

Verification & Certification Report

Project Title

Vaayu India Wind Power Project in Gujarat

UN Ref. No. **4700**

Monitoring Period: **Fourth**
01/09/2013 – 31/12/2014

For

Vaayu (India) Power Corporation Private Limited

Report No.

CDM.VER.15.15 MP04

Earthood Services Private Limited

Regd. Office: 224, Tower A, Spaze I-Tech Park, Sector 49, Sohna Road, Gurgaon-122018, India

T: +91 124 4204599 F: +91 124 4204599
W: www.earthood.in E: cdm@earthood.in

Executive Summary:

A) Basic information				
Project title	Vaayu India Wind Power Project in Gujarat			
UNFCCC registration number	4700			
Date of registration	09/05/2011			
Sectoral scope	1 : Energy industries (Renewable / non-Renewable sources), TA: 1.2			
Methodology/ies applied	ACM0002 V11			
Project participant	Vaayu (India) Power Corporation Private Limited			
B) Verification				
Start date of crediting period	01/06/2011			
Monitoring Period	01/09/2013 to 31/12/2014 (inclusive of both days)			
Emission Reductions in	MR	109,896 tCO ₂ e	PDD	141,934 tCO ₂ e
C) Monitoring report	Version		Date	
Publication	1		19/03/2015	
Final	1.2		20/05/2015	
D) Verification report	Version		Date	
Draft	1		02/06/2015	
Final	2		10/06/2015	
E) Verification Team				
Team Leader	Kaviraj Singh			
Verifier	Kaviraj Singh			
Technical Expert (TA 1.2)	Kaviraj Singh			
F) Approvals				
Technical Reviewer	Abhishek Mahawar		Date	22/06/2015
Technical Expert (TA 1.2)	Abhishek Mahawar			
G) Final opinion				
Earthood has performed the 4th verification of the CDM project “Vaayu India Wind Power Project in Gujarat” and UNFCCC Ref. Number 4700. The verification includes confirming the implementation of the monitoring plan of the PDD and the application of the monitoring methodology as per ACM0002 V11. Earthood confirms that the monitoring system is in place and the emission reductions are calculated without material misstatements. The emission reductions from the CDM project activity 4700 “Vaayu India Wind Power Project in Gujarat” in India during the period "4th Monitoring period 01/09/2013 to 31/12/2014" (including both days) amount to 109,896 tCO ₂ e. This verification concludes that the aforementioned quantity of emission reductions for the 4 th monitoring period is measured and real. The request for issuance of CERs is submitted to the CDM EB.				
H) Authorization				
Technical Manager	Ashok K Gautam			
Date	28/06/2015			
I) Distribution				
No public distribution without written confirmation from client.				
J) Verification Status				
Findings closed	Yes			
Draft report	No			
Final report	Yes			

Abbreviations

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM PCP	Clean Development Mechanism Project Cycle Procedure
CDM PS	Clean Development Mechanism Project Standard
CDM VVS	Clean Development Mechanism Validation and Verification Standard
CER	Certified Emission Reduction
CL	Clarification Request
DOE	Designated Operational Entity
DGR	Daily Generation Report
DNA	Designated National Authority
EB	Executive Board
ER	Emission Reduction
FAR	Forward Action Request
GHG	Greenhouse Gas(es)
GETCO	Gujarat Energy Transmission Corporation Limited
GEDA	Gujarat Energy Development Agency
IPCC	Intergovernmental Panel on Climate Change
JMR	Joint Meter Reading
MP	Monitoring Period
MR	Monitoring Report
MW	Mega Watt
MWh	Mega Watt Hour
NABL	National Accreditation Board for Testing and Calibration Laboratories
PDD	Project Design Document
PP	Project Participant
RMP	Revised Monitoring Plan
PGVCL	Pachim Gujarat Vij Co. Ltd.
UNFCCC	United Nations Framework Convention on Climate Change
WEG	Wind Electricity Generator

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1. INTRODUCTION

1.1 Objective

Vaayu (India) Power Corporation Private Limited has contracted Earthood Services Private Limited (Earthood) to conduct the verification and certification of emission reductions reported for the CDM project activity 4700 "Vaayu India Wind Power Project in Gujarat" in India for the period "4th Monitoring period 01/09/2013 to 31/12/2014". This report contains the findings of the verification process and a certification statement for the certified emission reductions.

The verification is the periodic independent review and *ex post* determination by Earthood of the monitored reductions in GHG emissions that have occurred as a result of the registered CDM project activity during a defined monitoring period. Certification is the written assurance by Earthood that, during a specific period in time, a project activity achieved the emission reductions as verified.

The objective of this verification was to verify and certify emission reductions reported for the "Vaayu India Wind Power Project in Gujarat" for the period "4th Monitoring period 01/09/2013 to 31/12/2014".

1.2 Scope

The scope of the verification is to establish/verify that:

- The project activity has been implemented and operated as per the registered PDD or any approved revised PDD, and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place;
- The monitoring report and other supporting documents provided are complete in accordance with the latest applicable version of the completeness checklist for requests for issuance of CERs, verifiable, and in accordance with applicable CDM requirements;
- The actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan, any revised approved monitoring plan, the approved methodology including applicable tool(s) and/or, where applicable, the approved standardized baseline;
- The data recorded and stored as per the monitoring methodology including applicable tool(s) and, where applicable, the standardized baseline.

1.3 Basic information of project activity

Title of project activity	Vaayu India Wind Power Project in Gujarat
UNFCCC Reg. No.	4700
Scale of project activity	Large Scale
Applied Methodology/ies	ACM0002 V11
Sectoral Scope(s) / Technical Area(s)	1, TA 1.2
Project participants	Vaayu (India) Power Corporation Private Limited
Host Party	India
Location of project activity	Jamnagar and Rajkot district of state of Gujarat, India. The project is located between latitude 21° 55' and 22° 08' North and longitude 70° 05' and 70° 19' East.
Start date of crediting period	01/06/2011
Type and length of crediting period	Fixed, 10 years
Monitoring period	4th ; 01/09/2013 to 31/12/2014 (both dates included)

2. METHODOLOGY

Earthood assessed and determined whether the implementation and operation of the project activity, and the steps taken to report emission reductions comply with the CDM criteria and relevant guidance provided by the Board.

The assessment involved a desk review of relevant documentation as well as an on-site visit(s). The personnel employed and their roles in this assessment is mentioned below;

Role	Name	Nature of involvement					
		Desk Review	On Site Visit	Reporting	Supervision	Technical Review	TA Expert
Team Leader	Kaviraj Singh	Y	Y	Y	Y	-	-
Verifier	Kaviraj Singh	Y	Y	Y	N	-	-
Technical Expert (TA 1.2)	Kaviraj Singh	Y	Y	Y	N	-	-
Technical Reviewer	Abhishek Mahawar	-	-	-	-	Y	Y
Technical Expert (TA 1.2)	Abhishek Mahawar	-	-	-	-	-	Y

The CV of verification team members are included under Section 7.

Verification milestones:

Monitoring report publication:	23/03/2015
Desk review:	23/04/2015 -24/04/2015
On-site assessment:	27/04/2015
Reporting, calculation checks and QA/QC:	28/04/2015
Draft Verification Report	02/06/2015
Final Verification Report	22/06/2015

Earthood followed a rule based verification approach, wherein, the contract review is undertaken as per valid/effective version of CDM Accreditation Standard. Once the contract is agreed for verification, the monitoring report of the project activity is made publicly available at UNFCCC website as per CDM procedures. Key steps are described in Section 2.1 to 2.4 of this report.

2.1 Desk Review

Earthood conducted a desk review as under;

- A review of the data and information presented to verify their completeness;
- A review of the monitoring plan, the monitoring methodology including applicable tool(s) and, where applicable, the applied standardized baseline, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the quality assurance and quality control procedures;
- An evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions;

In addition to the monitoring documentation, Earthood has reviewed;

- The PDD Version 3 dated 19/01/2011 /1/ and PDD Version 04 dated 17/04/2013 /8/ and the monitoring plan, including the revised monitoring plan (RMP) approved on date 01/08/2013 and/or changes from the registered PDD, and the corresponding validation opinion /9/;

- The Validation Report Revision 2 dated 02/04/2011 /2/ and the Validation Opinion on Post Registration Changes revision 0 dated 14/05/2013 /9/;
- Previous verification reports /7.1 to 7.3/;
- The applied monitoring methodology (ACM0002 V11.0) and, where applicable, the applied standardized baseline /3/;
- The monitoring report /4,5/ to verify that it is as per the standardized format;
- Any other information and references relevant to the project activity's emission reductions (e.g. IPCC reports, data on electricity generation in the national grid or laboratory analysis and national regulations).

The complete list of documents reviewed is included under Section 4.

2.2 Site Visits

A site visit was undertaken by Earthood on 27/04/2015 to carry out following;

- An assessment of the implementation and operation of the registered project activity as per the registered PDD or any approved revised PDD;
- A review of information flows for generating, aggregating and reporting the monitoring parameters;
- Interviews with relevant personnel to determine whether the operational and data collection procedures are implemented in accordance with the monitoring plan in the PDD;
- A cross check between information provided in the monitoring report and data from other sources such as plant logbooks, inventories, purchase records or similar data sources;
- A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the PDD, the applied methodology including applicable tool(s), and, where applicable, the applied standardized baseline;
- A review of calculations and assumptions made in determining the GHG data and emission reductions;
- An identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

2.3 Reporting of Findings

The objective of this step is to identify, discuss and conclude on the issues related to the monitoring, implementation and operations of the registered project activity that could impair the capacity of the registered project activity to achieve emission reductions or influence the monitoring and reporting of emission reductions. This is done based on the desk review and onsite assessment. The verification team prepares and/or updates a verification protocol (internal document) that records the conformities and non-conformities, which may be of following types;

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

- Non-compliance with the monitoring plan, the methodology or the standardized baseline are found in monitoring and reporting and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient;
- Modifications to the implementation, operation and monitoring of the registered project activity has not been sufficiently documented by the project participants;
- Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions;
- Issues identified in a FAR during validation to be verified during verification or previous verification(s) have not been resolved by the project participants.

Clarification request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met. All CARs and CLs raised by the Earthood during verification shall be resolved prior to submitting a request for issuance.

FAR (Forward Action Request) is raised during verification if the monitoring and reporting require attention and/or adjustment for the next verification period.

All the findings that are raised and communicated to project participant during the verification are included under Section 6. The section also includes the response, if provided, by the project participants and an assessment by the verification team if it was closed out or otherwise.

2.4 Technical Review

A draft verification report that is prepared by verification team is reviewed by an independent technical review team (one or more members) to confirm if the internal procedures established and implemented by Earthood were duly complied with and such opinion/conclusion is reached in an objective manner that complies with the applicable CDM rules/requirements. The technical review team is collectively required to possess the technical expertise of all the technical area/sectoral scope the project activity relates to. All team members of technical review team are independent of the verification team.

During the technical review process additional findings may be identified or the closed out findings may be opened, which needs to be satisfactorily resolved before the request for issuance is submitted to UNFCCC. The independent technical reviewer may either approve the report as such or reject/return the same in such case providing the comments/findings/issues that needs to be resolved by the verification team. The decision taken by the Technical Reviewer is final and is authorized by the Technical Manager on behalf of Earthood Services Private Limited.

3. VERIFICATION FINDINGS

This section summarises the findings from the verification of the emission reductions reported for the "Vaayu India Wind Power Project in Gujarat" for the monitoring period "4th Monitoring period 01/09/2013 – 31/12/2014" as reported in the monitoring report /5/.

3.1 Remaining Issues (FAR(s) from validation or previous verification)

This is 4th verification of the project activity. There are no FAR(s) from validation or previous verification that need to be closed during this verification. This was confirmed from the previous verification reports /7.1 – 7.3/.

3.2 Project implementation

The purpose of the project activity is generation and supply of clean electricity to the regional grid thereby displacing the electricity generation in the fossil fuel intensive power plants connected to the same grid. The total installation capacity of the project activity is 51.2 MW wind power generation. This includes 64 Wind Energy Convertors (WEC) with a capacity of 800kW each. The WECs are found located in Chattar, Narmana, Seth Wadala, Jam Ambardi, Mevasa, Dhun Dhoraji, Sadodar, Bodi, Padavala and Machharda villages in Jamnagar and Rajkot district of Gujarat state of India. There are 17 cluster of meters installed at the project site to monitor the electricity exported to grid and also imported from grid. A total 5 numbers of energy meters were found installed at the substation to monitor the electricity export to the grid. Meter SNGJU67589 was installed on 06/09/2013 by the grid company who is responsible for the metering and calibration of the meters and PP has no control on it. The implementation of the project with reference to capacity, number of turbines installed, project technology and location of the project activity were found consistent with the revised registered PDD. The information given in MR section B.1 for commissioning dates of all 64 turbines was verified from the commissioning certificates /18/ and found consistent.

The assessment team confirmed the accuracy of geographical location of the project during on site assessment using hand-held GPS device. The assessment team also confirmed the consistency of the physical aspects of the project design as reported under section A.1 of monitoring report. During site visit, assessment team observed that all the WEGs were commissioned, operational and supplying electricity to the regional grid. All the physical features of the project activity were found to be consistent with the registered/revised PDD. The actual operation of the project activity conforms to the accepted revised PDD.

The total emission reductions achieved for the current monitoring period are 109,896 tCO₂e, which is less than the annual estimated amount of 141,934 tCO₂e as per the registered PDD/8/. Therefore, no issues in this regard were identified.

3.3 Compliance of monitoring plan with monitoring methodology

The review of registered monitoring plan /1,8/ confirms that the monitoring plan allows the proper determination of emission reductions in accordance with the applied version of the methodology i.e., ACM0002 Version 11 /3/ against which the project was registered /1/.

3.4 Post registration changes, if any

There are no post registration changes that are identified or proposed during this monitoring period. However, the monitoring plan in the registered PDD was revised /8/ in the past that was approved by CDM EB on 01/08/2013.

3.5 Compliance of monitoring with monitoring plan

The latest approved monitoring plan /8/ contains the following monitoring parameters, which are required to be reported for emission reduction calculation in each monitoring period:

- a) Net Quantity of Electricity exported to the grid (EGpj,y) in MWh:

This parameter is calculated as per the following formula:

$$EG_{PJ} = EG_{PJ, Export, y} - EG_{PJ, Import, y}$$

$$EG_{PJ, Export, y} = EG_{GETCO, Export} \times EG_{Cluster, Export} / EG_{Cluster, WF, Export}$$

$$EG_{PJ, Import, y} = EG_{GETCO, Import} \times EG_{Cluster, Import} / EG_{Cluster, WF, Import}$$

$EG_{Cluster, Export}$ = Electricity exported by the project activities, as measured at Cluster Meter

$EG_{Cluster, Import}$ = Electricity imported by the project activities, as measured at Cluster Meter

$EG_{Cluster, WF, Export}$ = Electricity exported by all the project owners connected to Wind World (India) Limited substation, as measured at Cluster Meter

$EG_{Cluster, WF, Import}$ = Electricity imported by all the project owners connected to Wind World (India) Limited substation, as measured at Cluster Meter

b) Net Electricity export recorded at WWIL (earlier Enercon) Substation ($EG_{GETCO, Export}$) in kWh

c) Net Electricity imported recorded at WWIL (earlier Enercon) Substation ($EG_{GETCO, Import}$) in kWh

All monitoring parameters are duly reported in the MR along with required details to ensure complete traceability of the monitoring data, equipment and procedure.

The below tables describe how each parameter, which is to be measured according to the revised monitoring plan /8/, has been verified to confirm that the actual monitoring complies with the monitoring plan, monitoring data has been thoroughly assessed and that the calibration requirements are met.

3.5.1 Data/Parameter, Unit: Net Quantity of Electricity exported to the grid ($EG_{pj,y}$) in MWh

Criteria/Requirements	Assessment/Observation
Measuring /Reading /Recording frequency	This is a calculated value which is monitored and recorded on a monthly basis. However the electricity is continuously monitored.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes, the monitoring frequency is inline to the PDD /1/.
Monitoring equipment	The net electricity exported to the grid is a calculated value which takes into account the value of power export and import recorded at two different places (substation and cluster). The WEGs of a single customer are divided into clusters and each cluster has a dedicated meter (also called cluster meter) which records the power export and import by all WEGs connected to the meter. These clusters are connected to the main meters (also called substation meter) at substation (Sadodar). The readings taken by meters installed at substation and clusters are adjusted to the transmission losses inline to the procedure defined in registered PDD, and then the values calculated for the net electricity exported to grid by all individual customers are recorded in GETCO certificates.

Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	All the meter installed are of 0.2s accuracy class and were found within calibration valid calibration /15,16/. All these meters are two-way tri-vector meters/15/.
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	The accuracy is valid for the entire measuring range.
Calibration frequency /interval:	The meters were found calibrated for the entire calibration period /15/. However, the calibration of meter SN: 10059208, 10059203, GJU60947 & GJU60943 were delayed. During the next calibration the referred energy meters were found to be giving results within the permissible error and therefore the maximum permissible error of meter has been applied as error factor in the power generation value mentioned in share certificate of entire September month of 2013. It is worthy to note that the value monitored by these meters is used for apportioning of power export and import by wind turbine clusters and not directly used in emission reduction calculation. The values used for emission reduction calculation are directly taken from GETCO share certificates which also take into account the net power exported monitored by substation meters. Since there are no separate values reported for power import by specific turbines therefore PP, in order to take into account the possible error of import, has applied the error factor of 0.4% (i.e. $0.2\% \times 2$) on the power import values as well for the entire month of September, 2013. The calibration approach applied is even more conservative than the previous verification period and confirms to CDM VVS para 284.
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications?	PDD page 31 (section B.7.1) defines that 'calibration of all meters will be undertaken once in three years' therefore the calibration interval, as verified in above, was found in line with the monitoring plan of the PDD/8/.
Is the calibration of measuring equipment carried out by an accredited person or institution?	Yes, the calibration of meters were conducted by PGVCL (distribution company owned by Gujarat Electricity Board) & Joshi Electricals Vadodara (GEDA approved) for main meters and clusters meters, respectively/15/
Is (are) calibration(s) valid for the whole reporting period?	The calibration was found valid for the entire monitoring period /15/ except for the month of Sept 2013. The error has been applied for the said month, as discussed above.

Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes
How were the values in the monitoring report verified?	The values of net electricity exported to the grid (119,126.853 MWh) by the project activity in this monitoring period as reported in the MR, was sourced from GETCO's 'Certificates for share of electricity generation' for every month /14/. The month wise values of net electricity exported as reported in MR was verified from the GETCO certificates and found consistent /14/.
If applicable, has the reported data been cross-checked with other available data?	The readings of net electricity exported, to the grid, at substation, is taken jointly by representatives of WWIL (earlier Enercon) and GETCO and recorded in plant records. The value of net electricity exported to grid by the project activity as reported in the MR was cross verified from the plant records /17/.
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	The values which are used for emission reduction calculation are directly taken from GETCO certificate for share of electricity which is prepared by GETCO and used for billing purposes.
In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	There was no deviation observed.

3.5.2 Data/Parameter, Unit: Net Electricity export recorded at Enercon Substation (E_{GETCO, Export}) in kWh

Criteria/Requirements	Assessment/Observation
Measuring /Reading /Recording frequency	Monitoring: Continuously Recording: Monthly
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes, PDD page 31 prescribes monitoring frequency as monthly. The values are monitored continuously and recorded monthly.
Monitoring equipment	The values are being monitored by the two-way tri-vector energy meters installed at the Wind World Substation. In total there are 5 energy meters installed at the substation which monitors the power exported and imported to grid. Meter SN GJU 67589 was calibrated and installed on 06/09/2013 and brought into use from Jan 2014 onwards. Therefore the date of calibration (06/09/2013) was not considered as a delayed calibration.

Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	The accuracy class of meter is verified as 0.2s/15/.
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	The accuracy class is valid for the entire measuring range and there is no different accuracy levels applied for different measuring ranges /15/.
Calibration frequency /interval:	The calibration is conducted once in three years which is inline to the PDD details of calibration. Verified and found satisfactory/15/.
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications?	The monitoring plan of the PDD page 31 section B.7.1 requires the meter to be calibrated once in three years. Therefore, the implemented calibration interval for all the meters was found in line with the monitoring plan.
Is the calibration of measuring equipment carried out by an accredited person or institution?	The calibration of meters were conducted by PGVCL (distribution company owned by Gujarat Electricity Board) /15/.
Is (are) calibration(s) valid for the whole reporting period?	Yes the calibration is found valid for the current monitoring period /16/
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes, the calibration was carried out for the measuring range which is comparable with the range for which measurements have been carried out.
How were the values in the monitoring report verified?	The value (977,768,000 kWh) mentioned in the monitoring report are sourced from plant records which was verified and found consistent /17/.
If applicable, has the reported data been cross-checked with other available data?	The value reported in MR was cross checked from GETCO share of certificate /14/. However, the GETCO certificates adjust the values for transmission losses and imports.
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	The meters installed are sealed in presence of representatives of WWIL and grid representative for ensuring the correct monitoring of the power exported. The values are also recorded in presence of both the parties (WWIL & GETCO). The values which are used for emission reduction calculation are directly source form the 'Certificate of share of electricity' and the same document is also used for invoicing and payments of power sell to the grid.
In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	There was no deviation observed.

3.5.3 Data/Parameter, Unit: Net Electricity imported recorded at Enercon Substation (EG_{GETCO, Import}) in kWh

Criteria/Requirements	Assessment/Observation
Measuring /Reading /Recording frequency	Monitoring: Continuously Recording: Monthly
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes, PDD page 32 prescribes monitoring frequency as monthly. The values are monitored continuously and recorded monthly.
Monitoring equipment	The values are being monitor by the two-way tri-vector energy meters installed at the Wind World Substation. In total there are 5 energy meters installed at the substation which monitors the power exported and imported to grid. Meter SN GJU 67589 was calibrated and installed on 06/09/2013 and brought into use from Jan 2014 onwards. Therefore the date of calibration (06/09/2013) was not considered as a delayed calibration.
Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	The accuracy class of meter is verified as 0.2s/16/.
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	The accuracy class is valid for the entire measuring range and there is no different accuracy levels applied for different measuring ranges /17/.
Calibration frequency /interval:	The calibration is conducted once in three years which is inline to the PDD. The details of calibration are verified and found satisfactory/16/.
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications?	The monitoring plan of the PDD page 31 section B.7.1 requires the meter to be calibrated once in three years. Therefore, the implemented calibration intervals for the meters were found inline with the monitoring plan.
Is the calibration of measuring equipment carried out by an accredited person or institution?	Yes, the calibration was carried out for the measuring range which is comparable with the range for which measurements have been carried out.
Is (are) calibration(s) valid for the whole reporting period?	Yes the calibration is found valid for the current monitoring period /16/
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes, the calibration was carried out for the measuring range which is comparable with the range for which measurements have been carried out.
How were the values in the monitoring report verified?	The value (336,000 kWh) mentioned in the monitoring report is sourced from plant records which was verified and found consistent//17/.

If applicable, has the reported data been cross-checked with other available data?	The value reported in MR was cross checked from GETCO share of certificate /14/. However, the GETCO certificates adjust the values for transmission losses and imports.
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	The meters installed are sealed in presence of representatives of WWIL and grid representative for ensuring the correct monitoring of the power exported. The values are also recorded in presence of both the parties (WWIL & GETCO). The values which are used for emission reduction calculation are directly source form the 'Certificate of share of electricity' and the same document is also used for invoicing and payments of power sell to the grid.
In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	There was no deviation observed.

3.6 Data not monitored (ex-ante or external parameters)

Baseline emissions (BE in tCO₂) are the product of the baseline emission factor (EF_y in tCO₂/MWh) times the net electricity supplied by the project activity to the grid (EG_y in MWh). EF_y is emission factor of the grid, which was calculated ex-ante and will not be updated during the first crediting period. EF_y of the proposed project in the registered PDD is 0.92252 tCO₂/MWh which is a function of Operating Margin and Build Margin reported in the CO₂ Baseline Database for the Indian Power Sector Version 5 issued by Central Electrical Authority (CEA), Ministry of Power /13/.

3.6.1 Data/Parameter, Unit: Operating Margin Emission Factor of NEWNRE Electricity Grid (EF_{grid,OM,y}), t CO₂e/MWh

What is the value applied?	1.00498
How it was checked and is it correctly applied?	Verified from B.6.2 of the registered PDD

3.6.2 Data/Parameter, Unit: Build Margin Emission Factor of NEWNE Regional Electricity Grid (tCO₂e)/MWh, t CO₂e/MWh

What is the value applied?	0.67518
How it was checked and is it correctly applied?	Verified from B.6.2 of the registered PDD

3.6.3 Data/Parameter, Unit: Combined Margin Emission Factor of NEWNRE Regional Electricity Grid (EF_{grid,CM,y}), tCO₂e/MWh

What is the value applied?	0.92252
How it was checked and is it correctly applied?	Verified from B.6.2 of the registered PDD

3.7 Assessment of data and calculation of emission reductions

Baseline emissions (BE in tCO₂) are the product of the baseline Emission Factor times the net electricity supplied by the project activity to the grid. $EF_{grid,CM,y}$ is the emission factor of the grid, which was calculated ex-ante. $EF_{grid,CM,y}$ of the proposed project in the registered PDD is 0.92252 tCO₂/MWh, which has been verified to be correct based on the availability of grid data. $EG_{pj,y}$ is the net quantity of electricity exported to the grid.

The verification team confirms that

- a) A complete set of data for the specified monitoring period was available;
- b) The information provided in the monitoring report and corresponding spreadsheet has been cross checked and reported under Section 3.5, among others;
- c) The assessment team confirms that the formulae for calculating baseline emissions are in accordance with registered PDD, revised monitoring plan and applied methodology. There were no project emissions and leakage to be considered.
- d) The assumptions/emission factors used in emission calculations have been correctly applied and justified.

3.8 Quality of evidence to determine emission reductions

The assessment team has reviewed the audit trail and confirms that the complete set of all the relevant records and evidences were submitted. The review of all the evidences and records reveals that these are consistent with the monitoring requirements of the project with respect to completeness of parameters, source of recording, nature of records and evidences and the frequency and coverage of the monitoring period. The audit trail also include the records and evidences for cross-check of monitored data, which were found to be consistent. The sources for the basis of assumptions and ex-ante parameters have been duly verified.

3.9 Management system and quality assurance

The operation and maintenance team consists of engineers, site in-charge and operator who records the readings and prepare daily generation reports. The primary recording of the electricity fed to the state utility grid is carried out jointly at the incoming feeder of the state electricity utility. The joint measurement is carried out once in a month in the presence of both parties (the developers' representative and the officials of the state power utility), and the records are signed by the officials/authorized representatives from the project proponent and grid company. The monitoring procedures and system as reported in the monitoring report were reviewed by the assessment team during site visit and found to be consistent at ground and with the approved monitoring plan.

4. REFERENCES

S. No.	Title of Document	Version	Date																																										
1	Registered PDD	03	19/01/2011																																										
2	Validation Report	02	09/04/2011																																										
3	ACM0002 - Consolidated baseline methodology for grid-connected electricity generation from renewable sources	11	12/02/2010																																										
4	Monitoring Report (publication)	1.0	19/03/2015																																										
5	Monitoring Report (final)	1.2	20/05/2015																																										
6	ER spreadsheet (final)	1.2	20/05/2015																																										
7	/7.1/ Verification Report MP1 /7.2/ Verification Report MP2 /7.3/ Verification Report MP3	0 0 1	14/08/2012 14/05/2013 06/01/2014																																										
8	Revised PDD (approved by CDM EB on 01/08/2013)	4	17/04/2013																																										
9	Validation opinion on PRC	0	14/05/2013																																										
10	CDM Project Standard	7.0	01/06/2014																																										
11	CDM Project Cycle Procedure	7.0	01/06/2014																																										
12	CDM Validation and Verification Standard	7.0	01/06/2014																																										
13	CO ₂ Baseline Database for the Indian Power Sector issued by Central Electrical Authority (CEA), Ministry of Power	5.0	11/2009																																										
14	Certificates for share of electricity generation by GETCO (State Load Dispatch Centre, Gotri, Vadodara) from Sept, 2013 to Dec, 2014.																																												
15	Calibration certificate by PGVCL (distribution company owned by Gujarat Electricity Board) for substation (main) meters verified for the following information; <table><tr><th>SN of meter</th><th>Calibration Date</th><th>Validity</th></tr><tr><td>GJB 01470</td><td>17/01/2012</td><td>16/01/2015</td></tr><tr><td>GJU 04175</td><td>17/01/2012</td><td>16/01/2015</td></tr><tr><td>GJU 04176</td><td>17/01/2012</td><td>16/01/2015</td></tr><tr><td>KAB 11082</td><td>17/01/2012</td><td>16/01/2015</td></tr><tr><td>GJU 67589</td><td>06/09/2013</td><td>05/09/2016</td></tr></table>			SN of meter	Calibration Date	Validity	GJB 01470	17/01/2012	16/01/2015	GJU 04175	17/01/2012	16/01/2015	GJU 04176	17/01/2012	16/01/2015	KAB 11082	17/01/2012	16/01/2015	GJU 67589	06/09/2013	05/09/2016																								
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GJU 04176	17/01/2012	16/01/2015																																											
KAB 11082	17/01/2012	16/01/2015																																											
GJU 67589	06/09/2013	05/09/2016																																											
16	Calibration certificates of meters by Joshi Electricals Vadodara, and acknowledged by GEDA were verified and the relevant information is mentioned below; <table><tr><th>S.N. of meter</th><th>Calibration date</th><th>Validity</th></tr><tr><td>10059208</td><td>24/08/2010 & 25/09/2013</td><td>24/09/2016</td></tr><tr><td>10059203</td><td>24/08/2010 & 25/09/2013</td><td>24/09/2016</td></tr><tr><td>GJU60947</td><td>03/09/2010 & 25/09/2013</td><td>24/09/2016</td></tr><tr><td>GJU61707</td><td>29/01/2011 & 25/09/2013</td><td>24/09/2016</td></tr><tr><td>GJU61698</td><td>29/01/2011 & 25/09/2013</td><td>24/09/2016</td></tr><tr><td>GJU61321</td><td>05/02/2011 & 25/09/2013</td><td>24/09/2016</td></tr><tr><td>GJU61313</td><td>18/12/2010 & 25/09/2013</td><td>24/09/2016</td></tr><tr><td>GJU61690</td><td>29/01/2011 & 25/09/2013</td><td>24/09/2016</td></tr><tr><td>GJU61699</td><td>29/01/2011 & 25/09/2013</td><td>24/09/2016</td></tr><tr><td>GJU61322</td><td>09/12/2010 & 26/09/2013</td><td>25/09/2016</td></tr><tr><td>GJU61696</td><td>29/01/2011 & 26/09/2013</td><td>25/09/2016</td></tr><tr><td>GJU61310</td><td>18/12/2010 & 26/09/2013</td><td>25/09/2016</td></tr><tr><td>GJU61701</td><td>29/01/2011 & 26/09/2013</td><td>25/09/2016</td></tr></table>			S.N. of meter	Calibration date	Validity	10059208	24/08/2010 & 25/09/2013	24/09/2016	10059203	24/08/2010 & 25/09/2013	24/09/2016	GJU60947	03/09/2010 & 25/09/2013	24/09/2016	GJU61707	29/01/2011 & 25/09/2013	24/09/2016	GJU61698	29/01/2011 & 25/09/2013	24/09/2016	GJU61321	05/02/2011 & 25/09/2013	24/09/2016	GJU61313	18/12/2010 & 25/09/2013	24/09/2016	GJU61690	29/01/2011 & 25/09/2013	24/09/2016	GJU61699	29/01/2011 & 25/09/2013	24/09/2016	GJU61322	09/12/2010 & 26/09/2013	25/09/2016	GJU61696	29/01/2011 & 26/09/2013	25/09/2016	GJU61310	18/12/2010 & 26/09/2013	25/09/2016	GJU61701	29/01/2011 & 26/09/2013	25/09/2016
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GJU61701	29/01/2011 & 26/09/2013	25/09/2016																																											

	GJU61693	29/01/2011 & 26/09/2013	25/09/2016
	GJU61692	29/01/2011 & 25/09/2013	25/09/2016
	GJU61691	29/01/2011 & 26/09/2013	25/09/2016
	GJU60943	03/09/2010 & 26/09/2013	25/09/2016
17	Plant records (including joint meter readings) of power generation values recorded from cluster meters for the period from 01/09/2013 to 31/12/2014.		
18	Commissioning certificates of 64 WECs		

List of persons interviewed:

S. No.	Name	Designation	Organization	Date
1	Puneet Katyal	Head, Climate Change & Sustainability	WWIL	27/04/2015
2	Navneet Kumar	Asst. Manager	WWIL	27/04/2015
3	Jignesh Kumar	Site in-charge	WWIL	27/04/2015

5. CERTIFICATION STATEMENT

Earthood Services Private Limited (Earthood), contracted by Vaayu (India) Power Corporation Private Limited has performed the independent verification of the emission reductions for the CDM project activity 4700 "Vaayu India Wind Power Project in Gujarat" in India for the monitoring period "4th Monitoring period 01/09/2013 – 31/12/2014" as reported in the Monitoring Report (public) Version 1 dated 19/03/2015. Vaayu (India) Power Corporation Private Limited is responsible for the collection of data in accordance with the monitoring plan and the reporting of GHG emissions reductions from the project activity.

It is our responsibility to express an independent verification statement on the reported GHG emission reductions from the project activity.

Earthood commenced the verification on the basis of the baseline and monitoring methodology ACM0002 V11.0, the approved revised monitoring plan, registered PDD, Monitoring Report (public) Version 1 dated 19/03/2015 as per the verification methodology described under Section 2 of this report.

Earthood's verification approach is based on the understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these. Earthood planned and performed the verification by obtaining evidences and other information and explanations that Earthood considered necessary to give reasonable assurance that the reported GHG emission reductions are fairly stated.

In our opinion the GHG emissions reductions reported for the project activity for the period "4th Monitoring period 01/09/2013 – 31/12/2014" are fairly stated in the Monitoring Report (final) Version 1.2 dated 20/05/2015. The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology ACM0002 V11.0 and the approved revised monitoring plan and the method prescribed in registered PDD.

Earthood Services Private Limited is able to certify that the emission reductions from the CDM project activity 4700 "Vaayu India Wind Power Project in Gujarat" in India during the "4th Monitoring period 01/09/2013 – 31/12/2014" (including both days) amount to 109,896 tCO₂e.

Verified and certified emission reductions as per commitment period in the context of current monitoring period:

Commitment period	Amount
Up to 31/12/2012 (1 st commitment period)	Not Applicable
From 01/01/2013 onwards (current MP)	109,896 tCO ₂ e



Ashok Kumar Gautam
Technical Manager

28/06/2015
Gurgaon, Haryana, India

6. FINDINGS (CAR/CL/FAR)

Type	Date	27/04/2015
CL#01	Reference	Verification Protocol
Description of the Non Conformance		
The values of EG _{GETCO, Export} (877174,000,000 kWh) & EG _{GETCO, Import} (288,000,000 kWh) reported in MR version 01 were found inconsistent with the values recorded in the plant records available on site. Please refer para 262 b (iv) of VVS ver07.		
1st Response from PP	Date	05/05/2015
The total values of EG _{GETCO, Export} & EG _{GETCO, Import} have been revised to 977,768,000 kWh and 336,000 kWh respectively in MR version 1.1 as per plant records available on site. The same has been revised in ER sheet version 1.1.		
1st Assessment	Status	Closed
	Date	11/05/2015
The value of EG _{GETCO, Export} & EG _{GETCO, Import} has been revised in the MR version 1.1 which were found inline with the plant records. CLOSED.		

Type	Date	27/04/2015
CL#02	Reference	Verification Protocol
Description of the Non Conformance		
The monitoring report version 01 doesn't provide the sufficient information about calibration for 17 clusters meters and one substation meter, installed on the project site for monitoring. Please refer para 252 b of PS ver07.		
1st Response from PP	Date	05/05/2015
In revised MR version 1.1, PP has provided complete calibration details of all the 17 clustering metering points and five substation meters installed at the project site for monitoring purpose. The calibration certificates of all these cluster meters and substation meters have also been submitted to DOE for further verification.		
1st Assessment	Status	OPEN
	Date	11/05/2015
The MR version 1.1 provided the calibration details of all 17 meters however, the calibration dates doesn't cover the entire monitoring period. For eg. the cluster meters calibration was conducted on 25/09/2013/ and 26/09/2013 however the monitoring period starts from 01/09/2013.		
2nd Response from PP	Date	12/05/2015
PP has incorporated calibration details of all cluster and substation meters before the monitoring period in MR version 1.2. The error factor has been applied in net export values of GEDA Share certificates for the month of September 2013 as some of the cluster meters (Sr. no. 10059208, 10059203, GJU60947 & GJU60943) of WECs were not calibrated as per the calibration frequency. PP has also revised MR and ER sheet version 1.2.		
2nd Assessment	Status	CLOSED
	Date	02/06/2015
In the revised MR ver1.2, PP has applied the correction factor of maximum permissible error of the meters, in the final values of power generation used for emission reduction calculation, for the period wherein the meter was not in calibration. CLOSED.		

7. CV OF PERSONNEL

Competence Statement			
Name	Dr. Kaviraj Singh		
Country	India		
Education	Masters (Environment) Masters (Energy & Environment) Doctorate (Environmental Engg.)		
Experience	7+ Years in CDM at different roles. Completed more than 100 CDM projects as auditor & 4 GS projects		
Field	Climate Change, Environment, Energy, Waste Management		
Approved Roles			
Team Leader	YES		
Validator	YES		
Verifier	YES		
Financial Expert	NO		
Technical Reviewer	YES		
TA Expert (1.2)	YES		
TA Expert (13.1)	YES		
Reviewed by	Abhishek Mahawar	Date	29/12/2014
Approved by	Ashok K Gautam	Date	29/12/2014

Competence Statement			
Name	Abhishek Mahawar		
Country	India		
Education	B. Tech. (Chemical Engineering) MBA (Finance)		
Experience	7 Years		
Field	Climate Change & Environment		
Approved Roles			
Team Leader	YES		
Validator	YES		
Verifier	YES		
Financial Expert	YES		
Technical Reviewer	YES		
TA Expert (1.2)	YES		
Reviewed by	Ashok Gautam	Date	29/12/2014
Approved by	Kaviraj Singh	Date	29/12/2014

History of the document						
Version	Date	Nature of Revision	Prepared by		Reviewed by	
			Name	Date	Name	Date
2.0	02/09/2014	Compliance to VVS V7	Abhishek Mahawar	01/09/2014	Ashok Gautam	02/09/2014
1.0	18/02/2014	Editorial and compliance to VVS V05	Abhishek Mahawar	17/02/2014	Ashok Gautam	18/02/2014
0	01/07/2013	Initial adoption	Abhishek Mahawar	28/06/2013	Kaviraj Singh	01/07/2013