

“WIND BASED POWER GENERATION BY PANAMA WIND ENERGY GODAWARI PRIVATE LIMITED, PUNE IN THE STATE OF MAHARASHTRA, INDIA”

Document Prepared By Earthood Services Private Limited

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Summary:

Earthood has performed the VCS fourth verification of the project "Wind Based Power Generation by Panama Wind Energy Godawari Private Limited, Pune in the State of Maharashtra, India" (VCS Ref. Number 1523).

The scope of verification includes confirming the implementation of the monitoring plan of the registered VCS PD version 02 and the application of the monitoring methodology Approved consolidated baseline and monitoring methodology "ACM0002 - Version 16.0"

The verification is consisted of three phases: i) desk review of the project; ii) follow-up onsite visit and interviews with project stakeholders; iii) resolution of outstanding issues and the issuance of the final verification report and opinion. The overall verification, from Contract Review to Verification Report & Opinion, was conducted following Earthood internal quality procedures.

The purpose of the project activity is to generate power using renewable energy source i.e. wind potential and converts it into kinetic energy using Wind turbines, which drives the alternators to generate energy. The generated electricity is being exported to the regional grid system which is under the purview of the NEWNE grid of India which is dominated by mainly fossil fuel fired power plants. The total installed capacity of the project is 80 MW; which involves operation of 40 Wind Turbine Generators (WTGs) with capacity of 2 MW each located at Maharashtra state in India and the project is promoted by Panama Wind Energy Godawari Private Limited..

During the verification process 03 CARs, 00 CL and 00 FARs were raised and are discussed in detail in Appendix 4. Therefore, the emission reductions from the project activity "Wind Based Power Generation by Panama Wind Energy Godawari Private Limited, Pune in the State of Maharashtra, India" in India during the period 02/02/2018 to 28/02/2019 (including both days) could be verified.

Vintage wise representation of the emission reductions is as follows:

Period	Baseline Emissions (tCO ₂ e)	Project Emissions (tCO ₂ e)	Leakages (tCO ₂ e)	Emission Reductions (tCO ₂ e)
02/02/2018 to 31/12/2018	142,903	0	0	142,903
01/01/2019 to 28/02/2019	5,853	0	0	5,853
Total	148,756	0	0	148,756

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1 INTRODUCTION

1.1 Objective

Panama Wind Energy Godawari Private Limited has commissioned Earthood Services Private Limited (Earthood) to perform fourth verification of the “Wind Based Power Generation by Panama Wind Energy Godawari Private Limited, Pune in the State of Maharashtra, India” (hereafter called project) for the monitoring period 02/02/2018 to 28/02/2019 with VCS Ref number 1523. The objective of this verification is a thorough and independent verification for the emission reductions reported for “Wind Based Power Generation by Panama Wind Energy Godawari Private Limited, Pune in the State of Maharashtra, India” and managed by Panama Wind Energy Godawari Private Limited.

The verification is the periodic independent review and ex post determination by Earthood Services private limited of the monitored reductions in GHG emissions that have occurred as a result of the registered VCS 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.

1.2 Scope and Criteria

The scope of the verification is to establish and verify that;

- a) The project activity has been implemented and operated as per the registered PD or any approved revised PD, and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place;
- b) 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 VERs, verifiable, and in accordance with applicable VCS requirements;
- c) 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;
- d) The data recorded and stored as per the monitoring methodology including applicable tool(s) and, where applicable, the standardized baseline

1.3 Level of Assurance

A draft verification report that is prepared by assessment team will be 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 VCS and CDM (Clean Development Mechanism) requirements as appropriate. 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 validation team. The report approved by Quality Manager is endorsed by Managing Director, who is overall responsible to ensure quality, before final release. The further details of applicable procedures and responsibilities about Earthood Quality Management System (QMS) are available on its website (www.earthood.in).

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 evidence and other information and explanations that Earthood considered necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.

In our opinion the GHG emissions reductions reported for the project activity for the period 02/02/2018 to 28/02/2019 are fairly stated in the Monitoring Report Version 02 dated 09/08/2019^{2/}. The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology "ACM0002 - Version 16.0"^{7/}, and the VCS standard^{14/}.

For more information, please refer to section 6 of this verification report.

1.4 Summary Description of the Project

The purpose of the project activity is to generate energy electricity by the utilization of wind velocity and further selling the generated energy to the respective Grid. In this process there is no consumption of any fossil fuel and hence it does not lead to any greenhouse gas emissions. Thus, electricity would be generated through sustainable means without causing any negative impact on the environment.

The total installed capacity of the project is 80 MW^{10/}; which involves operation of 40 Wind Turbine Generators (WTGs) with capacity of 2 MW each located at Maharashtra state in India and the project is promoted by Panama Wind Energy Godawari Private Limited..

The technology employed, converts wind energy to electrical energy. In wind power generation, energy of wind is converted into mechanical energy and subsequently into electrical energy. Wind power generation technology is environment friendly technology since there are no GHG emissions associated with the electricity generation.

Panama Wind Energy Godawari Private Limited has given contract of operation & maintenance^{13/} to respective windfarm developer for the entire crediting period. Total capacity of the project activity is 80 MW as per the registered PD^{1/}. Duration of this fourth periodic verification of the project activity is from 02/02/2018 to 28/02/2019 and total emission reductions achieved during this monitoring period is 148,756 tCO₂e.

The commissioning details of the WTGs were verified from the commissioning certificates provided^{10/} by the PP. The WTGs used in this project are of Gamesa G97-2.0 MW make. Technical description was found to be consistent with the on-site observation^{9/} and registered VCS PD^{1/}.

2 VERIFICATION PROCESS

The registered VCS project is undergoing fourth verification, the approach adopted to ensure the quality of emission reductions is described in the following sections.

2.1 Method and Criteria

The overall verification, from Contract Review to Verification Report & Opinion, was conducted using Earthood internal procedures.

The Project was verified against the latest requirements and guidance set out in VCS and CDM standards.

No sampling approach has been applied by the verification team as all the monthly reported figures in the MR^{/2/} and the ER sheet^{/3/} were checked from the actual records.

2.2 Document Review

The verification is performed primarily as a document review of the documents submitted at various stages of assessments. The review is performed by assessment team using dedicated protocols. The assessment team cross checks the information provided in the documents (PDD, MR, validation report) and information from sources other than those used, if available, and also conducts independent background investigations. Earthood conducted a desk review as under;

- a) A review of the data and information presented to verify their completeness.
- b) 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.
- c) 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.

2.3 Interviews

Earthood performed an on-site visit and interviews on 08/08/2019 with project stakeholders to confirm selected information and to resolve issues identified in the document review. During the on-site visit, the PP representatives of were interviewed.

No.	Interviews			Date	Subject	Team Member
	Last Name	First Name	Affiliation			
1.	Solanke	Shankar	Site Incharge	08/08/2019	Project Implementation, Management, overall operation, JMR, O&M & calibration etc.	Dr. Atul Takarkhede
2.	Thackarey	Amar	Panama Energy		EHS Practices, trainings,	

No.	Interviews			Date	Subject	Team Member
	Last Name	First Name	Affiliation			
					administration, CSR etc.	
3.	Pol	Laxman	JBSS		LSC	
4.	Mahajan	Ganesh	Siemens Gamesa Renewable Power Pvt. Ltd.		SCADA operations	
5.	Navpute	Vikas	A.K.M		LSC	
6.	Lakhare	Bhagwan	Panama		LSC	

In addition, the location specified for the WTG were verified from the registered PD^{1/} along with the help of mobile GPS. The operation of the WTGs was checked through the JMRs^{6/} issued from the government authorities. Based on the site visit and desk review, the verification team is sufficiently confident of the implementation of the project activity as per registered PD^{1/}.

2.4 Site Inspections

A site visit was undertaken by Earthood from on 08/08/2019 to carry out following;

- An assessment of the implementation and operation of the registered project activity as per the registered PD^{1/}.
- 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 PD^{1/}.
- A cross check between information provided in the monitoring report and data from other sources such as invoices.
- A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the PD, 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.

Technical descriptions as seen on site was found to be in line with the registered VCS PD^{1/}. The following WTGs were visited by the DOE and their location was recorded through mobile application of Google earth^{17/}.

Sr. No.	Loc. No.	Commissioning date	Village	Taluka	District	Latitude (D° M' Sec")	Longitude (D° M' Sec")
1.	G01	7-Oct-14	Mulukwadi	Georai	Beed	N19 11	E75 43 38.4

Sr. No.	Loc. No.	Commissioning date	Village	Taluka	District	Latitude (D° M' Sec")	Longitude (D° M' Sec")
						35.6	
2.	G02	7-Oct-14	Mulukwadi	Georai	Beed	N19 11 12.3	E75 42 57.5
3.	G03	7-Oct-14	Mulukwadi	Georai	Beed	N19 11 50.0	E75 43 19.7
4.	G04	7-Oct-14	Mulukwadi	Georai	Beed	N19 11 30.1	E75 43 13.9
5.	G05	6-Sep-14	Khoipti	Georai	Beed	N19 13 35.5	E75 41 23.4
6.	G06	7-Oct-14	Mulukwadi	Georai	Beed	N19 11 59.1	E75 43 35.4
7.	G07	7-Oct-14	Mulukwadi	Georai	Beed	N19 11 20.6	E75 43 40.8
8.	G08	7-Oct-14	Mulukwadi	Georai	Beed	N19 11 59.5	E75 43 07.2
9.	G09	7-Oct-14	Mulukwadi	Georai	Beed	N19 12 04.9	E75 42 37.4
10.	G10	7-Oct-14	Mulukwadi	Georai	Beed	N19 12 24.6	E75 43 13.1
11.	G11	7-Oct-14	Mulukwadi	Georai	Beed	N19 11 35.6	E75 43 38.4
12.	G12	7-Oct-14	Manmodi	Georai	Beed	N19 12 38.0	E75 43 18.6
13.	G13	7-Oct-14	Manmodi	Georai	Beed	N19 12 23.5	E75 42 36.7
14.	G14	6-Sep-14	Manmodi	Georai	Beed	N19 12 50.5	E75 42 24.3
15.	G15	6-Sep-14	Manmodi	Georai	Beed	N19 12 59.8	E75 42 10.8
16.	G16	7-Oct-14	Manmodi	Georai	Beed	N19 13 17.1	E75 42 10.1
17.	G17	6-Sep-14	Manmodi	Georai	Beed	N19 13 22.3	E75 41 58.6
18.	G18	7-Oct-14	Khoipti	Georai	Beed	N19 13 29.6	E75 42 29.3
19.	G19	7-Oct-14	Manyarwadi	Georai	Beed	N19 13 41.9	E75 42 19.2
20.	G20	7-Oct-14	Khoipti	Georai	Beed	N19 13 45.5	E75 42 59.5
21.	G21	5-Dec-14	Rajpimpri	Georai	Beed	N19 14 06.3	E75 41 40.6
22.	G22	6-Sep-14	Rajpimpri	Georai	Beed	N19 13 54.1	E75 41 27.6
23.	G23	6-Sep-14	Rajpimpri	Georai	Beed	N19 13 46.6	E75 41 03.1
24.	G24	31-Mar-14	Rajpimpri	Georai	Beed	N19 13 34.5	E75 40 24.8
25.	G25	31-Mar-14	Bangali Pimpla	Georai	Beed	N19 13 23.9	E75 40 11.5
26.	G26	25-Jul-14	Sindkhed	Georai	Beed	N19 12 40.0	E75 37 28.9

Sr. No.	Loc. No.	Commissioning date	Village	Taluka	District	Latitude (D° M' Sec")	Longitude (D° M' Sec")
27.	G27	25-Jul-14	Kombadwadi	Georai	Beed	N19 13 09.5	E75 40 21.9
28.	G28	25-Jul-14	Kombadwadi	Georai	Beed	N19 13 25.4	E75 39 28.6
29.	G29	31-Mar-14	Devimpri	Georai	Beed	N19 13 43.7	E75 39 29.9
30.	G30	31-Mar-14	Kombadwadi	Georai	Beed	N19 13 51.7	E75 39 06.1
31.	G31	31-Mar-14	Sushi	Georai	Beed	N19 13 57.4	E75 39 33.0
32.	G32	25-Jul-14	Sushi	Georai	Beed	N19 12 16.2	E75 37 44.2
33.	G33	31-Mar-14	Sushi	Georai	Beed	N19 12 59.5	E75 38 47.3
34.	G34	31-Mar-14	Sushi	Georai	Beed	N19 13 14.9	E75 38 57.3
35.	G35	31-Mar-14	Sushi	Georai	Beed	N19 13 12.2	E75 38 26.2
36.	G36	31-Mar-14	Kumbhejalgaon	Georai	Beed	N19 13 27.1	E75 38 20.9
37.	G37	31-Mar-14	Sushi	Georai	Beed	N19 13 34.4	E75 38 00.3
38.	G38	25-Jul-14	Kumbhejalgaon	Georai	Beed	N19 12 49.7	E75 38 08.6
39.	G39	31-Mar-14	Bangalipimpla	Georai	Beed	N19 13 04.7	E75 37 53.8
40.	G40	31-Mar-14	Mulukwadi	Georai	Beed	N19 12 58.0	E75 37 31.5

2.5 Resolution 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 nonconformities, 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

- c) Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions
- d) Change to the key sustainable development indicators
- e) 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 requirements have been met. All CARs and CLs raised by the Earthhood 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.

A total of 03 CAR and 00 CL were raised in the current verification. All the findings that are raised and communicated to project participant during the verification are included under Appendix 4. 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

2.5.1 Forward Action Requests

Not Applicable

2.6 Eligibility for Validation Activities

Not Applicable

3 VALIDATION FINDINGS

Not Applicable

3.1 Participation under Other GHG Programs

This section is not applicable for present verification.

3.2 Methodology Deviations

There is no methodology deviation identified during the current monitoring period.

3.3 Project Description Deviations

There is no methodology deviation identified during the current monitoring period.

3.4 Grouped Project

Not Applicable

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

During the verification site visit it was concluded that the project is implemented as per the instruction of the registered PD^{/1/}, Final Validation report^{/2/} and commissioning certificates^{/10/}. During the current monitoring period it was observed that no unforeseen situation evolved which can impact the operation of the project activity. Breakdown summary is submitted by PP for the WTGs. Scheduled maintenance was carried out as per the instruction of the manufacturer and the same is acceptable to the assessment team^{/9/}.

The total installed capacity of the project is 80 MW; which involves operation of 40 Wind Turbine Generators (WTGs) with capacity of 2 MW each^{/10/}. The technical parameters have been verified with the nameplates as well as the technical specifications of WTGs^{/9/}.

During the current monitoring duration no events have been found that can change the design of project.

Technical details for Gamesa G97-2.0 MW¹, 2000 KW Machine

Particulars	Details
Model	Gamesa G97-2.0 MW
Rated Power	2000kW
Diameter	97 m
Swept Area	7,390 m ²
Rotational Speed	9.6 - 17.8 rpm
Design Lifetime	25 years

Power generated by the wind turbines is collected at 33 kV and fed to pooling substation near Rajpimpri village (5 kms away), where it is stepped up to 132kV. The pooling station itself is then connected to 132 kV grid at MSETCL existing Substation Georai.

The installation and specification of WTGs have been checked with commissioning certificates^{/10/} and during on-site assessments^{/9/}. There was no major breakdown or shut downs during the monitoring period which might affect the applicability of methodology or might cause material errors in emission reductions. CAR 04 was raised for the missing information on operational status of the project activity in MR and same resolved by revision in MR.

Assessment team concludes the following:

- The implementation status of project activity was found to be in compliance with registered PD^{/1/}.
- DOE has conducted the on-site visit to confirm the implementation status of the project^{/9/}.

¹ <http://www.gamesacorp.com/en/products-and-services/wind-turbines/gamesa-g97-20-mw-iiia-en.html>

- c) The commissioning date of the project activity was found to be accurately and consistently recorded^{/10/}.
- d) The actual operation of project activity was found to be in compliance with the flow diagram provided in registered PD^{/1/}.
- e) The emission reductions achieved during the current monitoring period are 148,756 tCO₂e.

The project activity contributes to the sustainable development by utilising wind energy for generating electricity which otherwise would have been generated through fossil fuels. Thereby reduction in usage of non-renewable sources used to generate energy.

Further the GHG emission reductions generated by the project activity has not been included by any other an emissions trading program or any other mechanism that includes GHG allowance trading. Also the project has not received any other form of environmental credit and has not been participated/rejected under any other GHG programs.

Sustainable Development- The project will contribute to the sustainable development in the following ways

1. Environmental: Since the project activity leads to cleaner production of energy, it is leading to displacement of fossil fuel based energy.
2. Social: Setting up of the project activity has created new job openings hence is supporting employment of the local people around.
3. Cleaner Air: Since the project activity leads to lesser GHG emission it results in better air quality.

Further the project has been implemented as described in the Project Description^{/1/}. CAR 03 was raised on the editorial issue of sustainable development description and same resolved by revision in the MR.

The total emission reductions achieved in this monitoring period i.e. from 02/02/2018 to 28/02/2019 are 148,756 tCO₂e.

4.2 Accuracy of GHG Emission Reduction and Removal Calculations

The project monitoring has been carried in accordance with the registered VCS PD^{/1/} and the monitoring report^{/02/}. The monitoring plan laid in the registered PD is being followed at the site^{/9/}. The assessment team has verified the information flow (from data generation, aggregation, to recording, calculation and reporting for these parameters including the values) in the MR^{/2/}.

The emission reductions are purely based on the net electricity generated and exported from the machines. PP has provided all the sufficient data for current monitoring period. The values of the parameter $EG_{PJ,y}$ used in deriving the GHG emission reduction could be very well correlated between the data sets and ER spreadsheet^{/3/} provided by PP. The verification of each monitoring parameter has been discussed later in section 4.3.

The calculation method and formulae used in calculating baseline emission is in compliance to the methodology used i.e. "ACM0002 - Version 16.0"^{/7/}.

4.3 Quality of Evidence to Determine GHG Emission Reductions and Removals

The below tables describe how the parameter, that is to be measured according to the monitoring plan, 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 fulfilled.

Parameter	$EG_{PJ,y}$ (MWh) Quantity of net electricity generation supplied by the project (Wind) plant/unit to the grid during monitoring period	
Means of verification	Criteria/Requirements	Assessment/Observation
	Measuring /Reading /Recording frequency	The parameter is continuously measured and monthly recorded as JMR ^{/6/} .
	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. The reporting frequency is in line with the monitoring plan as outlined in the registered PD ^{/1/} and monitoring methodology ^{/7/} .
	Monitoring equipment	Dedicated meters located at the sub-station

	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?	Accuracy class of the equipment is 0.2s, which is in line to registered PD ^{/1/} and consistent with calibration certificate ^{/4/} as well. Information was found consistent onsite ^{/9/} .
	Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Accuracy class is valid for entire range.
	Calibration frequency /interval:	The meters are calibrated by respective State Utility once in five years ^{/1/} . Details of the calibration are provided in FVR and revised MR.
	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, Pending untill the findings are closed.or as per the manufacturer's specifications?	Yes
	Is the calibration of measuring equipment carried out by an accredited person or institution?	The meters are calibrated by respective State Utility's testing division once in five years ^{/4/} .
	Is(are) calibration(s) valid for the whole reporting	Yes. The calibration dates are presented in appendix 5 of this

	period?	report. The dates have been checked from the calibration certificates ^{/4/} . Thus, it is valid for the whole monitoring period.
	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?	A value of Net Electricity export by the project activity for the monitoring period verified from monthly joint meter reading issued by State Utility ^{/9/} . The value was found to be consistently reported in MR ^{/2/} and ER sheet ^{/3/} .
	If applicable, has the reported data been cross-checked with other available data?	The readings were cross checked with the monthly bills raised by PP to respective State Utility ^{/5/} .
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, the calibration of the monitoring meters is done by state utility periodically. Check meters also help in verifying main meter readings.
	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?	No such issues.

Findings	CAR 04 was raised and resolved.
Conclusion	The parameter has been monitored appropriately, in accordance with the registered monitoring plan (as per measurement methods and procedures to be applied) and applied methodology. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan. The implementation of the project is as per the registered PD^{1/} could be confirmed by the verification team.

Parameters fixed ex ante:

Ex-ante Parameter:

$EF_{grid,CM,y}$ = Parameter is fixed ex-ante for the entire crediting period and as per the validated VCS PD same is fixed 0.9770 tCO₂/MWh. Verification team found same was used in the ER calculations.

Baseline Emissions:

The baseline Emissions for a given year is calculated by multiplying the energy baseline with the grid emission factor. The grid in this case would be the 'Indian Grid'

Formula Used:-

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

Where:

BE_y	=	Baseline emissions in year y (t CO ₂ /yr)
$EG_{PJ,y}$	=	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)
$EF_{grid,CM,y}$	=	Combined margin CO ₂ emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO ₂ /MWh)

$EG_{PJ,y}$ = The verification team has checked the entire monthly JMR reports for net electricity generated & supplied to the grid and crosschecked same with the invoices raised by PP towards State Utilities for the monitoring period. All values are found correct. All the parameters are monitored and recorded as per the monitoring plan in the registered VCS PD. The verification team has crosschecked the revised emission reduction sheet and monitoring report data with the JMR sheet and invoice and found all the values are matching.

PE_y = As per para 37 of ACM0002 - Version 16.0, all renewable energy power generation project activities, emissions due to the use of fossil fuels for the backup generator can be neglected. As the project activity involved wind project emissions (PE_y) are taken as zero. Leakage: As per para 60 of ACM0002 - Version 16.0, Leakage emissions are not considered for the project activity.

The calculation method and formulae used in calculating baseline emission is in compliance to the methodology used i.e. "ACM0002 - Version 16.0"^{7/}. Since project activity

is a wind power project, leakage emission and project emission has been considered as zero.

Calibration of meters:

During the verification assessment of the project activity, accuracy of all the metering were checked. The installation and working conditions of the meters were checked during the on-site inspection. Calibration details of the meter is given in Appendix of this report.

In line with the registered PD^{1/}, calibration frequency of the billing meters is once in five years and no delay in calibration has been observed in this periodic verification. Further, there was not any significant period of shut-down or break-down period during this monitoring period.

GHG Calculations

The emission reduction as per the applied methodology equals the baseline emissions (project emissions and leakage emissions for such project activities is considered zero). The formula provided for the calculation of baseline emissions is:

$$BE_y = EG_{PJ, y} * EF_{grid, CM, y}$$

Where:

BE_y : Baseline emissions in year y (tCO₂e/yr)

$EG_{PJ, y}$: Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the VCS project activity in year y (MWh/yr)

$EF_{grid, CM, y}$: Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO₂e/MWh)

Baseline emissions (BE_y) are calculated as follows:

$$\begin{aligned} BE_y &= EG_{PJ, y} * EF_{grid, CM, y} \\ &= 1,52,258 \times 0.9770 \\ &= 148,756 \text{ tCO}_2\text{e} \end{aligned}$$

Baseline Emissions for Project activity:

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
02-Feb-2018 to 31-Dec-2018	142,903	0	0	142,903
01-Jan-2019 to 28-February-2019	5,853	0	0	5,853
Total	148,756	0	0	148,756

4.4 Non-Permanence Risk Analysis

Not applicable.

5 SAFEGUARDS**5.1 No Net Harm**

Not applicable

5.2 Local Stakeholder Consultation

Local stakeholder consultation has been conducted at the time of project registration hence not applicable in the current monitoring period.

6 VERIFICATION CONCLUSION

Earthood Services Private Limited (Earthood), contracted by Panama Wind Energy Godawari Private Limited, has performed the independent verification of the emission reductions for the VCS project activity reference number 1523 “Wind Based Power Generation by Panama Wind Energy Godawari Private Limited, Pune in the State of Maharashtra, India” in India for the monitoring period 02/02/2018 to 28/02/2019 reported in the Monitoring Report Version 02 dated 09/08/2019.

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 - Version 16.0”, the monitoring plan contained in the PD version 02 and VCS guidelines version 3.7, Monitoring Report Version 02 dated 09/08/2019 as per the process 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 evidence and other information and explanations

that Earthood considered necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.

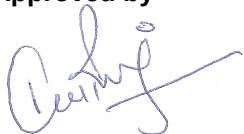
In our opinion the GHG emissions reductions reported for the project activity for the period 02/02/2018 to 28/02/2019 are fairly stated in the Monitoring Report Version 02 dated 09/08/2019. The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology "ACM0002 - Version 16.0" and the VCS standard.

Monitoring period: 02/02/2018 to 28/02/2019 (both days inclusive)

Verified GHG emission reductions and removals in the above verification period:

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
02-Feb-2018 to 31-Dec-2018	142,903	0	0	142,903
01-Jan-2019 to 28-February-2019	5,853	0	0	5,853
Total	148,756	0	0	148,756

Approved by



Kaviraj Singh
Managing Director
Earthood Services Privated Limited

Date: 19/11/2019

Place: Gurgaon, Haryana

APPENDIX 1: References

S.No	Title of Document	Version	Date
1.	Registered VCS PD	version 02	15/03/2016
2.	VCS Monitoring Report	2	09/08/2019
3.	ER spreadsheet (corresponding to the final monitoring report)	2	09/08/2019
4.	Certificates of Calibration for all the meters belongs to project activity (dated 16/07/2016 & 22/05/2018 for main meters & 27/07/2016 & 22/05/2018 for check meters)	-	-
5.	Invoice issued by PP for the duration of 02/02/2018 to 28/02/2019	-	-
6.	Joint Meter Readings for the duration of 02/02/2018 to 28/02/2019	-	-
7.	"Consolidated baseline methodology for grid-connected electricity generation from renewable sources", ACM0002,	"ACM0002 - Version 16.0"	-
8.	CO ₂ Baseline Database for the Indian Power Sector published by the Central Electricity Authority (CEA), Ministry of Power, Govt.	version 10	-
9.	On-site assessment, interviews of plant staff	-	08/08/2019
10.	Commissioning certificate for all the WTGs of the project activity	-	-
11.	Power Purchase Agreements	-	-
12.	VCS webpage for the project, VCS ID 1523; https://www.vcsprojectdatabase.org/#/project_details/1523	-	Last accessed on 13/11/2019
13.	O&M contract for all project sites	-	-
14.	VCS Standard	Version 3.7	Last accessed on 13/11/2019
15.	VCS Program Guide	Version 3.7	Last accessed on 13/11/2019
16.	Letter of declaration dated from PP regarding not having created or sought any other form of environmental credit for the same period and double counting	-	-
17.	Google Earth desktop/Mobile application	-	Last accessed on 08/08/2019

APPENDIX 2: Competency Statement

Competence Statement			
Name	Atul Takarkhede		
Education	Ph.D. Environmental Science		
Experience	12 years		
Field	Climate Change and environment		
Approved Roles			
Team Leader	YES		
Validator	NO		
Verifier	NO		
Methodology Expert	NO		
Local expert	NO		
Financial Expert	NO		
Technical Reviewer	NO		
TA Expert	YES (1.2)		
Reviewed by	Shreya Garg	Date	24/04/2019
Approved by	Anshika Gupta	Date	25/04/2019

Competence Statement			
Name	Shreya Garg		
Country	India		
Education	M.Sc. (Climate Science & Policy), TERI University		
Experience	6 Years +		
Field	Climate Change		
Approved Roles			
Team Leader	YES		
Validator	YES		
Verifier	YES		
Methodology Expert	AMS.I.A., AMS.I.C., AMS.I.D., AMS.I.F., AMS.II.D., AMS.II.G., AMS.II.J., AMS.III.AV., ACM0002, ACM0012		
Local expert	YES (India)		
Financial Expert	NO		
Technical Reviewer	YES		
TA Expert	YES (TA 1.2, TA 3.1)		
Reviewed by	Abhishek Mahawar	Date	01/03/2018
Approved by	Ashok Gautam	Date	01/03/2018

APPENDIX 3: Abbreviations

BEF	Baseline Emission Factor
BM	Build Margin
CAR	Corrective Action Request
CEA	Central Electricity Authority
CERC	Central Electricity Regulatory Commission
CL	Clarification Request
CMS	Central Monitoring System
CO ₂	Carbon dioxide
EB	Executive Board
FAR	Forward Action Request
GHG	Green House Gas
ISO	International Standards Organization
JMR	Joint Meter Reading
kW	Kilowatt
kWh	Kilowatt hour
MR	Monitoring Report
MW	Megawatt
MWh	Megawatt-hour
MSEDCL	Maharashtra State Electricity Distribution Co. Ltd.
NEWNE	Northern Eastern Western Northern-Eastern
PD	Project Description
PP	Project Proponent
PPA	Power Purchase Agreement
QA/QC	Quality Assurance and Quality Control
WTG	Wind Turbine Generator
VCS	Voluntary Carbon Standard
VCSA	Voluntary Carbon Standard Association
VCS PD	VCS Project Description
VCUs	Voluntary Carbon Units

APPENDIX 4: Verification Findings

Remaining FAR from validation and/or previous verification

FAR ID	01	Section no.		Date : DD/MM/YYYY
Description of FAR				
<i>There is no FAR from the previous verification.</i>				
Project participant response				Date : DD/MM/YYYY
NA				
Documentation provided by project participant				
NA				
DOE assessment				Date: DD/MM/YYYY
NA				

Table 1. CL from this verification

CL ID	02	Section no.		Date DD/MM/YYYY
Description of CL				
NA				
Project participant response				Date : DD/MM/YYYY
NA				
Documentation provided by project participant				
NA				
DOE assessment				Date: DD/MM/YYYY
NA				

Table 2. CAR from this verification

Project Implementation Status

CAR ID	03	Section no.	4.1	Date: 18/05/2019
Description of CAR				
Under column Economic well-being of sustainable development, environmental well-beings are described. Corrections requested in the section.				
Project participant response				Date: 09/08/2019
Corrections have been made to the MR V2.				
Documentation provided by project participant				
MR V2.				
DOE assessment				Date:11/10/2019
Section 1.10 of the MR have been now corrected appropriately. Thus CAR closed.				

CAR ID	04	Section no.	4.1	Date: 18/05/2019
Description of CAR				
Operational status of the project activity during this monitoring period is missing in the section. Corrections requested.				
Project participant response				Date: 09/08/2019
Operational status of the projects is added to the section 2.1 of MR V2				
Documentation provided by project participant				
MR V2.				
DOE assessment				Date: 11/10/2019

Information on operational status is now included in the Section 2.1 of the MR and during the this monitoring duration no events have been found that can change design of the project or ability to deliver VCUs. Thus, CAR closed.

Accuracy of GHG Emission Reduction and Removal Calculations

CAR ID	05	Section no.	4.2	Date:	18/05/2019
Description of CAR					
Export/Import values not matching with the JMR of April 2018 for Feeder 03; July 2018 for Feeder 04; Nov 2018 for Feeder 02 & 03; Dec 2018 for Feeder 02 Jan 2019 for Feeder 04 and Feb 2019 for all four Feeders. Correction requested in ER sheet and relevant sections of MR.					
Project participant response					Date: 09/08/2019
Corrections are made in the ER and accordingly in the MR					
Documentation provided by project participant					
ER V2 and MR V2.					
DOE assessment					Date: 11/10/2019
ER sheet and MR have been now revised and export / import value are matching with the JMRs. CAR closed.					

Quality of Evidence to Determine GHG Emission Reductions and Removals

CAR ID	06	Section no.	4.3	Date:	
Description of CAR					
NA					
Project participant response					Date:
NA					
Documentation provided by project participant					
NA					
DOE assessment					Date:
NA					

Table 3. FAR from this verification

FAR ID	07	Section No.		Date :	DD/MM/YYYY
Description of FAR					
<i>there is no FAR from this verification.</i>					
Project participant response					Date : DD/MM/YYYY
NA					
Documentation provided by project participant					
NA					
DOE assessment					Date: DD/MM/YYYY
NA					

APPENDIX 5: Calibration Details of the WTGs

Calibration Details of the WTGs installed in the project activity is provided below:

WTG ID	Feeder	Date of Calibration of Main Meter	Main Meter Sr. No.	Date of Calibration of Check Meter	Check Meter Sr. No.	Calibration Compliance
Location No. - 38,26,32	Feeder No. 1	16/07/2016 & 22/05/2018	5288748	27/07/2016 & 22/05/2018	5288752	Yes
Location No. - 24,25,29,30,31	Feeder No. 1	16/07/2016 & 22/05/2018		27/07/2016 & 22/05/2018		Yes
Location No. - 21	Feeder No. 2	16/07/2016 & 22/05/2018	5288749	27/07/2016 & 22/05/2018	5288753	Yes
Location No. - 5,22,23	Feeder No. 2	16/07/2016 & 22/05/2018	5288749	27/07/2016 & 22/05/2018	5288753	Yes
Location No. - 33,34,35,36,37, 39,40	Feeder No. 2	16/07/2016 & 22/05/2018	5288749	27/07/2016 & 22/05/2018	5288753	Yes
Location No. - 27,28	Feeder No. 2	16/07/2016 & 22/05/2018	5288749	27/07/2016 & 22/05/2018	5288753	Yes
Location No. - 1,2,3,4,6,7,8,10, 11	Feeder No. 3	16/07/2016 & 22/05/2018	5288751	27/07/2016 & 22/05/2018	5288750	Yes
Location No. - 9,12,13,16,18,19,20	Feeder No. 4	16/07/2016 & 22/05/2018	5288755	27/07/2016 & 22/05/2018	5288754	Yes
Location No. - 17,14,15	Feeder No. 4	16/07/2016 & 22/05/2018	5288755	27/07/2016 & 22/05/2018	5288754	Yes

The calibration frequency of the energy meter is once in 5 year as per the registered VCS PD^{1/}. Thus, during the current Monitoring Period, there is no delay in calibration observed.