossil fuel fired power plants connected to NTDC grid. As the primary emission from such plants is CO_2, the consideration of only CO_2 gas for the baseline emissions is justified. The project activity will also import power from the grid, whenever required. Such electricity imported is accounted for calculation of net quantity of electricity that is exported to the grid i.e. determination of the parameter $EG_{BL,y}$.

Validation team hereby confirms that the project design is sound and the geographical (Jhimpir, District Thatta) and temporal boundaries of the project are clearly defined. The validation team also confirms that the only greenhouse gas relevant to the project activity is CO_2. This gas is addressed by the applied methodology. Based on the above assessment, the validation team hereby confirms that the identified boundary and the selected sources and gases are justified for the project activity.

3.2.4 Baseline Scenario

The steps taken to assess the requirement given in paragraph 3.13 of the VCS Standard are described below:

The project activity includes installation of new renewable (wind) energy generating unit, which deliver power to NTDC grid. The baseline scenario identified by the project participant is "*If the project activity is the installation of a Greenfield power plant, the baseline scenario is electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system"*. This is in accordance with the para 24 of the applied methodology ACM0002 / Version 17.0.

Project participant has used the official published data from Pakistan Energy Year Books on operating and build margin emission factors. The edition of the data used is from Pakistan Energy Year Book 2015 published, and hence was available on the start date of validation i.e. on site visit date 26/08/2016. This data is published by Hydrocarbon Development Institute of Pakistan (HDIP), which has authority for the publication of such data in Pakistan. The project participant has applied weight factors for the OM and BM (75% & 25% respectively) as specified in the tool to arrive at the emission factor for the combined margin. The emission factor is calculated ex-ante. Accordingly, the combined margin emission factor is calculated as 0.6943 tCO_2/MWh.

Validation team agrees to this emission factor since it is based on the official background data published by Hydrocarbon Development Institute of Pakistan (HDIP) under Ministry of Petroleum & Natural Resources. The data published by the HDIP is an official publication of the Government of Pakistan and can definitely be regarded as a reliable and authentic source of data for the determination of grid emission factor. The validation team further notes that the emission factor is not provided by the DNA of the host party, but by a credible and competent authority of the Government of Pakistan.

It is noted that the selected baseline scenario is in line with the selected approved methodology. Validation team therefore confirms that the selected baseline scenario reasonably represents what would happen in the absence of the project activity.

Based on the above assessment, the VVB hereby confirms that:
(a) All the assumptions and data used by the project participants are listed in the VCS-PD, including their references and sources;

(b) All documentation used is relevant for establishing the baseline scenario and correctly quoted and interpreted in the VCS-PD;

(c) Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable;

(d) Relevant national and/or sectoral policies and circumstances are considered and listed in the VCS-PD;

(e) The approved baseline methodology has been correctly applied to identify the most reasonable baseline scenario and the identified baseline scenario reasonably represents what would occur in the absence of the project activity.

3.2.5 *Additionality*

The additionality of the proposed project activity has been demonstrated by applying the “Tool for demonstration and assessment of Additionality” (version 07.0.0) and “Methodological tool for Investment analysis (version 6.0)”. The selected benchmark analysis approach has been considered as appropriate, since the alternative to the project activity is the supply of the electricity from the grid. This is in line with the requirements of the “Methodological tool for Investment analysis (version 6.0)” and thus acceptable to the assessment team.

The above opinion of validation & verification team to the additionality of the proposed project activity is further explicitly explained in the following sections:

As per the approved large scale consolidated methodology “ACM0002 version 17”, the baseline scenario is the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources As per the “Methodological tool for Investment analysis version 6.0”, to assess the additionality of the proposed project, the PP has selected benchmark analysis to demonstrate the additionality.

a) Choice of approach:

Project participant has selected benchmark analysis to demonstrate additionality of the VCS project activity and project participant has demonstrated that the project without carbon revenues is financially not viable. The project generates financial benefits other than carbon revenues in the form of sale of electricity. Therefore, the project participant cannot apply simple cost analysis. The alternative to the project activity is supply of electricity from the grid, which requires no investment by PP, hence Investment comparison analysis is also not appropriate in accordance with "Methodological tool for Investment analysis (version 6.0)". Hence the project developer has appropriately chosen to apply the benchmark analysis method. PP has chosen post tax Equity Internal Rate of Return (IRR) as financial/economic indicator for demonstrating the additionality using benchmark analysis. This is also in line with the requirement of "Methodological tool for Investment analysis (version 6.0)". As per the para 20 of "Methodological tool for Investment analysis (version 6.0), the value for cost of equity is selected from Table-1 of investment analysis tool version 6.0 for the purpose of calculating the benchmark for the benchmark analysis.

b) Benchmark Selection:

The benchmark for the investment analysis of the project activity has been chosen as the expected return on equity. The PP has estimated the expected return on equity from the Appendix "Default values for the expected return on equity" of the "Methodological tool for Investment analysis (version 6.0)". The tool provides expected return on equity for various project types and countries. The project activity falls under host country Pakistan, Group 1 (Sectoral Scope 1 - Energy Industries). Therefore, the real term value for expected return on equity is 19.05%.

As per paragraph 17 of the "Methodological tool for Investment analysis (version 6.0), PP has converted the default benchmark which is in real terms into nominal terms by using the Fisher's equation. The average increase in inflation of Pakistan as determined by World Economic Outlook Database (published by International Monetary Fund (IMF)) is 6.54%. Hence, 26.84% is determined as benchmark for equity IRR.

The inflation forecasts are applicable at the time of decision making. Thus, validation & verification team concludes that PP has appropriately converted real term values into nominal values by applying the Fisher's equation to estimate the benchmark for this project activity.

The validation & verification team has confirmed that all data used to arrive at the benchmark were derived from the sources available to the project participant at the time of the investment decision and hence the assessment team accepted the same. Thus, the benchmark of the project activity is found to be in line with the requirement of Methodological tool for Investment analysis version 6.0.

The investment decision was made on 14/04/2012, at that time version 5.0 of the Guidelines on Investment Analysis was available. The benchmark selected at the time of investment decision was 21.99% (as reported in VCS-PD version 1.1) according to version 5.0 of the guidelines on investment analysis. During validation, VVB noticed that version 5.0 of the guidelines on investment analysis is no more valid, hence raised CAR for applying valid version of the tool. PP applied version 6.0 of the Methodological tool for Investment analysis according to which the benchmark was determined as 26.84%. The investment analysis (including sensitivity analysis) confirms that project was additional even if the benchmark 21.99% is considered.

c) Validity and Applicability of the Input Parameters:

The assessment team assessed the input values and assumptions in the investment analysis by checking the source documents as detailed in table below. It is noted that the values of the input values stated in the Joint VCS-PD are consistent with that of the financial calculation spreadsheet. The lifetime of the WTGs are confirmed to be 20 years in line with the EPC Contract with equipment supplier, and Generation License issued by NEPRA and IRR calculations have been carried out for 20 years. Para 6 of the Methodological tool for Investment analysis (version 6.0) states that it is appropriate that period of financial assessment is performed up to technical lifetime of the project activity for determining the financial viability of the project activity and in cases where assessment period is less than the technical lifetime, a fair value (i.e. salvage value) at the end of assessment period is to be considered. Accordingly the project participant has considered a 10% salvage value at the end of 20 years. Hence the assessment team has accepted the calculations considering it conservative and according to local practice for similar plant and equipment.

As the PP is an equity investor in the project and decision to invest or not to invest was based on the returns generated by the equity investment after paying all the expenses and taxes. Further, sale of electricity is the only source of income of this project activity. Hence, PP has considered post tax Equity IRR as the financial indicator for this project. The assessment team has assessed the revised VCS-PD and found that PP has appropriately identified the financial indicator for investment analysis at the time of decision making.

Also to determine the likelihood of the occurrence of a scenario other than the scenario presented for proposed project activity, a cross-check on the suitability of the assumptions used in the development of the investment analysis has been done. The detailed analysis on the assessment of the input parameters used in the investment analysis has been provided in the following table:

Sr. No.	Parameters	Value	Source	Validation Justification
1.	Net Electricity Exports	151.6 GWh/yr	Generation License	Confirmed from Generation License. This value is conservative.
2.	Total Project Cost	133.333 million USD	Detailed Project Report	Confirmed from Detailed Project Report and cross-verified from EPC Contract
3.	Debt-Equity ratio	75%:25%	Detailed Project Report	Confirmed from Detailed Project Report prepared by financial advisor of MWEL
4.	Foreign-Local loan ratio	50%:50%	Detailed Project Report	Confirmed from Detailed Project Report prepared by financial advisor of MWEL
5.	Foreign loan interest rate	4.301%	Loan Agreement with OPIC as 3-month LIBOR+3.7% (section	Confirmed from Loan Document

			12)+maintenance fee 0.3% (section 19) LIBOR rate LIBOR as per upfront tariff determination.	
6.	Domestic loan interest rate	12.290%	3-month KIBOR+3% as per Loan agreement with a consortium of banks; KIBOR rate as per upfront tariff	Confirmed from Loan Document and Tariff
7.	Salvage value	10%	Assumed at 4.5% depreciation rate	Value is conservatively selected and is according to local practice for similar equipment
8.	Depreciation rate	4.5%	Assumed 4.5% by Straight Line Method	Value is conservatively selected and is according to local practice for similar equipment
9.	Tariff (Year 1-10)	0.1711 USD/kWh	As per tariff determination, Original tariff in PKR, therefore USD exchange rate of 104.75 applied (as in indexed tariff)	Confirmed from Tariff Document
10.	Tariff (Year 11-20)	0.0689 USD/kWh	As per tariff determination, Original tariff in PKR, therefore USD exchange rate of 104.75 applied (as in indexed tariff)	Confirmed from Tariff Document
11.	Annual Fixed O&M Cost	2.465 million USD	O&M Agreement	Confirmed from O&M Agreement
12.	Annual Company Cost	1.333 million USD	company cost of PKR 140 million p.a., as per company budget and financing plan	Value is deemed conservative as it is 1% of the total project cost
13.	Annual insurance cost	0.458 million USD	Quotation from Lockton	Confirmed from quotation from insurance company

The assessment team confirmed that the fair value of the project activity assets at the end of the assessment period has been included as a cash inflow in the final year in the IRR calculation sheet in line with Methodological tool for Investment analysis version 6.0.

The assessment team confirmed that the depreciation value has been deducted for calculating the gross profit and has been added back to the net profit for the purpose of calculating the Equity IRR. Thus, it satisfies the requirement of Methodological tool for Investment analysis version 6.0.

With VCS-PD Version 1.1, the PP had submitted all the spreadsheets used for the investment analysis for the project activity based on the input parameters available from Detailed Project Report at the time of management decision based on version 5.0 of the Guidelines on investment analysis. The VVB found that version 5.0 was not valid at the time of submission of VCS-PD to VVB for validation. Furthermore, it was realized that project was implemented and completed by the time VCS-PD was submitted for validation, hence the assessment team asked PP to use valid version of the Methodological tool for investment analysis and use actual (or more conservative value) for investment analysis. The PP has submitted investment analysis sheet based on conservative values and using valid version 6.0 of the Methodological tool for investment analysis. The sheet was checked and approved by the financial expert. Further, assessment team confirmed that all the assumptions, links and formulae used in the sheet are readable and all cells are viewable and unprotected. The analysis has been presented in a transparent manner in the excel spreadsheet and is reproducible. Further assessment team has checked the correctness of computations carried out and documented by the project participants and found correct. Thus it satisfies the requirements of Methodological tool for Investment analysis.

The assessment team further assessed the correctness of computations and documentation carried out by the project participants. The assessment involves checking the data input taken from Proposal/publically available sources, adoption of correct accounting principle and arithmetical accuracy. The assessment team has checked the documents and ensured that right input has been taken in the project cost and other parameters as described above and projections. The accounting principles adopted with respect to computation of depreciation and tax computation are found to be in order. The arithmetical accuracy is also found to be correct.

The post tax equity IRR calculations and the benchmark analysis calculations were provided in excel spreadsheet and verified by the financial expert. The assumptions used in the calculations were verified by assessment team. Considering the above mentioned input parameters the equity IRR (14.83%) of the project activity without carbon revenue are less than the benchmarks (26.84%).

d) Sensitivity Analysis

The variables, that constitute more than 20% of either total project costs or total project revenues has been subjected to variation of ± 10% and the results of this variation is presented in the VCS-PD and can be reproduced in the associated IRR spread sheet. The assessment team confirms that this variation ±10% is reasonable and appropriate in the context of the proposed project activity circumstances. The PP has appropriately selected the variables such as Tariff rate, Plant Load Factor (PLF), O&M Cost, and Project Cost to conduct the sensitivity analysis.

The results of the sensitivity analysis have been presented in the VCS-PD and in the excel spreadsheet in a reproducible manner. Thus, it satisfies the requirements of Methodological tool for Investment analysis (version 6.0).

Parameter	Variation		
Tariff	0%	10%	-10%
	14.83%	20.42%	9.52%
PLF	0%	10%	-10%
	14.83%	17.66%	12.06%
O&M cost	0%	10%	-10%
	14.83%	14.20%	15.46%
Project cost	0%	10%	-10%
	14.83%	10.80%	20.13%

Considering the above assessment on additionality demonstration, benchmark selection, appropriateness of parameters used and correctness of financial calculations, the assessment team concludes that the project scenario is not economically viable. Hence, assessment team confirms that carbon revenues will alleviate the investment barrier faced by the project activity.

Common Practice Analysis:

The common practice analysis has been carried out step-wise as per Methodological tool "Common Practice" version 03.1. The results of the common practice conclude that project activity is not a common practice within a sector in the applicable geographical area. The VVB confirms that all the applicable steps of the Methodological tool Common Practice are correctly applied, and justifications in the VCS-PD meet the requirements and the identified criteria.

The validation team confirms that information provided in VCS-PD and relevant evidences provided are correct, and hence the project activity is additional.

3.2.6 *Quantification of GHG Emission Reductions and Removals*

The steps taken to assess the requirement outlined in paragraph 3.15 of the VCS Standard are described below:

The baseline emission calculation for the project activity is attributable to the CO_2 Emission that could have been produced by the fossil fuel based power plants in absence of the proposed project activity. Therefore the amount electricity supplied to the national grid will be multiplied by the grid emission factor to calculate the baseline emissions reduced by the proposed project activity.

$$BE_y = EG_{PJ,,y} \times EF_{grid,CMy}$$

BE_y	Baseline emissions in year *y* (tCO_2)
$EG_{PJ,y}$	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr); equal to $EG_{facility,y}$ - Quantity of net electricity generation supplied by the project to the grid in year *y* (MWh)
$EF_{grid,CM,y}$	Combined margin CO_2 emissions factor in year *y* (tCO_2/MWh)

PP has installed back-up diesel generator to provide power supply for wind farm's auxiliary consumption in case of grid failure. It provides back-up power to UPS and its batteries, Direct

Current Panel with batteries, SCADA system, VSAT power supply, Fire protection system of power transformers and MV room, security camera, offices and dormitories.

However as per para 36 of ACM0002 version 17, for all renewable energy power generation project activities, emissions due to the use of fossil fuels for the backup generator can be neglected. Hence project emission has been neglected.

PE_y = 0 tCO_{2e}

No leakage is identified as the project is a wind project:

LE_y = 0 tCO_{2e}

The project activity will generate GHG emission reductions by avoiding CO_2 emissions from electricity generation by fossil fuel power plants of the grid. The annual emission reductions (ER_y) are calculated as:

$ER_y = BE_y - PE_y - LE_y$

Where:

ER_y Emission reductions in year *y* (t CO2e/yr)
BE_y Baseline emissions in year *y* (t CO2e/yr)
PE_y Project emissions in year *y* (t CO2e/yr)
LE_y Leakage emissions in year *y* (t CO2e/yr)

ER_y= 105,255 – 0 – 0 = 105,255 tCO_{2e}/year

Validation team assessed the calculations of estimated VCUs as provided by project participant in a spreadsheet. The assumptions in this spreadsheet were validated as follows -

Parameter, Value	Source of Information	Validation Justification
Net Electricity Export to Grid 151.6 GWh	Generation License for the project activity	The validation team accepts the estimates for the net annual electricity export to grid. As verified from the Generation License. The Generation License is issued by National Electric Power Regulatory Authority (NEPRA).
Baseline EF, 0.6943 tCO2/MWh for NTDC grid	Pakistan Energy Year Books	Pakistan Energy Year Books database is an official source of data and hence accepted.

The estimated annual average of emission reductions of approximately 105,255 tCO2e over the 10 year renewable crediting period of emission reductions represents a reasonable estimation using the assumptions given by the project activity.

Based on the above assessment, the VVB hereby confirms that:
(a) All assumptions and data used by the project participants are listed in the VCS-PD, including their references and sources;

(b) All documentation used by project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the revised VCS-PD;

(c) All values used in the VCS-PD are considered reasonable in the context of the proposed project activity;

(d) The baseline methodology has been applied correctly to calculate project emissions, baseline emissions, leakage, and emission reductions;

(e) All estimates of the baseline emissions can be replicated using the data and parameter values provided in the VCS-PD.

3.2.7 Methodology Deviations

There are no methodology deviations. All required monitoring parameters are monitored as indicated in methodology and applicable to project activity.

3.2.8 Monitoring Plan

The project monitors the parameters in accordance with applied methodology ACM0002 / Version 17.0. The steps taken to assess whether the monitoring arrangements described in the monitoring plan are feasible within the project design are described below:

Requirement as per the monitoring methodology	Included in the monitoring plan appropriate to type of project activity
Quantity of net electricity supplied to the grid in year y	This parameter has been included by the project participant in section 4.2 of revised VCS-PD as **"$EG_{PJ,y}$"**. It is calculated from two parameters i.e. gross export and import from grid. Also other losses are deducted as explained in above sections. The measurement methods and procedure described are in accordance with applied methodology i.e. quantity of net electricity supplied to grid will be continuously measured by the energy meters and recorded monthly (i.e. Net export is calculated from measured values of "EG_{Export}" – "EG_{Import}"). The joint meter readings are taken for every month by representative of power purchaser (NTDC) and

	MWEL based on which MWEL raise the invoice for sale of electricity. The monitoring plan includes requirements and procedures for meter testing and calibration.

In revised VCS-PD, a cross checking mechanism for net exported power to the grid is included. PP has made provision to cross check exported power from the electricity sales invoices /receipts. Hence validation team confirms that revised VCS-PD provides the monitoring of net electricity export to grid by main and check meters. Further the cross checking mechanism will ensure the reliability of data.

The Validation team hereby confirms that the project participant is able to implement the monitoring plan in accordance with the applied monitoring methodology. The validation team also interacted with the operating team of project participant and found that they are capable of operating the wind power plant.

The validation team therefore is of the opinion that the project participant is capable of implementing the monitoring plan in the context of the project activity.

3.3 Non-Permanence Risk Analysis

Not Applicable in case of project activity.

4 SAFEGUARDS

4.1 No Net Harm

The validation team interacted with local stakeholders during onsite validation visit, reviewed Environmental Impact Assessment (EIA) Report, records of the periodical stakeholders' consultation meetings, and relevant approvals from government agencies that there is no negative impact from proposed VCS project activity.

4.2 Environmental Impact

As per Environmental Impact Assessment (EIA) Report dated October 2010, and revised in 2016, there will be no impact on the flora & fauna of the area since there is no established grazing land, national parks, protected wild life zones or bird sanctuary present near the wind farm. The site has also been examined from Noise, Shadow Flickering and Visualisation Impact Angle in the EIA report. The results show that there would be no adverse impact of Noise, Shadow Flickering and visualization on the Jhimpir dwellings. The land is also free from resettlement issues since it is the property of Government of Sindh and is allocated to Alternate energy Development Board (AEDB) for wind power generation and AEDB has leased the land to Master Wind Energy Limited.

The project participant has also complied with the statutory requirements in respect of obtaining the necessary clearances from the regulatory authorities. Based on the conducted EIA, the PP has

also obtained environmental approvals dated 27/11/2010 and 15/07/2016 from Sindh Environmental Protection Agency.

The validation team has assessed that project activity does not involve any negative environmental impacts, as the equipment used for the project activity generates electricity using wind power which is one of the cleanest sources of energy.

4.3 Local Stakeholder Consultation

Validation team during the site visit on 26/08/2016 interacted with some of the stakeholders who were present during actual stakeholders meeting which was carried out by Master Wind Energy Limited on 27/04/2010 and were conducted periodically till commissioning of the project activity. The meeting was carried out by PP at Project site, Jhimpir, District Thatta. Announcement of the stakeholders' consultation meeting was made in the on public notice boards and direct letters to potential stakeholders. Following stakeholders were identified by PP and invited for meeting:

1. Representatives from Government Authorities
2. Local villagers
3. Contractors
4. MWEL employees

Validation team has checked the invitation advertisement sent to the identified stakeholders for attending the stakeholders meeting. Comments were invited from the attendees during the question and answer session and all their doubts were cleared by the team of MWEL.

Validation team also checked the minutes of the stakeholders meeting, and photos of stakeholder's meeting and attendance sheet wherein all stakeholders have signed providing the names, designation or occupation along with residence location.

The stakeholders consulted by validation team expressed concurrence towards setting up of the project activity and confirmed the fact that there was no major displacement of population required for implementing the project activity. It was also noted that the project activity actually involved villagers during construction activities and provided employment opportunities for both skilled and unskilled labour.

The interviewed stakeholders also mentioned that the project has generated a positive impact on the environment as it uses renewable energy for power generation. Overall, validation team could ascertain that all stakeholders were in agreement with positive impacts of project activity in surrounding area and on social wellbeing of stakeholders within project area.

4.4 Public Comments

The first VCS-PD version 1.1 was uploaded on VCS project database website on 16/08/2016. No public comments were received.

5 VALIDATION CONCLUSION

Bureau Veritas Certification has performed a validation of the "49.5 MW Wind Power Project by Master Wind Energy Limited in Pakistan". The validation was performed on the basis of Verified Carbon Standard VCS Version 3 criteria and also on the criteria given to provide for consistent project operations, monitoring and reporting. For validation process, validation team referred to guidelines for completing VCS PD as given in VCS-PD template version 3.3 dated 19th October 2016. Along with this the requirements of VCS Standard, version 3.6, dated 19th October 2016 and Validation and Verification Manual, ver. 3.2 dated 19th October 2016 were followed which gives guidance to validation and verification bodies for carrying out validation and verification activities.

The validation consisted of the following three phases: i) a desk review of the project design and the baseline and monitoring plan; ii) follow-up interviews with project stakeholders; iii) the resolution of outstanding issues and the issuance of the final validation report and opinion.

The project correctly applies CDM approved consolidated methodology ACM0002 / Version 17.0 and uses the latest tool for the demonstration and assessment of the additionality. The additionality of project was demonstrated by using investment analysis.

By synthetic description of the project, the project is likely to result in reductions of GHG emissions partially displacing the electricity that would have been generated using fossil fuels. The investment analysis demonstrates that the proposed project activity is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

Given that the project is implemented and maintained as designed, the project is likely to achieve the estimated annual emission reductions of 105,255 tCO_2e during the ten years of its renewable crediting period amount of emission reductions.

The review of the VCS-PD, version 1.5 and the subsequent follow-up interviews have provided Bureau Veritas Certification with sufficient evidence to determine the fulfilment of stated criteria. In our opinion, the project correctly applies and meets the relevant VCS requirements and the relevant host country criteria. Bureau Veritas Certification thus requests registration of "49.5 MW Wind Power Project by Master Wind Energy Limited in Pakistan" as VCS project activity.

Mr. Sanjay Patankar

Internal Technical Reviewer

20/05/2017

Mr. Imran Altaf Bhatti

Team Leader

20/05/2017

APPENDIX 1: VALIDATION FINDINGS (Resolution of Corrective/ Forward Actions/ Clarification Requests)

Draft report clarifications and corrective action requests by validation team	Summary of project owner response	Validation team conclusion
CAR 1 At least once in the VCS Project Description (PD), each and every abbreviation has to be explained. This is applicable for all abbreviations used in the VCS PD.	The abbreviations are explained in the revised version of PD.	The PP has revised VCS-PD and all the abbreviations are explained at least once in the VCS-PD. Hence, CAR 1 has been closed by the validation team.
CAR 2 VCS PD mentions capacity of project as 49.5 MW (33 WTGs of capacity 1.5 MW each) whereas during onsite validation visit, it was revealed that capacity of the project is 52.8 MW (33 WTGs of capacity 1.6 MW each). Please correct the capacity rating of WTGs and Project in the VCS PD.	The PD, IRR and ER sheet has been revised for the enhanced capacity of 52.8 MW (33 WTGs of capacity 1.6MW each). The NEPRA generation license has been provided in support of enhanced capacity.	The capacity of the project is corrected to 52.8 MW (33 WTGs of capacity 1.6 MW each). The Project Coordination Agreement between Master Wind Energy Limited and Contractors gives a provision for changing the WTG model from 1.5 XLE to 1.6 XLE which doesn't require any physical change in WTG. Nameplate of the WTGsm Energy purchase agreement, modified generation license, revised environmental approval confirm that enhancement in capacity from 49.5 MW to 52.8 MW is achieved. The PP has revised VCS-PD. Hence, CAR 2 has been closed.

CAR 3 Please mention in the VCS PD information about Diesel Genset and its purpose/utilization.	The project activity is a wind power based electricity generation activity. The Diesel generator is not part of the project activity and it will be used as a back-up to meet the auxiliary power demand in case grid is not available.	The response provided by the PP has been accepted by the validation team as the applied methodology, for renewable energy projects, allows neglecting back-up power generation facility from project emission calculations. The PP has provided justification for the same in the VCS-PD. Hence, CAR 3 has been closed.
CAR 4 §1.5 and §2.5 of VCS PD refer to older version 3.4 of VCS Standard. Please apply latest available version.	The section 1.5 and 2.5 has been updated for latest VCS standard version 3.5.	The latest availble version 3.6 of VCS standard is referred in the revised VCS-PD. Hence, CAR 4 has been closed.
CAR 5 During onsite validation visit, it was found that geographical coordinates of WTG No. 3 and WTG No. 13 mentioned in §1.9 of VCS PD are incorrect. Please correct geographical coordinates.	The geographical coordinates of WTG No. 3 and WTG No. 13 are corrected in the revised PD for their location.	Validation team has independently checked the location of wind farm and each WTG using GPS during onsite validation visit and confirmed that geographical coordinates provided in the revised VCS-PD are correct. Hence, CAR 5 has been closed.

CAR 6 §1.11 of VCS PD must demonstrate compliance of the project with all and any relevant local, regional and national laws, statutes and regulatory frameworks. a) Please provide letter / approval from AEDB for 52.8 MW capacity of the project and mention its reference. b) Mention modified generation license by NEPRA. c) Please demonstrate compliance to Environmental Protection Agency. Please provide copy of Letter Of Support (LOS) from AEDB.	AEDB does not provide any approval in matters relating to capacity increase. However, Letter of Intent issued for 50 MW wind power project by AEDB is attached with this response. In addition, following documents are submitted: 1. Copy of modified Generation License is attached. 2. Approval on IEE by SEPA is attached. The section 1.1 of the PD has been updated for the above mentioned approvals. Copy of LOS is attached	Energy purchase agreement, modified generation license, revised environmental approval confirm that enhancement in capacity from 49.5 MW to 52.8 MW is achieved after obtaining relevant approvals from regulatory agencies. Letter of Support from AEDB was also achieved. Hence, CAR 6 has been closed.
CAR 7 It was noted that version 17 of the applied methodology was available after May 13, 2016. However, VCS PD submitted by the PP refers to an earlier version 16 of the methodology which is not applicable for new submissions. Please apply valid (most recent) version of the methodology ACM0002.	The PD has been updated for the most recent version of the applied methodology.	The latest availble version 17.0 of CDM approved Methodology ACM0002 is used in the revised VCS-PD. Hence, CAR 7 has been closed.

CAR 8 It was noted that version 5 of the applied tool to calculate the emission factor of an electricity system was available after November 27, 2015. However, VCS PD submitted by the PP refers to an earlier version 4 of the tool which is not applicable for new submissions. Please apply valid (most recent) version of the tool. 1. According to §36, Step 3 of the tool; for simple OM method it should be demonstrated that LMCR share is less than 50% in recent 5 years. PP has not demonstrated the same using recent 5 years data. PP has not used recent 5 years data. Furthermore, approach for calculating $Share_{LMCR}$, approach and formula as per §37 of the tool is not mentioned in PD. 2. For calculation of OM and BM, §39(a) of the tool implies to use most recent data available at the time of submission of the PD to VVB. PP has not used most recent data for calculation of OM and BM.	The PD has been updated for the most recent version of the tool to calculate the emission factor of an electricity system. 1. The calculation of $Share_{LMCR}$ is now done for last five years. It is less than 50%. Approach adopted has been described too in revised PD. 2. Most recent available data for the years 2012-13, 2013-14 & 2014-15 has been used to update OM & BM calculations.	The latest availble version 05.0 of tool to calculate emission factor for an electricity system is used in the revised VCS-PD. The calcuation of $Share_{LMCR}$ is now done for 5 years most recent data prior to submission of VCS-PD for validation. Similarly most recent available data is used for OM & BM calculation. The data source is Pakistan Energy Year Books, which is an official source of data and hence accepted. Hence, CAR 8 has been closed.
CAR 9 §2.5 of VCS PD applies version 2 of the guidelines on additionality of first-of-its-kind project activities whereas latest version 3 is availble since May 28, 2015. Please apply latest availble version of guidance / tool and demonstrate its compliance to each applicable step / para in the VCS PD.	The PD has been updated for the most recent version of the Methodological tool- Additionality of first-of-its kind project activities.	The latest availble version 3.0 of Methodological tool for additionality of first-of-its-kind project activities is used in the revised VCS-PD. Hence, CAR 9 has been closed.

CAR 10 §2.5 of VCS PD applies version 5 of the guidelines on the assessment of investment analysis whereas latest version 6 is availble since July 24, 2015. Please apply latest availble version of investment analysis and demonstrate its compliance to each applicable step / para in the VCS PD.	The PD has been updated for the most recent version of the Methodological tool-Investment Analysis.	The valid version 06.0 of Methodological tool for investment analysis is used in the revised VCS-PD. Requests for registration can be submitted until 01 Jul 2017 while using this version of the tool. Hence, CAR 10 has been closed.
CAR 11 Common practice analysis is conducted in PD using outdated guidelines on common practice instead of latest available tool on common practice analysis. 1. Please use latest tool on common practice analysis. 2. Correct references in PD according to latest available tool on common practice. 3. Applicable output range considered in common practice analysis is based on value 49.5 MW instead of 52.8 MW capacity of project. 4. Please see CL 7 regarding Commercial Operation date of FFC Wind Project.	1. Common Practice Tool Version 3.1 has been applied now to conudct common practice analysis. 2. Correct references in PD have been used according to latest Common Practice Tool version 3.1 3. Common practice analysis has been done for the revised capapcity 52.8 MW. 4. Please see reponse in CL 7.	The latest availble version 3.1 of Methodological tool for common practice is used in the revised VCS-PD. Applicable output range is now calculated using updated capacity (52.8 MW) value. Commerical Operation date of the FFC Wind Project has been corrected in the revised VCS-PD. References to the common practice tool are correctly made in the revsied VCS-PD. Hence, CAR 11 has been closed.

CL 1 §1.1 of VCS PD mentions that the project shall generate 131.49 GWh of power per annum. Please provide supporting document for this value. Please provide calculation and supporting document of 138.858 GWh/yr net electricity generation.	The page 83 and 171 of the feasibility report provides the generation details. The generation details mentioned in the feasibility report is for 50MW capacity and it is used to calculate the generation details for the enhanced capacity of 52.8MW. The net generation from the project is now from WRA carried out by Lahmayer. Accordingly, P90 values are considered at 150.999 million units per annum.	The PP has used 151.6 GWh/yr value of net electriciy exports in the revised VCS-PD, ER calculation sheet, and investment analysis sheet. This value is substantiated by generation license from NEPRA, and is most conservative value for investment analysis. As the value is conservative, hence it is acceptable for validation team. CL 1 has been closed.
CL 2 §1.1, §1.8, and §1.12.1 of VCS PD mentions date of EPC Contract as 5th July 2014 whereas the date of Contract Agreement mentioned on EPC Contract Document provided by MWEL is 1st February 2015. Please clarify.	The PD has been revised for the correct EPC contract dated 1st Feb 2015.	From EPC Contract between MWEL and technology supplier, it's evident that correct date of Contarct is 01/02/2015. The VCS-PD is revised accordingly. Hence, CL 2 has been closed.
CL 3 Please provide supporting documents from supplier / Contract Documents for technical details of project activity mentioned in §1.8 of VCS PD. A weblink to general technical brochure is not sufficient.	The technical details of the project activity has been taken from the Modified generation license issued by NEPRA. The necesssary correctionas have been made in the PD and a copy of the same generaation licese is provided to DOE.	The technical details of WTG are confirmed throgh Modiefied Generation License issued by NEPRA. Hence, CL 3 has been closed.

CL 4 §1.8 of VCS PD, footnote 3 refers to page 83 of Feasibility Study Report to verify the value 131494.87 MWh annual power generation. However, same this value is not mentioned on the referred page. Please provide supporting document for annual power generation and plant load factor mentioned in VCS PD. Please provide calculation and supporting document of 138.858 GWh/yr net electricity generation.	The referred page 83 of the feasibility report provides the generation details. The page 171 also refers the same generation details. The net generation from the project is now from WRA carried out by Lahmayer. Accordingly, P90 values are considered at 150.999 million units per annum.	The PP has used 151.6 GWh/yr value of net electriciy exports in the revised VCS-PD, ER calculation sheet, and investment analysis sheet. This value is substantiated by generation license from NEPRA, and is most conservative value for investment analysis. As the value is conservative, hence it is acceptable for validation team. CL 4 has been closed.
CL 5 It is reckoned that the proposed VCS Project intended to be registered as a CDM project activity as prior consideration of the CDM document was received by UNFCCC Secretariat on November 10, 2014. Please clarify status of participation in CDM. From authorized personnel of MWEL, please provide a declaration that project activity has not been registered or is seeking any registration under any other GHG programs.	The project was initially conceptualized as a CDM project and the project developer had intimated their intention to seek CDM registration through “Prior Consideration of CDM form”. However, due to downfall in the CDM market, the project developer finally decided to go ahead with VCS. No further step has been taken in order to register the project under CDM. Copy of declaration is enclosed.	The validation team has found that this project was not hosted for CDM GSP after its submission for prior consideration of CDM on 10/11/2014. An undertaking from Managing Director of MWEL is also obtained that the project activity is not registered or seeking registration in any other GHG program. Hence, CL 5 has been closed.

CL 6 Please provide grid emission factor calculation sheet as per valid tool to calculate the emission factor for an electricity system. Please provide all supporting documents for the parameters used in the calculation. The provided grid emission factor calculation sheet refers to older version 4 of the Tool to calculate the emission factor for an electricity system. Most recent data is not used as pointed out in CAR8 above. Pakistan Energy Yearbook are not provided.	The calculation sheet for grid emission factor calculation is attached with this response. The sheet includes all references (weblinks and documents details) for the input parameters used for calculation. Grid emission factor is now estimated using latest version 5 of the Tool to calculate the emission factor for an electricity system. Most recent data till 2014-15 has been used now. Pakistan Energy Yearbook for the 2013-14 and 2014-15 are also provided.	The grid emission factor calculation sheet according to latest availble version 05.0 of tool to calculate emission factor for an electricity system has been submitted. The data source is Pakistan Energy Year Books, which is an official source of data and hence accepted. Hence, CL 6 is closed.
CL 7 Please provide supporting documents for commercial operation dates of FFC Energy Limited and Zorlu Enerji Pakistan Limited mentioned in §2.5 of VCS PD. 1. The date 7/11/2012 is not consistent with registered VCS-PD of FFCEL. 2. Zorlu Enerji is not a VCS registered project.	The reference has been provided in the revised PD. 1. The COD for FFCEL has been now corrected to 16-May-2013 as given in registered VCS PD. 2. Zorlu Enerji is a CDM registered project. UNFCCC Ref 9849.	Correct commercial operation dates of FFC Energy Limited and Zorlu Enerji Pakistan Limited projects are now mentioned in the revsied VCS-PD. These projects are registered VCS and CDM projects, respectively. The dates can be verified from registered Project Documents availabel at VCS and CDM websites. Hence, CL 7 is closed.

CL 8 Please provide supporting documents for each input parameter to investment analysis (IRR calculation) sheet. Mention specific reference of each parameter in the IRR calculation sheet.	The following documents are provided in support of input parameters considered for IRR calculation: 1. Feasibility study for 50MW Wind Power Project December 2008. The revised IRR sheet includes references for all input parameters.	Feasibility study report, and detailed project report were provided to substantiate date sources to investment analysis done at the time of investment decision. Validation team realized that project was implemented and completed by the time VCS-PD was submitted for validation, hence the assessment team asked PP to use actual (or more conservative value) for investment analysis. Since conservative values are used in the latest sheet for investment analysis, hence, CL 8 is closed.

CL 9 Please provide document related to investment decision in the project activity. There is a significant time gap in issuance of the Feasibility Study Report (December 2008), MWEL BoD meeting reagarding investment decision (April 2012, and EPC Contract Signing (February 2015). As per §11 of Investment Analysis tool, please justify that parameters from the feasibility study were valid for investment analysis at the time of investment decision.	The following documents are provided in support to investment decision in the project activity: 1. Feasibility study for 50MW Wind Power Project December 2008. In addition, the project was initially conceptualized as a CDM project and the project developer had intimated their intention to seek CDM registration through "Prior Consideration of CDM form". However, due to downfall in the CDM market, the project developer finally decided to go ahead with VCS. The prior consideration of CDM also supports the project developer's intention to invest in the project. In this regard, the following documents are provided: 1. Copy of email sent to UNFCCC 2. Acknowledgement recieved from UNFCCC The revised IRR is now submitted with numbers from DPR and other documents of a date close to decision date of BoD.	Feasibility study report, and detailed project report were provided to substantiate date sources to investment analysis done at the time of investment decision. Validation team realized that project was implemented and completed by the time VCS-PD was submitted for validation, hence the assessment team asked PP to use actual (or more conservative value) for investment analysis. Since conservative values are used in the latest sheet for investment analysis, hence, CL 9 is closed.
CL 10 Please provide energy purchase agreement with enhanced capacity of 52.8 MW. Please provide the document. Please also provide evidence of CoD as expected date of CoD was 15/10/2016.	Amendment to the EPA is yet to be executed. However, the ***NEPRA generation license*** specifies the enhanced project capacity. Amended Generation License Attached. Notification of achievement of CoD Attached.	The PP has provided letter from NTDC to CPPA which confirms approval of enhancement of capacity to 52.8 MW. Moreover, modified generation license for 52.8 MW capacity is also issued by NEPRA. Commercial operation date is 14/10/2016 as informed by CPPA through its letter. Hence, CL 10 is closed.

CL 11 Please clarify if the tariff rate 0.1291 USD/kWh is subject to any escalation. Provide supporting document / justification.	The escalation on tariff rate is not applicable as it is based on a cost compensating mechanism and the tariff is only indexed to the extent that the costs increase. Therefore it should have no impact on the financial feasibility of the project. Upfront Tariff document from NEPRA is atatched.	From Tariff document notified by NEPRA, it is confirmed that tariff is based on cost compensating mechanism and it shall not have affect on the financial feasibility of the project. Sensiticity analysis ±10% is also performed on tariff rate to confirm that additionality of the project remains intact within this range. As it doesn't impacy financial viability of the project, hence, CL 11 has been closed.
CL 12 As per §7 of Investment Analysis tool, please justify that annual depreciation rate of 5% on straight line method is in accordance with local practice, or international best practice for similar projects. Please provide supporting document that 4.5% depreciation by SLM is according to prevailing practice / law of Master Group or host country.	The depreciation rate has been considered at 4.5% SLM. Depreciation has no bearing on the results of equity IRR. Moreover, for a salvage value of 10%, depreciation rate would be 4.5%.	Technical lifetime of the plant as mentioned in EPC Contarct and generation license is 20 years, for which VVB accepts that 4.5% depreciation by SLM is according to local practice for similar plant and equipment installed in the region. The value 4.5% per annum is conservative and doesn't affect additionality. Hence, CL 12 has been closed.

CL 13 As per §7 of Investment Analysis tool, fair value shall be included as a cash inflow in the final year. Please justify in accordance with local laws and practice of PP that why fair value is taken as zero in the IRR calculation sheet. Please provide supporting document that 5% salvage value of such plant & equipment is according to prevailing practice / law of Master Group or host country.	Fair value has been now added at 5%. Salvage value has been considered as a conservative approach even though PP does not see any recovery after 20 years. More so, PP might be incurring expenses in dismantling the set up. There is no reference available from similar projects registered under CDM or VCS, therefore a reference from a most recent wind project registered in India is made (UNFCCC 10319) where 10% salvage value has been considered. PP in this case also has now considered 10% salvage value as a conservative measure.	Technical lifetime of the plant as mentioned in EPC Contarct and generation license is 20 years, for which VVB accepts that 10% salvage value using annual depreciation of 4.5% (a conservative value) is according to local practice for similar plant and equipment installed in the region. The fair value 10% is conservative and doesn't affect additionality. Hence, CL 13 has been closed.
CL 14 Please substantiate that following input parameters to the IRR analysis are conservative. 1. Fixed O&M Cost 0.63 Million USD/year 2. Variable O&M Cost 0.63 Million USD/year 3. Escalation in O&M Cost 6.67% per year 4. Annual insurance cost as 1% of Project Cost	O&M cost is USD 2.465 million per year based on the O&M agreement signed. Copy is attached. The agreement is for 8 years. It is realistic to assume escalation however for conservative estimates, same cost has been carried forward for the life time of project. Insurance cost is based on quotation received from M/s Lockton. Copy is attached.	The validation team has assessed O&M Agreement, and quotation from insurance company to substantiate the values in investment analysis sheet. The validation team has assessed that conservative parameters are used in the investment analysis. Hence CL 14 is closed.

CL 15 Please provide actual documents of following parameters. 1. Total project cost 2. Equity and debt (loan) amount in project cost 3. Interest rate for loan 4. Loan document with detail 5. Tax rate of 0% (import duties)	1. Project cost is USD 133.33 million 2. Equity:Debt struture 25:75 3. Interest rate: Foreign debt – LIBOR+3.7%+0.3% & Domestic debt – KIBOR+3% 4. Loan documents are attached for reference. 5. Consering tax rate at 0% is anyway conservative.	The validation team has assessed EPC Contract, Loan Document, Detailed Project Report by Financial Advisor to substantiate the values in investment analysis sheet. The validation team has assessed that conservative parameters are used in the investment analysis. Hence CL 15 is closed.
CL 16 Plant load factor value in IRR analysis sheet is not consistent with Feasibility Study. Please justify with calculation. Please preform sensitivity analysis on the value of net electricity generation 151.60 GWh/yr mentioned in Schedule-II of Generation License.	The net generation from the project is now from WRA carried out by Lahmayer. Accordingly, P90 values are considered at 150.999 million units per annum. Sensitivity analysis is now carried out on value of net electricity generation 151.60 GWh/annum of Schedule II of Generation License.	The PP has used 151.6 GWh/yr value of net electriciy exports in the revised VCS-PD, ER calculation sheet, and investment analysis sheet. This value is substantiated by generation license from NEPRA, and is most conservative value for investment analysis. As the value is conservative and sensitivity analysis is also performed on this valye, hence it is acceptable for validation team. CL 16 has been closed.

APPENDIX 2: LIST OF DOCUMENTS REVIEWED

Sr. No.	Documents
/1/	VCS Project Description (VCS-PD), Version 1.5, dated 18/04/2017
/2/	Emission Reduction Calculation Sheet
/3/	Emission Factor Calculation Sheet
/4/	Investment Analysis Sheet as per actual & conservative parameters
/5/	Investment Analysis Sheet as per Feasibility Study
/6/	Pakistan Energy Yearbook 2011
/7/	Pakistan Energy Yearbook 2012
/8/	Pakistan Energy Yearbook 2013
/9/	Pakistan Energy Yearbook 2014
/10/	Pakistan Energy Yearbook 2015
/11/	Certificate of incorporation of Master Wind Energy Limited issued by SECP, dated 03/05/2005
/12/	Letter of Allocation of Land by Alternate Energy Development Board (AEDB), dated 18/04/2008 along with its extension letter dated 06/04/2011
/13/	Site Sub-Lease Deed between Alternate Energy Development Board and MWEL, dated 23/01/2015
/14/	Letter of Intent issued by Alternate Energy Development Board (AEDB), dated 20/12/2006
/15/	Letter of Support issued by Alternate Energy Development Board (AEDB), dated 08/08/2012
/16/	Feasibility Study Report prepared by ME Consult
/17/	Detailed Project Report prepared by Financial Advisor “Bridge Factor”
/18/	Wind Resource Assessment and Energy Yield Evaluation Report for Master Wind Energy Limited prepared by Lahmeyer International
/19/	Final approval of Feasibility Study by Alternate Energy Development Board, dated 14/02/2012
/20/	Drawing of coordinates of WTG (micro siting)

/21/	Electrical Single Line Diagram
/22/	Environmental Impact Assessment (EIA) Report Draft based on 50 MW Capacity, October 2010
/23/	Approval of 50 MW Capacity EIA by Environment Protection Agency, Government of Sindh, dated 27/11/2010
/24/	Environmental Impact Assessment (EIA) Report Draft based on 52.8 MW Capacity, 2016
/25/	Approval of 52.8 MW Capacity EIA by Environment Protection Agency, Government of Sindh, dated 15/07/2016
/26/	Photographs and feedback forms of periodical meetings conducted with Stakeholders
/27/	Offshore Supply Contract between Master Wind Energy Limited and PowerChina Huadong Engineering Corporation Limited dated 01/02/2015
/28/	Construction Contract between Master Wind Energy Limited and Zhejiang Huadong Engineering Science & Technology Development Company Limited dated 01/02/2015
/29/	O&M Contract between Master Wind Energy Limited and Zhejiang Huadong Engineering Science & Technology Development Company Limited dated 01/02/2015
/30/	Project Coordination Agreement between Master Wind Energy Limited, PowerChina Huadong Engineering Corporation Limited, and Zhejiang Huadong Engineering Science & Technology Development Company Limited dated 01/02/2015
/31/	Email dated 01/07/2016 from MWEL to Contractor as notice for conversion from WTG Model 1.5XLE to 1.6XLE
/32/	Email dated 05/07/2016 from Contractor to MWEL as Confirmation for conversion from WTG Model 1.5XLE to 1.6XLE
/33/	Site Request for Layout Form by Contractor along with photographs supporting date of start of civil works, dated 26/08/2015
/34/	Decision of NERPA for upfront tariff, dated 23/04/2014
/35/	Tariff Notification of Master Wind Energy Limited, dated 10/11/2014
/36/	Generation License modified for 52.8 MW capacity issued by National Electric Power Regulatory Authority (NEPRA), dated 28/06/2016.
/37/	Energy Purchase Agreement between MWEL and National Transmission and Despatch Company (NTDC), dated 16/01/2015
/38/	Approval by NTDC for capacity enhancement to 52.8 MW, Letter dated 18/02/2016
/39/	Project Investment Decision Document as Extract of Minutes of Meeting of Board of Directors of Master Wind Energy Limited dated 12/04/2012

/40/	Certificate of readiness for energization, dated 21/07/2016
/41/	Notification of Commercial Operation Date (COD) by Central Power Purchasing Agency Limited (CPPA), Letter dated 27/10/2016
/42/	Undertaking from Managing Director of MWEL that project is not seeking registration under any other GHG program, dated 09/12/2016
/43/	Operational Phase Insurance Program quotation from Lockton Limited dated 17/09/2014
/44/	Technical Description of WTGs

APPENDIX 3: LIST OF DOCUMENTS AVAILABLE PUBLICLY

Reference	Documents
VCS Ver.3	VCS Standard dated 19th October 2016, v3.6
VCS Ver.3	VCS Project Description Template v3.3, dated 19th October 2016
VCS Ver.3	Validation and Verification Manual v3.2 dated 19th October 2016
VCS Ver.3	Registration and Issuance Process version 3.7 dated 19th October 2016
Meth	ACM0002 / Version 17.0 under UNFCCC CDM
Tools	Tool for the demonstration and assessment of the additionality / Version 07.0.0 Tools to calculate emission factor for an electricity system / Version 05.0 Methodological tool for investment analysis / Version 06.0

APPENDIX 4: PERSONS INTERVIEWED

List of persons interviewed during the validation or persons that contributed with other information that are not included in the documents listed above.

/1/	Mr. Syed Shahzad Ali, Manager, Master Wind Energy Limited.
/2/	Mr. Rizwan Arshad, Site Engineer, Master Wind Energy Limited.
/3/	Mr. Muhammad Babar, Electrical Engineer, Master Wind Energy Limited.
/4/	Mr. Abdul Hameed, Local Villager
/5/	Mr. Noor Muhammad, Local Villager
/6/	Mr. Nizam Din, Local Villager
/7/	Mr. Mushtaq, Local Villager
/8/	Mr. Mushahid Ali, Local Villager
/9/	Mr. Aasan, Local Villager
/10/	Mr. Abbas, Local Villager
/11/	Mr. Aijaz Ali Barohi, Local Villager

APPENDIX 5: CURRICULA VITAE OF THE VVB'S VALIDATION TEAM MEMBERS

Mr. Imran Altaf Bhatti – Team Leader
Bureau Veritas Certification (Pakistan), Lead Verifier - Climate Change
Graduate in the field of Mechanical Engineering and post graduate diploma in Business Administration. Has more than 5 years of Industrial work experience and 15 years of experience in the field of auditing quality, environmental and occupational health and safety management systems. Lead Auditor and Lead Trainer in Bureau Veritas Certification for Environment Management System, Quality Management System, Occupational Health and Safety Management System. Lead Auditor and Lead Trainer for Social Accountability Management System and Auditor for Energy Management System and supply Chain Security Management System. He has undergone training on Clean Development Mechanism. He is involved in the Validation of CDM projects and Validation & Verification of VCS projects in Pakistan.

Mr. Feroz Baig – Team Member
Bureau Veritas Certification (Pakistan), Verifier - Climate Change
Graduate in the field of Electrical (Power) Engineering and Masters in Industrial Management. Has more than 9 years of experience in CDM and VCS as Consultant. Participated as an observer and trainee verifier in validation & audit of technical, financial, and legal aspects of projects involving energy efficiency in heat/power generation projects, renewable energy, and fuel switch measures. Study and review of all technical, financial, and legal compliance of wind energy projects, cogeneration and fuel switch projects in Pakistan.

Mr. Sanjay Patankar - Technical Reviewer
Product Manager – Climate Change & Sustainability Services, Bureau Veritas Certification (India)
He holds a Masters and Bachelors degree in Mechanical Engineering. He has over 20 years of experience in engineering manufacturing industry covering various functions like enterprise management, product design, engineering, tool & die design, improvements in the production shop, quality assurance & control and systems planning and implementation, including ISO 9001 based quality management systems. He is working with Bureau Veritas Certification (India) Pvt. Ltd. as Lead Auditor for the last 5 years on ISO 9001, 14001, 50001 and OHSAS 18001 standards/specifications. Has undergone training related to Clean Development Mechanism and is currently involved in validation and verification of CDM project activities and Validation & Verification of VCS projects.

Mr. Bhavesh Prajapati – Financial Specialist/ Technical Reviewer, Climate Change Lead Verifier.
He is graduate in the field of Chemical Engineering and post-graduate in Finance (MBA- Finance). He has more than 8 years of Industrial work experience in the field of environment audits, consultancy of HVAC (pharmaceutical industry as well as commercial air conditioning) and utility services and project management of various green field as well as gray field projects. He has more than 4 years of experience in designing and executing various pharmaceutical projects in both formulation and API manufacturing. He has undergone lead verifier's training on Clean Development Mechanism. He is also lead verifier for GHG accounting as per ISO 14064. He is involved in the Validation and Verification of more than 40 CDM and VCS projects.