



---

# VERIFICATION / CERTIFICATION REPORT

---

## BUNDLED WIND ENERGY POWER PROJECTS (2004 POLICY) IN RAJASTHAN IN INDIA

(UNFCCC Ref. No.1166)

Monitoring Period:  
01 December 2009 to 31 August 2010

REPORT No. 2010-0558

REVISION No. 02

DET NORSKE VERITAS



## VERIFICATION / CERTIFICATION REPORT

Date of first issue: 2010-12-13	Project No.: PRJC-266095-2010-CCS-IND	
Recommended for approval Hendrik W. Brinks	Approved by Hendrik W. Brinks	Organisational unit: DNV Climate Change and Environmental Services
Client: Enercon (India) Limited		Client ref.: Mr. Rajnish Khanna

DET NORSKE VERITAS  
CERTIFICATION AS

Veritasveien 1,  
1322 HØVIK, Norway  
Tel: +47 67 57 99 00  
Fax: +47 67 57 99 11  
http://www.dnv.com  
Org. No: NO 945 748 931 MVA

### Summary:

Det Norske Veritas Certification AS (DNV) has performed the verification of the emission reductions reported for the “Bundled wind energy power projects (2004 policy) in Rajasthan” in India (UNFCCC Ref. No.1166) for the period 01 December 2009 to 31 August 2010.

In our opinion, the GHG emission reductions reported for the project in the revised monitoring report (Version 02) of 05 January 2011 are fairly stated.

The GHG emission reductions were calculated correctly on the basis of the approved monitoring methodology ACM0002 (version 06), the revised monitoring plan approved on 02 August 2010 and the Project Design Document of 23 October 2008.

Det Norske Veritas Certification AS is able to certify that the emission reductions from the “Bundled wind energy power projects (2004 policy) in Rajasthan” in India during the period 01 December 2009 to 31 August 2010 amount to 22 731 tonnes of CO<sub>2</sub> equivalent.

Report No.: 2010-0558		Subject Group: Environment	
Report title: Bundled wind energy power projects (2004 policy) in Rajasthan			
Work carried out by: Gaurav Srivastava, Murali Govindarajulu			
Work verified by: Felipe Lacerda Antunes			
Date of this revision: 15 February 2011	Rev. No.: 02	Number of pages: 13	

Indexing terms	
Key words Climate Change Kyoto Protocol Validation Clean Development Mechanism	Service Area Verification
	Market Sector
	Energy Industry
<div><input checked="" type="checkbox"/> No distribution without permission from the client or responsible organisational unit</div> <div><input type="checkbox"/> free distribution within DNV after 3 years</div> <div><input type="checkbox"/> Strictly confidential</div> <div><input type="checkbox"/> Unrestricted distribution</div>	

© 2002 Det Norske Veritas AS

All rights reserved. This publication or parts thereof may not be reproduced or transmitted in any form or by any means, including photocopying or recording, without the prior written consent of Det Norske Veritas AS.



<b><i>Table of Content</i></b>	<b><i>Page</i></b>
1 INTRODUCTION .....	1
1.1 Objective	1
1.2 Scope	1
1.3 Description of the project activity	1
1.4 Methodology for determining emission reductions	2
2 METHODOLOGY .....	2
2.1 Review of documentation	3
2.2 Site visit	4
2.3 Reporting of findings	5
3 VERIFICATION FINDINGS .....	6
3.1 Remaining issues, CARs, FARs from previous validation / verification	6
3.2 Project implementation	6
3.3 Compliance of monitoring plan with monitoring methodology	9
3.4 Compliance of monitoring with the monitoring plan	9
3.5 Assessment of data and calculation of emission reductions	13
3.6 Quality of evidence to determine emission reductions	13
3.7 Management system and quality assurance	13
4 CERTIFICATION STATEMENT .....	13
5 REFERENCES .....	13
Appendix A Corrective action requests, clarification requests and forward action requests	
Appendix B Curricula vitae of the verification team members	

**Abbreviations**

AVVNL	Ajmer Vidyut Vitran Nigam Limited
C-I	Class-I
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction(s)
CH <sub>4</sub>	Methane
CL	Clarification request
CMS	Central Monitoring Station
CO <sub>2</sub>	Carbon dioxide
CO <sub>2</sub> e	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
EIL	Enercon (India) Limited
FAR	Forward Action Request
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
JMR	Joint Meter Readings
LCS	Local Control System
MP	Monitoring Plan
NABL	National Accreditation Board for Testing and Calibration Laboratories
NZR	Nordwestdeutsche Zahlerrevision Ing.Aug.Knemeyer GmbH &Co. KG
PPA	Power Purchase Agreement
PDD	Project Design Document
RRVNL	Rajasthan Rajya Vidhyut Prasaran Nigam Limited
RPPC	Rajasthan Power Procurement Center
UNFCCC	United Nations Framework Convention on Climate Change
WEG	Wind Electricity Generators



## 1 INTRODUCTION

Enercon (India) Limited has commissioned Det Norske Veritas Certification AS (DNV) to carry out the verification and certification of emission reductions reported for the “Bundled wind energy power projects (2004 policy) in Rajasthan” in India (the project) in the period 01 December 2009 to 31 August 2010. This report contains the findings from the verification and a certification statement for the certified emission reductions.

### 1.1 Objective

Verification is the periodic independent review and *ex post* determination by a Designated Operational Entity (DOE) of the monitored reductions in GHG emissions that have occurred as a result of the registered CDM project activity during a defined monitoring period.

Certification is the written assurance by a DOE that, during a specific period in time, a project activity achieved the emission reductions as verified.

The objective of this verification was to verify and certify emission reductions reported for the “Bundled wind energy power projects (2004 policy) in Rajasthan” in India for the period 01 December 2009 to 31 August 2010.

### 1.2 Scope

The scope of the verification is:

- To verify that actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan.
- To evaluate the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emission reduction data is free from material misstatement.
- To verify that reported GHG emission data is sufficiently supported by evidence.

The verification shall ensure that reported emission reductions are complete and accurate in order to be certified.

### 1.3 Description of the project activity

Project Parties:	India (Host Party) and Japan
Title of project activity:	Bundled wind energy power projects (2004 policy) in Rajasthan
UNFCCC registration No:	1166
Baseline and monitoring methodology	ACM0002 (version 06)
Project Entity:	Enercon (India) Limited from Host Party, India and Japan Carbon Finance from Annex-I Party, Japan.



Location of the project activity: The Project is located at Kita and Bhu village, in Jaisalmer district of Rajasthan that forms part of the northern (now part of north east west and north-eastern grid of India) grid of India. The project area extends between latitude 26°41' and 26°46.5' North and longitude 70°57.5' and 71 °4' East.

Project's crediting period: 30 October 2008 to 29 October 2018

Period verified in this verification: 01 December 2009 to 31 August 2010

The project activity harnesses wind energy in the Jaisalmer region of Rajasthan to generate electricity and export to the northern grid (now part of north east west and north-eastern grid) of India. The project activity has an aggregated installed capacity of 24.8 MW comprising of 31 Enercon made wind electricity generators (WEGs) each having a capacity of 0.8 MW. All the WEGs are connected to the RRVPNL 33/132/220 kV substation at Amarsagar, which is part of the Rajasthan state electricity grid. The energy generated in the project is measured by individual LCS meters and energy meters installed (bulk meter) at the substation after stepping up to 33 kV. The operation and maintenance of the machines are carried out by Enercon (India) Limited (EIL), who is also the supplier of the machines.

The project activity results in the reduction of GHG emissions through displacement of fossil fuel based northern (now part of north east west and north eastern grid of India) grid of India by the wind based renewable power.

#### 1.4 Methodology for determining emission reductions

The emission reductions from the project for the monitoring period starting from 01 December 2009 to 31 August 2010, as reported in the revised monitoring report version 02 dated 05 January 2011 /1/ and actually verified at site equals to 22 731 tCO<sub>2</sub>e. The emission reductions from the project activity is calculated as a product of net electricity supplied to the grid from the project activity and the emission factor fixed *ex-ante* for the northern grid (now part of north east west and north eastern grid) of India, to which the project is connected in a transparent manner and has been validated to be 873.87 tCO<sub>2</sub>e/GWh /19/. DNV confirms that the emission reduction calculations are in line with approved revised monitoring plan /13/ and approved monitoring methodology ACM0002 version 06 /6/.

## 2 METHODOLOGY

The verification of the emission reductions has assessed all factors and issues that constitute the basis for emission reductions from the project. These include:

- i) Emission factor of the northern regional grid of India, fixed *ex-ante* as 873.87 tCO<sub>2</sub>e/GWh /19/.
- ii) The net electricity supplied by wind turbines of the project activity is determined by following a process of allocating the total electricity exported/imported by the wind farm (recorded at the main meters and back up meters installed at substation) to the individual turbines in proportion of the electricity generation recorded by the LCS



meters at the individual wind turbines /9/. Following parameters were used for apportioning :

- Electricity imported, as recorded by the main meter at the EB substation /7/:
- Electricity exported, as recorded by the main meter at the EB substation /7/:
- Electricity exported by a WEG, as measured at the controller (LCS) /11/:
- Electricity exported by a WEG to the grid, calculated inline with the formulae provided in section B.7.2 of the approved revised monitoring plan /9/;
- Electricity imported by a WEG from the grid, calculated inline with the formulae provided in section B.7.2 of the approved revised monitoring plan /9/;
- Summation of electricity exported to the grid by all the WEGs included in the project activity /2/;
- Summation of electricity imported from the grid by all the WEGs included in the project activity /2/;

### **Verification team**

<b>Role</b>	<b>Last Name</b>	<b>First Name</b>	<b>Country</b>	<b>Type of involvement</b>						
				Administrative	Desk review	Site visit	Reporting	Supervision of work	Technical review	Sectoral competence
Project manager/ CDM Verifier	Srivastava	Gaurav	India	✓	✓	✓	✓			
Technical team leader (CDM verifier)	Govindarajulu	Murali	India		✓	✓	✓	✓		✓
Technical reviewer	Antunes	Felipe	Brazil						✓	✓

### **Duration of verification**

Webhosting of Monitoring Report: 22 October 2010  
 Preparations: From 15 November 2010 to 19 November 2010  
 On-site verification: From 22 November 2010 to 24 November 2010  
 Reporting, calculation checks and QA/QC: From 13 December 2010 to 15 February 2011

## **2.1 Review of documentation**

The monitoring reports (version 01 dated 05 October 2010 and 02 dated 05 January 2011) /1/ and the emission reduction calculations (version 01 dated 05 October 2010 and 02 dated 05 January 2011) /2/ submitted by Enercon (India) Limited was assessed as a part of the



verification. The copies of the generation certificates for all months within the verification period (December 2009 to August 2010) /7/ and generation of individual WEGs within the verification period (01 December 2009 to 31 August 2010) /9/ which forms the basis of the emission reduction calculation were verified.

In addition to the monitoring documentation provided by the project participants, DNV has reviewed:

- a) The registered PDD /3/, as well as the validation report /4/, revised monitoring plan approved by UNFCCC /13/ and previous verification report /21/;
- b) The applied monitoring methodology ACM0002 version 06 /6/;
- c) Relevant decisions, clarifications and guidance from the CMP and the CDM Executive Board /17/ /20/;
- d) Other operational documents referenced as were also assessed as evidence during the site visit /7/-/20/.

## 2.2 Site visit

Detailed verification of all data contained in the monitoring report was performed during the site visit by Govindarajulu Murali and Gaurav Srivastava of DNV at the wind farm of Enercon (India) Limited on 23 November 2010. The site visit was carried out and covered all the WEGs installed as part of this project activity. The on-site assessment involved:

- (i) Assessment of the implementation and operation of the project activity as per the registered PDD;
- (ii) Review of information flows for generating, aggregating and reporting the monitoring parameters; i.e. evidences for the reported net generation of electricity were verified /7/ - /16/.
- (iii) Cross-check between information provided in the monitoring report i.e., the electricity supplied to the grid minus the electricity consumption of the project (electricity imported from the grid) as per the monthly statements have been cross checked /7/-/11/.
- (iv) Check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the approved revised monitoring plan /13/, registered PDD /3/ and the selected methodology /6/.
- (v) Review of calculations and assumptions made in determining the GHG data and emission reductions /2/;
- (vi) Identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters /11/.
- (vii) Interviews with relevant personnel to confirm that the operational and data collection procedures are implemented in accordance with the approved revision of monitoring plan.





## 2.3 Reporting of findings

A corrective action request (CAR) is issued, where:

- i. Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;
- ii. Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impair the estimate of emission reductions;
- iii. Issues identified in a FAR during validation to be verified during verification have not been resolved by the project participants.

A clarification request (CL) shall be 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 issued for actions if the monitoring and reporting require attention and/or adjustment for the next monitoring period.

During this verification, three CARs have been identified. These CARs were satisfactorily addressed by Enercon (India) Limited by revising the monitoring report. No forward action requests were identified (refer to Appendix A of this report).



### 3 VERIFICATION FINDINGS

This section summarises the findings from the verification of the emission reductions reported for the “Bundled wind energy power projects (2004 policy) in Rajasthan” in India for the period 01 December 2009 to 31 August 2010.

#### 3.1 Remaining issues, CARs, FARs from previous validation / verification

According to the previous verification report /21/, no CAR's /FAR's or CL's were required to be closed out during this verification period.

#### 3.2 Project implementation

As part of the site visit DNV was able to confirm that the project implementation is in accordance with the project description contained in registered PDD of 23 October 2008 /3/. The 24.80 MW wind project comprises of 31 WEGs of 0.80 MW each commissioned between 25 March 2006 and 13 May 2006 /10/. The commissioning certificates for the wind turbines were verified against the commissioning capacity details and found to be correct. The key details of the plant equipment are provided below:

Serial No:	Parameter:	Equipment Details:
1.	Number of WEGs	31 Machines
2.	Capacity of Individual WEGs	800 kW
3.	WEG Supplier	Enercon
4.	WEG Model:	E-48
5.	Date of Commissioning:	Between 25 March 2006 and 13 May 2006
6.	Power Purchase Agreement signed for the WEGs of the project activity /16/.	<p>CEPCO Industries:</p> <ul style="list-style-type: none"> <li>• PPA signed with Jaipur Vidyut Vitran Nigam Limited dated 28 March 2006 for 1.6 MW.</li> <li>• PPA signed with Jodhpur Vidyut Vitran Nigam Limited dated 28 March 2006 for 9.6 MW.</li> <li>• PPA signed with Jodhpur Vidyut Vitran Nigam Limited dated 28 March 2006 for 0.8 MW.</li> </ul> <p>Delta Enterprises:</p> <ul style="list-style-type: none"> <li>• PPA signed with Jaipur Vidyut Vitran Nigam Limited dated 28 March 2006 for 2.4 MW.</li> </ul> <p>Ushdev International:</p> <ul style="list-style-type: none"> <li>• PPA signed with Ajmer Vidyut Vitran Nigam Limited dated 28 March 2006</li> </ul>



		<p>for 2.4 MW.</p> <p>Brindavan Agro Industries :</p> <ul style="list-style-type: none"> <li>• PPA signed with Jodhpur Vidyut Vitran Nigam Limited dated 28 March 2006 for 1.6 MW.</li> </ul> <p>Amrit Bottlers Ltd.</p> <ul style="list-style-type: none"> <li>• PPA signed with Jodhpur Vidyut Vitran Nigam Limited dated 28 March 2006 for 0.8 MW.</li> </ul> <p>Brindavan Bottlers Ltd.</p> <ul style="list-style-type: none"> <li>• PPA signed with Jodhpur Vidyut Vitran Nigam Limited dated 28 March 2006 for 0.8 MW.</li> </ul> <p>Dee Dee Enterprises:</p> <ul style="list-style-type: none"> <li>• PPA signed with Jodhpur Vidyut Vitran Nigam Limited dated 28 March 2006 for 0.8 MW.</li> </ul> <p>J.N. Investment:</p> <ul style="list-style-type: none"> <li>• PPA signed with Jodhpur Vidyut Vitran Nigam Limited dated 28 March 2006 for 0.8 MW.</li> </ul> <p>Malani Impex Inc:</p> <ul style="list-style-type: none"> <li>• PPA signed with Jodhpur Vidyut Vitran Nigam Limited dated 28 March 2006 for 0.8 MW.</li> </ul> <p>Metalfab high-tech private limited:</p> <ul style="list-style-type: none"> <li>• PPA signed with Jodhpur Vidyut Vitran Nigam Limited dated 28 March 2006 for 0.8 MW.</li> </ul> <p>Sankalp International:</p> <ul style="list-style-type: none"> <li>• PPA signed with Jodhpur Vidyut Vitran Nigam Limited dated 28 March 2006 for 0.8 MW.</li> </ul> <p>S.E. Investment:</p> <ul style="list-style-type: none"> <li>• PPA signed with Jodhpur Vidyut Vitran Nigam Limited dated 28 March 2006 for 0.8 MW.</li> </ul>
--	--	---



### Metering Arrangement for Electricity Generated by Individual WEGs:

The electricity generated by the individual WEGs is measured through the local control system (LCS) meters, which are connected to the central monitoring station (CMS) for the entire wind farm. These LCS meters do not require calibration as the energy readings of electricity generated at the LCS meter is cross verified by the energy calculated by inverting system installed in the WEGs. In case of any mismatch in the energy values recorded by the LCS meter and the energy value calculated by inverting the system, the machine will stop automatically and will generate an error report. The operation and maintenance staff will calibrate the meter immediately and a correction factor will be determined accordingly. The unique identification number of individual WEG and LCS meter Serial Numbers, supplier type and accuracy are provided below:

Serial No:	Project Proponent	Unique Identification Number	LCS meter serial number	Supplier	Type	Accuracy Class
1	Cepco Industries Private Limited	Cepco-01	466706	NZR	ITZR	Class - I
2		Cepco-02	466699	NZR	ITZR	Class - I
3		Cepco-03	466657	NZR	ITZR	Class - I
4		Cepco-04	466690	NZR	ITZR	Class - I
5		Cepco-05	466694	NZR	ITZR	Class - I
6		Cepco-06	466683	NZR	ITZR	Class - I
7		Cepco-07	466382	NZR	ITZR	Class - I
8		Cepco-08	466385	NZR	ITZR	Class - I
9		Cepco-09	466303	NZR	ITZR	Class - I
10		Cepco-10	466689	NZR	ITZR	Class - I
11		Cepco-11	466398	NZR	ITZR	Class - I
12		Cepco-12	466269	NZR	ITZR	Class - I
13		Cepco-13	466659	NZR	ITZR	Class - I
14		Cepco-14	466408	NZR	ITZR	Class - I
15		Cepco-15	466693	NZR	ITZR	Class - I
16	Delta Enterprises	DE-01	466685	NZR	ITZR	Class - I
17		DE-02	466390	NZR	ITZR	Class - I
18		DE-03	466532	NZR	ITZR	Class - I
19	Ushdev International Limited	UIL-01	466702	NZR	ITZR	Class - I
20		UIL-02	466404	NZR	ITZR	Class - I
21		UIL-03	466670	NZR	ITZR	Class - I
22	Brindavan Agro Industries Limited	BAIL-01	466478	NZR	ITZR	Class - I
23		BAIL-02	466701	NZR	ITZR	Class - I
24	Amrit Bottlers Ltd.	ABL-01	466704	NZR	ITZR	Class - I
25	Brindavan Bottlers Ltd.	BBL-01	466678	NZR	ITZR	Class - I
26	Deedee Enterprises	DDE-01	266705	NZR	ITZR	Class - I
27	JN Investment	JNI-01	466397	NZR	ITZR	Class - I
28	Malani Impex Inc.	MII-01	466526	NZR	ITZR	Class - I
29	Metalfab	MHPL-01	466281	NZR	ITZR	Class - I



	Hightech Private Limited					
30	Sankalp International	SI-01	466304	NZR	ITZR	Class - I
31	SE Investment	SE-01	466389	NZR	ITZR	Class - I

### Metering Arrangement Details for cluster:

The bulk electricity meters used are of 0.2 class accuracy and have been calibrated by Yadav Measurements Pvt. Limited (accredited by National Accreditation Board for Testing and Calibration Laboratories) /12/. The net electricity supplied to the northern regional grid of India by the cluster of WEGs for the period 1 December 2009 to 31 August 2010 were monitored by two sets of bi-directional main (with serial number TNU00946 and TNU00945) installed at Amarsagar substation and back up meters (with serial number RJB00052 and ABB00691) installed at Temdarai substation. The details of bulk meters are provided below:

Meter Details		
Line 1	Main Meter	Back up Meter
Type	Tri-Vector, 3 Phase Static Energy Meter, 3 Phase 4 wire	Tri-Vector, 3 Phase Static Energy Meter, 3 Phase 4 wire
Make	Secure Meter	Secure Meter
Model	E3M021	E3M021
Class	0.2 class	0.2 class
Serial No.	TNU00946	RJB00052

Line 2	Main Meter	Back up Meter
Type	Tri-Vector, 3 Phase Static Energy Meter, 3 Phase 4 wire	Tri-Vector, 3 Phase Static Energy Meter, 3 Phase 4 wire
Make	Secure Meter	Secure Meter
Model	E3M021	E3M021
Class	0.2 class	0.2 class
Serial No.	TNU00945	ABB00691

### 3.3 Compliance of monitoring plan with monitoring methodology

DNV is able to confirm that the revised monitoring plan approved on 02 August 2010 /13/ is in accordance with the approved methodology applied by the project activity, i.e. ACM0002 (version 06) /6/.

### 3.4 Compliance of monitoring with the monitoring plan

The monitoring has been carried out in accordance with the revised monitoring plan approved on 2 August 2010 /13/. As per the revised monitoring plan, the parameter net electricity supplied to the grid EGy is calculated as the difference of the electricity exported and the electricity imported from the grid. It also indicates that (a) the electricity is measured with electronic meters at the wind farm substation, (b) the data is measured continuously and recorded monthly, (c) calculation of net electricity supplied to the grid is calculated based on



100% monitored data and (d) data will be archived electronically. The monitoring plan and the applied methodology have been properly implemented; all parameters stated in the approved revised monitoring plan and the applied methodology have been sufficiently monitored and updated.

The 31 WEG machines of the project activity form a small cluster in the large wind farm and are hence, not connected to a dedicated uploading meter in the wind farm sub-station. The revised monitoring plan, approved by UNFCCC, has been properly implemented and elaborates on the monitoring of gross electricity exported to the grid ( $E_{g,y}$ ) and the apportioning plan practiced by Enercon (India) Limited to arrive at the net electricity exported to grid from the project activity:

- a) The gross electricity fed to the state utility grid ( $E_{JMR, Export}$ ) and electricity imported from the grid ( $E_{JMR, Import}$ ) for the wind farm is monitored through the meters available at the substation, by two sets of bi-directional main (with serial number TNU00946 and TNU00945) and back up meters (with serial number RJB00052 and ABB00691) /7/. The net electricity exported to the grid is difference between the gross export and import.
- b) The joint meter readings are carried out at the above meters once in a month in presence of both parties (the developer's representative and RRVPNL officials) /7/.
- c) The electricity generated from the individual WEGs in the entire wind farm is measured through the local energy meters (local control system (LCS) meters  $E_{Controller, Export}$ ) which are connected to the central monitoring station (CMS) of the entire wind farm /9/.
- d) The export multiplication factor and import multiplication factor is arrived as per the revised monitoring plan and DNV has confirmed that the electricity export and electricity import as stated under (a) above is used in establishing the multiplication factors.  $E_{WEG, Import}$  and  $E_{WEG, Export}$  is calculated based on the multiplication factors, and  $E_{Controller, Export}$ , as indicated under (c) above.
- e) The net electricity exported to the grid from the project activity is arrived based on the  $E_{WEG, Import}$ ,  $E_{WEG, Export}$  data for the individual WEGs connected to this project activity as indicated under equation 5 of the revised monitoring plan /13/.

In line with the details provided in the section B.7.2 of the approved revised monitoring plan /13/, the state electricity distribution company provides a monthly statement to individual party/owner which forms the basis for the emission reduction calculations. The generation details have also been cross checked with invoices /8/ and payment details issued by RPPC to individual owners /15/. All the records, as signed by both the parties, have been verified by DNV. All the backup data are also being archived.

As per the registered PDD /3/, the approved revised monitoring plan /13/ and power purchase agreement signed /16/ for the project activity all the energy meters will be calibrated on an annual basis; however, it has been noted that the calibration for main meters (Serial Number: TNU00946 and TNU00945) and back up meters (Serial Number: RJB00052 and TNU00951) was delayed (calibration was due on 28 January 2010 for main meters and on 29 January 2010 for back up meters but calibration for main meters were conducted on 30 March 2010 and for back up meters were conducted on 31 March 2010 only) /12/. Though the calibration conducted on 30 March 2010 (for main meters) and 31 March 2010 (for back up meters)



indicated that errors are within the acceptable accuracy limit /12/. The electricity exported and imported to the grid has been adjusted by applying the maximum inaccuracy level of the meters (0.2%) on the measured value of the electricity exported and imported for the period 1 January 2010 to 31 March 2010. DNV observes that this methodology is in line with the "Guidelines for assessing compliance with the calibration frequency requirement" version 1 (Annex-60 of CDM-EB 52) /20/ and is conservative (though the calibration was missing only for period from 28 January 2010 to 30 March 2010, the correction factor has been applied for period from 1 January 2010 to 31 March 2010 as joint meter reading records provides electricity exported and imported on monthly basis). The accuracy of equipment used for monitoring has been controlled and calibrated in accordance with the monitoring plan. All necessary management system procedures including responsibility and authority of monitoring activities have been verified to be consistent with the registered PDD /3/ and the approved revised monitoring plan /13/ for the project activity. Knowledge of personnel associated with the project activity was also found to be satisfactory.

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	Total electricity exported/Imported recorded by the main and back meters at the EB substation. Main Meters (Serial Number: TNU00946 and TNU00945) and Back up Meters (RJB00052 and TNU00951)
Measuring frequency:	Continuously
Reporting frequency:	Monthly in Joint Meter Reading (JMR) certificates.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes, the measuring and reporting frequency is in accordance with the approved revised monitoring plan and the applied monitoring methodology.
Type of monitoring equipment:	Tri-Vector, 3 Phase Static Energy Meter, 3 Phase 4 wire
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	The PDD or approved revised monitoring plan does not specify any accuracy of the monitoring equipment. However the main meters and back up meters are of 0.2 class accuracy class and is inline with the accuracy class specified in the power purchase agreement.
Calibration frequency /interval:	Annual
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Yes
Company performing the calibration:	Yadav Measurements Pvt. Limited (accredited by National Accreditation Board for Testing and Calibration Laboratories)
Did calibration confirm proper functioning	Yes



of monitoring equipment? (Yes / No):	
Is (are) calibration(s) valid for the whole reporting period?	<p>No, calibration for main meters was due on 28 January 2010 and for back up meters was due on 29 January 2010, but calibration for main meters was conducted on 30 March 2010 and for back up meters was conducted on 31 March 2010 only.</p> <p>The errors observed during the calibration conducted on 30 March 2010 were found to be lower than the maximum permissible error of the meters (0.2%). Hence the electricity exported and imported to the grid has been adjusted by applying the maximum inaccuracy level of the meters (0.2%) on the measured value of the electricity exported and imported, in line with the requirement of "Guidelines for assessing compliance with the calibration frequency requirement" version 1/20/.</p> <p>The details of calibration conducted is provided below:</p> <p>i) For Main Meters: Calibration was conducted on 30 March 2010 and is valid from 30 March 2010 to 29 March 2011 /12/.</p> <p>Previous Calibration for main meters was conducted on 29 January 2009 and is valid from 29 January 2009 to 28 January 2010/12/.</p> <p>ii) For Back up Meters: Calibration was conducted on 31 March 2010 and is valid from 31 March 2010 to 30 March 2011/12/.</p> <p>Previous Calibration for back up meters was conducted on 30 January 2009 and is valid from 30 January 2009 to 29 January 2010 /12/.</p>
If applicable, has the reported data been cross-checked with other available data?	Yes the total electricity exported/Imported figures have been cross checked.
How were the values in the monitoring report verified?	The total electricity exported/Imported figures have been cross checked against the sales invoices raised to electricity board /8/ and payment details issued by Rajasthan Power Procurement Center /15/.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes. Monthly reports are monitored on regular basis by the project management. CDM team is responsible for data monitoring and management.
In case only partial data are available because activity levels or non-activity	NA





parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	
--	--

### 3.5 Assessment of data and calculation of emission reductions

The parameters of electricity supplied to the grid, imported from the grid and net electricity supplied to the grid (as per the approved revision of monitoring plan section B.7.1) is being monitored and archived. The monthly joint meter readings are carried out by the EIL and RRVPNL/Jodhpur Discom (state electricity Distribution Company) officials. The net electricity exported to the grid from the individual WEGs is apportioned based on the electricity metered at the local energy meters (local control system (LCS) meters). A statement (indicating the import, export and the net electricity) showing the monthly net electricity generated by all the WEGs in the wind farm is issued by the state electricity distribution company to individual owners of the WEGs. The project participant translates this statement (indicating the net electricity exported to the grid from the WEG involved in this project activity) into an invoice and this is forwarded to Rajasthan Power Procurement Center. The monthly statement /7/ forms the basis for calculations of the emission reductions and is in line with the approved revision of monitoring plan.

The meter at the grid interconnection point of the substation is jointly inspected and sealed on behalf of the parties and is not tampered with by either party except in the presence of the other party or its accredited representatives. The general conditions set out for metering, recording, meter readings, meter inspections, test, checking and communication are as per the PPA (power purchase agreement) with respective distribution company officials (as also indicated in section 3.2 of this report) /16/. As part of the overall transaction cycle mentioned in the earlier paragraphs, DNV has verified the electricity generation from individual turbines through the log sheets, monthly statements issued by Rajasthan State Electricity Board to the individual owners of WEGs, and the same has been double checked with the sale invoices and the cheque details of RPPC, Jaipur /8/9//11//15/. The meter reading is recorded during the daytime and while taking meter reading open and closing meter reading has been taken into account and hence leads to the overlapping of end/start dates of monthly measured data as is seen in the joint meter reading records (JMR) /7/.

For e.g., joint reading record of 01 April 2010 covers electricity import and export figures from 01 March 2010 till 01 April 2010 (till day time when the Joint meter reading was conducted) and for the next joint reading record period will start again from 01 April 2010 (considering electricity import and export figures after the joint meter reading was conducted on 01 April 2010). Hence there will be overlapping of end/start dates of joint reading record but there is no chance of double counting of electricity import and export figures.

The net electricity supplied to the grid by the project activity (after applying correction factor due to delayed calibration) for the period from 01 December 2009 to 31 August 2010 is 26.012 GWh and the emission reductions from the project for the same period as reported in the revised monitoring report version 02 dated 05 January 2011 /1/ and actually verified at site equals to 22 731 tCO<sub>2e</sub>. The reported emission reductions of 22 731 tCO<sub>2e</sub> is less by 27.49%



than the estimated emission reduction of 31 353 tCO<sub>2</sub>e (estimated for the same period as per the registered PDD of 23 October 2008) /3/.

DNV also confirms that the JMR readings for the complete monitoring period were taken from the main meters (with serial number TNU00946 and TNU00945) and emission reductions are based on main meter readings, back up/check meter reading (RJB00052 and TNU00951) will be taken only when main meters are defective. It has been confirmed by DNV that the maximum output capacity has not been exceeded on any given month during the monitoring period and considering uncertainty of wind pattern the emission reductions for the period of 01 December 2009 to 31 August 2010 are found to be reasonable.

Emission factor of the grid, fixed ex-ante as 873.87 tCO<sub>2</sub>e/GWh /19/ based on the data available from the CO<sub>2</sub> Baseline data for Indian Power Sector published in the CEA website. The central electricity authority, Ministry of Power, Government of India has published a database of carbon dioxide emission factors from the power sector in India based on detailed authenticated information obtained from all operating power stations in the country. This database provides information about the OM and BM factors of all the regional electricity grids in India. DNV confirms that the database is an official publication of the Government of India for the purpose of CDM baselines. The value has been fixed *ex-ante* for the crediting period.

### 3.6 Quality of evidence to determine emission reductions

The data presented in the revised monitoring report version 2 dated 05 January 2011 /1/ was assessed by reviewing project documentation, collection of monitored data, observation of established monitoring and reporting practices and assessment of the reliability of monitoring equipment. Sufficient evidence was presented for the reported net emission reductions.

### 3.7 Management system and quality assurance

The project participant has established management procedures and implemented effectively to ensure that the process is consistent. The procedures cover management responsibilities, data monitoring procedures, training procedures, periodical internal audits, management reviews and corrective actions in case of any deviations. Calibration of the monitoring equipments was carried out and the calibration certificates of the instruments used for data monitoring and recording were also verified during the site visit.

Necessary management system procedures including responsibility and authority of monitoring activities have been verified to be consistent with the registered PDD and the approved revised monitoring plan. Knowledge of personnel associated with the project activity was also found to be satisfactory.



#### 4 CERTIFICATION STATEMENT

*Det Norske Veritas Certification AS (DNV) has performed the verification of the emission reductions that have been reported for the “Bundled wind energy power projects (2004 policy) in Rajasthan” in India (UNFCCC Registration Ref. No.1166) for the period 01 December 2009 to 31 August 2010.*

*The project participants are responsible for the collection of data in accordance with the monitoring plan and the reporting of GHG emissions reductions from the project.*

*It is DNV's responsibility to express an independent verification statement on the reported GHG emission reductions from the project. DNV does not express any opinion on the selected baseline scenario or on the validated and registered PDD.*

*DNV conducted the verification on the basis of the monitoring methodology ACM0002 (version 06), the approved revised monitoring plan and the monitoring report (Version 02) dated 05 January 2011. The verification included i) checking whether the provisions of the monitoring methodology and the monitoring plan were consistently and appropriately applied and ii) the collection of evidence supporting the reported data.*

*DNV's verification approach draws on an understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these. DNV planned and performed the verification by obtaining evidence and other information and explanations that DNV considers necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.*

*In our opinion the GHG emissions reductions of the “Bundled wind energy power projects (2004 policy) in Rajasthan” in India (UNFCCC Registration Ref. No.1166) for the period 01 December 2009 to 31 August 2010 are fairly stated in the revised monitoring report (Version 02) dated 05 January 2011.*

*The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology ACM0002 (version 06) and the approved revised monitoring plan.*

*Det Norske Veritas Certification AS is able to certify that the emission reductions from the “Bundled wind energy power projects (2004 policy) in Rajasthan” in India during the period 01 December 2009 to 31 August 2010 amount to 22 731 tonnes of CO<sub>2</sub> equivalent.*

Chennai and Oslo, 15 February 2011

G.Murali  
CDM Verifier  
DNV Chennai, India

Hendrik W. Brinks  
Technical Director for CDM,  
Det Norske Veritas Certification AS



## 5 REFERENCES

*Documents provided by the Project Participants that relate directly to the GHG components of the project. These have been used as direct sources of evidence for the periodic verification conclusions, and are usually further checked through interviews with key personnel.*

- /1/ EIL: Monitoring Report of “Bundled wind energy power projects (2004 policy) in Rajasthan” in India for the period 01 December 2009 to 31 August 2010, version 01 dated 05 October 2010 and 02 dated 05 January 2011
- /2/ EIL: Monthly data archiving and project monitoring Excel sheet, “Emission reduction and generation calculation” version 01 dated 05 October 2010 and 02 dated 05 January 2011.
- /3/ EIL: CDM PDD for the “Bundled wind energy power projects (2004 policy) in Rajasthan” in India, version 06 dated 23 October 2008.
- /4/ SGS: Validation report for the “Bundled wind energy power projects (2004 policy) in Rajasthan” in India Report No: CDM.VAL0800 dated 27 October 2008.

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



- /5/ CDM Executive Board: Validation and Verification Manual. Version 1.2
- /6/ CDM Executive Board: ACM0002 – “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”, version 6.
- /7/ RRVPN/Jodhpur Discom: Record of JMR monthly statements for the energy generated through wind mills covering the entire monitoring period (01 December 2009 to 31 August 2010).
- /8/ EIL: Record of invoices issued by EIL for electricity sales covering this entire monitoring period (01 December 2009 to 31 August 2010).
- /9/ EIL: Record of monthly power generation details from the individual WEGs covering this entire monitoring period provided in energy break up report (01 December 2009 to 31 August 2010).
- /10/ RRVPN/Jodhpur Discom: Commissioning certificates of all the 31 WEGs dated between 25 March 2006 and 13 May 2006.
- /11/ EIL: Records of daily and monthly generation details in CMS, Maintenance records and Internal audit reports covering this entire monitoring period (01 December 2009 to 31 August 2010).
- /12/
  - Calibration Records for the main meters (Serial Number: TNU00946 and TNU00945) installed at the substation issued on 06 April 2010 and valid from 30 March 2010 to 29 March 2011 and previous period valid from 29 January 2009 to 28 January 2010.
  - Calibration Records for the back up meters (Serial Number: RJB00052 and TNU00951) installed at the substation issued on 16 April 2010 and valid from 31 March 2010 to 30 March 2011 and previous period valid from 30 January 2009 to 29 January 2010.
- /13/ UNFCCC: Approved revision of monitoring plan for the project activity dated 02 August 2010.  
<http://cdm.unfccc.int/Projects/DB/SGS-UKL1181723770.26/view>
- /14/ EIL: Instantaneous monitoring of the electricity generation from the individual WEGs and the location numbers checked during the site visit.
- /15/ RPPC: Monthly Cheque details indicating the transaction for the purchase of wind electricity covering this entire monitoring period (01 December 2009 to 31 August 2010).
- /16/ Power purchase agreements of all the 31 WEGs :
  - PPA signed between CEPCO Industries and Jaipur Vidyut Vitran Nigam Limited dated 28 March 2006 for 1.6 MW.
  - PPA signed between CEPCO Industries and Jodhpur Vidyut Vitran Nigam Limited dated 28 March 2006 for 9.6 MW.
  - PPA signed between CEPCO Industries and Jodhpur Vidyut Vitran Nigam Limited dated 28 March 2006 for 0.8 MW.
  - PPA signed between delta enterprises and Jaipur Vidyut Vitran Nigam Limited dated 28 March 2006 for 2.4 MW.
  - PPA signed between Ushdev International and Ajmer Vidyut Vitran Nigam Limited dated 28 March 2006 for 2.4 MW.
  - PPA signed between Brindavan Agro Industries and Jodhpur Vidyut Vitran Nigam Limited dated 28 March 2006 for 1.6 MW.



- PPA signed between Amrit Bottlers Ltd. and Jodhpur Vidyut Vitran Nigam Limited dated 28 March 2006 for 0.8 MW.
  - PPA signed between Brindavan Bottlers Ltd. and Jodhpur Vidyut Vitran Nigam Limited dated 28 March 2006 for 0.8 MW.
  - PPA signed between Dee dee Enterprises and Jodhpur Vidyut Vitran Nigam Limited dated 28 March 2006 for 0.8 MW.
  - PPA signed between J.N. Investment and Jodhpur Vidyut Vitran Nigam Limited dated 28 March 2006 for 0.8 MW.
  - PPA signed between Malani Impex Inc and Jodhpur Vidyut Vitran Nigam Limited dated 28 March 2006 for 0.8 MW.
  - PPA signed between Metalfab high-tech private limited and Jodhpur Vidyut Vitran Nigam Limited dated 28 March 2006 for 0.8 MW.
  - PPA signed between Sankalp International and Jodhpur Vidyut Vitran Nigam Limited dated 28 March 2006 for 0.8 MW.
  - PPA signed between S.E. Investment Limited and Jodhpur Vidyut Vitran Nigam Limited dated 28 March 2006 for 0.8 MW.
- /17/ UNFCCC: Template for Monitoring Report, version 1.EB 54 Annex 34.
- /18/ UNFCCC; Guidance on completeness check of request for Issuance, EB 48 Annex 68.
- /19/ CEA: Baseline Carbon Dioxide Emissions from Power Sector, <http://cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>.
- /20/ CDM Executive Board: Guidelines for assessing compliance with the calibration frequency requirement, version 1.
- /21/ DNV Verification Report: “Bundled wind energy power projects (2004 policy) in Rajasthan” in India Report No: 2010:9233 version 02 dated 14 January 2011.

*Persons interviewed during the initial verification, or persons who contributed with other information that are not included in the documents listed above.*

- /22/ Ms. Anushree Mishra: Member CDM Corporate Team, Enercon India Limited
- /23/ Mr. Jeetendra Kumar: Supervisor Site, Enercon India Limited
- /24/ Mr. Ravinder Singh: Technical Site In charge, Enercon India Limited
- /25/ Mr. Jugal Kishore Joshi: Rajasthan Rajya Vidhyut Prasaran Nigam Limited

- o0o -

## **APPENDIX A**

---

### **CORRECTIVE ACTION REQUESTS, CLARIFICATION REQUESTS AND FORWARD ACTION REQUESTS**

**Corrective action requests**

<b>CAR ID</b>	<b>Corrective action request</b>	<b>Response by Project Participants</b>	<b>DNV's assessment of response by Project Participants</b>
<b>CAR 1</b>	<p>It was witnessed during the site visit that the serial numbers of LCS meters for following WEG's are wrongly stated in the webhosted MR.</p> <ul style="list-style-type: none"> <li>• CEPCO 14 (466627 instead of 466408)</li> <li>• CEPCO 15 (1166693 instead of 466693)</li> <li>• JN Investment 01 (466391 instead of 466397)</li> </ul>	<p>The Serial Numbers of LCS Meters are now corrected in revised MR. Revised MR enclosed.</p>	<p>The monitoring report has been revised to reflect the correct serial numbers of the LCS meters. Revised MR version 02 has been reviewed by DNV.</p> <p>Therefore this CAR is closed</p>
<b>CAR 2</b>	<p>Project proponent is requested to revise the emission reduction spreadsheet in order to meet the requirement of EB 48 Annexure- 68 (GUIDELINES ON COMPLETENESS CHECK OF REQUESTS FOR ISSUANCE): Spreadsheet of calculation of emission reductions shall contain:-</p> <ol style="list-style-type: none"> <li>a) Value of the monitored parameters</li> <li>b) formulae of calculation are shown in the spreadsheet cells for ease of assessment, whenever possible;</li> <li>c) Any other explanation with regard to application of formulae in the spreadsheet.</li> </ol>	<p>Emission Reduction Spreadsheet has been revised inline with the UNFCCC guidance on completeness check of request for issuance. Revised ER sheet is enclosed.</p>	<p>The emission reduction spreadsheet has been revised inline with the UNFCCC Guidance on Completeness Check of Request for Issuance (EB 48 Annexure-68). The revised emission reduction spreadsheet version 02 has been reviewed by DNV.</p> <p>Therefore this CAR is closed</p>



<b>CAR ID</b>	<b>Corrective action request</b>	<b>Response by Project Participants</b>	<b>DNV's assessment of response by Project Participants</b>
<b>CAR 3</b>	<p>It was witnessed during the site visit that calibration for main meters was due on 28 January 2010 and for back up meters was due on 29 January 2010, but calibration for main meters were conducted on 30 March 2010 and for back up meters were conducted on 31 March 2010 only. However, it was observed from the emission reduction spreadsheet that inline with "Guidelines for assessing compliance with the calibration frequency requirement version 1" (Annex-60 of CDM-EB 52), project proponent has applied the correction factor for the entire verification period.</p> <p>Project proponent is requested to correct the monitoring report and emission reduction spreadsheet accordingly.</p>	<p>MR and Emission Reduction Spreadsheet have been corrected now.</p> <p>Revised documents have been submitted to UNFCCC.</p>	<p>The revised emission reduction spreadsheet and monitoring report has been verified by DNV. In the revised MR and ER Sheet electricity exported and imported to the grid has been adjusted by applying the maximum inaccuracy level of the meters (0.2%) on the measured value of the electricity exported and imported for the period 1 January 2010 to 31 March 2010. DNV observed that the methodology applied is in line with the "Guidelines for assessing compliance with the calibration frequency requirement version 1" (Annex-60 of CDM-EB 52) as the errors observed during the calibration conducted on 30 March 2010 were lower than the maximum permissible error of the meters (0.2%).</p> <p>Therefore this CAR is closed.</p>

### Clarification requests

<b>CL ID</b>	<b>Corrective action request</b>	<b>Response by Project Participants</b>	<b>DNV's assessment of response by Project Participants</b>
	<i>No clarification requests were identified</i>		

**Forward action requests from previous verification**

<b>FAR ID</b>	<b>Forward action request</b>	<b>Summary of how FAR has been addressed in this reporting period</b>	<b>Assessment of how FAR has been addressed</b>
	<i>No forward action requests were identified in the last verification</i>		

**Forward action requests from this verification**

<b>FAR ID</b>	<b>Forward action request</b>	<b>Response by Project Participants</b>	<b>DNV's assessment of response by Project Participants</b>
	<i>No forward action requests were identified</i>		

## **APPENDIX B**

---

### **CURRICULA VITAE OF THE VERIFICATION TEAM MEMBERS**

## ***Gaurav Srivastava***

Gaurav Srivastava, CDM Validator/Verifier, DNV Bangalore, India holds a Master's Degree in Energy Systems. His educational qualification covers the fields of sustainable development, power plant technology, renewable energy technology, performance of thermal & electrical utilities and project financing. He has received extensive training in the CDM validation and verification process. He has experience of more than 3 years in validation and verification of numerous CDM projects in DNV, both Indian and international. He has completed ISO 14001:2004 - Environmental Management System Auditor / Lead Auditor Program, approved by IRCA.

## ***Govindarajulu Murali***

Holds a Bachelor's Degree in Chemical Engineering and has done a Short term diploma course in Management. Having an overall experience of around eleven years. Prior to joining DNV having around seven years experience in Chemical process industry covering production, energy efficiency improvement and equipment design erection and commissioning. His experience also covers the fields of environmental management and resource conservation including identification of alternative fuels. He has also been actively involved in implementation of Management Systems such as ISO 140001 and OHSAS 18001 standards in chemical process industry for more than three years.

He has experience of around 4 years in validation and verification of numerous CDM projects in DNV, both in India & abroad. His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in energy generation from renewable energy sources.

## ***Felipe Lacerda Antunes***

Felipe Antunes holds a Master's Degree in Production Engineering (Quality) and a Post Graduate Diploma in Environmental Management and Industrial Waste Management and Treatment. Possesses an International experience of more than 10 years in the field of quality and environmental auditing, working two years as the responsible of the QMS of Rede Metrológica RS and since 1999 as a QMS and EMS auditor in DNV.

He has experience of more than 3 years in validation and verification of numerous CDM projects in DNV, both in South America & abroad. He has also been actively involved in Management System Audits such as ISO 9001, ISO 140001 and OHSAS 18001 standards in various industrial sectors for more than 10 years in DNV.

His qualification and experience in CDM demonstrate him sufficient sectoral competence in energy generation from renewable energy sources, waste handling and disposal, and animal waste management.