



Voluntary Carbon Standard Version 2007
Verification Report

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Verification Report:

Name of Verification company:	Date of the issue:
TÜV NORD CERT GmbH	2010-01-05
Report Title:	Approved by:
Bundled wind energy generation projects in Gujarat, India	R. Winter
Client:	Project Title:
Enercon (India) Limited	Bundled wind energy generation projects in Gujarat, India
Summary:	

Enercon (India) Limited has commissioned the TÜV NORD JI/CDM Certification Program to carry out the 2nd periodic verification of the project - "Bundled wind energy generation projects in Gujarat, India.", with regard to the relevant requirements of VCS 2007.1 Standard.

The project is a renewable energy project. It has been implemented to produce electricity by using wind which is a renewable source of energy. Total installed capacity of the project is 59.4 MW comprising of 72 WTGs of 800 kW each and three of 600 kW. The electricity produced is supplied to the NEWNE grid of India.

The project has been validated and 1st periodic verification has been conducted for the period 01/06/2004 to 31/12/2006 by DNV vide their report number 46072030 dated 14/02/2007.

A risk based approach has been followed to perform this verification. In the course of the verification 07 Corrective Action Requests (CARs) were raised and closed successfully.

The verification is based on the registered Project Design (PD) dated 22/05/2007 and validated by M/s DNV,, monitoring report and other supporting documents made available to the verifiers by project proponent.

As a result of the verification, the verifiers confirm that the GHG emission reduction in the crediting period (2007.01.01 to 2009.07.25) is: **223,573** t CO_{2e}.

Work carried out by:	Number of pages:
Mr. Pankaj Patel Mr. Hemang Shah Mr. Saroj Sahoo	19

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1. Introduction

1.1 Objective

The purpose of this verification, by independent checking of objective evidence, is as follows:

- to verify that the project is implemented as described in the project design document;
- to confirm that the monitoring system is implemented and fully functional to generate Voluntary Emission Reductions (VERs/VCUs¹) without any double counting during the monitoring period from 01/01/2007 to 25/07/2009, and
- to establish that the data reported are accurate, complete, consistent, transparent and free of material error or omission by checking the monitoring records and the emissions reduction calculation.

1.2 Scope and Criteria

The verification of this VCS project is based on the VCS project design ^{/VCS PD/}, the monitoring report ^{/MR 1 MR 2/}, Excel calculation sheet ^{/xls1, xls2/} and supporting documents made available to the verifier and information collected through performing interviews during the on-site assessment. Furthermore publicly available information was considered as far as available and required.

The TÜV NORD JI/CDM CP has employed a risk-based approach in the verification, focusing on the identification of significant risks and reliability of project monitoring and generation of emission reductions.

1.3 VCS project Description

The objective of the 59.4 MW wind power project is to reduce GHG emission by replacing electricity of the Northern Eastern Western and North Eastern (NEWNE) region grid of India which predominantly uses fossil fuel. The project introduces installation of 75 nos. of wind turbine generators (WTG), 72 among which are of 0.80 MW and three are of 0.60 MW aggregating total capacity of

¹ As per VCS, Verified Emission Reductions (VERs) are considered to be VCUs only after successful registration in an approved VCU Registry

the project to 59.4 MW. Project is implemented in the state Gujarat of India. The generated electricity is supplied to the NEWNE region grid of India. All WTG are supplied by M/s Enercon (India) limited and operation and maintenance of the project activity is also undertaken by the same entity. The project is currently operational and its design has taken care of the current good practices and indigenously designed safety and environmental features.

1.4 Level of assurance

The verification report is based on VCS PD^{/VCS PD/}, Monitoring report^{/MR1,MR2/}, VCS PD^{/VCS PD/}, Excel calculation sheet^{/xls1,xls2/} supporting documents made available to the verifier and information collected through performing interviews and during the on-site assessment. The verification opinion is assured provided the credibility of all above.

2. Methodology

The verification of the project was carried out from July 2009 to January 2010.

Preparations	:	2009-07-01
On-site Verification	:	2009-07-02
(Draft) Reporting	:	2009-10-20
(Final) Reporting	:	2010-01-05

The verification consisted of the following steps:

- A desk review of the Registered VCS PD^{/PD/}, UNFCCC Project page documents and supporting documents with the use of the relevant sections of a customised protocol according to the VCS 2007.1;
- A desk review of the Monitoring Report^{/MR1, MR2/}, VCS PD^{/VCS PD/}, Excel calculation sheet^{/xls1,xls2/} and additional supporting documents which were submitted by the client. The relevant sections of the above mentioned customised protocol according to the VCS 2007 were used.
- Verification audit planning,
- On-Site assessment,
- Background investigation and follow-up interviews with personnel of the project developer,
- Verification reporting (Draft Verification Report and Final Verification Report).

The criteria of this verification include the relevant rules and steps as set out in the VCS 2007.1.

3.Verification Findings

3.1. Remaining issues, including any material discrepancy, from previous validation

The verification has been carried out based on the registered VCS PD^{/VCS PD/} and 1st Periodic verification monitoring report. There is no remaining issue including any material discrepancy from previous validation or verification.

3.2. Project Implementation

It was verified that the project was implemented as it is described in the registered VCS project design document. The 59.4 MW wind farm comprises wind turbines commissioned between June 2004 and March 2006. The GEDA share of electricity certificates form the basis for the verification team to verify the installed capacity of the WTGs involved in the project activity. Moreover the verification team has also verified the nameplate capacity of the turbines to be 600 kW and 800 kW during site visit. The first periodic verification from 1st Jan 2004 to 31st Dec 2006 has already been carried out and the generated VERs are successfully issued to the project proponent. The ongoing 2nd periodic verification covers the duration from 1st Jan 2007 to 25th July 2009.

3.3. Completeness of Monitoring

PP has submitted monitoring report^{/MR1, MR2/}, Excel calculation sheet^{/xls1,xls2/} describing various details of the project activity, monitored parameters and ER calculations. Based on the document review, verification team is convinced that the reporting^{/MR1,MR2/ xls1,xls2/} is in line with the requirements of the validated monitoring plan as well as with the applied methodology ACM 0002, version 6^{/ACM 0002/}.

The reporting procedures reflect the requirements of the monitoring plan^{/VCS PD/}. The net electricity exported is recorded once every month and stored appropriately in the spread sheets during the whole monitoring period. During the site visit and based on document review verification team has verified that the net electricity is exported to the grid and metered at 132 KV Bhogat substation and 66

KV Navadra substation. Monthly joint meter reading is taken by representatives of GEDA, and M/s Enercon (PP). Individual metering arrangement is also in place at each WTG. Based on the Joint meter reading and individual meter reading, GEDA will issue share of electricity certificate^{/SE/}.. These data forms the basis of emission reduction calculation.

As per the Registered VCS PD, Net electricity supplied by WTGs per annum in the project activity is the only parameter which is to be monitored during the whole crediting period and same is verified by verification team by conducting document review.

Verification team has verified that the calibration of the energy meters are carried out by GETCO as described in the validated PDD^{/VCS PD/}. The calibration certificates of the common meters at each sub station end were verified. The list of the common meters with their details is as follows:

Substation location	Meter No	Calibration date
Bhogat	GJB 00486	25/02/09
	GJU 04121	20/04/07
		13/04/09
Navadra	GJ-2029	28/05/09
	GJ-2060	28/05/09

Nevertheless the following CARs were raised during the course of the verification and closed successfully.

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
CAR 3.1 The details of the energy meters used by the project activity during the requested monitoring period including both at transformer	/MR1/	The details of the main meters connected at the sub-station are included in tabular form in section F of the monitoring	/MR2/	The details are incorporated in the revised MR. OK

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
yard and at the sub station with their calibration details should be included in the monitoring report.		report.		
CAR 3.2 The calibration certificates of the energy meters used at both the sub stations namely Navadra and Bhogat pertaining to the requested monitoring period may be furnished to the DOE.	/MR1/	The soft copies of the calibration certificates of energy meters installed at Bhogat and Navadra Sub-station is submitted to the DOE	/MR2/	The certificates submitted to the DOE verified and found to be OK
CAR 3.3 The description provided under the head monitoring Information of the monitoring report (page-9) is not adequate. This may be described more comprehensively.	/MR1/	The description is revised according to the requirement	/MR2/	The relevant information on metering system, metering equipment, calibration are now included in section E of the VCS PD, CAR is closed.

3.4. Accuracy of Emission Reduction Calculations

For the calculation of baseline emissions the ex-ante validated value of 0.94022 tCO₂/MWh for combined margin has been used. Verification team has verified the value by doing alternate calculation and confirmed that the value mentioned in the registered VCS PD is correct and in line with the methodology ACM 0002 Version 6.

Baseline Emissions:

The formula used for the determination of baseline emissions which is consistent with the VCS PD:

$$BE_y = EG_y \times EF_y / 1000$$

$$BE_y = \text{Baseline Emissions (tCO}_2\text{/yr)}$$

$$EG_y = \text{Net electricity supplied to the grid by the Projects in kWh}$$

$$EF_y = \text{Grid Emission Factor (t CO}_2\text{ /MWh)}$$

$$\text{Thus, } BE_y = 237788.342 \text{ MWh} \times 0.94022 \text{ (tCO}_2\text{/MWh)}$$

$$= 223,573 \text{ tCO}_2\text{e}$$

The baseline emissions (BE during the monitoring period are **223,573 tCO₂e**.

Project Emission & Leakage:

In accordance with ACM 0002 (Version 6), the project emission and leakage were ignored.

Emission Reduction:

$$ER_y = BE_y$$

Emission Reduction = baseline emission

Summary of Emission Reductions using above formula during the monitoring period:

Sr. No	WTG owners	Installed capacity MW	Net generation during 1st Jan 2007 to 31st July 2009 (kWh)	Emission reduction during 1st Jan 2007 to 31st July 2009 (tCO ₂)
1	Gujarat Guardian Ltd.	23.2	91622888	86,146
2	Dinesh Mills	4	14592964	13,721
3	Rachana Art Prints Pvt. Ltd.	0.8	2785324	2,619
4	Kanishka Prints P. Ltd.	0.8	2722320	2,560
5	Shreeji Prints Pvt. Ltd.	1.6	5652277	5,314

Sr. No	WTG owners	Installed capacity MW	Net generation during 1st Jan 2007 to 31st July 2009 (kWh)	Emission reduction during 1st Jan 2007 to 31st July 2009 (tCO ₂)
6	Manish Packaging P. Ltd.	0.8	3453861	3,247
7	Prabhat Elastomers P. Ltd.	1.6	6502316	6,114
8	Ahmedabad Strips P. Ltd.	0.8	3446035	3,240
9	Nawaz Silk Mill	0.8	3343188	3,143
10	Indo Fashions Pvt. Ltd.	0.8	3199456	3,008
11	Surbhi Industries Ltd.	0.8	3272724	3,077
12	Rajhans Metals Pvt Ltd	0.8	3262928	3,068
13	Austin Engineering Co Ltd	0.8	3328264	3,129
14	Inova Cast Pvt Ltd	0.8	3363322	3,162
15	Eagle Fibres P. Ltd.	0.8	3344514	3,145
16	Jayant Agro-Organics Limited	1.6	6613359	6,218
17	Bhavani Industries -Rajkot 1	0.8	3227827	3,035
18	Shree Sai Calnates India (P) Ltd.	0.8	3302939	3,105
19	Shilp Gravures Ltd.	0.8	3346903	3,147
20	Empilon Fabrics P. Ltd.	0.8	3195867	3,005
21	Leamak Healthcare P. Ltd.	0.8	3281582	3,085
22	Ravikan Ceramics Pvt. Ltd.	0.8	3269302	3,074
23	Unique Tags Private Limited	0.8	3536495	3,325
24	Jagdish Technocast Pvt. Ltd.	0.8	3298872	3,102
25	Excel Crop Care Limited	0.8	3516756	3,307
26	Transmetal Limited -1	0.8	3250626	3,056
27	Echjay Industries Pvt Ltd	4.8	20439665	19,218
28	Sayaji Iron & Engineering Co.	0.8	3173670	2,984
29	Zydex Industries	0.8	3370498	3,169
30	Mascot Forge Pvt. Ltd.	0.8	3439881	3,234
31	Madhusudan Special Solutions	0.8	3506959	3,297
32	Desai Textiles	0.6	2382302	2,240
33	Rivaa textiles	1.2	4661700	4,383
34	Rajshanti Metals Pvt Ltd	0.8	3080758	2,897
Total		59.4	2377884	223,573

However, the following CARs were raised and closed successfully.

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
CAR 4.1 As per GEDA share of electricity certificate the net share of electricity	/MR1/ /XLS1/ /GEDA/	We agree with DOE's observation. The changes are made accordingly in the net	/MR2/ /XLS2/	The same has been corrected in the revised MR and calculation

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
from the WTG owned by Bhavani Industries, Rajkot in February 2007 is 48851 kWh where as in the excel calculation sheet for VER it has been entered to be 48712 kWh. This may be corrected.		share of electricity of Bhavani Industries, Rajkot in the spreadsheet as well as the Monitoring report		sheet. OK
CAR 4.2 The equation used to calculate the emission reduction calculation in section H (page -12) of the monitoring report is wrong. This should be as per the registered VCD PDD.	/VCS PDD/	The section H in the monitoring report is revised as per the registered VCS PD	/MR2/	The monitoring report has been revised. OK
CAR 4.3 Since the GEDA share of electricity certificate for the month of July 2009 is based on the final reading taken as on 25.07.09, to consider it as generation for the whole month i.e. till 31st	/MR1/ /XLS1/ /GEDA/	We agree with DOE's observation and we have changed monitoring period from 31 July 09 to 25 July 09. The revision is incorporated in the monitoring report and	/MR2/ /XLS2/	The necessary changes are done in the revised MR and spread sheet. OK

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
of July is not correct. The same should be corrected and the monitoring report should be revised accordingly.		VER spreadsheet		
CAR 4.4 - The number (2nd) of the periodic verification should be specified in the title of the monitoring report. - The description provided against type and category under the head "project reference" of the monitoring report (page 9) is not relevant. This may be revised. - The table depicted for the summary of the emission reduction vide page 12 of the monitoring may be revised showing the emission	/MR1/ /VCSPDD/ /XLS1/ /ACM 0002/ /GEDA/	- The changes are incorporated in the title of the monitoring report. - In the Section D, the 'project reference' is revised. - The table bifurcating the emission reduction on annual basis is incorporated in section G of the revised monitoring	/MR2/ /section D of MR2/ /Section G of MR2/	The necessary corrections are done in the revised monitoring report. OK Necessary corrections made OK Yearwise break up of emission reduction is included in the table under section G of revised monitoring report (MR2) OK

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
reduction on annual basis for better representation.		report		

All the figures as per the monitoring report^{/MR1,MR2/} were cross-checked by the verification team with the GEDA share of electricity certificate and the CEA report Version 1.1. The emission reduction calculation was also cross checked by the verification team and found to be correct.

3.5. Quality of Evidence to Determine Emission Reductions

The only key monitoring parameters which influence on the calculation of the emission reductions is the net power exported to the Grid and the grid emission factor. The power is measured with high accuracy and duly calibrated class 0.5S power meters. The grid emission factor which had been selected to be fixed ex-ante is taken from the registered VCS PDD.

All necessary monitoring instruments are installed. The measuring devices are well known and state of the art. The details of the meters are given under section 3.3 of this report. The details of the meters were verified on the basis of physical verification during the site visit and on the basis of the Generation report. Calibration has been carried out in accordance with the monitoring plan of the registered VCS PDD.

All relevant evidences i.e. GEDA share of electricity certificate^{/SE/}, Calibration certificate^{/CAL/}, Excel calculation sheet^{/XLS1, XLS2/} were fully checked by the verification team during the on-site visit. All evidences are clearly identifiable and assessed to be correct.

M/s Enercon is one of the reputed manufacturers of Wind mills and having skilled operational staff. This will ensure the services of the skilled personnel for the Operation and maintenance of the WTG of the project activity. As verified during the site visit and document review, verification team is convinced that the trained personnel are available for Operation and maintenance of the WTGs.

Accuracy, calibration, periodical testing and maintenance procedures of monitoring equipment are described in the section E of revised monitoring report^{/MR2/} as per QA/QC procedure of validated PDD^{/VCS PD/} (Annex-4). Verification team has reviewed the same and is convinced that the same is adequate and led to correct measurement of the net electricity exported to the grid.

All records needed for monitoring are archived as per the requirements of the monitoring plan. No significant, lack of evidence and missing data were detected during on-site verification.

3.6. Management and Operational System

The roles and responsibilities of Operation and Maintenance team, regional service heads, Corporate VCS team, and team coordinator for monitoring of emission reductions are defined. Verification of data measurement, data monitoring, collection, archiving as well as the preparation of monitoring report have been implemented as it is defined in section H of revised Monitoring report^{/MR2/}. This was verified during the on site visit conducted by the verification team. All monitored data are archived partly in physical and partly in electronic form. The data will be kept for the whole crediting period and additional 2 years as given in the PD.

The net resultant value of VER remained as 223,573 even after closure of the CARs and CRs issued during the verification.

Verification conclusion

The scope of this verification covers the determination of voluntary greenhouse gas emission reductions generated by the above mentioned project. The verification is based on the registered VCS PD, 1st periodic verification report, monitoring report and supporting documents made available to the verifiers by the project proponent.

As a result of the verification, the verifier confirms that:

- All operations of the project are implemented and installed as planned and described in the project design document and the installed equipment essential for generating emission reductions runs reliably.
- The monitoring plan is in accordance with the applied approved CDM methodology ACM 0002 Version 6 (19 May 2006)
- The installed equipment essential for measuring parameters required for calculating emission reductions are calibrated appropriately.
- The monitoring system is in place and functional. The project has generated GHG emission reductions
- The GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner.

All the documents checked during on-site visit and verification process will be kept confidential and will not be disclosed at any time other than the Project Proponent consent as required by VCSA.

Monitoring period: 2007-01-01 to 2009-07-25 including both days.

Verified emission in the above reporting period:

Years	Baseline emissions (t CO ₂ eqv.)	Project emissions (t CO ₂ eqv.)	Leakage (t CO ₂ eqv.)	Net Emission reductions (t CO ₂ eqv.)
2007	78,044	0	0	78,044
2008	91,086	0	0	91,086
2009 (till	54,444	0	0	54,444

Years	Baseline emissions (t CO ₂ eqv.)	Project emissions (t CO ₂ eqv.)	Leakage (t CO ₂ eqv.)	Net Emission reductions (t CO ₂ eqv.)
25 th Jul)				
Total	223,573	0	0	223,573 (Round ed Down)



Pankaj Patel
Verification Team Leader
Vadodara, 2010-01-05



Rainer Winter
Final approval
Essen, 2010-01-05

Annexure 1:

Abbreviations

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CO ₂	Carbon dioxide
CO _{2e}	Carbon dioxide equivalent
CR	Clarification Request
EIL	Enercon (India) Limited
ER	Emission Reduction
GEDA	Gujarat Energy Development Authority
GETCO	Gujarat Energy Transmission Corporation Limited
GHG	Greenhouse gas(es)
GWh	Giga Watt Hour
kW	Kilo Watt
MR	Monitoring Report
MP	Monitoring Plan
MW	Megawatt
NEWNE	Northern Eastern Western and North Eastern Grid
PDD	Project Document
PP	Project Participant
QA/QC	Quality Assurance / Quality Control
UNFCCC	United Nations Framework Convention on Climate
VER	Voluntary Emission Reduction
WTG	Wind Turbine Generator

Annexure 2:

Documents referred during the course of verification:

Reference	Documents
/CAL/	Calibration Certificate of electricity meters covering t ^{he} 1st monitoring period
/LOG/	Daily Log Book.
/MR1/	Monitoring Report version 1
/MR2/	Monitoring Report version 2
/VCS PD/	VCS Project Design Document
/SD/	Shut down details of the each plant
/SE/	GEDA share of electricity certificate
/TS/	Technical specifications of instruments
/VER-R/	Verification Report dated 14/02/2007
/XLS1/	Excel calculation sheets provided by the project participant (related to MR1).
/XLS2/	Excel calculation sheets provided by the project participant (related to MR2).

Background investigation and assessment documents

Reference	Document
/ACM-0002/	Grid connected renewable electricity Generation (Version 13: EB 36)
/CPM/	TÜV NORD JI / CDM CP Manual (incl. CP procedures and forms)
/VAL/	Validation Report for VCS project 'Bundled Wind Power project in Gujarat managed by Enercon (India) Limited.' issued by DNV.

Reference	Document
/VCS/	Voluntary Carbon Standard 2007
/VAL/	Validation report in accordance with VCS policy announcement dated 19th march 2008 of VCs 2007.

Websites used

Reference	Link	Organisation
/UNFCCC/	http://cdm.unfccc.int	UNFCCC
/VCS/	http://www.v-c-s.org	VCS
/IPCC/	www.ipcc-nggip.iges.or.jp	IPCC publications

Interviewed Persons

Reference		Name	Organisation / Function
/IM01/	☒ Mr. ☐ Ms.	K.D Baria	Enercon (India)Ltd.
/IM01/	☒ Mr. ☐ Ms	Keshav Singh	Enercon (India)Ltd.
/IM01/	☒ Mr. ☐ Ms	Saujanya Kumar	Enercon (India)Ltd.