



# VERIFICATION REPORT VAAYU (INDIA) POWER CORPORATION PRIVATE LIMITED

## VERIFICATION OF THE VAAYU INDIA WIND POWER PROJECT IN TAMIL NADU

REPORT No.BVC/INDIA -VR/577.49/2013

REVISION No. 01

BUREAU VERITAS CERTIFICATION

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## VERIFICATION REPORT

<b>Date of first issue:</b> <b>05/04/2013</b>	<b>Organizational unit:</b> <b>Bureau Veritas Certification Holding SAS</b>
<b>Client:</b> <b>Vaayu (India) Power Corporation Private Limited</b>	<b>Client ref.:</b> <b>Mr. Yogesh Mehra</b>

**Summary:**

Bureau Veritas Certification has conducted the 2<sup>nd</sup> periodic verification of *Vaayu India Wind Power Project in Tamil Nadu*, CDM Registration Reference Number 4930, owned by Vaayu(India) Power Corporation Private Limited, which is located in Vagaikulam, Kuruchikulam, Ettankulam, Kalakudi, Muthammalpuram, Ukkirankottai villages in Tirunelveli district of Tamil Nadu State in India, and applying the methodology ACM0002 version 12.1.0, on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. 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.


The verification scope is defined as an independent and objective review and ex-post determination of the monitored GHG emission reductions, and consisted of the following three phases: i) desk review of the project design, 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.

In summary, Bureau Veritas Certification confirms that the project is implemented as planned and described in the validated and registered project design documents. Installed equipments being essential for generating emission reduction run reliably and are calibrated appropriately. The monitoring system is in place and the project is generating GHG emission reductions.

The GHG emission reductions are calculated without material misstatements, and the emission reductions verified totalize 98,269 tons of CO<sub>2</sub>e for the monitoring period.

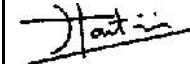
Our opinion relates to the projects' GHG emissions and resulting GHG emission reductions reported and related to the valid and registered project baseline, approved monitoring plan and its associated documents.

Reporting period:	18/02/2012 to 11/12/2012
Baseline emissions:	98,269 t CO <sub>2</sub> equivalents.
Project emissions:	0 t CO <sub>2</sub> equivalents.
Leakage emissions:	0 t CO <sub>2</sub> equivalents.
Emission Reductions:	98,269 t CO <sub>2</sub> equivalents.

<b>Report No.:</b> BVC-India /VR/577.49/2013	<b>Subject Group:</b> CDM
<b>Project title:</b> <b>Vaayu India Wind Power Project in Tamil Nadu</b>	
<b>Work carried out by:</b> <b>Mr. Anurag Juyal - Team Leader</b> <b>Mr. Srinivasan Selvaraj - Team Member</b>	
<b>Internal Technical Review carried out by:</b>  <b>Mr. Sanjay Patankar- Local Product Manager</b>	
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<b>Number of pages:</b> 55	

## Indexing terms

## Work approved by:


**Mr. Matthieu Martini**

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## Abbreviations

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reductions
CL	Clarification Request
CO2	Carbon Dioxide
CO2e	Carbon Dioxide Equivalent
DOE	Designated Operational Entity
DRR	Daily Reading Record
ETN	Electricity Transaction Note
FAR	Forward Action Request
GHG	Green House Gas(es)
MoV	Means of Verification
MP	Monitoring Plan
MR	Monitoring Report
MRR	Monthly Reading Record
PDD	Project Design Document
PLF	Plant Load Factor
PP	Project Participant
PPA	Power Purchase Agreement
UNFCCC	United Nations Framework Convention on Climate Change
VVS	Validation and Verification Standard
WEC	Wind Energy Converter

<b>Table of Contents</b>	<b>Page</b>
1. INTRODUCTION .....	5
1.1. Objective	5
1.2. Scope	5
1.3. GHG Project Description	6
1.4. Verification Team	6
2. METHODOLOGY .....	7
2.1. Review of Documents	7
2.2. Follow-up Interviews	7
2.3. Resolution of Clarification, Corrective and Forward Action Requests	8
2.4. Internal Technical Review	9
3. VERIFICATION CONCLUSIONS.....	9
3.1. Remaining issues from validation or previous verification (213)	10
3.2. Compliance of the project implementation with the registered project design document (228)	10
3.3. Compliance of the monitoring plan with the monitoring methodology including applicable tool(s) (232)	14
3.4. Compliance of monitoring activities with the monitoring plan (235-236)	14
3.5. Compliance with the calibration frequency requirements for measuring instruments (243)	18
3.6. Assessment of data and calculation of emission reductions (246)	20
4. VERIFICATION OPINION.....	22
5. REFERENCES .....	24
6. CURRICULA VITAE OF THE DOE'S VERIFICATION TEAM MEMBERS .....	25
APPENDIX A: CDM PROJECT VERIFICATION PROTOCOL.....	





## 1. INTRODUCTION

***Vaayu (India) Power Corporation Private Limited*** has commissioned Bureau Veritas Certification to verify the emissions reductions of its CDM project “***Vaayu India Wind Power Project in Tamil Nadu***” (hereafter called “**the Project**”) at Vagaikulam, Kuruchikulam, Ettankulam, Kalakudi, Muthammalpuram, Ukkirankottai villages in Tirunelveli district of Tamil Nadu State in India .

This report summarizes the findings of the verification of the Project, performed on the basis of UNFCCC criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

### 1.1. Objective

The objective of CDM verification is to conduct a thorough, independent assessment of the registered project activities.

In carrying out its verification work, the DOE shall ensure that the project activity complies with the requirements of paragraph 62 of the CDM modalities and procedures. In particular, this assessment shall:

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

### 1.2. Scope

The verification scope is defined as an independent and objective review and ex-post determination of the monitored GHG emission reductions. The verification is based on the validated and registered project design document, the monitoring report, emission reduction calculation spreadsheet, and supporting documents. The information in these documents is reviewed against Kyoto Protocol requirements, UNFCCC rules and associated interpretations.

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

### 1.3. GHG Project Description

The Project consists of installation of 63 WECs with a unit installed capacity of 800 kW, providing a total installed capacity of 50.40 MW. The annual expected electricity supplied to southern regional grid is 103972 MWh (approx) and the annual estimated emission reductions are **98269** tCO<sub>2</sub>e.

Project title:	Vaayu India Wind Power Project in Tamil Nadu
UNFCCC ref number:	4930
Registration Date:	19/07/2011
Crediting Period:	19/07/2011 to 18/07/2021 (fixed)
Monitoring Period:	18/02/2012 to 11/12/2012
Project Participants:	Vaayu (India) Power Corporation Private Limited (Host Party Name)
Methodology used	ACM0002 version 12.1.0
Location of the Project:	Vagaikulam, Kuruchikulam, Ettankulam, Kalakudi, Muthammalpuram, Ukkirankottai villages in Tirunelveli district of Tamil Nadu State in India.
UNFCCC view page:	<a href="http://cdm.unfccc.int/Projects/DB/DNV-CUK1308823376.98/view">http://cdm.unfccc.int/Projects/DB/DNV-CUK1308823376.98/view</a>

Geo coordinates of the WECs are specified in the revised MR. The project activity involves supply, erection, commissioning and operation of 63 WECs of rated capacity 800 kW each. The machines are Enercon E-53 make. The WECs generates 3-phase power at 400V, which is stepped up to 33 KV. The project activity can operate in the frequency range of 47.5–51.5 Hz and in the voltage range of 400 V  $\pm$  12.5%. The electricity generated by the project activity is supplied to the state electricity utility thereby contributing to reducing the energy demand supply gap in the state of Tamil Nadu.

*The verification team confirms that there have been no modifications or alterations to the project activity during this monitoring period.*

No post registration changes have been requested.

### 1.4. Verification Team

The assessment team and internal technical reviewer team consist of the following personnel:

FUNCTION	NAME	TA 1.2	TA X.X	TASK PERFORMED*
Team Leader	Mr. Anurag Juyal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> DR <input type="checkbox"/> SV <input type="checkbox"/> RI <input type="checkbox"/> TR
Team Member	Mr. Srinivasan Selvaraj	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> DR <input checked="" type="checkbox"/> SV <input type="checkbox"/> RI <input type="checkbox"/> TR
Technical Specialist	N.A.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> DR <input checked="" type="checkbox"/> SV <input type="checkbox"/> RI <input type="checkbox"/> TR
Internal Technical Reviewer (ITR)	Mr. Sanjay Patankar	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> DR <input type="checkbox"/> SV <input type="checkbox"/> RI <input checked="" type="checkbox"/> TR
Specialist supporting ITR	N.A.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> DR <input type="checkbox"/> SV <input type="checkbox"/> RI <input checked="" type="checkbox"/> TR
Report approval	Mr. Matthieu Martini	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> DR <input type="checkbox"/> SV <input checked="" type="checkbox"/> RI <input type="checkbox"/> TR



\*DR = Document Review; SV = Site Visit; RI = Report issuance; TR = Internal Technical Review

## 2. METHODOLOGY

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

In order to ensure transparency, a verification protocol was customized for the project, according to the version 03.0 of the Clean Development Mechanism Validation and Verification Standard, issued by CDM Executive Board at its 70<sup>th</sup> meeting on 23/11/2012. The protocol shows, in a transparent manner, criteria (requirements), means of verification and the results from verifying the identified criteria. The verification protocol serves the following purposes:

- It organizes, details and clarifies the requirements a CDM project is expected to meet;
- It ensures a transparent verification process where the verifier will document how a particular requirement has been verified and the result of the verification.

The completed verification protocol is enclosed in Appendix A to this report.

### 2.1. Review of Documents

The assessment 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 02 dated 28/03/2013 and emission reduction calculation spreadsheet. 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.

The monitoring report version 01 submitted by the project participant was also web hosted on the UNFCCC-CDM web site on 14/02/2013 and thus, was available in the public domain.

In addition to the monitoring documentation provided by the project participants, the DOE reviews:

- (a) The registered PDD (/1/) and the monitoring plan, including the revised monitoring plan and the corresponding validation report
- (b) The validation report (/2/)
- (c) The applied monitoring methodology(/3/)
- (d) Relevant decisions, clarifications and guidance from the CMP and the CDM Executive Board
- (e) Other information and references relevant to the project activity's resulting emission reductions (e.g. IPCC reports, laboratory analysis or national regulations)

### 2.2. Follow-up Interviews

On 05/03/2013, Bureau Veritas Certification performed a site visit and interviews with project stakeholders to confirm selected information and to resolve issues identified in the document review. Representatives of Vaayu (India) Power Corporation Private Limited (Project Owner) and Wind World India Limited (CDM Consultant) were interviewed (see References). The main topics of the interviews are summarized in Table 1.

Table 1 Interview topics

Interviewed organization	Interview topics
<b>Vaayu (India) Power Corporation Private Limited</b> (the Project Owner)	<ul style="list-style-type: none"> <li>➤ Project Design and implementation</li> <li>➤ Technical equipment, calibration and operation</li> <li>➤ Monitoring Plan and management procedures</li> <li>➤ Monitoring data</li> <li>➤ Data uncertainty and residual risks (QA/QC)</li> <li>➤ GHG Calculation</li> <li>➤ Environmental Impacts</li> <li>➤ Compliance with National Laws and Regulations</li> </ul>
<b>Wind World India Ltd.</b> (the Consultant)	<ul style="list-style-type: none"> <li>➤ Monitoring Plan</li> <li>➤ Monitored data and Monitoring Report</li> <li>➤ GHG Calculations</li> </ul>

### 2.3. Resolution of Clarification, Corrective and Forward Action Requests

The objective of this phase of the verification is to resolve 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 prior to Bureau Veritas Certification's 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.

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

- (a) Non-compliance with the monitoring plan or methodology 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;
- (b) 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) Issues identified in a FAR during validation to be verified during verification or previous verification(s) have not been resolved by the project participants.

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

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

To guarantee the transparency of the verification process, the concerns raised are documented in more detail in the verification protocol in Appendix A.



## 2.4. Internal Technical Review

The verification report underwent an Internal Technical Review (ITR) before requesting issuance of CERs for the project activity.

The ITR is an independent process performed to examine thoroughly that the process of verification has been carried out in conformance with the requirements of the verification scheme as well as internal Bureau Veritas Certification procedures.

The Team Leader provides a copy of the verification report to the reviewer, including any necessary verification documentation. The reviewer reviews the submitted documentation for conformance with the verification scheme. This will be a comprehensive review of all documentation generated during the verification process.

When performing an Internal Technical Review, the reviewer ensures that:

- The verification activity has been performed by the team by exercising utmost diligence and complete adherence to the CDM rules and requirements.
- The review encompasses all aspects related to the project which includes project design, baseline, additionality, monitoring plans and emission reduction calculations, internal quality assurance systems of the project participant as well as the project activity, review of the stakeholder comments and responses, closure of CARs, CLs and FARs during the verification exercise, review of sample documents.

The reviewer may raise Clarification Requests to the verification team and discusses these matters with Team Leader.

After the agreement of the responses on the Clarification Requests from the verification team as well as the PP(s), the finalized verification report is accepted for further processing such as uploading via the UNFCCC interface.

## 3. VERIFICATION CONCLUSIONS

In the following sections, the conclusions of the verification are stated.

The findings from the desk review of the original monitoring documents and the findings from interviews during the follow up visit are described in the Verification Protocol in Appendix A.

The Clarification, Corrective and Forward Action Requests are stated, where applicable, in the following sections and are further documented in the Verification Protocol in Appendix A. The verification of the Project resulted in **00 CAR(s), 06 CL(s) and 00 FAR(s)**.

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

The number between brackets at the end of each section corresponds to the VVS paragraph.

### 3.1. Remaining issues from validation or previous verification (213)

All CARs and CLs raised were successfully closed during the validation stage and previous verification of the Project, no remaining issues were left.

### 3.2. Compliance of the project implementation with the registered project design document (228)

From the site visit performed, the verification team is able to conclude that all the sixty three Wind Energy Convertors (WECs) each of capacity 800 kW as stated in the registered PDD have been commissioned and are in operation. The WECs are located in Vagaikulam, Kuruchikulam, Ettankulam, Kalakudi, Muthammalpuram, Ukkirankottai villages in Tirunelveli district of Tamil Nadu State in India. The total installed capacity of the project activity is 50.40 MW (63 nos. × 800 kW). The commissioning dates of the wind turbines were confirmed by checking the commissioning certificates of each WEC (/4/). All the equipments as described in the registered PDD (/1/) have been installed at the project site and the project activity does not involve any phase wise implementation. The electricity exported to and imported from the grid is recorded through energy meters<sup>1</sup> (referred as main meters and located at WEC) bearing high tension service connection nos. (referred as HTSC). In the project activity, a total of 51 energy meters (or 51 HTSCs) are used to measure the net electricity supplied to the grid by all the 63 WECs. All the WECs are not provided with individual high tension service connections and hence in some cases electricity supplied by more than one WEC is measured through the same high tension service connection. Apart from the recording at the WEC end, electricity export and import from all the WECs in the wind farm (including non-PP WECs) is also recorded at the Enercon pooling substation<sup>2</sup> for the purpose of calculation of transmission loss.

The WEC SC nos. and the commissioning dates of the WECs are tabulated below:

Sr. No.	HTSC no	No of WECs	Capacity (MW)	DOC
1	3376	4 × 800	3.2	29/09/2010
		5 × 800	4.0	02/03/2011
		2 × 800	1.6	11/03/2011
2	3461	1 X 800 kW	0.8	28/12/2010
3	3462	1 X 800 kW	0.8	28/12/2010
4	3463	1 X 800 kW	0.8	28/12/2010
5	3464	1 X 800 kW	0.8	28/12/2010
6	3465	1 X 800 kW	0.8	28/12/2010
7	3466	1 X 800 kW	0.8	28/12/2010
8	3467	1 X 800 kW	0.8	28/12/2010
9	3470	2X 800 kW	0.8	31/12/2010
10	3500	1 X 800 kW	0.8	18/03/2011
11	3501	1 X 800 kW	0.8	18/03/2011

<sup>1</sup> This metering happens at 33 kV and is referred further in the report as WEC metering location

<sup>2</sup> This metering happens at 110 kV at the Enercon pooling substation and is referred further in the report as metering at pooling substation.



## VERIFICATION REPORT

12	3502	1 X 800 kW	0.8	18/03/2011
13	3503	1 X 800 kW	0.8	18/03/2011
14	3504	1 X 800 kW	0.8	18/03/2011
15	3505	1 X 800 kW	0.8	18/03/2011
16	3506	1 X 800 kW	0.8	18/03/2011
17	3507	1 X 800 kW	0.8	18/03/2011
18	3508	1 X 800 kW	0.8	18/03/2011
19	3509	2X 800 kW	0.8	18/03/2011
20	3510	1 X 800 kW	0.8	18/03/2011
21	3511	1 X 800 kW	0.8	18/03/2011
22	3512	1 X 800 kW	0.8	18/03/2011
23	3513	1 X 800 kW	0.8	18/03/2011
24	3514	1 X 800 kW	0.8	18/03/2011
25	3515	1 X 800 kW	0.8	18/03/2011
26	3516	1 X 800 kW	0.8	18/03/2011
27	3517	1 X 800 kW	0.8	18/03/2011
28	3518	1 X 800 kW	0.8	18/03/2011
29	3519	1 X 800 kW	0.8	18/03/2011
30	3528	1 X 800 kW	0.8	22/03/2011
31	3768	1 X 800 kW	0.8	01/07/2011
32	3769	1 X 800 kW	0.8	01/07/2011
33	3770	1 X 800 kW	0.8	01/07/2011
34	3771	1 X 800 kW	0.8	01/07/2011
35	3772	1 X 800 kW	0.8	01/07/2011
36	3773	1 X 800 kW	0.8	01/07/2011
37	3774	1 X 800 kW	0.8	01/07/2011
38	3775	1 X 800 kW	0.8	01/07/2011
39	3776	1 X 800 kW	0.8	01/07/2011
40	3777	1 X 800 kW	0.8	01/07/2011
41	3778	1 X 800 kW	0.8	01/07/2011
42	3779	1 X 800 kW	0.8	01/07/2011
43	3780	1 X 800 kW	0.8	010/7/2011
44	3781	1 X 800 kW	0.8	01/07/2011
45	3782	1 X 800 kW	0.8	01/07/2011
46	3783	1 X 800 kW	0.8	01/07/2011
47	3784	1 X 800 kW	0.8	01/07/2011
48	3785	1 X 800 kW	0.8	01/07/2011
49	3789	1 X 800 kW	0.8	11/07/2011
50	3790	1 X 800 kW	0.8	11/07/2011
51	3791	1 X 800 kW	0.8	11/07/2011



## VERIFICATION REPORT



The verification team based on the physical verification of site and documentary evidence is able to confirm and conclude that:

- a) There is no change in the effective output capacity due to increased installed capacity or increased number of units, or installation of units with lower capacity or units with a technology which is less advanced than that described in the PDD.
- b) There is no addition of component or extension of technology.
- c) There is no removal or addition of one (or more) site of a project activity registered with multiple-sites.

The verification team also confirms that there has not been any change in the values of the actual operational parameters during the current monitoring period.

The meter numbers and the calibration details are crosschecked by the calibration certificates issued by the TNEB (5/).

The details of meters installed at each HTSC connection is as follows:-

<b>Sr. No</b>	<b>HTSC no</b>	<b>Meter Serial No.</b>	<b>Make</b>	<b>Accur acy class</b>	<b>Last dates of calibration before monitoring period</b>	<b>Calibration date during Monitoring Period</b>	<b>Due Date of Calibration</b>
1	3376	TNU04909	Premier	0.5s	11/03/2011	02/11/2012	01/11/2013
2	3461	HT2110167	Wallabey	0.2s	09/05/2011	02/11/2012	01/11/2013
3	3462	HT2110162	Wallabey	0.2s	09/05/2011	02/11/2012	01/11/2013
4	3463	HT2110156	Wallabey	0.2s	09/05/2011	02/11/2012	01/11/2013
5	3464	HT2110161	Wallabey	0.2s	09/05/2011	02/11/2012	01/11/2013
6	3465	HT2110151	Wallabey	0.2s	10/05/2011	02/11/2012	01/11/2013
7	3466	HT2110149	Wallabey	0.2s	10/05/2011	02/11/2012	01/11/2013
8	3467	HT2110153	Wallabey	0.2s	10/05/2011	02/11/2012	01/11/2013
9	3470	TN901101	Premier	0.5s	08/11/2011	02/11/2012	01/11/2013
10	3500	HT2110146	Wallabey	0.2s	09/05/2011	02/11/2012	01/11/2013
11	3501	HT2110143	Wallabey	0.2s	09/05/2011	02/11/2012	01/11/2013
12	3502	HT2110152	Wallabey	0.2s	10/05/2011	02/11/2012	01/11/2013
13	3503	HT2110166	Wallabey	0.2s	09/05/2011	02/11/2012	01/11/2013
14	3504	HT2110148	Wallabey	0.2s	10/05/2011	02/11/2012	01/11/2013
15	3505	HT2110154	Wallabey	0.2s	10/05/2011	02/11/2012	01/11/2013
16	3506	HT2110168	Wallabey	0.2s	10/05/2011	02/11/2012	01/11/2013
17	3507	HT2110144	Wallabey	0.2s	10/05/2011	02/11/2012	01/11/2013
18	3508	HT2110163	Wallabey	0.2s	10/05/2011	03/11/2012	02/11/2013
19	3509	TNB04626	Premier	0.5s	18/03/2011	03/11/2012	02/11/2013
20	3510	HT2110165	Wallabey	0.2s	09/05/2011	03/11/2012	02/11/2013
21	3511	HT2110158	Wallabey	0.2s	09/05/2011	03/11/2012	02/11/2013
22	3512	HT2110157	Wallabey	0.2s	09/05/2011	03/11/2012	02/11/2013
23	3513	HT2110147	Wallabey	0.2s	10/05/2011	02/11/2012	01/11/2013



24	3514	HT2110150	Wallabey	0.2s	10/05/2011	02/11/2012	01/11/2013
25	3515	HT2110159	Wallabey	0.2s	09/05/2011	02/11/2012	01/11/2013
26	3516	HT2110164	Wallabey	0.2s	09/05/2011	02/11/2012	01/11/2013
27	3517	HT2110142	Wallabey	0.2s	09/05/2011	02/11/2012	01/11/2013
28	3518	HT2110160	Wallabey	0.2s	09/05/2011	02/11/2012	01/11/2013
29	3519	HT2110145	Wallabey	0.2s	09/05/2011	02/11/2012	01/11/2013
30	3528	HT2110155	Wallabey	0.2s	09/05/2011	02/11/2012	01/11/2013
31	3768	HT2110195	Wallabey	0.2s	01/07/2011	02/11/2012	01/11/2013
32	3769	HT2110220	Wallabey	0.2s	01/07/2011	03/11/2012	02/11/2013
33	3770	HT2110196	Wallabey	0.2s	01/07/2011	03/11/2012	02/11/2013
34	3771	HT2110215	Wallabey	0.2s	01/07/2011	02/11/2012	01/11/2013
35	3772	HT2110219	Wallabey	0.2s	01/07/2011	03/11/2012	02/11/2013
36	3773	HT2110216	Wallabey	0.2s	01/07/2011	03/11/2012	02/11/2013
37	3774	HT2110169	Wallabey	0.2s	01/07/2011	03/11/2012	02/11/2013
38	3775	HT2110191	Wallabey	0.2s	01/07/2011	03/11/2012	02/11/2013
39	3776	HT2110218	Wallabey	0.2s	01/07/2011	03/11/2012	02/11/2013
40	3777	HT2110226	Wallabey	0.2s	01/07/2011	03/11/2012	02/11/2013
41	3778	HT2110198	Wallabey	0.2s	01/07/2011	03/11/2012	02/11/2013
42	3779	HT2110223	Wallabey	0.2s	01/07/2011	03/11/2012	02/11/2013
43	3780	HT2110218	Wallabey	0.2s	01/07/2011	03/11/2012	02/11/2013
44	3781	HT2110229	Wallabey	0.2s	01/07/2011	03/11/2012	02/11/2013
45	3782	HT2110206	Wallabey	0.2s	01/07/2011	03/11/2012	02/11/2013
46	3783	HT2110211	Wallabey	0.2s	01/07/2011	03/11/2012	02/11/2013
47	3784	HT2110192	Wallabey	0.2s	01/07/2011	03/11/2012	02/11/2013
48	3785	HT2110203	Wallabey	0.2s	01/07/2011	03/11/2012	02/11/2013
49	3789	HT2110225	Wallabey	0.2s	11/07/2011	03/11/2012	02/11/2013
50	3790	HT2110228	Wallabey	0.2s	11/07/2011	03/11/2012	02/11/2013
51	3791	HT2110224	Wallabey	0.2s	11/07/2011	03/11/2012	02/11/2013

The details of meters installed at Enercon pooling sub-station is as follows:-

Sr. No	Meter type	Meter Serial No.	Make	Accur acy class	Last dates of calibration before monitoring period	Calibration date during Monitoring Period	Due Date of Calibration
1	Main meter	HT1100044	Wallabey	0.2s	09/11/2011	07/12/2012	07/12/2013
2	Check meter	HT1100045	Wallabey	0.2s	12/11/2011	09/12/2012	09/12/2013

The verification team also reviewed the Monitoring report version 2 (/6/) and confirms that the information provided in the Monitoring report is in accordance with that stated in the registered PDD.

**[Management and Operation]**

The PP has operated the Project as per the registered PDD. The monitoring organization has been set up and all monitoring staffs have been trained. Meter reading records of all the meters are based on continuous measurement and monthly recorded by the PP. The grid company issues the Monthly statement to the PP every month to confirm the electricity exported to and imported from the grid.

✌ Corresponding to the paragraph 228 of VVS version 03.0, Bureau Veritas Certification can confirm that:

- The implementation of the Project is consistent with the registered PDD.
- The Project is operated as per the registered PDD by the PP.

**3.3. Compliance of the monitoring plan with the monitoring methodology including applicable tool(s) (232)**

The verification team has verified the monitoring plan, including the data and parameters required to be monitored, measurement procedures, monitoring frequency and QC/QA procedures as described in the registered PDD.

The project activity is registered with methodology ACM0002 version 12.1.0 (/3/) according to which the net electricity supplied to the Grid by the renewable energy technology i.e. electricity exported by the project activity to the Grid and the electricity imported from the grid is to be monitored and measured. Accordingly, the monitoring plan of the registered PDD indicates that the net electricity supplied to the Grid by the project activity ( $EG_{PJ,y}$ ) is calculated as the difference between Electricity exported to the grid by the project activity ( $EG_{Export,y}$ ) and Electricity imported from the grid to the project activity ( $EG_{Import,y}$ ) including transmission loss ( $T_E$ ).

The electricity generation is monitored through electronic tri-vector meter installed at each WEC metering location (or each HTSC) as well as the energy meters (main and check) installed at the pooling substation. The meters installed at each metering location are with an accuracy class of either 0.5s and 0.2s.

The grid emission factor (**0.94515** tCO<sub>2</sub>/MWh) has been fixed ex-ante for the entire crediting period in the registered PDD.

Hence the verification team concluded that no deviation request or revision request is required for the current monitoring period.

✌ Corresponding to the paragraph 232 of VVS version 03.0, Bureau Veritas Certification can confirm that the monitoring plan is in accordance with the approved methodology including applicable tool(s) applied by the Project.

**3.4. Compliance of monitoring activities with the monitoring plan (235-236)**

Monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD.

**[Parameters and information flow]**

The parameters required by the monitoring plan and how Bureau Veritas Certification has verified the information flow (from data generation, aggregation, to recording, calculation and reporting) for these parameters including the values in the monitoring report are described below:

**Parameters monitored:**

<b>Sr. no.</b>	<b>Parameter</b>	<b>Data information flow</b>
(1)	<b>Electricity imported by project activity to grid recorded at 33kV metering points (Cluster meter) (<math>EG_{Import,y}</math>)</b>	<p>The verification team noted that the electricity imported from the grid to the project activity is recorded through Single billing electronic meters owned by TNEB located at each HTSC connection.</p> <p>The electronic tri-vector meter measures the electricity imported from the grid on a continuous basis and is recorded by state utility on monthly basis.</p> <p>The parameter energy imported from the grid by the project activity (<math>EG_{Import,y}</math>) is measured on a continuous basis and is recorded and signed jointly by the recorded and signed jointly by the personnel of TNEB and EIL.</p> <p>The same value is reflected in the "<u>Statement showing the energy generated by the wind mill</u>" issued by Tamil Nadu Generation and Distribution Corporation Limited (State Utility) on a monthly basis.</p> <p>The verification team has cross-checked and verified the monthly statements (/7/) of all the WECs for all the months during the entire monitoring period.</p> <p>Since monthly statements are the certificate issued by the state utility viz. Tamil Nadu Generation and Distribution Corporation Limited hence the same is considered as authentic and reliable.</p> <p><i>Based on the above, the verification team concludes that the monitoring of electricity imported from the grid by the project activity is in line with the provision described in the monitoring plan.</i></p>
(2)	<b>Electricity exported by project activity to grid recorded at 33kV metering points (Cluster meter) (<math>EG_{Export,y}</math>)</b>	<p>The verification team noted that the electricity exported to the grid is recorded through Single billing electronic meters owned by TNEB located at each HTSC connection.</p> <p>The electronic tri-vector meter measures the electricity export on continuous basis and is recorded by state utility on monthly basis.</p> <p>The parameter energy exported to the grid by the project</p>



		<p>activity (<math>EG_{\text{Export},y}</math>) is measured on a continuous basis and is recorded and signed jointly by the personnel of TNEB and EIL.</p> <p>The same value is reflected in the “<u>Statement showing the energy generated by the wind mill</u>” issued by Tamil Nadu Generation and Distribution Corporation Limited (State Utility) on a monthly basis.</p> <p>The verification team has cross-checked and verified the monthly statements (/7/) of all the WECs for all the months during the entire crediting period.</p> <p>Since monthly statements are the certificate issued by the state utility viz. Tamil Nadu Generation and Distribution Corporation Limited hence the same is considered as authentic and reliable.</p> <p><i>Based on the above, the verification team concludes that the monitoring of electricity exported to grid by the project activity is in line with the provision described in the monitoring plan.</i></p>
(3)	<p><b>Line loss between the metering point at 33 kV metering points of project activity and the metering point at 110 kV at the ENERCON pooling substation (<math>T_E</math>)</b></p>	<p>Apart from metering at the WEC metering location (33 kV), joint meter reading is also taken at the pooling Enercon substation (110 kV) by representatives of the state utility and the PP.</p> <p>The electricity measured at the substation represents the electricity supplied by the entire wind farm (including Non-PP WEC), hence a transmission loss<sup>3</sup> is calculated for the cumulative generation and the transmission loss percentage is applied to calculate the net energy export from each WEC metering location. The cumulative transmission loss is calculated in the following manner:</p> $Z = ((X1+X2+X3+X4+.....Xn) - Y) / (X1+X2+X3+X4+.....Xn) \times 100\%$ <p>Where,</p> <p><i>Z = Percentage Line loss incurred in Line between the meters located at 33 kV metering point (including the machines of the project activity and other project developers) and the meters located at 110kV metering point (bulk meter: main and check) at high voltage side of receiving sub-station.</i></p> <p><i>(X1+X2+X3+X4+.....Xn) = Summation of meter readings (Export- Import) at 33 kV metering points for all the project developers connected to receiving substation (including the</i></p>

<sup>3</sup> This calculation is performed by the state utility

		<p><i>machines of the project activity and other project developers)</i></p> <p><i>X<sub>n</sub> = Net Export (Export – Import) Reading (X<sub>i</sub>) noted at energy meter installed at 33kV metering point where i vary from 1 to n which represents the meters connected to project activity and other project developers. X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>,...X<sub>n</sub> are the meters that are installed at 33kV metering point (including the machines of the project activity and other project developers) and further connected to the receiving substation at 110 kV by internally connected lines.</i></p> <p><i>Y = Net Export (Export-Import) Reading at bulk meter installed at high voltage side of transformer of the receiving sub-station at 110 kV connecting machines of the project activity and other project developers.</i></p> <p>Therefore Line Loss for the project activity (between 33kV &amp; 110kV metering point) is calculated as follows:-</p> <p><b>Line Loss (T<sub>E</sub>) = Z × Net Export recorded at 33 kV metering point of project activity.</b></p> <p><b>T<sub>E</sub> = Z × ( EG<sub>Export,y</sub> - EG<sub>Import,y</sub> )</b></p>
(4)	<b>Net electricity supplied to the grid by the project (EG<sub>PJ,y</sub>)</b>	<p>Based on the monitored parameters as described above, the net electricity supplied to the grid is calculated as per the following formula by the state utility:</p> <p><b>EG<sub>PJ,y</sub> = EG<sub>Export,y</sub> - EG<sub>Import,y</sub> - T<sub>E</sub></b></p> <p>Where</p> <p><b>EG<sub>Export,y</sub></b> – Electricity exported by project activity to grid recorded at WEC metering location</p> <p><b>EG<sub>Import,y</sub></b> – Electricity imported by project activity from grid recorded at WEC metering location</p> <p><b>T<sub>E</sub></b> – Line loss between WEC metering location of project activity and the metering point at 110 kV at the ENERCON pooling substation.</p> <p>The verification team has cross-checked the value of <b>EG<sub>Export,y</sub></b>, <b>EG<sub>Import,y</sub></b> and <b>T<sub>E</sub></b> from the monthly statements (/7/) of all the HTSCs for all the months during the entire monitoring period and found them to be appropriate.</p> <p>Since monthly statements are the certificate issued by the state utility viz. Tamil Nadu Generation and Distribution Corporation Limited hence the same is considered as authentic and reliable.</p>

		Based on the above, the verification team concludes that the monitoring of net electricity exported to grid by the project activity is in line with the provision described in the monitoring plan.
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**Parameters determined ex-ante:**

(1)  $EF_{grid,CM,y}$  emission factor of the southern regional grid

The emission factor of the Project has been determined ex-ante in the registered PDD. The emission factor used in the monitoring report has been verified against the PDD and found them to be consistent.

✌ Corresponding to the paragraph 235 and 236 of VVS version 03.0, Bureau Veritas Certification can confirm that:

- The monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD.
- All parameters required by the monitoring plan have been sufficiently monitored and correctly listed. The monitored data for required parameters have been verified by checking the whole information flow.

### 3.5. Compliance with the calibration frequency requirements for measuring instruments (243)

#### Details of calibration frequency of measuring equipment

<b>Baseline emission parameters</b>		
<b>Sr. no.</b>	<b>Parameter</b>	<b>Details</b>
(1)	<b>Net electricity supplied to the grid by the project (<math>EG_{PJ,y}</math>)</b>	<p><u>Monitoring equipment</u> – (or energy meters) installed at each HTSC connection and the pooling sub-station which are used to measure the net electricity exported to the grid are of 0.2s and 0.5s accuracy class and are under the control of the state electricity utility.</p> <p><u>Calibration frequency</u> – All the energy meters have been calibrated and details of calibration of all the energy meters for the entire monitoring period has been included in section C of the monitoring report. The verification team has cross-checked the records of calibration (/5/) of all the energy meters for the entire monitoring period and found them to be appropriate.</p> <p>From reviewing each of the calibration certificates, the verification team was able to confirm that test results for all the energy meters are satisfactory and that the meters have operated within the permissible error limit.</p> <p><i>The procedure followed in case of delay in meter calibration is</i></p>

		<i>described below.</i>
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Hence, in line with the above the verification team confirms that the calibration frequency has been carried out in accordance with the national standards and EB guidance.

#### [Calibration frequency]

The calibration frequency fulfills the requirement as described in the monitoring plan and is in compliance with the national standard/8/.

During the site visit, while reviewing the meter details of all the HTSCs, the verification team noted that the energy meters for following HTSCs were changed. The details are provided below:

WEC HTSC no.	Old meter number	New meter number	Meter change date	Reason for meter change
3776	HT2110214	HT2110218	22/05/2012	No display of meter reading

It is identified that the calibration has been delayed during the monitoring period. A conservative approach is adopted in the calculation of emission reductions as follows:

Conservative approach to calculate the net electricity supplied has been followed in line with EB 52 Annex 60 wherever applicable as follows:

Measured Value	Parameter	Error identified during calibration	Corrected values
X MWh	Electricity export	$\pm 1\%$	X (1 -Max . permissible error%/100)
X MWh	Electricity import	$\pm 1\%$	X (1+Max . permissible error%/100)

As per the calibration records available after the delayed calibration, the energy meters were found to be within maximum permissible error and hence for the above procedure the maximum permissible error of energy meters viz. either  $\pm 2\%$  or  $\pm 5\%$  was used. The verification team also raised CL 2 and CL 3 to address the issue of delayed calibration.

Separate sub-sheet has been included in the ER spreadsheet which specifies the details of all energy meters and the time period for which the calibration was delayed. Also included is the period for which error factor is applied.

For example...energy meter for HTSC 3461 was calibrated on 09/05/2011 and recent calibration was done in 02/11/2012, so to cover maximum period; complete months of May-2012 (covering a period from 17/04/2012 to 17/05/2012) to Nov-12(11/10/2012 to 14/11/2012) covering a period from were considered while applying correction factor.

Corresponding to the paragraph 243 of VVS version 03.0, Bureau Veritas Certification can confirm that:



- For calibration that has been delayed, the conservative approach is adopted in the calculation of emission reductions and deemed as appropriate.

### 3.6. Assessment of data and calculation of emission reductions (246)

A complete set of data for the specified monitoring period is available.

The critical parameter used for the determination of the Emission Reductions is the net electricity supplied to the grid by the Project. The data pertaining to the above parameter are maintained in the identified records. All the data are in compliance with that stated in the Monitoring Report version 02.

As per the methodology ACM0002 version 12.1.0 and the registered PDD, the emission reductions for the Project are calculated as the baseline emissions minus the project emissions. Hence the emission reduction is determined by the following formula:

$$ER_y = BE_y - PE_y$$

Where,

ER<sub>y</sub>: Emission reductions

BE<sub>y</sub>: Baseline emissions

PE<sub>y</sub>: Project emissions

The data used for calculation of the GHG emission reductions are as follows:

- The net electricity exported to the grid by the project activity
- The southern regional grid emission factor.

As per the monitoring plan of the registered PDD, the following complete data set was required for the specified monitoring period to calculate the GHG emission reductions resulting from the project activity-

<b>Baseline emission</b>	
<b>Parameter</b>	<b>Source</b>
<b><i>Net electricity supplied to the grid by the project (EG<sub>P,J,y</sub>)</i></b>	<b><u>Statement showing the energy generated by the wind mill</u></b>  All the monthly Statements showing the energy generated by the project activity wind mills for the current monitoring period have been cross-checked by the verification team.  The value in the statement is aggregated to calculate the net electricity exported to the grid by the project activity. The PP has included a separate worksheet in the ER calculation spreadsheet (/9/), which mentions monthly statement readings for the project activity for the current monitoring period separately for each billing month.



## VERIFICATION REPORT

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

**Cross check of information in monitoring report**

The information in the monitoring report has been cross-checked through other documentary evidence as explained below:

<b>Baseline emission</b>	
<b>Parameter</b>	<b>Cross-check Source</b>
<b>Net electricity supplied to the grid by the project (<math>EG_{PJ,y}</math>)</b>	The value of net electricity supplied to the grid as reflected in the monthly statements has been compared with the invoices submitted to TNEB (/10/).

**Calculation procedure of baseline emissions, project emissions and leakage**

	<b>Calculation procedure</b>
<b>Baseline emissions</b>	<p>Baseline emission calculations have been done in the monitoring report as per the following equation -</p> $BE_y = EG_{PJ,y} * EF_{grid,CM,y}$ <p>Where –</p> <p><math>BE_y</math> – Baseline emissions</p> <p><math>EG_{PJ,y}</math> – Net electricity supplied to the grid by the project activity</p> <p><math>EF_{grid,CM,y}</math> – Baseline emission factor for southern regional grid</p> <p>The above mentioned calculation procedure is in line with the procedure described in the registered PDD.</p>
<b>Project emissions</b>	Not applicable since there are no emissions attributed to the project activity outside the project boundary.
<b>Leakage</b>	Not applicable since there are no emissions attributed to the project activity outside the project boundary.

The verification team confirms that appropriate methods and formulae for calculating baseline emissions have been followed.

**Emission factor and default values**

**Baseline emission factor of southern regional grid** - The emission factor taken for the calculation of baseline emissions (0.94515 tCO<sub>2</sub>/MWh) is determined ex-ante and fixed for the crediting period. The same is in line with the registered PDD.

The verification team confirms that the emission factor is in line with the requirement of the applied methodology and associated tools.



### [Comparison of ERs]

The annual estimated emission reductions are 103612 tCO<sub>2</sub>e as per the registered PDD. The actual operation period of the Project in the monitoring period is 298 days. The corresponding estimate in the monitoring period are  $(103612/365) \times (298) = 84593$  tCO<sub>2</sub>e. The actual emission reductions are 16.17 % higher than the estimated value in the monitoring period.

The verification team noted that the selected monitoring period (18/02/2012 to 11/12/2012) considers the peak wind season i.e. from May-2012 to October-2012 i.e. six months out of total ten months of monitoring period. The peak wind season in Tamil Nadu was also confirmed through interview with the officials of TANGEDCO.

Further, when full year duration (12 months) is considered i.e. from Jan 2012 to December 2012, the amount of emission reduction is 101,044 tCO<sub>2</sub>e, which is still less than the estimated value of 103,612 tCO<sub>2</sub>e for the same duration in the registered PDD. Hence the verification team concluded that higher generation for this monitoring period is only due to majority coverage of peak wind season, which covers a major duration of the monitoring period.

✌ Corresponding to the paragraph 246 of VVS version 03.0, Bureau Veritas Certification can confirm that:

- Data used for the determination of the emission reductions are available and monitored in accordance with the monitoring plan contained in the registered PDD.
- Information and data provided in the monitoring report have been cross-checked with other sources such as plant logbooks, inventories, purchase records, laboratory analysis.
- Appropriate methods and formulae for calculating baseline emissions, project emissions and leakage have been followed.
- Assumptions, emission factors and default values that were applied in the calculations have been justified.

## 4. VERIFICATION OPINION

Bureau Veritas Certification has performed the 2<sup>nd</sup> periodic verification of “**Vaayu India Wind Power Project in Tamil Nadu**” CDM Registration Reference Number **4930**, which is located in Vagaikulam, Kuruchikulam, Ettankulam, Kalakudi, Muthammalpuram, Ukkirankottai villages in Tirunelveli district of Tamil Nadu State in India, and applying the methodology ACM0002 version 12.1.0. The verification was performed based on the requirements set by 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, 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 management of *Vaayu (India) Power Corporation Private 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 monitoring plan contained in the registered PDD. 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 02 dated 28/03/2013 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 as a CDM project.

Bureau Veritas Certification can confirm that the GHG emission reductions are calculated without material misstatements. Our opinion relates to the projects' GHG emissions and resulting GHG emission reductions reported and related to the validated and registered project baseline, approved 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: 18/02/2012 to 11/12/2012  
 Baseline emissions: 98,269 t CO<sub>2</sub> equivalents  
 Project emissions: 0 t CO<sub>2</sub> equivalents  
 Leakage emissions: 0 t CO<sub>2</sub> equivalents  
 Emission Reductions: 98,269 t CO<sub>2</sub> equivalents

	
<b>Mr. Sanjay Patankar</b>	<b>Mr. Anurag Juyal</b>
Internal Technical Reviewer	Team Leader
12/04/2013	12/04/2013



## 5. REFERENCES

### Documents reviewed:

/1/	Registered PDD version 04 dated 15/03/2011, UNFCCC ref no. 4930
/2/	Validation Report dated 16/06/2011
/3/	ACM0002 / version 12.1.0 " <i>Consolidated baseline methodology for grid-connected electricity generation from renewable sources</i> "
/4/	Commissioning certificate of all the WECs
/5/	Calibration certificates of all the energy meters for the year 2011 and 2012.
/6/	Monitoring Report version 02, dated 28/03/2013
/7/	Monthly statement showing the energy generated by the wind mill issued by Tamil Nadu Generation and Distribution Corporation Limited for the entire monitoring period
/8/	CEA metering regulations
/9/	ER Calculation Spreadsheet version 02, dated 28/03/2013
/10/	Invoices submitted to TANGEDCO for the entire monitoring period

### Persons interviewed:

	<b><i>Vaayu (India) Power Corporation Private Limited</i></b>	
/1/	Mr. M Paramasivam	
/2/	Mr. S. Jaiprakash	
	<b><i>Wind World India Limited</i></b>	
/3/	Mr. Bhupendra Verma	



## 6. CURRICULA VITAE OF THE DOE'S VERIFICATION TEAM MEMBERS

Mr. Anurag Juyal	Bureau Veritas Certification, India	<p><b>Team Leader, Climate Change Lead Verifier</b></p> <p>Mr. Anurag Juyal is a Post-graduate in Energy Systems with more than 5 years of experience in the field of climate change services. He is working in Bureau Veritas Certification (India) Pvt. Ltd. as Lead 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.</p>
Mr. Srinivasan Selvaraj	Bureau Veritas Certification, India	<p><b>Team Member, Climate Change Lead Verifier.</b></p> <p>He has a Bachelors of Technology degree in Chemical Engineering and Master of Engineering degree in Environmental Management and has successfully completed the IRCA approved Lead Auditor training course for Environmental Management System. He has over 7 years of experience in the field of Environment and Energy services including detailed design engineering and preparation of Detailed Project Reports, environmental assessment reports, Environmental management plans for urban as well as industrial projects. He has been in the CDM validation and verification since June 2008 and he is with Bureau Veritas Certification (India) Pvt. Ltd. as Verifier - Climate change since March 2010. He has undergone training related to Clean Development Mechanism and is currently involved in validation and verification of CDM project activities.</p>
Mr. Sanjay Patankar	Bureau Veritas Certification, India	<p><b>Technical Reviewer, Climate Change Local Product Manager</b></p> <p>Educational qualifications: B.E. (Mech.) M.E. (Mech.)</p> <p>He has over 20 years of experience in engineering manufacturing industry covering various functions like enterprise management, product design, engineering, tool &amp; die design, improvements in the production shop, quality assurance &amp; control and systems planning and implementation, including ISO 9001 based quality management systems.</p>



Report No: BVC/India -VR/577.49/2013 rev. 01

VERIFICATION REPORT

		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.
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## APPENDIX A: CDM PROJECT VERIFICATION PROTOCOL

Table 1 Verification requirements based on VVS version 03.0 (EB 70 Annex 3), PS version 02.1 (EB 70 Annex 2), PCP version 03.1 (EB 70 Annex 4), and Guidelines for completing the Monitoring Report Form version 03.1 (EB 70 Annex 11)

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
<b>Part I Cover Page</b>					
(a) Is the title of the project activity provided?	MR		Yes provided as "Vaayu India Wind Power Project in Tamil nadu".	OK	OK
(b) Is the reference number of the project activity provided?	MR		Yes provided as 4930, which is matching with the information available on UNFCCC Website. <a href="http://cdm.unfccc.int/Projects/projsearch.html">http://cdm.unfccc.int/Projects/projsearch.html</a>	OK	OK
(c) Is the version number of the monitoring report indicated?	MR		Yes the version number of the webhosted MR is provided as 01	OK	OK
(d) Is the completion date of the monitoring report provided in DD/MM/YYYY format?	MR		Yes provided in DD/MM/YYYY format, 14/02/2013	OK	OK
(e) Is the registration date of the project activity provided in DD/MM/YYYY format?	MR		Yes provided in DD/MM/YYYY format, 19/07/2011	OK	OK
(f) Are the monitoring period number and duration of this monitoring period (first and last days included in DD/MM/YYYY format) provided?	MR		Yes provided, 18/02/2012 to 11/12/2012, (Both days inclusive).	OK	OK
(g) Are project participants indicated?	MR		Yes indicated.	OK	OK

## VERIFICATION REPORT

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
(h) Is the host party(ies) indicated?	MR		Yes the Host Parties have been stated in the Monitoring Report.	OK	OK
(i) Are the sectoral scope(s) and applied methodology(ies) indicated?	MR		Yes indicated.	OK	OK
(j) Is the estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD indicated?	MR		Yes provided as 84,593 t CO2e.	OK	OK
(k) Are the actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period indicated?	MR		Yes provided as 98,277 t CO2e.	OK	OK
(l) Are the actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period up to 31 December 2012 indicated (if applicable)?	MR		Yes provided as 98,277 t CO2e.	OK	OK
(m) Are the actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period from 1 January 2013 onwards indicated (if applicable)?	MR		Not provided. Hence Not Applicable.	-	OK
<b>Part II Monitoring Report</b>					
<b>A. Description of project activity</b>					
<b>A.1 Purpose and general description of project activity</b>					





## VERIFICATION REPORT

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
A.1.1 Is the description of the project activity to be presented in this section a brief summary of the detailed description given in the section B.1 Implementation status of the project activity?	MR		Yes, the description has been provided by the Project Participant.	OK	OK
A.1.2 Does this description include:					
A.1.2.1 Purpose of the project activity and the measures taken for GHG emission reductions or net anthropogenic GHG removals by sinks?	MR		The purpose of project activity and the measure taken for GHG emission reductions has been included in the Monitoring Report.	OK	OK
A.1.2.2 Brief description of the installed technology and equipments?	MR		Yes, brief description with technical specifications of the turbine & generators are provided.	OK	OK
A.1.2.3 Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods, etc.)?	MR		The details of commissioning of project activity are provided in the Monitoring Report. It is mentioned that the WECs under the project activity were commissioned between 29/09/2010 and 11/07/2011 and the expected operational lifetime of the project is for 20 years.	OK	OK
A.1.2.4 Total GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period?	MR		Yes, the total emission reductions achieved during the current monitoring period is provided as <b>98,277 tCO<sub>2</sub>..</b>	OK	OK
<b>A.2 Location of project activity</b>					
A.2.1 Is the information on the location of the project activity provided, including Host Party(ies), Region/State/Province,	MR		Yes provided Vagaikulam, Kuruchikulam, Ettankulam, Kalakudi, Muthammalpuram, Ukkirankottai villages in Tirunelveli district in the State of Tamil Nadu. The	OK	OK



## VERIFICATION REPORT

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
City/Town/Community, Geographical location etc.?			information is matching with the details provided in the registered PDD.		
<b>A.3 Parties and project participant(s)</b>					
A.3.1 Is the Party(ies) and project participant(s) involved in the project activity listed in the provided table?	MR		Yes the information of parties and project participant are provided in the Monitoring Report.	OK	OK
<b>A.4 Reference of applied methodology</b>					
A.4.1 Is the exact reference (number, title, version) of the methodology (ies) indicated?	MR		Yes, the applied methodology and version number are correctly quoted (ACM0002, Version 12.1.0).	OK	OK
A.4.2 Is the exact reference (number, title, version) of any tools and other methodologies to which the applied methodology (ies) refers indicated?	MR		Yes, the reference no, title and version no are provided, for each of the tools applied. The same is matching with the registered PDD.	OK	OK
<b>A.5 Crediting period of project activity</b>					
A.5.1 Are the type, start date and length of the crediting period corresponding to this monitoring period provided?	MR		The Project Participant has chosen Fixed Crediting Period of 10 Years. The same is stated in the Monitoring Report.	OK	OK
<b>B. Implementation of project activity</b>					
<b>B.1 Description of implemented registered project activity</b>					



## VERIFICATION REPORT

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
B.1.1 Is the description of the installed technology, technical processes and equipments provided, include diagrams where appropriate?	MR PS	191(a)	The technical and technology details are provided in the Monitoring Report.	OK	OK
B.1.2 Is the information on the implementation and actual operation of the project activity, including relevant dates (e.g. construction, commissioning, continued operation periods, etc.) provided?	PS	191(b)	The information pertaining to construction, commissioning and continued operation are presented in the Monitoring Report.	OK	OK
B.1.3 Is the description of: (i) the events or situations that occurred during the monitoring period that may impact the applicability of the methodology (ii) how the issues resulting from these events or situations have been addressed provided?	PS	191(c)	There are no such events which can be considered to have an impact on the applicability of the methodology. The log books and operation & maintenance records were checked during the site visit to affirm the same.	OK	OK
B.1.4 Have the project participants addressed the FARs identified during validation or previous verification(s)?	VVS	213	There were no FARs which were raised / open in the previous verification and which had to be addressed during this verification.	OK	OK
B.1.5 Have the implementation and operation of the project activity been conducted in accordance with the description contained in the registered PDD?	VVS	226	CL 1: As per the information available in the registered PDD, the project activity was expected to export net electricity of 89502.2 MWh for the (298 days) monitoring period (18/02/2012-11/12/2012). However, the actual (net) export for the monitoring period is 103981 MWh. This is about 16.17 % higher than the estimated quantity. Please clarify as to why there was a higher generation during the current monitoring period.	CL1	OK



## VERIFICATION REPORT

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
B.1.6 Are all physical features of the project activity in the registered PDD in place?	VVS	227	The physical features are the same as mentioned in the registered PDD.	OK	OK
B.1.7 Have the project participants operated the project activity as per the registered PDD or any approved revised PDD?	VVS	227	Please refer to B.1.5 above	(GL-4)	OK
B.1.8 Was an on-site visit conducted?	VVS	227	Yes, the on-site visit was conducted on 05/03/2013.	OK	OK
B.1.9 If an on-site visit is not conducted, is the rationale of the decision justified?	VVS	227	Not Applicable, since the on-site visit was conducted on 05/03/2013.	OK	OK
<b>B.2 Post registration changes</b>					
B.2.1 Temporary deviations from registered monitoring plan or applied methodology					
B.2.1.1 Is it indicated whether any temporary deviations have been applied during this monitoring period?	MR		There were no temporary deviations applied during this monitoring period, hence the same is not applicable.	–	OK
B.2.1.2 Is a description of the deviation(s) in accordance with applicable provisions in the Project standard provided?	MR		Not Applicable	–	OK
B.2.1.3 Are the reasons for the deviation(s), how it deviates from the monitoring plan and/or applied methodology (ies), the duration for which the deviation(s) is(are) applicable and justification on	MR		Not Applicable	–	OK



## VERIFICATION REPORT

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
the conservativeness of the approach included in the description?					
B.2.1.4 For deviation(s) that require prior approval by the Board, are the date of approval and reference number included in the description?	MR		Not Applicable	–	OK
B.2.2 Corrections					
B.2.2.1 Is it indicated whether any corrections to project information or parameters fixed at validation have been approved during this monitoring period or submitted with this monitoring report?	MR		There are no corrections with respect to project information on any fixed parameters during this monitoring period.	OK	OK
B.2.2.2 In cases where the correction(s) and the revised PDD are approved prior to the submission of this monitoring report for request for issuance, are the approval date and reference number provided? Otherwise, are the version number and the completion date of the revised PDD provided?	MR		There are no corrections with respect to project information on any fixed parameters during this monitoring period.	OK	OK
B.2.3 Permanent changes from registered monitoring plan or applied methodology					
B.2.3.1 Is it indicated whether any permanent changes from the registered monitoring plan or applied methodologies have	MR		There are no permanent changes from the registered and the subsequent approved monitoring plan.	OK	OK



## VERIFICATION REPORT

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
been approved during this monitoring period or submitted with this monitoring report?					
B.2.3.2 In cases where the change(s) and the revised PDD are approved prior to the submission of this monitoring report for request for issuance, are the approval date and reference number provided? Otherwise, are the version number and the completion date of the revised PDD provided ?	MR		Not applicable	OK	OK
B.2.4 Changes to project design of registered project activity					
B.2.4.1 Is it indicated whether any changes to the project design of the project activity have been approved during this monitoring period or submitted with this monitoring report?	MR		Not applicable	OK	OK
B.2.4.2 In cases where the change(s) and the revised PDD are approved prior to the submission of this monitoring report for request for issuance, are the approval date and reference number provided? Otherwise, are the version number and the completion date of the revised PDD provided?	MR		Not applicable	OK	OK

# BUREAU VERITAS CERTIFICATION



Report No: BVC/India -VR/577.49 rev. 00

## VERIFICATION REPORT

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
B.2.5 Changes to start date of crediting period					
B.2.5.1 Is it indicated whether any changes to the start date of the crediting period have been approved during this monitoring period?	MR		Not applicable	OK	OK
B.2.5.2 In cases where the changes and the revised PDD are approved prior to the submission of this monitoring report for request for issuance, are the approval date and reference number provided?	MR		Not Applicable.	–	OK
B.2.6 Types of changes specific to afforestation or reforestation project activity					
B.2.6.1 Is it indicated whether any changes specific to afforestation or reforestation project activities have been applied during this monitoring period based on applicable provisions in the Project standard that do not require prior approval by the Board?	MR		Not Applicable	–	OK
B.2.6.2 If changes were applied, are the version number and the completion date of the revised PDD provided?	MR		Not Applicable	–	OK
<b>C. Description of monitoring system</b>					
<b>C.1 General requirements</b>					



## VERIFICATION REPORT

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
C.1.1 Have project participants described the monitoring system and provided line diagrams (graphical schemes) showing all relevant monitoring points?	MR PS	193	Yes, the project participants have described the monitoring system and illustrations of the monitoring points are provided in the monitoring report.	OK	OK
C.1.2 Does this description where appropriate include data collection procedures (information flow including data generation, aggregation, recording, calculations and reporting), organizational structure, roles and responsibilities of personnel, and emergency procedures for the monitoring system?	MR PS	193	The description of data collection, procedures are provided.	OK	OK
C.1.3 Is the monitoring plan of the project activity in accordance with the applied methodology including applicable tool(s)?	VVS	229	Yes, the monitoring plan is in accordance with the applied methodology.	OK	OK
C.1.4 For monitoring aspects that are not specified in the methodology, particularly in the case of small-scale methodologies (e.g. additional monitoring parameters, monitoring frequency and calibration frequency), are there any issues which may enhance the level of accuracy and completeness of the monitoring plan and should bring to the attention of the Board?	VVS	231	There are no monitoring aspects which are not specified in the applied approved methodology which is being used by the Project Participant.	OK	OK
C.1.5 Has the monitoring plan been properly implemented and followed by the project	VVS	234(a)	The monitoring plan has been implemented and followed by the project participant, the same was evidenced	OK	OK





## VERIFICATION REPORT

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
participants?			during the on-site visit and subsequent document assessment.		
C.1.6 Have all parameters stated in the monitoring plan and relevant Board decisions been monitored and updated as applicable, including:	VVS	234(b)		-	
C.1.6.1 Project emission parameters?	VVS	234(b)	Yes provided.	OK	OK
C.1.6.2 Baseline emission parameters?	VVS	234(b)	Yes provided.	OK	OK
C.1.6.3 Leakage parameters?	VVS	234(b)	Yes provided.		
C.1.6.4 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?	VVS	234(b)	Yes, the management and operational system have been defined and is found to be in accordance with the approved monitoring plan.	OK	OK
<b>D. Data and parameters</b>					
<b>D.1 Data and parameters fixed ex ante or at renewal of crediting period</b>					
D.1.1 For "Purpose of data", is one of the following options chose: (a) Calculation of baseline emissions or baseline net GHG removals by sinks; (b) Calculation of project emissions or actual net GHG removals by	MR		The data used in the computation are fixed ex-ante. The project participant has chosen ten year fixed crediting period.	OK	OK



## VERIFICATION REPORT

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
sinks; (c) Calculation of leakage?					
D.1.2 For "Value(s) applied", if applicable, is one table used to report multiple values referring to the same data and parameter? If necessary, are reference(s) to electronic spreadsheets used?	MR		There are three different values which were derived and used at the time of validation and has been fixed ex-ante.	OK	OK
D.1.3 Is the source of data provide and/or identified?	PS	195(d)	Yes, the source of data is provided as Central Electricity Authority (CEA).	OK	OK
D.1.4 Is information about appropriate emission factors, IPCC default values and any other reference values that have been used in the calculation of GHG emission reductions or net GHG removals provided?	PS	195(g)	Yes the same has been provided.	OK	OK
<b>D.2 Data and parameters monitored</b>					
D.2.1 For "Purpose of data", is one of the following options chose: (a) Calculation of baseline emissions or baseline net GHG removals by sinks; (b) Calculation of project emissions or actual net GHG removals by sinks; (c) Calculation of leakage?	MR		The project participant for the 'Purpose of Data' has chosen option a) viz., Calculation of baseline emissions or baseline net GHG removals by sinks;	OK	OK
D.2.2 For "Value(s) of monitored parameter", if applicable, is one table used to report multiple values referring to the same data and parameter? If necessary, are	MR		There are three values which are monitored $EG_{P,y}$ , $EG_{export,y}$ and $EG_{import,y}$ which are used to calculate the net electricity. The values are provided in separate tables and spreadsheets containing the data are has been	OK	OK



## VERIFICATION REPORT

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
reference(s) to electronic spreadsheets used?			submitted by the Project Participant.		
D.2.3 Are the values of the monitored parameter for the purpose of calculating GHG emission reductions or net GHG removals provided? Where data are measured continuously, are they presented using an appropriate time interval? For default values (such as an IPCC value), where it is ex post confirmed, is the most recent value applied?	PS	195(a)	Yes, the data are measured and the measured data is used to calculate the net electricity. The time interval is stated in the monitoring report.  The generation details are provided separately in the ER calculation sheet.	OK	OK
D.2.4 Is the equipment used to monitor each parameter described, including details on accuracy class, and calibration information (frequency, date of calibration and validity), if applicable as per monitoring plan?	PS	195(b)	CL 2: The accuracy class of the measuring instruments, mentioned in the MR for HTSC No 3470 and 3509 does not match with the accuracy class of the instruments, observed during the site visit (accuracy class of the meter observed was 0.5s instead of 0.2s mentioned in the MR). Also please clarify if the error adjustments for the delay in calibration frequency of the measuring instruments have considered the correct accuracy class of the respective instruments.	CL-2	OK
D.2.5 Is the equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan, the applied methodology, the Board guidance, local/national standards, or as per the manufacturer's specification?	VVS	234(c)	The frequency of calibration is stated as annual in approved monitoring plan. The calibration in the current monitoring period has not been conducted in the frequency as stated. However, the PP has attempted to adjust the error in accordance with Guidance on	CL-3	OK



## VERIFICATION REPORT

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
			Calibration (EB 52, Annex 60)  CL 3. The error adjustments are incorporated in the emission reduction calculations, for the delay in calibration frequency of the measuring instruments. It is not clear how the period for error adjustments has been selected for each of the measuring instruments (HTSC Nos.). Please clarify and provide the details in the ER calculation sheet and in the MR.		
D.2.6 Is the calibration of those measuring equipments that have an impact on the claimed emission reductions conducted by the project participants at a frequency specified in the applied monitoring methodology and/or the monitoring plan?	VVS	237	The error adjustments are incorporated in the emission reduction calculations, for the delay in calibration frequency of the measuring instruments. It is not clear how the period for error adjustments has been selected for each of the measuring instruments (HTSC Nos.). Please clarify and provide the details in the ER calculation sheet and in the MR.	(CL-3)	OK
D.2.7 If, during verification of a certain monitoring period, the calibration has been delayed and the calibration has been implemented after the monitoring period in consideration (i.e. the results of delayed calibration are available), is the following conservative approach adopted in the calculation of emission reductions:	VVS	238			



## VERIFICATION REPORT

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
D.2.7.1 Applying the maximum permissible error of the instrument to the measured values taken during the period between the scheduled date of calibration and the actual date of calibration, if the results of the delayed calibration do not show any errors in the measuring equipment, or if the error is smaller than the maximum permissible error?	VVS	238(a)	Please refer to D.2.6 above	(CL-3)	OK
D.2.7.2 Applying the error identified in the delayed calibration test, if the error is beyond the maximum permissible error of the measuring equipment?	VVS	238(b)	Please refer to D.2.6 above	(CL-3)	OK
D.2.8 Has the error has been applied:	VVS	239	-	-	
D.2.8.1 In a conservative manner, such that the adjusted measured values of the delayed calibration shall result in fewer claimed emission reductions?	VVS	239(a)	Please refer to D.2.6 above	(CL-3)	OK
D.2.8.2 For all measured values taken during the period between the scheduled date of calibration and the actual date of calibration.	VVS	239(b)	Please refer to D.2.6 above	OK	OK
D.2.9 In cases where the results of the delayed calibration are not available, or the calibration has not been conducted at the	VVS	240		OK	OK



## VERIFICATION REPORT

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
time of verification, prior to finalizing verification, were the project participants requested to conduct the required calibration have the project participants calculated the emission reductions conservatively using the approach mentioned in item "D.2.7" above?			Please refer to D.2.6 above		
D.2.10 In cases where it is not possible for the project participants to conduct the calibration at a frequency specified by either the applied methodology, guidance provided by the Board, and/or the registered monitoring plan due to reasons beyond the control of PPs, are the requirements for post registration changes, in section 9.5 of the VVS, followed?	VVS	241	Please refer to D.2.6 above	OK	OK
D.2.11 In cases where neither the monitoring methodology nor the monitoring plan specify any requirements for calibration frequency for measuring equipments, are the equipments calibrated either in accordance with the specifications of the local/national standards, or as per the manufacturer's specification? If neither local/national standards nor the manufacturer's specification are available, were international standards used?	VVS	242	Please refer to D.2.6 above	OK	OK



## VERIFICATION REPORT

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
D.2.12 Is it described how the parameters are measured/calculated and the measurement and recording frequency?	PS	195(c)	Yes, the description is provided as to how the parameters are measured and calculated. Also the measurement and recording frequency are quoted.	OK	OK
D.2.13 Are monitoring results consistently recorded as per approved frequency?	VVS	234(d)	Yes the monitoring frequency is consistent with the approved monitoring plan.	OK	OK
D.2.14 Is the source of data (e.g. logbooks, daily records, surveys, etc.) provide and/or identified?	PS	195(d)	The source of data is log books and the Joint Meter Readings.	OK	OK
D.2.15 Where relevant is the calculation method of the parameter provided?	PS	195(e)	Not applicable, as the parameters are directly sourced from the referred sources.	OK	OK
D.2.16 Are the QA/QC procedures applied described (if applicable per monitoring plan)?	PS	195(f)	Yes the QA/QC procedures applied are described,	OK	OK
D.2.17 Have quality assurance and quality control procedures been applied in accordance with the monitoring plan or the revised monitoring plan?	VVS	234(e)	Yes the quality assurance and quality control procedures are applied as per the revised monitoring plan.	OK	OK
D.2.18 Is information about appropriate emission factors, IPCC default values and any other reference values that have been used in the calculation of GHG emission reductions or net GHG removals provided?	PS	195(g)	The information has been provided	OK	OK
<b>D.3 Implementation of sampling plan</b>					



## VERIFICATION REPORT

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
D.3.1 Is a description provided on how project participants implemented the sampling efforts and surveys for those data and parameters according to the sampling plan, Include:	MR		Not applicable, as the Project Participant has not used the sampling plan / approach.	-	OK
D.3.1.1 Description of implemented sampling design?	MR		Not applicable, as the Project Participant has not used the sampling plan / approach.	-	OK
D.3.1.2 Collected data (electronic spreadsheets may be attached and referenced)?	MR		Not applicable, as the Project Participant has not used the sampling plan / approach.	-	OK
D.3.1.3 Analysis of the collected data?	MR		Not applicable, as the Project Participant has not used the sampling plan / approach.	-	OK
D.3.1.4 Demonstration on whether the required confidence/precision has been met?	MR		Not applicable, as the Project Participant has not used the sampling plan / approach.	-	OK
<b>E. Calculation of emission reductions or GHG removals by sinks</b>					
<b>E.1 Calculation of baseline emissions or baseline net GHG removals by sinks</b>					
E.1.1 Are the sample calculations for all formulae used and calculation of baseline emissions or baseline net GHG removals by sinks provided, applying actual values?	MR PS	197(a)	The calculation of baseline emissions applying actual values has been provided.	OK	OK
E.1.2 Are the electronic spreadsheets to present full calculations in the monitoring report	MR		The emission reduction electronic spreadsheet has been	OK	OK



## VERIFICATION REPORT

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
attached?			provided separately by the Project Participant.		
<b>E.2 Calculation of project emissions or actual net GHG removals by sinks</b>					
E.2.1 Are the sample calculations for all formulae used and calculation of project emissions or actual net GHG removals by sinks provided, applying actual values?	MR PS	197(b)	There are no project emissions resulting from the project activity.	OK	OK
E.2.2 Are the electronic spreadsheets to present full calculations in the monitoring report attached?	MR		Yes, provided.	OK	OK
<b>E.3 Calculation of leakage</b>					
E.3.1 Are the sample calculations for all formulae used and calculation of leakage provided, applying actual values?	MR PS	197(c)	There are no leakages resulting from the project activity.	OK	OK
E.3.2 Are the electronic spreadsheets to present full calculations in the monitoring report attached?	MR		The electronic spreadsheet has been provided.	OK	OK
<b>E.4 Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks</b>					
E.4.1 Are the results of above sections summarized and GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period presented,	MR PS	197(d)	Yes the results for this monitoring period have been summarized and provided in the monitoring report using the table.	OK	OK

# BUREAU VERITAS CERTIFICATION



Report No: BVC/India -VR/577.49 rev. 00

## VERIFICATION REPORT

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
using the provided table?					
E.4.2 Is a complete set of data for the specified monitoring period is available?	VVS	245(a)	<p>No, the complete set of data for the monitoring period is not available.</p> <p>CL: For the following HTSC No, there was a meter change during the current monitoring period.</p> <p>1. 3776</p> <p>Please provide the meter change report, if any. Please clarify the procedures followed to calculate the net electricity supplied through the defective meter till the point of time of it's replacement.</p> <p>CL: For the following HTSC No, the calibration certificate for the current monitoring period is not provided.</p> <p>1. 3502.</p> <p>CL: Following Generation statements from TANGEDCO is not provided.</p> <p>1. HTSC No. 3466 for the month of July 12.</p> <p>2. HTSC No. 3773 for the month of June 12</p>	CL-4 CL-5 CL-6	OK
E.4.3 Has information provided in the monitoring report been cross-checked with other sources such as plant log books, inventories, purchase records, laboratory analysis?	VVS	245(b)	<p>Yes, the information provided has been cross checked with the log book details and invoices.</p>	OK	OK
E.4.4 Have calculations of baseline emissions,	VVS	245(c)	<p>Yes, the calculations are in accordance with the formulae</p>	OK	OK

## VERIFICATION REPORT

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
and project activity 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?			and methods described in the monitoring plan and applied methodology.		
E.4.5 Have any assumptions used in emission calculations been justified?	VVS	245(d)	Yes, the assumptions have been justified	OK	OK
E.4.6 Have appropriate emission factors, IPCC default values and other reference values been correctly applied?	VVS	245(e)	Yes, the default values have been applied correctly	OK	OK
<b>E.5 Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD</b>					
E.5.1 Is a comparison of actual GHG emission reductions or net anthropogenic GHG removal of the project activity achieved during this monitoring period with the estimates in the registered PDD provided?	MR PS	198	Yes, the comparison of actual emission reductions with the estimated reductions in the registered PDD is provided.	OK	OK
<b>E.6 Remarks on difference from estimated value in registered PDD</b>					
E.6.1 For any registered CDM project activity, except A/R project activities, have project participants explained the cause of any increase in the actual GHG emission reductions achieved during the current	MR PS	199	The actual emission reduction is higher than the estimated emission reductions in the registered PDD.  The actual emission reductions achieved (viz., 98,277 t	OK	OK

## VERIFICATION REPORT

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
monitoring period (e.g. higher water availability, higher plant load factor, etc.), including all information (i.e. data and/or parameters) that is different from that stated in the registered PDD?			CO <sub>2</sub> e) is 16.17 % higher than the estimated emission reductions in the registered PDD (viz., 84,593 t CO <sub>2</sub> e).		
<b>E.7 Actual emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards</b>					
E.7.1 If the monitoring period starts before 31 December 2012 and ends anytime thereafter, are actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved for the following two periods provided respectively? (a) Up to 31 December 2012 (1st commitment period); (b) From 1 January 2013 onwards.	MR		The monitoring period for this verification is from 18/02/2012-11/12/2012 which falls under the first commitment period.	OK	OK
E.7.2 Is it ensured that the achieved GHG emission reductions or net anthropogenic GHG removals by sinks are calculated proportionally for each period? In cases where annual caps were applied in the calculations, is it ensured that the annual caps are pro-rated to each period?	MR		Yes, the same is ensured, however there are no annual caps.	OK	OK



VERIFICATION REPORT

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

Draft report clarifications and corrective action requests by verification team	Ref. to checklist question in table 1	Summary of project participant response	Verification team conclusion



## VERIFICATION REPORT

Draft report clarifications and corrective action requests by verification team	Ref. to checklist question in table 1	Summary of project participant response	Verification team conclusion
<p>CL 1: As per the information available in the registered PDD, the project activity was expected to export net electricity of 89502.2 MWh for the (298 days) monitoring period (18/02/2012-11/12/2012). However, the actual (net) export for the monitoring period is 103981 MWh.</p> <p>This is about 16.17 % higher than the estimated quantity. Please clarify as to why there was a higher generation during the current monitoring period.</p>	B.1.5	<p>The monitoring period (18/02/2012-11/12/2012) exclusively considers the peak wind season from May-12 to October'12 i.e. six months out of total ten months of monitoring period. This is also evident from the generation data provided.</p> <p>Also, the project has delivered 55.34% lower emission reduction in last already verified period of 19/07/2011 to 17/02/2012.</p> <p>Considering cumulatively period under consideration, from 19/07/2011 to 11/12/2012, the project is likely to deliver 13.55% lesser emission reduction than estimated in registered PDD.</p>	<p>The verification team noted that the selected monitoring period (18/02/2012 to 11/12/2012) considers the peak wind season i.e., from May-12 to October'12 i.e. six months out of total ten months of monitoring period. The peak wind season in Tamil Nadu was also confirmed through interview with the officials of TANGEDCO.</p> <p>Further, the verification team noted that during the last monitoring period (19/07/2011 to 17/02/2012), the project has delivered 55.34% lower electricity generation. Hence the verification team noted that for the cumulative period (both 1<sup>st</sup> and 2<sup>nd</sup> monitoring period) i.e., from 19/07/2011 to 11/12/2012, the project has delivered 13.55% lesser electricity generation than estimated in the registered PDD. Further, when full year duration (12 months) is considered i.e., from Jan 2011 to December 2012, the amount of emission reduction is 1, 01,044</p>



## VERIFICATION REPORT

Draft report clarifications and corrective action requests by verification team	Ref. to checklist question in table 1	Summary of project participant response	Verification team conclusion
			tCO <sub>2</sub> e, which is still less than the estimated value of 1, 03,612 tCO <sub>2</sub> e for the same duration, in the registered PDD. Hence the verification team concluded that higher generation for this monitoring period is only due to majority coverage of peak wind season, which covers a major duration of the monitoring period; Hence this CL 01 was closed.
CL 2: The accuracy class of the measuring instruments, mentioned in the MR for HTSC No 3470 and 3509 does not match with the accuracy class of the instruments, observed during the site visit (accuracy class of the meter observed was 0.5s instead of 0.2s mentioned in the MR). Also please clarify if the error adjustments for the delay in calibration frequency of the measuring instruments have considered the correct accuracy class of the respective instruments.	D.2.4	The accuracy class of the measuring instruments at HTSC No 3470 and 3509 has been rectified as 0.5s in revised MR. Also, error adjustments for the delay in calibration frequency of the measuring instruments have been corrected to considered the correct accuracy class of meters. Please refer revised CER calculation sheet.	The verification team reviewed the revised MR and noted that the accuracy class of the measuring instruments at HTSC 3470 and 3509 is correctly mentioned as 0.5s. The error adjustment for the delay in calibration frequency has been corrected, as per the accuracy class of 0.5s. The verification team has checked the error adjustment calculations and confirms the same. Hence this CL 2 was closed.
CL 3. The error adjustments are incorporated in the emission reduction calculations, for the	D.2.4	The period of application of error adjustments for the delay in calibration frequency of the	The PP has provided a separate table in a separate spreadsheet in



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<p>delay in calibration frequency of the measuring instruments. It is not clear how the period for error adjustments has been selected for each of the measuring instruments (HTSC Nos.). Please clarify and provide the details in the ER calculation sheet and in the MR.</p>		<p>measuring instruments consider the conservative period to cover maximum duration under this adjustment. For example for HTSC number 3461, past calibration was done in 09/05/2011 and recent calibration was done in 02/11/2012, so to cover maximum period; complete months of May-2011 to Nov-12 (as per the billing cycle) were considered while applying correction factor. This information has been included in revised MR and CER calculation sheet.</p>	<p>the ER Excel sheet "Meter calibration details". The PP has included separate columns for each HTSC viz., 1) Due (Scheduled) date of calibration, 2) Latest calibration date (Actual date of calibration) and 3) Period for error adjustment.</p> <p>The verification team noted that in each case of error adjustment, the PP has considered a longer period than the actual delay period, which is more conservative for the determination of emission reductions.</p> <p>For e.g., For the HTSC, 3461, the Scheduled date of calibration is 09/05/2012, whereas the actual calibration was done on 02/11/2012. Hence as per Para 4 (a) of EB 52, Annex 60, it is sufficient to apply error between 09/05/2012 and 02/11/2012. However, the verification team noted that the PP has applied for longer period i.e., between 17/04/2012 and 14/11/2012, which covers the period</p>





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CL 4: For the following HTSC No, there was a meter change during the current monitoring period.  1. 3776  Please provide the meter change report, if any. Please clarify the procedures followed to calculate the net electricity supplied through the defective meter till the point of time of it's replacement.	E.4.2	Please find the meter change report at HTSC no. 3776, dated 22/05/2012.  The electricity generated between date of failure meter to date of replacement of new meter is not considered while raising invoices and calculation of total electricity supplied by project.	of delay in calibration of the measuring instrument. Hence the verification team concludes that the PP has applied error adjustment conservatively.  Hence this CL was closed.  The verification team reviewed the meter change report for replacement of measuring instrument for HTSC No 3776 (Ref /PoX) and noted that the error in the failed meter is "No display error" and the manufacturer of the meter has informed that the data cannot be retrieved since the memory is erased. The verification team also noted that there was no recording for the month of May 2012 for this HTSC. The PP has considered the last recorded reading with the replaced meter (Sr No: HT 2110214) i.e., as on 17/04/2012 as the final reading. The new meter with the Sr. No HT 2110218, was implemented on 22/05/2012 and the



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			<p>initial reading of the new meter as per the Meter change report is 0.32 (Export) and 0.8 (Import). The verification team noted that the date of implementation of the new meter and the initial readings (Export and Import) are matching with the JMR statement for the month of June 2012.</p> <p>Thus, the verification team was able to confirm that the PP has not considered the electricity generation from the HTSC No 3776 during the period of failure of the respective meter. The same can be noted in the Emission reduction calculation sheet, spreadsheet "May 12", Row 42, for the meter 3776, the value of <math>E_{PJ,Y}</math> is taken as "zero".</p> <p>Hence this CL 4 was closed.</p>
<p>CL 5: For the following HTSC No, the calibration certificate for the current monitoring period is not provided.</p> <p>1. 3502.</p>	E.4.2	The calibration certificate for HTSC no: 3502 being provided.	<p>The PP has submitted calibration certificate for the HTSC 3502. The verification team noted that there is no change in the meter for the current monitoring period and that</p>



Report No: BVC/India -VR/577.49 rev. 00

## VERIFICATION REPORT

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CL 6: Following Generation statements from TANGEDCO is not provided. 1. HTSC No. 3466 for the month of July 12. 2. HTSC No. 3773 for the month of June 12	E.4.2	Generation statements from TANGEDCO for respective HTSC and months are provided.	the meter has operated satisfactorily i.e., within the permissible error limit. Hence this CL 5 was closed.  The PP has submitted the JMR generation statements for HTSC No. 3466 for the month of July 12 and HTSC No. 3773 for the month of June 12. The verification team reviewed the same and noted that the electricity readings are correctly taken for the emission reduction calculations. Hence this CL 6 was closed.