



VERIFICATION REPORT AND CERTIFICATION STATEMENT

VERIFICATION OF BUNDLED WIND ENERGY GENERATION PROJECTS IN GUJARAT, INDIAINDIA

REPORT No. 46072030

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DET NORSKE VERITAS



VERIFICATION REPORT

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Approved by: Einar Ternes Director	Organisational unit: DNV Certification, International Climate Change Services
Client: Enercon (India) Ltd	Client ref.: A. Raghavan

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Summary:

DNV Certification AS has performed a verification of the 'Bundled wind energy generation projects in Gujarat, India', managed by Enercon (India) Ltd. for the period 1 June 2004 to 31 December as per the requirements of Voluntary Carbon Standard Version 1.

In our opinion the GHG emissions reductions reported for the project in the monitoring report dated 22 May 2007 are fairly stated.

The GHG emission reductions were calculated correctly on the basis of the baseline and monitoring methodology provided in the PDD of 22 May 2007.

DNV Certification AS is able to certify that the emission reductions from the 'Bundled wind energy generation projects in Gujarat, India', a wind power project in Gujarat, India, managed by Enercon (India) Ltd during the period 1 June 2004 to 31 December 2006 amount to 93 043 tCO₂ equivalent.

The verification of reported emission reductions is based on the information made available to us and the engagement conditions detailed in this report. DNV Certification AS can not guarantee the accuracy or correctness of this information. Hence, DNV Certification AS cannot be held liable by any party for decisions made or not made based on this report.

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**Abbreviations**

BM	Build Margin
CEF	Carbon Emission Factor
CEA	Central Electricity Authority of India
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
DNV	Det Norske Veritas
EIL	Enercon India Limited
GEDA	Gujarat Energy Development Agency
GETCO	Gujarat Energy Transmission Corporation Limited
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
MP	Monitoring Plan
MVP	Monitoring and Verification Plan
N ₂ O	Nitrous oxide
NGO	Non-governmental Organisation
ODA	Official Development Assistance
OM	Operating Margin
PDD	Project Design Document
PPA	Power Purchase Agreement
UNFCCC	United Nations Framework Convention for Climate Change
VCS	Voluntary Carbon Standards
VCU	Voluntary Carbon Unit
VER	Verified Emission Reductions



1 INTRODUCTION

Enercon (India) Ltd (EIL) has commissioned DNV Certification AS to carry out the verification of emission reductions generated by the “Bundled wind energy generation projects in Gujarat, India” for the period 1 June 2004 to 31 December 2006. This report contains the findings from the verification and a statement for the verified emission reductions.

1.1 Objective

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

1.2 Scope

The Verification scope is:

- Review of the calculation of the relevant grid carbon emission factor for the electricity grid applicable for the state and the additionality of the project activity.
- To verify that actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan for the project activity,
- To evaluate the GHG emission reduction data and express a conclusion with a high level of assurance about whether the reported GHG emission reduction data is free from material misstatement,
- To verify that the reported GHG emission data is sufficiently supported by evidence.

The verification conducted as per VCS Version 1 is meant to ensure that reported emission reductions are complete and accurate and is based on generation of renewable energy that replaces fossil-based electricity generation in the grid.

1.3 GHG Project Description

The purpose of the project is to harness renewable wind potential in the Jamnagar district of Gujarat and enable displacement of fossil fuel based electricity generating systems. The 59.4 MW bundled project comprises 72 800 kW E-48 and three 600 kW E-40 Enercon-make wind energy converters. Enercon (India) Ltd (EIL) is the turbine supplier and is also the operation and maintenance contractor. The project activity includes development, design, engineering, procurement, finance, construction, operation and maintenance of wind energy based electric generating stations supplying electricity to the captive consumers through wheeling and banking arrangements with the Gujarat Energy Transmission Corporation Limited (GETCO). The details of the turbines with respect to their numbers, type and model of the machines have been verified to be as per details provided in the PDD.

The project activity will displace energy that is dispatched at the operating margin (primarily thermal energy) and also delay any planned expansion of the Gujarat grid generation capacity by its equivalent size.



The project has accounted for emission reductions generated by power from wind turbines generated from 1 June 2004 to 31 December 2006. The power generated is used for captive purposes under the wheeling arrangement and banking arrangements with the GETCO.

The projects emission reductions are determined by multiplying the net amount of electricity generated by the project by an estimated ex-ante fixed grid emission coefficient of 940.22tCO₂/MWh, taken from the CO₂ database for emission factors developed and published by Central Electricity Authority (CEA*) of India. According to the project design there are no project emissions and leakage effects associated with the project.

Title of the project activity :	Bundled wind energy generation projects in Gujarat, India
Location of the project activity :	Jamnagar district in the state of Gujarat, India
Verification period :	1 June 2004 to 31 December 2006
Project starting date :	29 January 2004

2 METHODOLOGY

The verification of the emission reductions has assessed all factors and issues that constitute the basis for emission reductions from the project, including,

- The review of the calculation of the carbon emission factor for the Western Regional Electricity Grid
- The net electricity supplied by the project activity to the GEDA multiplied by the estimated grid emission factor

Verification Team:

Ma-Paa-Puratchikkanal	DNV, Bangalore	Team Leader, GHG Auditor
Chandrashekara Kumaraswamy	DNV, Bangalore	Technical reviewer

Duration of verification:

Preparation – (monitoring report review baseline grid factor estimations etc.)	:	4 April 2007 to 29 May 2007
Site visit	:	9 April 2007 to 11 April 2007
Reporting	:	15 May 2007 to 29 May 2007

* CO₂ Baseline Database, <http://cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>



2.1 Review of Documentation

The monitoring reports /1/ and the monthly electricity generation receipts from GEDA were assessed as a part of the verification. In addition the Project Design Document /2/, in particular the baseline estimations and the monitoring plan contained in the PDD were also assessed.

2.2 Site Visits

From 9 April 2007 to 11 April 2007, DNV carried out a site visit at EIL. During this visit, DNV verified the actual implementation of the project as described in the PDD. The commissioning certificates and the unique identification of the turbines were also checked and found to be correct. The electricity meters and calibration records of the meters were checked and found to be in order. The evidence of the reported net electricity generation was also verified, which in the project activity case is the monthly certificate for share of electricity generation receipts of GEDA.

3 VERIFICATION FINDINGS

3.1 Project Implementation

The project has been implemented as planned. The 59.4 MW wind farm comprises wind turbines commissioned between June 2004 and March 2006. The commissioning certificates for the wind turbines were verified against the commissioning capacity details and found to be correct. DNV has also verified the nameplate capacity of the turbines to be 600 kW and 800 kW.

Though the commissioning dates of the turbines varied from June 2004 to March 2006, the generation details have been considered for the VCU project period of 1 June 2004 to 31 December 2006. This data has been verified with the generation details in the certificate for share of electricity by the GEDA for invoices. The calibration certificates of the main meter and check meter have been verified and found to be in order.

3.2 Project Baseline

The approved baseline methodology ACM0002 version 6- “Consolidated baseline methodology for grid connected electricity generation from renewable sources”, has been adopted for the proposed project activity. The baseline methodology is applicable and justified for the proposed project as the project involves electricity capacity additions through wind sources. The project applies the baseline methodology approach – “existing actual or historical emissions”. This is deemed as appropriate as the proposed project is not representing common practice at the present time; it displaces fossil fuel based electricity that would otherwise be provided by the operation and expansion of the Gujarat state grid. The Gujarat state power sector is not dominated by generating sources with zero or low operating cost projects such as hydro and nuclear, and their contribution is less than 50% of the total grid generation.

The baseline is the emission reductions occurring due to electricity generation through renewable sources, derived from the electricity consumed times the relevant emission factor of the selected grid. As the project activity is feeding the generated power to the Gujarat state grid, which is a part of the western regional grid; the baseline for this project activity is the function of the generation mix of western regional grid. The baseline emission factor for the western regional



grid is established *ex-ante* based on approved methodology ACM0002 using a combined margin approach.

Enercon has used the OM and BM data published in the CEA* database, for calculation of the baseline emission factor. 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 i.e. the CO₂ baseline database provides information about the OM and BM factors of all the regional electricity grids in India. DNV confirms that the OM in the CEA database is calculated *ex ante* using the simple OM approach and the BM is calculated *ex ante* based on 20% most recent capacity additions in the grid based on net generation as described in ACM0002. The average of the OM for the three years 2002-03, 2003-04 and 2004-05 has been determined and verified to be 994.55 tCO₂e/GWh and the BM to be 777.22 tCO₂e/GWh

As stipulated in the methodology ACM0002 version 6 May 19 2006 and as relevant for wind energy projects, EIL has considered a weighting for OM as 0.75 and for BM as 0.25. Accordingly, using the values for operating margin and build margin emission factors provided in the CEA database and their respective weights for calculation of combined margin emission factor, the baseline carbon emission factor (CM) has been established *ex-ante* as 940.22 tCO₂e/GWh.

3.3 Project Additionality

The project activity has turbines commissioned from June 2004 to March 2006. The additionality of the project have been argument as per the requirements of VCS, version 1 standard:

Enforcement of applicable laws and regulations:

The project is not mandated by any laws or regulations of the country or state. The wind power projects are developed voluntarily by the developers in the region and are not under any mandatory obligation.

The power generated is transmitted to the GETCO grid attached to the western regional electricity grid. The project activity is not the choice of least cost option of power provision by the regional load dispatch centre to the end-users.

Common practice analysis:

In 2004-05 the wind power generation has been verified to be 350 GWh which is around 0.65% of the total generation of 53410 GWh in the state and cannot be considered as the prevailing practice for power generation in the region.

Comparison analysis which demonstrates that the wind generation is not the least cost option for to the off-takers:

The project is not a least cost option for power and this as been demonstrated from the tariff order 31 March 2007 of Gujarat State Electricity Corporation Limited (GSECL) which provides the cost of power purchase from thermal, lignite, gas and hydro projects to be as low as

* CO₂ Baseline Database, <http://cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>



Rs.1.83/kWh, Rs. 2.49/kWh, Rs. 2.89/kWh and Rs. 0.51/kWh, whereas, the cost of wind power purchase from the project activity is agreed upon at Rs. 3.37/kWh for the year 2006-07. Thus the project is not a least cost option for to the off-takers.

Carbon credits should not be the byproduct from the creation of an ancillary environmental asset and/or financial instrument (e.g. renewable energy credits):

The project carbon credits are not a byproduct by creation of ancillary environmental asset. The carbon credits are the only credits that are generated by the project activity.

The emission reductions from the project must not have been used against any voluntary corporate emission reduction targets:

India is not mandated by any carbon emission targets and the project activity doesn't have any voluntary corporate emission reduction target.

The project activity is thus deemed additional to those that would have otherwise occurred.

3.4 Completeness of Monitoring

The only monitoring indicator, i.e., the net electricity generation, has been monitored with calibrated energy meters as described in the monitoring plan of the PDD.

3.5 Accuracy of emission reduction calculations

The main meter and check meters are installed by EIL and the ownership have been transferred after commissioning to GETCO. The monthly meter readings (both main and check meters) are taken jointly by the parties on the first day of the following month at 12 Noon. At the conclusion of each meter reading an appointed representative of the GEDA, GETCO and EIL sign a document indicating the number of kilowatt-hours indicated by the meter. This is then translated in a format (certificate for share of electricity) and forwarded by GEDA to EIL which clearly indicates the net electricity exported and becomes the basis for calculations of the emission reductions.

Each meter is jointly inspected and sealed on behalf of the parties and is not interfered 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 wheeling and banking agreement with GETCO and GEDA. If the variation between the main meter and the check meter during any of the monthly meter readings is more than the permissible limit for meters of 0.2% accuracy class, all the meters are retested and calibrated. Test and certificate for share of electricity reports have been verified.

3.6 Quality of evidence to determine emission reductions

The net amount of electricity of 17 873 868 kWh and thus the claimed emission reductions of 93 299 tCO₂e reported for the period 1 June 2004 to 31 Decemebr 2006 was verified by reviewing the presented certificate for share of electricity generation receipts of GEDA.

The energy generated and emission reductions claimed for the proposed period were as shown in the following table:



Period	Energy Generated (kWh)	Emission Reductions (tCO ₂)
1 June 2004 to 31 December 2004	1 055 294	992
1 January 2005 to 31 December 2005	25 687 600	24 152
1 January 2006 to 31 December 2006	72 488 586	68 155

Sufficient evidence was presented for the reported net electricity generation after certification of commissioning by GEDA.

3.7 Management System and Quality Assurance

Monitoring and reporting of electricity generation is part of normal operations of EIL. The quality of meter readings is assured through calibration of electricity meters and through cross checking of readings between the main meters and the check meters.

4 VERIFICATION AND CERTIFICATION STATEMENT

DNV Certification AS has performed a verification of emission reductions reported for the “Bundled wind energy generation projects in Gujarat, India” managed by Enercon (India) Ltd. for the period 1 June 2004 to 31 December 2006.

In our opinion the GHG emissions reductions reported for the project in the monitoring report of 22 May 2007 are fairly stated.

The GHG emission reductions were calculated correctly on the basis of the baseline and monitoring methodology provided in the PDD of 22 May 2005.

Det Norske Veritas Certification AS is able to certify that the emission reductions from the ‘Bundled wind energy generation projects in Gujarat, India’, a wind power project at Jamnagar district in Gujarat state of India managed by Enercon (India) Ltd is in full compliance with VCS Version 1. during the period 1 June 2004 to 31 December 2006 amount to 93 299 tCO₂ equivalent.

The verification of reported emission reductions is based on the information made available to us and the engagement conditions detailed in this report. DNV Certification AS cannot guarantee the accuracy or correctness of this information. Hence, DNV Certification AS cannot be held liable by any party for decisions made or not made based on this report.

Manager
Climate Change Services
DET NORSKE VERITAS AS



5 REFERENCES

Category 1 Documents:

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 initial verification conclusions, and are usually further checked through interviews with key personnel.

- /1/ Monitoring Report of 'Bundled wind energy generation projects in Gujarat, India' dated 22 May 2007.
- /2/ Project Design Document – 'Bundled wind energy generation projects in Gujarat, India' dated 22 May 2007.

Category 2 Documents:

Background documents related to the design and/or methodologies employed in the design or other reference documents. Where applicable, Category 2 documents have been used to cross-check project assumptions and confirm the validity of information given in the Category 1 documents and in verification interviews.

- /3/ International Emission Trading Association (IETA) & the World Bank's Prototype Carbon Fund (PCF): *Validation and Verification Manual*. <http://www.vvmanual.info>
- /4/ ACM0002 – Approved Consolidated baseline and monitoring methodology

Persons interviewed:

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

- /5/ Mr. K.D. Baria, EIL stationed in Jamnagar, Gujarat, India
- /6/ Mr. Neeraj Gupta, EIL stationed in Mumbai, India

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