

VERIFICATION REPORT

44 MW BUNDLED WIND POWER PROJECT IN MAHARASHTRA MANAGED BY ENERCON INDIA LIMITED



Document Prepared By Bureau Veritas Certification Holding SAS

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Summary:

Bureau Veritas Certification has made the 5th periodic verification of “44 MW Bundled Wind Power Project in Maharashtra managed by Enercon India Limited”, which is spread across villages in Kadvekhurd, Varekarwadi, Bhambarwadi & Panchpatta, in Satara, Sangli, Nasik & Ahmednagar district in the state of Maharashtra, India with VCS project ID 489 on the basis of Voluntary Carbon Standard (VCS) Version 3 Program, as well as criteria given to provide for consistent project operations, monitoring and reporting UNFCCC criteria refer to Article 12 of the Kyoto Protocol, as well as the host country criteria.

The verification scope is defined as a periodic independent review and ex-post determination by the Designated Operational Entity of the monitored reductions in GHG emissions during defined verification period, and consisted of the following three phases: i) desk review of the project design and the baseline and monitoring plan; ii) follow-up 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 using Bureau Veritas Certification internal procedures.

The first output of the verification process is a list of Clarification Requests, Corrective Actions Requests, Forward Actions Requests (CLs, CARs and FARs).

In summary, Bureau Veritas Certification confirms that the Project is implemented as planned and described in the VCS-PD. Installed equipment being essential for generating emission reduction runs reliably and is calibrated appropriately. The monitoring system is in place and the Project is ready to reduce GHG emission. The GHG emission reduction is calculated without material misstatements.

Our opinion relates to the Project's GHG emissions and the resulting GHG emission reductions viz. Voluntary Carbon Units (VCUs) reported are based on the valid project baseline, monitoring plan and associated documents. Based on the evidence and information that are considered necessary to guarantee that GHG emission reductions are appropriately calculated, Bureau Veritas Certification confirms following statement:

Reporting period	Baseline Emissions, (BE _y) (tCO ₂ e)	Project Emissions, (PE _y) (tCO ₂ e)	Leakages, (L _y) (tCO ₂ e)	Emission Reductions, (ER _y) (tCO ₂ e)
01/10/2012 to 31/12/2012	10206	0	0	10206
01/01/2013 to 30/04/2013	12934	0	0	12934

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Abbreviations

CDM	Clean Development Mechanism
CEA	Central Electricity Authority
CL	Clarification Request
CO ₂	Carbon Dioxide
DOE	Designated Operational Entity
JMR	Joint Meter Reading
PDD	Project Design Document
M&P	Modalities and Procedure
MP	Monitoring Plan
MSEDCL	Maharashtra State Energy Distribution Company Limited
MW	Mega Watt
MWh	Mega Watt Hour
NCES	Non Conventional Energy Sources
OM/BM	Operating Margin/Built Margin
O&M	Operation and Maintenance
PPA	Power Purchase Agreement
PP	Project Participant
WTG	Wind Turbine Generators
VCS	Verified Carbon Standard
VER	Verified Emission Reduction
VVM	Validation and Verification Manual
VVS	Validation and Verification Standard

1 INTRODUCTION

1.1 Objective

Enercon (India) Limited¹ has commissioned Bureau Veritas Certification to verify the emission reductions (VER) for 5th periodic VCS verification of the Verified Carbon Standard project (VCS) of *“44 MW Bundled Wind Power Project in Maharashtra managed by Enercon India Limited”* (hereafter referred to as “the Project”), which is spread across villages in Kadvekhurd, Varekarwadi, Bhambarwadi & Panchpatta, in Satara, Sangli, Nasik & Ahmednagar district in the state of Maharashtra, India, for the period from 01/10/2012 to 30/04/2013.

Bureau Veritas Certification as the validation/verification body of the Project has been accredited as a DOE by UNFCCC and also meets the competence requirements as set out in ISO 14065:2007.

The Verification is the independent review and ex-post determination by the verification body of the monitored reductions in GHG emissions during defined verification period.

The certification is the written assurance by a Certification Entity that, during a specific period in time, a project activity achieved the emission reductions as verified. According to the VVS, the Certification Entity is defined as an entity which has been accredited as a DOE by the CDM Executive Board for the particular scope into which the project falls or has been accredited as an approved Certification Entity by the VCS Steering Committee. Bureau Veritas Certification is an accredited DOE for the particular scope into which the Project falls.

The objective of verification is to verify and certify the Verified Carbon Units (VCUs) generated by the Project from 01/10/2012 to 30/04/2013.

VCS Version 3 Program and UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM rules and modalities and the subsequent decisions by the CDM Executive Board, as well as the host country criteria.

1.2 Scope and Criteria

The verification scope is defined as an independent and objective review of the VCS Project Description (VCS-PD), the Project's baseline study and Monitoring Report (MR) and other relevant documents. The information in these documents is reviewed against VCS Version 3 requirements, UNFCCC rules and associated interpretations.

The verification is not meant to provide any consulting towards the client. However, stated requests for forward actions and/or corrective actions may provide input for improvement of the Project monitoring towards reductions in the GHG emissions.

1.3 Level of assurance

The verification report is based on the VCS-PD (Ref /P01/), the VCS Monitoring Report (Ref /P02/) (MR) and supporting evidences made available to the verifier and information collected through performing interviews. The verification conclusion is assured the level of assurance of the Project is high.

¹ The project activity is a bundled project of capacity 44 MW with 29 different customers (owners), each implementing different capacities ranging from 0.8 MW to 7.2 MW. The Enercon (India) Ltd (EIL) is the equipment supplier and the O & M contractor for the WTGs. EIL act as the coordinator among the different customers. EIL has been given approval by the project owners to act as Project participant for securing VCU credits for this project. Hence EIL has contracted BVCH for this VCS verification.

1.4 Summary Description of the Project

The Project activity involves electricity generation by WTGs and supplying the same to the NEWNE grid². This is the renewable energy generation, which can replace the fossil fuel dominated grid connected electricity generation. The project activity consists of 55 WTGs with an installed capacity of 44 MW in the state of Maharashtra, India. All the 55 WTGs are of 0.8 MW (E-48) capacity and have been sourced from Enercon.

The verification team noted that the project has been implemented as planned. The 44 MW wind farm comprises WTGs commissioned between February 2006 and December 2008. The commissioning certificates for the wind turbines (Ref /P03/) were verified against the commissioning capacity details and found to be correct.

The Project has been registered under VCS standard 2007.1 with project ID 489 under approved CDM methodology ACM 0002, Version 10 “*Consolidated methodology for grid-connected electricity generation from renewable sources*”. The Project Start Date is 07/02/2006, when the first WTG in the bundle was commissioned and started electricity generation. The 5th monitoring period for the Project under VCS is from 01/10/2012 to 30/04/2013.

Project Title	44 MW Bundled Wind Power Project in Maharashtra managed by Enercon India Limited
VCS Project ID	489
Monitoring period	01/10/2012 to 30/04/2013
Project Participants	Enercon (India) Limited
Methodologies used	ACM 0002 version 10
Location of the project	Villages in Kadvekhurd, Varekarwadi, Bhambarwadi & Panchpatta, in Satara, Sangli, Nasik & Ahmednagar district in the state of Maharashtra, India
Geo Coordinates	As provided in Section 1.5 of VCS PD and Section 1.7 of the monitoring report
VCS Link	https://vcsprojectdatabase2.apx.com/myModule/Interactive.asp?Tab=Projects&a=2&i=489&lat=17%2E554167&lon=73%2E924444&bp=1

² Northern, Eastern, North Eastern and Western Grid was synchronised in August, 2006. At present, the Indian electricity system is divided into two grids, the Integrated Northern, Eastern, Western, and North-Eastern regional grids (NEWNE) and the Southern Grid.

2 VALIDATION PROCESS, FINDINGS AND CONCLUSION

2.1 Validation Process

This is the 5th periodic verification for the registered VCS project activity with project ID 489. Hence this section is not applicable.

2.2 Validation Findings

2.2.1 Gap Validation

Not applicable

2.2.2 Methodology Deviations

Not applicable

2.2.3 Project Description Deviations

Not applicable

2.2.4 New Project Activity Instances

Not applicable

2.3 Validation Conclusion

Not applicable

3 VERIFICATION PROCESS

3.1 Method and Criteria

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

The Project was verified against the requirements set in VCS Standard Version 3.3 effective as on 04/10/2012 (Ref/B01/) and the Clean Development Mechanism Validation and Verification Standard (Ref/B02/).

3.2 Document Review

The verification of the project documentation provided by the project participant is based upon both quantitative and qualitative information on emission reductions. Quantitative information comprises the reported numbers in the monitoring report (MR), version 03 dated 16/08/2013 (Ref/P04/) submitted to Bureau Veritas Certification. Qualitative information comprises information on internal management controls, calculation procedures, procedures for transfer of data, frequency of emissions reports, and review and internal audit of calculations.

In addition to the monitoring documentation provided by the project participants, Bureau Veritas Certification reviewed:

- a) The VCS-PD of the Project, the monitoring plan and the corresponding validation report (Ref/P05/).
- b) The applied monitoring methodology (Ref/B03/).
- c) Other information and references relevant to the project activity's resulting emission reductions.

3.3 Interviews

Bureau Veritas Certification performed interviews with project stakeholders to confirm selected information and to resolve issues identified in the document review.

3.4 Site Inspections

The verification team did not conduct the on-site assessment for this verification. The verification team has reviewed the verification reports of all the previous monitoring periods and noted that the project has been implemented and operated in accordance with the description provided in the registered VCS-PD. For the current monitoring period, the verification team has reviewed all the monthly statements for the current monitoring period, which are the official records for the generation and supply of electricity to the national grid. The verification team has cross checked the same with the invoices and receipts of payment, which also confirms the same figures mentioned in the monthly statements. Thus the verification team deemed that the on-site assessment was not required in order to arrive at conclusions regarding the project activity.

3.5 Resolution of Any Material Discrepancy

The objective of this phase of the verification is to raise the requests for corrective actions and clarification and any other outstanding issues that needed to be clarified for Bureau Veritas Certification positive conclusion on the GHG emission reduction calculation.

Findings established during the verification can either be seen as a non-fulfillment of criteria ensuring the proper implementation of a project or where a risk to deliver high quality emission reductions is identified.

Corrective Action Requests (CARs) are issued, where:

- a) Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;
 - b) Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impair the estimate of emission reductions;
 - c) Issues identified in a FAR during validation or previous verification to be verified during verification have not been resolved by the project participants.
- Forward Action Requests (FARs) are issued, for actions if the monitoring and reporting require attention and/or adjustment for the next verification period.

The verification team may also use the term Clarification Requests (CLs), if information is insufficient or not clear enough to determine whether the applicable VCS requirements have been met.

To guarantee the transparency of the verification process, the issues raised are documented in more details below.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

The project has been implemented; all WTGs were commissioned and are in operation as described in the registered VCS PD. The same has been confirmed by reviewing the commissioning certificates (Ref /P03/). The first WTG has been commissioned on 07/02/2006 and the last one on 10/12/2008. The commissioning dates mentioned in the monitoring report of

all the WTGs was cross checked against the details provided in the commissioning certificates and found to be consistent.

The verification team noted that the project consist of 55 WTGs with an installed capacity of 44 MW in the state of Maharashtra, India, which is same as described in the registered VCS PD. The entire power generated by the project activity is supplied to the NEWNE (western) regional grid of India with a firm power purchase agreement with the Maharashtra State Electricity Distribution Company Limited (MSEDCL).

The Project involves 55-wind energy converters (WECs) of Enercon make (800 kW E-48) with internal electrical lines connecting the project with local evacuation facility. The WECs generates 3-phase power at 400V, which is stepped up to 22 KV at the WTG site. The Project can operate in the frequency range of 47.5–51.5 Hz and in the voltage range of 400 V $\pm$ 12.5%.

4.2 Accuracy of GHG Emission Reduction or Removal Calculations

Monitoring has been carried out in accordance with the monitoring methodology described in ACM0002, version 10 (Ref /B03/) and the monitoring plan contained in the VCS-PD. The parameters, required by the monitoring plan and the way the verification team has verified the information flow (from data generation, aggregation, to recording, calculation and reporting for these parameters including the values) in the VCS-MR are described below:

Parameters monitored ex-post:

Sr. no.	Parameter	Data information flow
(1)	Electricity exported to the grid by the project activity in year y ($EG_{Export,y}$)	The verification team noted that the value of electricity generation from project and non-project WECs is archived from central monitoring station that collects data from the WEC controller. The controller meter measures the electricity generation of the WEC on a continuous basis and is recorded at the Central monitoring station. The verification team also noted that the electricity exported /imported from the grid (by both project activity and non-project activity) is recorded through Single billing electronic meters connected to different feeders. The electronic tri-vector meters (main and check) installed at the substation measures the electricity exported/imported from the grid on a continuous basis and is recorded by state utility on monthly basis. Based on the above two, the parameter energy exported to the grid by the project activity is calculated by MSEDCL. The same value is reflected in the “<u>Monthly credit note</u>” issued by Maharashtra State Electricity Distribution Company Limited (State Utility). The verification team has verified the monthly credit notes (P/06/) of all the feeders for all the months during the entire monitoring period. Since monthly credit notes are the certificate issued by the

		state utility viz. Maharashtra State Electricity Distribution Company Limited hence the same is considered as authentic and reliable. <i>Based on the above, the verification team concludes that the monitoring of electricity exported to the grid is in line with the provision described in the monitoring plan.</i>
(2)	Electricity imported from the grid ($EG_{Import,y}$)	The verification team noted that the value of electricity generation from project and non-project WECs is archived from central monitoring station that collects data from the WEC controller. The controller meter measures the electricity generation of the WEC on a continuous basis and is recorded at the Central monitoring station. The verification team also noted that the electricity exported /imported from the grid (by both project activity and non-project activity) is recorded through Single billing electronic meters connected to different feeders. The electronic tri-vector meters (main and check) installed at the substation measures the electricity exported/imported from the grid on a continuous basis and is recorded by state utility on monthly basis. Based on the above two, the parameter energy imported from the grid by the project activity is calculated by MSEDCL. The same value is reflected in the “<i>Monthly credit note</i>” issued by Maharashtra State Electricity Distribution Company Limited (State Utility). The verification team has verified the monthly credit notes (P/06/) of all the feeders for all the months during the entire monitoring period. Since monthly credit notes are the certificate issued by the state utility viz. Maharashtra State Electricity Distribution Company Limited hence the same is considered as authentic and reliable. <i>Based on the above, the verification team concludes that the monitoring of electricity imported from the grid is in line with the provision described in the monitoring plan.</i>
(3)	Net electricity supplied to the grid by the machines of the Project ($EG_{y,net}$)	Based on the calculated parameters as described above, the net electricity supplied to the grid is calculated as: $EG_{y,net} = EG_{Export,y} - EG_{Import,y}$

Parameters determined ex-ante:

Sr. no.	Parameter	Value/ Data unit	Source document
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1.	Operating margin emission factor of NEWNE Grid ($EF_{OM,y}$)	1.00862 tCO ₂ /MWh	CEA CO ₂ baseline database version 04. This is an official source of data and hence acceptable.
2.	Build margin emission factor of NEWNE grid ($EF_{BM,y}$)	0.59771 tCO ₂ e/MWh	CEA CO ₂ baseline database version 04. This is an official source of data and hence acceptable.
3.	Combined margin emission factor of NEWNE grid ($EF_{grid,y}$)	0.90589 tCO ₂ e/MWh	Calculated as per Tool to calculate emission factor for an electricity system (Ref-B/4/)

Calibration

During the verification assessment of the project activity, accuracy and calibration of all the monitoring equipments have been checked through review of the calibration certificates (Ref /P07/ and /P08/). The details of monitoring equipments involved in the project activity and their calibration details are mentioned in the table below:

Feeder number	District	Meter serial number	Accuracy class	Make	Calibration date
F3	Satara	04760188	0.2	Elster	03/05/2012
F1	Satara	04760189	0.2	Elster	05/05/2012
F1	Sangli	04862746	0.2	Elster	27/08/2012
F3	Sangli	04862747	0.2	Elster	27/08/2012
F4	Nasik	04862984	0.2	Elster	20/06/2012
F6	Nasik	04862987	0.2	Elster	20/06/2012
F5	Ahmednagar	04862983	0.2	Elster	20/06/2012
F1	Ahmednagar	04862978	0.2	Elster	20/06/2012
F4	Ahmednagar	04862984	0.2	Elster	20/06/2012

Further, the accuracy class of the meters installed at substation is 0.2 and was verified from the individual calibration reports of these meters (Ref /P07/). Thus the verification team confirms that the accuracy class of all the monitoring equipments is the same as mentioned in the monitoring report. The gazette of India (Registered No. DL(N) – 04/0007/2003) dated 26/07/2010 which is gazette for metering regulations in India clearly mentions that for voltage of 650 V upto 33kV, the recommended accuracy class of meters is 0.5s and better. Hence the verification team concluded that the accuracy class of 0.2 of energy meters installed at the sites is appropriate and hence acceptable.

By reviewing the calibration certificates, the verification team noted that calibrations for all monitoring equipments have been carried out once in a year. The CEA notification No. 502/70/CEA/DP&D dated 17/03/2006 which is considered as national standard mentions that “All interface meters shall be tested at least once in five years”. Hence the calibration frequency of once in a year for the meters is appropriate.

Further, from reviewing each of the calibration certificates, the verification team was able to confirm that test results for all the energy meters are satisfactory, that the meters have operated within the permissible error limit and as per the stated frequency in the Monitoring report.

4.3 Quality of Evidence to Determine GHG Emission Reductions or Removals

All records like credit notes, invoices, meter calibration reports, etc. related to the project activity operations have been submitted to the verification team.

The project participant has submitted a spreadsheet for the ER calculation spreadsheet (Ref /P09/), which mentions monthly statement readings for each project promoter, for the current monitoring period, separately for each billing month from 01/10/2012 to 30/04/2013. The verification team has checked the readings in each monthly statement and confirms that the readings are correctly taken in the ER calculation sheet.

The verification team confirms that complete data set for all the above mentioned monitored parameters is available for the current monitoring period; hence any theoretical assumption or request for deviation was not required for the current monitoring period.

Cross check of information in monitoring report

As per the monitoring plan, the measurement results of net electricity supplied to the grid has been cross-checked with the invoices raised by the PP (Ref /P10/). Thus the verification team was able to confirm the net electricity supplied by the project activity to the grid.

4.4 Management and Operational System

The operations, maintenance and monitoring of the project activity is being carried out by the WTG supplier, Enercon whose operation and maintenance activities are ISO certified. Hence it can be confirmed that the management system of the VCS project is in place; with the responsibilities properly identified.

5 VERIFICATION CONCLUSION

Bureau Veritas Certification has performed the 5th periodic verification of “44 MW Bundled Wind Power Project in Maharashtra managed by Enercon India Limited”, VCS project ID 489, which is located in villages in Kadvekhurd, Varekarwadi, Bhambarwadi & Panchpatta, in Satara, Sangli, Nasik & Ahmednagar district in the state of Maharashtra, India and applying the methodology ACM 0002 Version 10.

The verification was performed based on the requirements set by VCS Standard Version 3.3 effective as on 04/10/2012, UNFCCC criteria for the CDM and relevant guidance provided by CMP and the CDM Executive Board.

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

The CDM team of Enercon (India) Limited is responsible for the preparation of the GHG emissions data and the reported GHG emission reductions of the project on the basis set out within the project Monitoring Plan in the registered VCS-PD. The development and maintenance of records and reporting procedures in accordance with that plan, including the calculation and determination of GHG emission reductions from the Project, is the responsibility of the management of the Project.

Bureau Veritas Certification has verified the project Monitoring Report, version 03 dated 16/08/2013 for the reporting period as indicated below. Bureau Veritas Certification confirms that the Project is implemented as described in the validated and registered project design documents. Installed equipments being essential for generating emission reductions, run reliably and are calibrated appropriately. The monitoring system is in place and the Project is generating GHG emission reductions. The Project also conforms to the verification criteria for projects and their GHG emission reductions or removals set out in the VCS rules.

Bureau Veritas Certification can confirm that the GHG emission reductions are calculated without material misstatements. Our opinion relates to the projects' GHG emission and resulting GHG emission reductions reported and related to the validated and registered project baseline, monitoring plan and its associated documents. Based on the evidence and information that are considered necessary to guarantee that GHG emission reductions are appropriately calculated, Bureau Veritas Certification confirms the following statement:

Reporting period: From [01/10/2012] to [30/04/2013]

Verified GHG emission reductions or removals in the above reporting period:

GHG Emission Reductions or Removals	tCO ₂ e
Baseline Emissions	10206 (01/10/2012 - 31/12/2012)
	12934 (01/01/2013 – 30/04/2013)
Project Emissions	0
Leakage	0
Net GHG emission reductions or removals	23140



Anurag Juyal
(Team Leader)
20/08/2013



Srinivasan Selvaraj
(Supporting Internal Technical
Reviewer)
20/08/2013



Sanjay Patankar
(Internal Technical Reviewer)
20/08/2013

6 REFERENCES

Category 1 documents:

Documents provided by the project participant that related directly to the GHG components of the project.

/P01/	Registered VCS PD, Version 01, dated 16/09/2009
/P02/	VCS - MR version 01 dated 15/06/2013
/P03/	Commissioning certificates of all the WTGs of the project activity
/P04/	VCS – MR version 03 dated 16/08/2013

/P05/	VCS Validation Report dated 13/11/2009
/P06/	Monthly credit notes for the electricity supplied to the grid issued by MSEDCL for the current monitoring period
/P07/	Calibration records for all the individual meters at the WTG locations, for the current monitoring period
/P08/	Calibration records for the substation meters for the current monitoring period
/P09/	ER calculation spreadsheet
/P10/	Invoices for the project activity (monthly, for the entire monitoring period)

Category 2 Documents:

Background documents related to the design and/or methodologies employed in the design or other reference documents.

/B01/	VCS Standard Version 3.3
/B02/	CDM Validation and Verification Standard (Version 3)
/B03/	Approved Baseline & Monitoring Methodology: ACM 0002, version 10
/B04/	Tool to calculate emission factor

Persons interviewed:

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

/I01/	Mr. Bhupendra Kumar Verma, CDM, Enercon India Limited
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7 CURRICULA VITAE OF THE DOE'S VERIFICATION TEAM MEMBERS

Mr. Anurag Juyal - Team Leader:

Bureau Veritas Certification, Lead Verifier – Climate Change

Mr. Anurag Juyal is a Post-graduate in Energy Systems with around 6 years of experience in the field of climate change services. He is working in Bureau Veritas Certification (India) Pvt. Ltd. as Verifier-Climate Change. Prior to joining Bureau Veritas, he worked on GS/CDM/VCS projects as a consultant. He has received extensive training in CDM validation and verification processes and participated in assessment of CDM projects.

Mr. Pramod Kamble - Team Member:

Bureau Veritas Certification, Lead Verifier – Climate Change

Graduate in Chemical Engineering from Mumbai University (MUICT). He has prior experience in CDM, VCS and CCX projects development. He has undergone intensive training on Clean Development Mechanism and completed CDM Verifier/Lead Verifier training course. He has hands on experience in carrying out energy audits for energy industries and buildings. At present he is involved in the Validation/verification of CDM and VCS projects.

Sanjay Patankar, Bureau Veritas Certification, Internal Technical Reviewer

Educational qualifications: B.E. (Mech.) M.E. (Mech.)

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. Working for the last 2 years in Bureau Veritas Certification (India) Pvt. Ltd. as Lead Auditor for ISO 9001, 14001 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.

Srinivsan Selvaraj, Bureau Veritas Certification, Supporting ITR

Education: B.TECH - Chemical Engineering, M.E (Environmental Management) and PGDBM (Finance). He has over 8 years of experience in the field of Environment and Energy services. He is a certified energy auditor from Bureau of Energy efficiency from Ministry of Power and has successfully completed the IRCA approved Lead Auditor course for ISO 14001. He has been in the validation and verification of CDM/VCS/Gold standard projects since June 2008.

VERIFICATION PROTOCOL

Table 1 Verification requirements based on the Verified Carbon Standard version 3.

CHECKLIST QUESTION	COMMENTS	Draft Concl	Final Concl
1 Project implementation in accordance with the registered project document			
a Are all physical features of the proposed VCS project proposed in the registered PD in place?	All the physical features of the registered VCS project (Project ID 489) are in place at the site and in operation. Project activity involves the installation and operation of 55 WTGs of 0.8 MW capacity each with aggregate capacity of 44 MW in Satara, Sangli, Nasik and Ahmednagar district of Maharashtra state.	OK	OK
b Have the project participants operated the proposed VCS project as per the registered PD?	Yes, project participant have operated the proposed VCS project as per the registered PD and monitoring plan contains therein. Monitoring report states that in the last verification PP got approved the revised monitoring plan for the project activity. Please submit the required supporting documents for verification. Also provide the reference web link in footnote for the deviation approved and provide the copy for verification.	CL-1	OK
c Is the monitoring report prepared in line with the requirements of standard VCS Monitoring report template ver 3.2?	Yes. Monitoring report is prepared by using the latest available template version 3.2. However following issues are identified during review of monitoring report. 1) Cover page does not provide the dates in standard DD-Month-YYYY formats for monitoring period and issuance of document. 2) Section 1.2 does not specify the Project type as per requirements specified in standard MR template. 3) Section 1.7 of MR does not specify the latitude and longitude for some of the WTGs. Please provide the same for all individual WTGs and modify MR. 4) Section 1.8, makes reference to earlier version of VCS. Please update the VCS version and provide the link for the referenced methodology. 5) Section 2.1 does not provide additional information regarding the operation of WTGs, generated kWh and achieved PLF vis-a-vis that given in registered VCS-PD as per VCS MR guidelines	CAR-1	OK

CHECKLIST QUESTION	COMMENTS	Draft Concl	Final Concl
	6) In Section 3.3, As per VCS MR guidance, procedure for handling internal auditing and non-conformities to be described. Please clarify how it is taken care of. 7) In section 3.3, for some of the WTGs, the Feeder Details are not provided. Clarify and update the MR.		
d Was an on-site visit conducted?	No. Verification team did not conduct the onsite visit as the required parameters for estimation of emission reductions are available through online measurement of generated power from the individual WTGs and same is recorded on live basis in Central Monitoring Station of Enercon. Also the net power exported to the grid by project activity WTGs along with other project owner WTGs is monitored by energy meters installed at the substation operated and controlled by MSEDCL. Therefore the monitored and measured data is deemed to be authentic. The representatives of MSEDCL and PP takes the monthly joint reading based on which MSEDCL issue the final energy break up sheet which provides the individual net power export values for each of the WTGs in project activity. Hence it is concluded that the data available for calculation of emission reductions is available and it is verified and certified by the government authority i.e. MSEDCL who also made the payment based on final credit note. Therefore verification team did not carry out the site visit as no further verification of any other issues was envisaged at the project site. However, verification team sought all the required data and documentary evidences toward establishing the stated emission reductions in final monitoring report.	OK	OK
e If not, justify the rationale of the decision.	Please refer above comment.	OK	OK
f Does the implementation or operation of VCS project conform with the description contained in the registered PD?	Yes. The project implementation and operation conform to the description contained in the registered VCS-PD.	OK	OK
g If not, which are the potential impacts due to these changes?	Not Applicable	OK	OK
2 Compliance of the monitoring plan with the monitoring methodology			
a Is the validated monitoring plan in accordance with the approved methodology applied by the proposed VCS project?	The validated monitoring plan is in accordance with the approved applied methodology ACM0002 version 10.	OK	OK
b Are there any monitoring aspects of the project that	There are no further monitoring aspects identified which are required	OK	OK

CHECKLIST QUESTION	COMMENTS	Draft Concl	Final Concl
are not specified in the methodology (e.g. additional monitoring parameters, monitoring frequency and calibration frequency)?	to be specified in the monitoring plan of the project activity.		
3 Compliance of monitoring with the monitoring plan			
a Have the monitoring plan and the applied methodology been properly implemented and followed by the project participants?	Yes. The monitoring plan and the applied methodology has been properly implemented and followed by the project participants. However please clarify why the EG _{Gross,y} parameter is not included in MR as per registered VCS PD. The description provided in MR regarding the same is not clear.	CL-2	OK
b Have all parameters stated in the monitoring plan, the applied methodology been sufficiently monitored and updated as applicable, including:			
i Project emission parameters?	Project emissions are not applicable for the project activity	OK	OK
ii Baseline emission parameters?	EG_{export,y} and EG_{import,y} are the monitoring parameters from which the net power export to the grid i.e. EG_{net,y} is calculated. These parameters are mentioned in MSEDCL share certificate or credit note which is issued by MSEDCL based on the monthly Joint Meter Readings taken in presence of project proponent representatives. PP requires to respond following issues. 1) In section 3.2, list of monitoring parameters is provided. Please clarify measurement and recording frequency of data and state clearly for all monitoring parameters. 2) Section 3.2, does not specify clearly about the Monitoring equipment. Identify the equipment used to monitor the data/parameter including type, accuracy class, serial number of equipment for all parameters and mentioned same as per requirement of VCS. 3) Section 3.2 does not clearly specify the QA/QC procedures for quality assurance and control including frequency and dates of calibration for monitoring equipment. Pls provide all details for the monitoring period. 4) In section 5, Please clarify whether the daily generation reports are used for net electricity export calculation from project activity.	CAR-2	OK

CHECKLIST QUESTION	COMMENTS	Draft Concl	Final Concl
iii Leakage parameters?	Leakage emissions are not applicable for the project activity	OK	OK
iv Management and operational system: the responsibilities and authorities for monitoring and reporting are in accordance with the responsibilities and authorities stated in the monitoring plan?	Monitoring report specifies the responsibilities and authorities for monitoring and reporting which are in accordance with the responsibilities and authorities stated in the monitoring plan of the registered VCS-PD. Verification team interviewed the PP and confirms that same management and operational system is implemented and maintained during all verification period.	OK	OK
c Are equipment controlled and calibrated in accordance with the monitoring plan?	The energy meters used for monitoring of electricity exported to the grid during current verification period are calibrated however the calibration frequency is not maintained. Pls respond to following issues. 1) Section 3.3 provides reference towards older calibration guidance. Please update MR with the latest guidance from CDM so that the error can be conservatively applied. 2) Monitoring report specifies the calibration frequency of the energy meters to be considered as per revised monitoring plan which is stated as annual. Please provide the Revised Monitoring plan along with PPA for the project activity for verification.	CAR-3	OK
d Are monitoring results consistently recorded as per approved frequency?	Project activity involves the monitoring of net electricity export to the grid by the WTGs in project activity. The parameter EGy i.e. net electricity export to the grid is monitored continuously by main and check meter and recorded monthly in form of JMRs. The actual net electricity export to the grid is calculated and reflected in Invoices raised by PP to Maharashtra State Electricity Distribution Company Limited.	OK	OK
e Have quality assurance and quality control procedures been applied in accordance with the monitoring plan?	Registered monitoring plan of the VCS-PD specifies the calibration frequency of main and check meters to be maintained annually. However, same is not followed annually in current monitoring plan. Please demonstrate the accuracy of monitored data and its impact on emission reduction calculated in monitoring report since it is identified that the error observed during the delayed calibration period is not applied for emission reduction calculations.	CAR-4	OK
4 Assessment of data and calculation of greenhouse			

CHECKLIST QUESTION	COMMENTS	Draft Concl	Final Concl
gas emission reductions			
a Is a complete set of data for the specified monitoring period available? (If no, i.e., only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, the validator shall make the most conservative assumption theoretically possible in finalizing the verification report).	The complete set of data is available with the Project participant for monitoring period under consideration.	OK	OK
b Has information provided in the monitoring report been cross-checked with other sources such as plant log books, inventories, purchase records, laboratory analysis?	The net electricity export figures are calculated by Enercon from monitored data by control panel meters of WTGs, feeder meters and JMR readings. The energy breakup sheets for each feeder connected WTGs is prepared and provided to MSEDCL for checking and approval. MSEDCL prepares the feeder wise final energy break up sheet which contains the net energy export contribution for each WTG owner. Verification team has checked JMRs and energy breakup sheets from MSEDCL for WTGs owned by PP. The readings of electricity import and export provided in MSEDCL approved energy break sheets are matching with those of invoices raised by PP to the MSEDCL. Hence same is accepted by verification team.	OK	OK
c Have calculations of baseline emissions, proposed project emissions and leakage, as appropriate, been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology document?	Calculations of baseline emissions have been carried out in accordance with the formulae and methods described in monitoring plan and applied methodology ACM0002 version 10. The current monitoring period is chosen from 01/10/2012 till 30/04/2013. During the review of JMR cum energy break up sheet of MSEDCL for the month of Oct-09, it is identified that the JMR for Oct-09 was carried out from 17 Sep 2012 to 18 Oct 2012 and hence there is possibility of overlapping of net electricity export data in current verification period from previous verification period. Please clarify any double accounting of emission reductions happening in this verification period which were already considered in previous verification.	CL-3	OK
d Have any assumptions used in emission calculations been justified?	1) Section 5 of MR provides the estimated PLF in current verification period as 12.1%. However please clarify how the estimated PLF is comparable with that of 20% PLF in registered PDD considering the fact that only 7 months data in this monitoring period is considered for PLF estimation.	CL-4	OK

CHECKLIST QUESTION	COMMENTS	Draft Concl	Final Concl
	2) ER sheet calculates the PLF based on the Net Power Export to the grid. Clarify how it gives correct PLF value since the actual generation from WTG will be known from gross generation data.		
e Have appropriate emission factors, IPCC default values and other reference values been correctly applied?	Yes, Appropriate emission factors are used for the emission reduction calculations. The emission factor is fixed ex-ante in VCS-PD as 0.90589 tCO ₂ /MWh.	OK	OK

Table 2 Resolution of Corrective Action / Forward Action / Clarification Requests.

Draft report clarifications and corrective action requests by verification team	Reference to checklist question in Periodic Verification Checklist	Summary of project owner response	Verification team conclusion
CL-1 Monitoring report states that in the last verification PP got approved the revised monitoring plan for the project activity. Please submit the required supporting documents for verification. Also provide the reference web link in footnote for the deviation approved and provide the copy for verification.	1-b	The revised monitoring plan and deviation has been discussed in verification report covering the monitoring period from 1st Oct 2010 to 30th Nov 2011. This report can be accessed from VCS project database at following weblink. (https://vcsprojectdatabase2.apx.com/myModule/Interactive.asp?Tab=Projects&a=2&i=489&lat=17.554167&lon=73.924444&bp=1)	Verification team has reviewed the previous verification reports and MRs for monitoring period from 01/10/2010 to 30/11/2011 and 01/12/2011 to 30/09/2012. It is observed that the monitoring plan implemented for the current verification period is in accordance with the registered monitoring plan in the PDD except the deviation in monitoring plan adopted from third verification onwards. The gross generation i.e. "EGgross,y" is no more taken as the monitoring parameter and apportion procedure mentioned in the PDD is not actually followed by PP for ER calculations since the same is followed by MSEDCL. Verification team accepts the fact that MSEDCL is a government agency who purchases the power from project activity and they apportioned the total gross generation, export and import values based on joint meter readings and thereby calculate the share of power generation from each WTG. Hence same calculation is not required to be performed again for emission reduction calculation. Therefore the share certificate issued by MSDECL to project participants is considered for referring to the value of Net power export to the grid. Share certificate also provides the values of "EGexport and EGimport" from which net export to the grid is calculated by taking the difference of two values. Since the JMR and thereby share certificate is the basis of invoice raised by PP and MSEDCL makes the payment against raised invoices, the values of EGexport, EGimport and EGnet are appropriate to be considered from Share

Draft report clarifications and corrective action requests by verification team	Reference to checklist question in Periodic Verification Checklist	Summary of project owner response	Verification team conclusion
			certificate and hence validation team accepts the same. Therefore clarification request is closed.
CL-2 Please clarify why the $EG_{Gross,y}$ parameter is not included in MR as per registered VCS PD. The description provided in MR regarding the same is not clear.	3-a	The revised monitoring plan and deviation has been discussed in verification report covering the monitoring period from 1st Oct 2010 to 30th Nov 2011. This report can be accessed from VCS project database at following weblink. Also, the description has been modified in revised MR for current monitoring period. (https://vcspromotedatabase2.apx.com/myModule/interactive.asp?TAB=PROJECTS&A=2&I=489&LAT=17.554167&LON=73.924444&BP=1)	Verification team has reviewed previous verification reports and confirmed that the VCSA has accepted the Verification report with revised monitoring plan in previous verification. Hence $EG_{Gross,y}$ parameter is not required to be included in monitoring plan. Also the corresponding section 3.2 and 3.3 of revised Monitoring Report is modified by PP which is in accordance with guidance provided to complete VCS-MR template ver 3.2. Therefore clarification request is closed.
CL-3 The current monitoring period is chosen from 01/10/2012 till 30/04/2013. During the review of JMR cum energy break up sheet of MSEDCL for the month of Oct-12, it is identified that the JMR for Oct-12 was carried out from 17 Sep 2012 to 18 Oct 2012 and hence there is possibility of overlapping of net electricity export data in	4-c	The difference in billing cycle and monitoring period is related to Kadvekhurd site. The meter reading cycle used for the month of September-12 was from 21-Aug-2012 to 17-Sep-2012; which was covered under the last monitoring period for Kadvekhurd	The verification team has reviewed the ER spreadsheet for the last verification period and it was observed that the PP has claimed ERs only till 17-Sep-2012 and hence PP is eligible to claim ERs from 17-Sep-2012 onwards during this verification period since the entire period falls under the project crediting period.

Draft report clarifications and corrective action requests by verification team	Reference to checklist question in Periodic Verification Checklist	Summary of project owner response	Verification team conclusion
current verification period from previous verification period. Please clarify any double accounting of emission reductions happening in this verification period which were already considered in previous verification.		site. For other substations under project, billing cycle was from first of the month to last date of month. For Kadvekhurd site, the meter reading cycle used for the month of October-12 was from 17-Sep-2012 to 18-Oct-2012, so there has been no overlap of dates with last monitoring period while calculating emission reductions. JMR copy of month September-12 belonging to Kadvekhurd site being submitted to DOE as supporting evidence.	Hence CL 3 is closed.
CL-4 1) Section 5 of MR provides the estimated PLF in current verification period as 12.1%. However please clarify how the estimated PLF is comparable with that of 20% PLF in registered PDD considering the fact that only 7 months data in this monitoring period is considered for PLF estimation. 2) ER sheet calculates the PLF based on the Net Power Export to the grid. Clarify how it gives correct PLF value since the actual generation from WTG will be known from gross generation data.	4-d	The revised MR compares the estimated gross electricity generation from project activity with actual electricity exported from project in monitoring period. Actual electricity exported from the project in monitoring period is found to be 43 % Less than estimated gross electricity generation as mentioned in registered PD. However, PLF calculation has also been presented with gross electricity generation data considering the transmission losses of 5% as per the state wind tariff order. PLF achieved in current monitoring period based on this calculation is 12.06% against 20% PLF value in registered PD.	The PP has now compared the estimated annual ERs in the VCS PD with the actual ERs achieved. Actual ERs achieved are 4.7% higher compared to the VCS PD owing to higher actual PLF i.e. 20.94%. Sensitivity was checked in the registered VCS PD till a PLF value of 22% and therefore even with the increase PLF value the project would remain additional. Hence CL 4 is closed.

Draft report clarifications and corrective action requests by verification team	Reference to checklist question in Periodic Verification Checklist	Summary of project owner response	Verification team conclusion
		As the above mentioned calculations cover only the seven months of a year, to calculate the yearly figures, yearly VCUs have been compared. Referring to last monitoring period, yearly VCU's covering the duration from May-12 to April-13 were compared with yearly estimated VCUs in registered PD. Actual VCUs were found to be about 4.7% higher than estimated VCUs in registered PD.	
CAR-1 Monitoring report is prepared by using the latest available template version 3.2. However following issues are identified during review of monitoring report. 1) Cover page does not provide the dates in standard DD-Month-YYYY formats for monitoring period and issuance of document. 2) Section 1.2 does not specify the Project type as per requirements specified in standard MR template. 3) Section 1.7 of MR does not specify the latitude and longitude for some of the WTGs. Please provide the same for all individual WTGs and modify MR. 4) Section 1.8, makes reference to earlier	1-c	MR has been revised as follows; 1) Date format has been modified on cover page as required 2) Section 1.2 of revised MR specifies the Project type. 3) Section 1.7 of MR has been revised to include latitude and longitude for some of the WTGs 4) Section 1.8, makes reference to methodology mentioned. 5) Section 2.1 provides the operational details of all WTGs 6) Section 3.3, describes handling internal auditing and non-conformities process. 7) In section 3.3, specifies the	1) PP has corrected the cover page mentioning the dates in standard DD-Month-YYYY formats and same is found in line with the guidance provided to complete VCS MR template. 2) Section 1.2 is now updated by PP to clearly mention the project type where in it is specified that the project activity is not a grouped project activity. Hence accepted by verification team. 3) Latitude and longitudes are now provided by PP in revised MR. The same are found to be in accordance with registered VCS PDD. Hence same is accepted by verification team. 4) Revised MR now correctly provides the reference web link for the applied methodology ACM0012 version 10. Also the latest version of VCS is mentioned in revised MR. 5) Section 2.1 now provides the operation

Draft report clarifications and corrective action requests by verification team	Reference to checklist question in Periodic Verification Checklist	Summary of project owner response	Verification team conclusion
version of VCS. Please update the VCS version and provide the link for the referenced methodology. 5) Section 2.1 does not provide additional information regarding the operation of WTGs, generated kWh and achieved PLF vis-a-vis that given in registered VCS-PD as per VCS MR guidelines 6) In Section 3.3, As per VCS MR guidance, procedure for handling internal auditing and non-conformities to be described. Please clarify how it is taken care of. 7) In section 3.3, for some of the WTGs, the Feeder Details are not provided. Clarify and update the MR.		Feeder Details for all WTGs	details of all WTGs for the verification period. It includes the generation, downtime of WTGs and grid. Also the WTG availability and grid availability percentage are provided for each WTG. 6) Please provide evidences towards internal audit carried out during current verification period. 7) Section 3.3 now provides the feeder details for all WTGs and same is found correct. Point no. 6 above needs further clarification and hence CAR-1 is open. Evidence of internal audit is provided and hence CAR 1 is closed.
CAR-2 PP requires to respond following issues. 1) In section 3.2, list of monitoring parameters is provided. Please clarify measurement and recording frequency of data and state clearly for all monitoring parameters. 2) Section 3.2, does not specify clearly about the Monitoring equipment. Identify the equipment used to monitor the data/parameter including type, accuracy class, serial number of equipment for all parameters and mentioned same as per	3-b-(ii)	Revised section 3.2, specifies all monitoring parameters, measurement and recording frequency of data, monitoring equipment (type, accuracy class, serial number) and QA/QC procedures for quality assurance and control. Section 5 has been revised to include appropriate informatiion.	Verification team has reviewed the revised MR, section 3.2. 1) The measurement and recording frequency of the data is not clearly specified in section 3.2 for each of the parameters. 2) & 3) In section 3.2, the monitoring parameters are referring to section 3.3 for further details on details of main meter, accuracy, serial number along with calibration records. Hence this is accepted. 4) The section 5 is completely modified by PP and hence this query is not relevant now.

Draft report clarifications and corrective action requests by verification team	Reference to checklist question in Periodic Verification Checklist	Summary of project owner response	Verification team conclusion
requirement of VCS. 3) Section 3.2 does not clearly specify the QA/QC procedures for quality assurance and control including frequency and dates of calibration for monitoring equipment. Pls provide all details for the monitoring period. 4) In section 5, Please clarify whether the daily generation reports are used for net electricity export calculation from project activity.			Since the point 1 above is open therefore CAR-2 is open. Correction has been applied in MR and hence CAR 2 is closed.
CAR-3 The energy meters used for monitoring of electricity exported to the grid during current verification period are calibrated however the calibration frequency is not maintained. Pls respond to following issues. 1) Section 3.3 provides reference towards older calibration guidance. Please update MR with the latest guidance from CDM so that the error can be conservatively applied. 2) Monitoring report specifies the calibration frequency of the energy meters to be considered as revised monitoring plan which is stated as annual. Please provide the Revised Monitoring plan along with PPA for the project activity for verification.	3-c	Table-4, under Section 3.3 provides the metering equipment details (type, accuracy class, serial number) along with calibration dates. The current monitoring period covers the duration from 1st Oct 2012 to 30th Apr 2013. The annual meters calibration dates cover the entire monitoring period and there is no overlap of duration due to delayed calibration. It eliminates the need to application of error factor because of delay in meters calibration.	1) The monitoring period specified in response is not correct. Further the corresponding section in section 3.3 is deleted by PP. As the project activity WTGs meters were calibrated on 03/05/2012, 5/05/2012, 27/08/2012 and 20/06/2012 and considering the annual frequency of calibration; the meter are calibrated and covers the monitoring period from 01/10/2012 to 30/04/2013. 2) The calibration frequency is stated as annual in registered VCS-PD. Also verification team has checked the same from the previous verification reports for the project activity. Hence this is accepted.

Draft report clarifications and corrective action requests by verification team	Reference to checklist question in Periodic Verification Checklist	Summary of project owner response	Verification team conclusion
			Point 1 above is open. CAR-3 is Open. Dates have been rectified and hence CAR 3 is closed.
CAR-4 Registered monitoring plan of the VCS-PD specifies the calibration frequency of main and check meters to be maintained annually. However, same is not followed annually in current monitoring plan. Please demonstrate the accuracy of monitored data and its impact on emission reduction calculated in monitoring report since it is identified that the error observed during the delayed calibration period is not applied for emission reduction calculations.	3-e	Table-4, under Section 3.3 provides the metering equipment details (type, accuracy class, serial number) along with calibration dates. The current monitoring period covers the duration from 1st Oct 2012 to 30th Apr 2013. The annual meters calibration dates cover the entire monitoring period and there is no overlap of duration due to delayed calibration. It eliminates the need to application of error factor because of delay in meters calibration.	The monitoring period is wrongly mentioned in the response. The monitoring period is from 01/10/2012 to 30/04/2013. Also Table-4 in section 3.3 provides the calibration date of the meters from 08/09/2011 which is much outside the current verification period and hence creates the confusion towards not following of annual frequency of calibration. Latest calibration date along with the validity till next calibration is not provided. <u>DOE's final response</u> Dates have been rectified. Changes has been made in MR and hence CAR 4 is closed.