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# VERIFICATION / CERTIFICATION REPORT

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Enercon Wind farms in  
Karnataka Bundled Project-30.4  
MW” in India  
UNFCCC Registration Reference No.1291

FIRST PERIODIC VERIFICATION

VERIFICATION PERIOD  
18 March 2010 to 31 August 2010

REPORT No. 2011-9609

REVISION No. 03

DET NORSKE VERITAS



## VERIFICATION / CERTIFICATION REPORT

Date of first issue: 29 December 2010	Project No.: PRJC-267341-2010-CCS-IND
Approved by  Edwin Aalders	Organisational unit: DNV Climate Change and Environmental Services
Client: Enercon (India) Ltd	Client ref.: Mr. Yogesh Mehra

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**Summary:**

DNV Climate Change Services AS (DNV) has performed the verification of the emission reductions reported for the “Enercon Wind farms in Karnataka Bundled Project-30.4 MW” (UNFCCC Registration Ref. No. 1291) for the period 18 March 2010 to 31 August 2010.

In our opinion, the GHG emissions reductions reported for the project in the revised monitoring report, version 5 dated 5 December 2011, are fairly stated.

The GHG emission reductions were calculated correctly on the basis of the approved monitoring methodology ACM0002 Version 6, the revised monitoring plan approved on 21 July 2011 and formulae contained in the validated and registered Project Design Document of 16 April 2011.

As a consequence, DNV Climate Change Services AS is able to certify that the emission reductions from the “Enercon Wind farms in Karnataka Bundled Project-30.4 MW” during the period 18 March 2010 to 31 August 2010 amount to 28 114 tCO<sub>2e</sub>.

Report No.: 2011-9609		Subject Group: Environment		<b>Indexing terms</b>	
Report title: Enercon Wind farms in Karnataka Bundled Project-30.4 MW				Key words Climate Change Kyoto Protocol Validation Clean Development Mechanism	Service Area Verification
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Work carried out by: Murali Govindarajulu, Ravi Kumar Prabhu				<input checked="" type="checkbox"/> No distribution without permission from the client or responsible organisational unit  <input type="checkbox"/> free distribution within DNV after 3 years  <input type="checkbox"/> Strictly confidential  <input type="checkbox"/> Unrestricted distribution	
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***Abbreviations***

BESCOM	Bangalore Electricity Supply Company Ltd.
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CMP	CDM Modalities and Practices
CEA	Central Electricity Authority
CEF	Carbon Emission Factor
CER	Certified Emission Reduction(s)
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) Ltd.
FAR	Forward Action Request
GHG	Greenhouse gas(es)
HESCOM	Hubli Electricity Supply Company Ltd.
IPCC	Intergovernmental Panel on Climate Change
JMR	Joint Meter Reading
KPTCL	Karnataka Power Transmission Corporation Ltd.
MP	Monitoring Plan
MR	Monitoring Report
PDD	Project Design Document
UNFCCC	United Nations Framework Convention on Climate Change
VVM	Validation and verification manual
WEG	Wind Electricity Generators



## 1 INTRODUCTION

Enercon (India) Ltd has commissioned DNV Climate Change Services AS (DNV) to carry out the verification and certification of emission reductions reported for the Enercon Wind farms in Karnataka Bundled Project-30.4 MW (UNFCCC Registration Ref. No. 1291) for the period 18 March 2010 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 verification 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 “Enercon Wind farms in Karnataka Bundled Project-30.4 MW” for the period 18 March 2010 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. The verification was based on the recommendations in the Validation and Verification Manual /12/.

### 1.3 Description of the Project Activity

Project Parties	<i>India, Japan</i>
Title of project activity:	<i>Enercon Wind farms in Karnataka Bundled Project-30.4 MW</i>
UNFCCC registration No:	<i>1291.</i>
Baseline and monitoring methodology	<i>ACM0002 Version 6</i>
Project Participants:	<i>Enercon (India) Ltd, Japan Carbon Finance</i>



Location of the project activity: *The Project is located at Gadag and Chitradurga districts in the State of Karnataka that forms part of the Southern regional electricity grid of India.*

Project's crediting period: *18 March 2010 to 17 March 2020*

Period verified in this verification: *18 March 2010 to 31 August 2010*

The bundled project consists of 38 WEGs of 800 kW Enercon make machines, involving 18 investors, with a combined capacity of 30.4 MW. The owners of the sub projects have entrusted Enercon (India) Ltd as the focal point for the CDM related activities. The details of owners, unique identification numbers and geo-coordinates of the WEGs are listed in section A.3. of the Monitoring Report /1/. Ownership of one of the WEGs has been changed during validation of the project. This was verified from the approval of the Government of Karnataka to transfer the ownership of the 800 kW WEG from R.K. Marbles to Power Link Systems Private limited, dated 15 February 2008/7/. DNV is able to verify that the monthly Form B (Joint meter reading) has been raised by BESCOM for the WEG is in the name of the new entity Power Link Systems Private limited during the verification period /6/. The change in ownership of the WEG was also notified to UNFCCC vide a "Notification of changes in PDD", which was approved on 16 June 2011 /16/. The monthly invoices for the WEG are also raised by Power Link Systems Private limited for the verification period/5/.

## 1.4 Methodology for Determining Emission Reductions

According to the applied methodology ACM0002 Version 6/13/, the emission reductions from the project activity are determined as the difference between the baseline emissions, project emissions and leakage:

$$ER_y = BE_y - PE_y - L_y$$

$PE_y$  and  $L_y$  are considered as to be zero as stated in the registered PDD /14/ and /4/ validation report/18/. Therefore, the emission reductions are accounted as:

$$ER_y = BE_y = EG_y \times EF_y$$

where,

$EF_y$  is the emission factor of the grid to which the project is connected, and was determined and validated *ex-ante* as 0.93204 tCO<sub>2e</sub>/MWh and will not be updated during the crediting period.

$EG_y$  is the net electricity generation delivered to the grid, which is determined by the electricity exported to the grid minus the electricity imported from the grid

## 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) Review of project documentation;
- ii) The net electricity supplied by the project to the grid which is multiplied with a fixed grid baseline combined emission factor of 0.93204 tCO<sub>2e</sub>/MWh/14//19/;
- iii) The actual installed capacity of the wind farm is 30.4 MW, consisting of 38 WEGs of 800kW each, is in conformance with the descriptions in the registered PDD/14/.

**Verification team**

<b>Role</b>	<b>Last Name</b>	<b>First Name</b>	<b>Country</b>	<b>Type of involvement</b>					
				Desk review	Site visit	Reporting	Supervision of work	Technical review	TA 1.2 competence
Team leader (Verifier)	Govindarajulu	Murali	India	✓	✓	✓	✓		✓
Verifier	Prabhu	Ravi Kumar	India	✓	✓	✓			
Technical reviewer	Dudek	Agnes	Norway					✓	✓

**Duration of verification**

Monitoring report publication:

25 October 2010

On-site verification:

From 18 November 2010 to 19 November 2010

Reporting, calculation checks and QA/QC: From 23 November to 9 December 2011

**2.1 Review of Documentation**

The monitoring report, version 01 dated 7 October 2010/1/has been made publicly available on the CDM website. In addition to the monitoring report, the verification has been performed based on the review of the following documentation:

- The registered PDD, including the monitoring plan and the corresponding validation report/14//18/.
- The approved baseline and monitoring methodology ACM0002 Version 6 applied by the project/13/.
- The Notification Changes in PDD, approved by UNFCCC on 16 June 2010/16/.
- Request for revision of monitoring plan approved by UNFCCC on 21 July 2011 /17/.
- Relevant decisions, clarifications and guidance from the CMP and the CDM Executive Board/12/.
- Other information and references relevant to the project activity's resulting emission reductions/2/-/8/.
- The copies of the generation certificates for all months within the verification period, which forms the basis of the emission reduction calculation/9/.

During the desk review, DNV has applied standard auditing techniques to assess the quality of information provided. The following activities were performed:

- A review of the data and information presented to verify their completeness;
- A review of the monitoring plan and monitoring methodology, paying particular attention to the frequency of measurements, the quality of metering equipment



- including calibration requirements, and the quality assurance and quality control procedures; and
- An evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions.

## 2.2 Site Visits

During 18 and 19 November 2010, DNV visited Chitradurga and Gadag in Karnataka State and performed interviews with the project participants. The key personnel/20/-/23/of the project were interviewed or assisted the verification team.

During the on-site assessment, DNV has applied standard auditing techniques to assess the quality of information provided. The following aspects of the CDM project activity have been verified:

- The implementation and operation of the CDM project activity as per the registered PDD;
- The information flow for generating, aggregating and reporting of the monitoring parameters; and
- The operational and data collection procedures are implemented in accordance with the monitoring plan in the PDD.

Further, the following activities were performed:

- A cross-check between information provided in the monitoring report /1/and data from other sources/2/-/9/;
- A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the PDD /12//14/and the selected methodology/13/;
- A review of calculations and assumptions made in determining the GHG data and emission reductions/2/; and
- An identification that quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

The data presented in the monitoring report was assessed by review of the detailed project documentation and production records, as well as by interviews with personnel of Enercon (India) Ltd and observation of collection of measurements, observation of established monitoring and reporting practices and assessment of the reliability of monitoring equipment. This has enabled the verification team to assess the accuracy and completeness of reported monitoring results; to verify the correct application of the approved monitoring methodology and the determination of the emission reductions.

In addition, all parameters required by the monitoring methodology ACM0002 Version 6/13/, and the management system were assessed during the site visit.

## 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 verification period.

3 CARs and 6 CLs were raised and have been adequately addressed by the project participants (refer to Appendix A). One FAR also was raised during the validation, which will be checked during next verification.

After completion of the initial verification of the project, the MR, emission reduction calculation and verification report was further revised to address the issues raised during the completion check of UNFCCC.



### 3 VERIFICATION FINDINGS

This section summarises the findings from the verification of the emission reductions reported for the Enercon Wind farms in Karnataka Bundled Project-30.4 MW for the period 18 March 2010 to 31 August 2010.

#### 3.1 Remaining Issues, CARs, FARs from Previous Validation or Verification

There are no remaining issues from the validation report/18/.

#### 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/14/. The verification team confirmed through visual inspection and document review/3/that all physical features of the proposed CDM project activity including data collection systems and storage systems have been implemented in accordance with the revised monitoring plan and registered PDD. DNV confirmed during the on-site visit that the CDM project is completely operational. The Notification of changes to PDD submitted by project participant was accepted by UNFCCC on 16 June 2010 /16/ and a request for revision of monitoring plan was approved by UNFCCC on 21 July 2011 /17/. The changes have been detailed under section 3.3 of the report.

The project is a wind power plant, located at Chitradurga and Gadag districts of Karnataka, India, with 27 and 11 WEGs of respectively. All the WEGs have been supplied by Enercon (India) Ltd. The first machine of the bundle was commissioned on 29 March 2006 and the last machine commissioned on 29 December 2006/3/.

The installed capacity of the project activity is 30.4 MW consisting of 38 WEGs of 800 kW turbines of Enercon make with gearless horizontal axis, variable speed rotor and independent electromechanical pitch system for each blade. The details of the WEGs with respect to installation and capacity have been verified to be consistent with description indicated in the PDD/3//14/. The actual implementation of the project during this verification period was verified in terms of name plate capacities of WEGs, monitoring equipment and their accuracy levels.

The electricity generated is supplied to the Karnataka grid, which is part of southern grid of India, under the Power Purchase Agreement (PPA)/10/ with the state electricity distribution companies BESCOM and HESCOM. The WEGs are provided with a main electricity meter and check meter, for each of the investors. The details of the meters are described in section 3.5.1 of the report. All meters are bidirectional with 0.2% accuracy, each of these meters are used for both measuring the electricity exported to and imported from the grid. The electricity meters are sealed by the state utility to guarantee the integrity of the instruments. This is in line with the monitoring plan. Further, each of the WEG has in built control panel meter to monitor generation from the central monitoring stations.

#### 3.3 Information (data and variables) provided in the monitoring report that is different from that stated in the registered PDD

The emissions reductions reported in this monitoring period are 28 114 tCO<sub>2</sub>e in the period



from 18 March 2010 to 31 August 2010 (i.e. 166 days). The yearly expected emission reductions in the registered PDD are 65 774 tonnes of CO<sub>2</sub> equivalents, which corresponds to the emission reductions of 29 913 tonnes of CO<sub>2</sub> equivalents in 166 days, and hence the reported emission reductions are lower than the expected. The variation is deemed to be within a reasonable range due to the following reasons:

- i) Electricity generation for the period of 18 to 31 March 2010 was not considered in ER calculations.

Apart from the changes notified through Notification of changes in PDD /15/ and the request for revision of monitoring plan /17/, other information (data and variables) stated in MR are consistent with PDD.

The Notification of changes in PDD was made with respect to the following:

- a) To indicate the village in which each of the Wind Energy Generator (WEG) is located, in accordance with the commissioning certificates.
- b) To indicate the actual geo-coordinate of the individual WEGs as per the actual site measurements done by Enercon.
- c) Transfer of ownership with respect to one of the WEGs of 0.8 MW capacity.

The revision of monitoring plan was with respect to the following:

- a) Inclusion of "Electricity Export,  $EG_{\text{export}}$ "
- b) Inclusion of "Electricity Export,  $EG_{\text{import}}$ "
- c) Inclusion of "Transmission Losses,  $TE$ "
- d) The formula for calculation of "Net Electricity supplied to the grid"  $EG_y$  is corrected to:  $EG_y = EG_{\text{export}} - 115\% * EG_{\text{import}} - \text{Transmission Loss } (TE)$
- e) The procedure adopted by the state utility for calculation of transmission loss as given in the PPA.

### 3.4 Compliance of monitoring plan with monitoring methodology

DNV is able to confirm that the revised monitoring plan approved by UNFCCC on 21 July 2011/17/ is in accordance with the approved methodology applied by the project activity, i.e. ACM0002 Version 6/13/.

### 3.5 Compliance of monitoring with the monitoring plan

The monitoring has been carried out in accordance with the monitoring plan contained in the revised monitoring plan /17/.

As per the revised monitoring plan, the following parameters need to be monitored:

- a) Net electricity supplied to the grid by the project activity  **$EG_y$** ,
- b) Electricity export recorded at meters ( **$EG_{\text{export}}$** ) of the individual investors (as stated under section 3.5.1 of the verification report and section C of the MR /1/.
- c) Electricity import recorded at meters ( **$EG_{\text{import}}$** ) of the individual investors (as stated under section 3.5.1 of the verification report and section C of the MR /1/.
- d) Transmission loss ( **$TE$** ) for export between the metering location at 33 kV metering point and the high voltage side of the substation to which the subproject is connected. This is calculated by state utility and reported in JMR (as stated under section 3.5.1 of the verification report and section C of the MR /1/.



The joint measurement will be carried out at the meters of the individual sub projects once in a month in presence of both parties (the developer's representative and officials of the state power utility). Both parties will sign the recorded reading. Each WEG is also equipped with an integrated electronic meter which is connected to the central monitoring station (CMS) of the entire wind farm and maintained by Enercon. The transmission loss is apportioned by the state utility among the various project developers based on the electricity metered at the metering stations and the reading of meters located at the respective sub stations. The procedure adopted by the state utility for calculation of transmission loss is stated in section B.7.2 of the revised monitoring plan /17/ and section C of the MR /1/. The transmission loss is calculated by state utility which is reflected in the JMR (Form B) /6/ for each sub project recorded at 33kV metering point. Net electricity supplied to the grid is calculated after subtracting the transmission loss and 115% of the power imported from grid, to the meter readings taken at 33 kV metering location for all the sub projects included in the project activity. The subtraction of transmission losses and 115% of the power imported from the grid from the gross electricity generated recorded by the meters will result in lower net electricity exported to the grid and is deemed conservative.

All the joint meter reading records/6/ signed by both the parties and invoices /5/ have been verified by DNV. All the documents serving as the source for the emission reduction calculations are being archived. Necessary management system procedures including responsibility and authority of monitoring activities have been verified to be consistent with the PDD. During the site visit interactions, the knowledge of personnel associated with the project activity was also found to be satisfactory.

All parameters stated in the revised monitoring plan are monitored and reported appropriately. The monitoring report lists each parameter required by the monitoring plan and the information flow (i.e. from data generation, aggregation, to recording, calculation and reporting) for these parameters is provided in the monitoring report. The information flow for the each parameter is further verified in the following sections. DNV confirms that no deviation to the monitoring plan has been requested to CDM Executive Board.

### 3.5.1 Monitoring parameters

According to the revised monitoring plan approved by UNFCCC /17/, there are 4 parameters to be monitored:

- a) Net electricity supplied to the grid by the project activity **EG<sub>y</sub>**,
- b) Electricity export recorded at meters (**EG<sub>export</sub>**) of the individual investors (as stated under section 3.7 of the verification report and section C of the MR/1/.
- c) Electricity import recorded at meters (**EG<sub>import</sub>**) of the individual investors (as stated under section 3.7 of the verification report and section C of the MR/1/.
- d) Transmission loss for export between the metering location at 33 kV metering point and the high voltage side of the substation to which the subproject is connected **T<sub>E</sub>**.

The following tables are related to the parameters in the monitoring plan / methodology:



Data / Parameter:	Net electricity supplied to the grid EG <sub>y</sub>
Measuring frequency:	Calculated from the sum of the net electricity supplied by the 18 sub projects. $EG_y (\text{Sub project}) = EG_{\text{export}} - 115\% * EG_{\text{import}} - \text{Transmission Loss (TE)}$
Reporting frequency:	Monthly
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Type of monitoring equipment:	Calculated.
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?	Not applicable
Calibration frequency /interval:	Not applicable
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?	Not applicable
Company performing the calibration:	Not applicable
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Not applicable
Is(are) calibration(s) valid for the whole reporting period?	Not applicable
If applicable, has the reported data been cross-checked with other available data?	The values of net electricity exported were verified from the JMR /6/and electricity sales invoices/5/ and found to be consistent.
How were the values in the monitoring report verified?	The values of net electricity exported were verified from the JMR /6/and electricity sales invoices/5/ and found to be consistent.
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?	The QA/QC procedures described in MR was verified during site visit, and found to be adequate
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption	Not applicable



theoretically possible been applied or has a request for deviation been approved?	
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Data / Parameter:	Electricity export ( <b>EG<sub>export</sub></b> ) and Electricity import ( <b>EG<sub>import</sub></b> ) recorded at meters																																		
Measuring frequency:	Continuous																																		
Reporting frequency:	Monthly																																		
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes																																		
Type of monitoring equipment:	<p>EG<sub>Import</sub> and EG<sub>Export</sub> to the grid have been monitored by the following energy meters of sub projects:</p> <table border="1"> <thead> <tr> <th>Meter no.</th><th>Calibrated on</th></tr> </thead> <tbody> <tr> <td>Main Meter 5463842</td><td>31 March 2006</td></tr> <tr> <td>Check Meter 5463855</td><td>2 September 2010</td></tr> <tr> <td>Main Meter 5437939</td><td>1 September 2008</td></tr> <tr> <td>Check Meter 5437956</td><td>27 February 2010</td></tr> <tr> <td>Main Meter 5389379</td><td>1 September 2008</td></tr> <tr> <td>Check Meter 5389378</td><td>27 February 2010</td></tr> <tr> <td>Main Meter 5436130</td><td>21 July 2009</td></tr> <tr> <td>Check Meter 5436135</td><td>25 September 2010</td></tr> <tr> <td>Main Meter 5389971</td><td>1 September 2008</td></tr> <tr> <td>Check Meter 5389974</td><td>27 February 2010</td></tr> <tr> <td>Main Meter 5436122</td><td>24 July 2009</td></tr> <tr> <td>Check Meter 5436121</td><td>29 September 2010</td></tr> <tr> <td>Main Meter 5390229</td><td>27 February 2010</td></tr> <tr> <td>Check Meter 5390230</td><td>30 August 2010</td></tr> <tr> <td>Main Meter 05390421</td><td>26 December 2009</td></tr> <tr> <td>Check Meter</td><td>19 February 2010</td></tr> </tbody> </table>	Meter no.	Calibrated on	Main Meter 5463842	31 March 2006	Check Meter 5463855	2 September 2010	Main Meter 5437939	1 September 2008	Check Meter 5437956	27 February 2010	Main Meter 5389379	1 September 2008	Check Meter 5389378	27 February 2010	Main Meter 5436130	21 July 2009	Check Meter 5436135	25 September 2010	Main Meter 5389971	1 September 2008	Check Meter 5389974	27 February 2010	Main Meter 5436122	24 July 2009	Check Meter 5436121	29 September 2010	Main Meter 5390229	27 February 2010	Check Meter 5390230	30 August 2010	Main Meter 05390421	26 December 2009	Check Meter	19 February 2010
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	Main Meter 5437934 Check Meter 5462964	21 March 2009 16 June 2010
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	Main Meter 5437948 Check Meter 5463853	24 December 2009 16 June 2010
	Main Meter 5463841 Check Meter 6760772	5 February 2007 3 June 2010
	Main Meter 6607372 Check Meter 5389381	5 February 2007 3 June 2010
	Main Meter 6675385 Check Meter 6675392	5 February 2007 3 June 2010
	Main Meter 5463849 Check Meter 6605127	5 February 2007 3 June 2010
	Main Meter 6675402 Check Meter 6760764	5 February 2007 3 June 2010
	Main Meter 6675414 Check Meter	6 February 2007 3 June 2010



	6675384	
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?	Yes. The meters have an accuracy class 0.2%, which is in line with the PDD and it represents good monitoring practise.	
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?	The calibration interval is in line with the revised monitoring plan and the selected frequency represents good monitoring practice. However, it was observed that some of the calibrations were delayed and the details have been given above.	
Company performing the calibration:	HESCOM and BESCOM	
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes	
Is(are) calibration(s) valid for the whole reporting period?	No. The calibrations of some of the meters were delayed. Hence the maximum error of the equipment has been applied on the measured values as per EB52 Annex 60.	
If applicable, has the reported data been cross-checked with other available data?	The values <b>EGexport</b> and <b>EGimport</b> required for calculation of net electricity exported were verified from the JMR /6/ and electricity sales invoices /5/ and were found to be consistent.	
How were the values in the monitoring report verified?	The values <b>EGexport</b> and <b>EGimport</b> required for calculation of net electricity exported were verified from the JMR /6/and electricity sales invoices /5/ and were found to be consistent. .	
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?	The QA/QC procedures described in MR were verified during site visit, and were found to be adequate	
In case only partial data are available because activity levels or non-activity 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?	Not applicable	

Data / Parameter:	Transmission loss for export between the metering location at 33 kV metering point
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	and the high voltage side of the substation to which the subproject is connected, $T_E$
Measuring frequency:	Calculated by the state utility as the percentage difference between the electricity exported recorded by the meters at substation and the total of net generation recorded by the meters of sub projects connected to it. The transmission losses are reported in joint meter reading /6/.
Reporting frequency:	Monthly
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Type of monitoring equipment:	Calculated.
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?	Not applicable
Calibration frequency /interval:	Not applicable
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?	Not applicable
Company performing the calibration:	Not applicable
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Not applicable
Is(are) calibration(s) valid for the whole reporting period?	Not applicable
If applicable, has the reported data been cross-checked with other available data?	The values of transmission losses were verified against the JMR /6/ and were found to be consistent.
How were the values in the monitoring report verified?	The values of net electricity exported were verified against the JMR /6/ and were found to be consistent.
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?	The QA/QC procedures described in MR was verified during site visit, and was found to be adequate
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption	Not applicable



theoretically possible been applied or has a request for deviation been approved?	
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The calibration records of the electricity meters of the sub projects /4/ and the bulk meters located at the sub stations /11/ have been provided to DNV for verification. There was delay in calibration of some of meters for the monitoring period. The late calibrations indicate that the error is within limits. The maximum error was applied for all the meters the entire monitoring period, as per EB52 Annex 60 /15/conservatively in emission reduction calculations.

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

DNV confirms that appropriate methods and formulae for calculating baseline emissions, project emissions and leakage have been followed, and the assumptions, emission factors and default values that are applied in the calculation have been justified.

As stated in the section 1.4, the emission reductions  $ER_y$  by the project activity during the monitoring period is the difference between the baseline emission, project emissions or leakage.

$$ER_y = BE_y - PE_y - L_y$$

#### 3.6.1 Baseline emissions

Baseline emissions ( $BE_y$  in  $tCO_2$ ) are the product of the baseline emission factor ( $EF_y$  in  $tCO_2/MWh$ ) times the net electricity supplied by the project activity to the grid ( $EG_y$  in  $MWh$ ).

$EF_y$  is emission factor of the grid, which was calculated *ex-ante* and will not be updated during the first crediting period.  $EF_y$  of the proposed project in the registered PDD is  $0.93204 tCO_2/MWh$ , which has been verified to be correct based on the CEA data/19/.

$EG_y$  is the net electricity generation supplied to the grid, which is determined by the electricity supplied to the grid minus the 115% of the imported electricity from the grid and transmission loss as described under Section 3.5.1. The net electricity supplied by the sub projects to the grid was verified by DNV from the monthly JMR report /6/, the electricity sales invoice/5/.

$$EG_y (\text{Sub project}) = EG_{\text{export}} - 115\% * EG_{\text{import}} - \text{Transmission Loss (TE)}$$

The project was registered on 18 March 2010 and the JMR of the sub projects was recorded on the 1 April 2010. The project participant opted to exclude the generation from 18 to 31 March 2010 from ER calculations, since the PDD has not described how to handle such a scenario. Further, in lieu of the delayed calibrations, maximum permissible error of the equipment has been applied on the measured values ( $EG_y$ ) in accordance with EB52 Annex 60/15/ The maximum error of 0.2%, the accuracy of the electricity meters, was applied on the measured values for the entire monitoring period conservatively. DNV considers the exclusion of the generation data for the month of March 2010 and the application of correction factor as per EB 52 Annex 60 /15/as appropriate.

Hence,

$$BE_y = EF_y * EG_y = 28\,114\, tCO_{2e}$$

The total net electricity exported during the verification period was 30 164.633 MWh.



### 3.6.2 Project emissions

The project emissions are regarded as zero according to the methodology ACM0002. At the time of site visit, no potential source of project emissions was observed.

### 3.6.3 Leakage

There are no leakages that need to be considered in applying the methodology ACM0002.

### 3.6.4 Emission reductions

Therefore, the emission reductions in this monitoring period are:

$$ER_y = BE_y - PE_y - L_y = 28\,114 - 0 - 0 = 28\,114 \text{ tCO}_2\text{e}.$$

The emissions reductions reported in this monitoring period are 28 114 tCO<sub>2</sub>e for the period from 18 March 2010 to 31 August 2010 (166 days).

It has been confirmed by DNV that maximum output capacity has not been exceeded the design capacity on any given month during the verification period.

As outlined above, the input data for calculating the emission reductions, the calculating process and the result are complete and transparent. Therefore, DNV is able to confirm the accuracy of the emission reductions.

## 3.7 Quality of evidence to determine emission reductions

DNV confirms that a complete set of data for this monitoring period was available to be verified and was in accordance with the registered PDD.

All necessary documentation were collected, referenced and aggregated and were easily accessible in hard-copy and electronic format. Measurements are performed by calibrated equipment, and the key data were cross-checked against the invoices issued by for electricity sales invoices /5/. No assumptions are used that have any material influence on reported emission reductions.

## 3.8 Management system and quality assurance

The owners of the sub project have entered into a maintenance and services agreement with Enercon (India)Ltd., which was verified during the site visit. The performance of the WEGs, safety in operation and scheduled / breakdown maintenance thereof are organized and monitored by EIL. EIL maintains records, in both electronic and well as printed (paper) form, of generation data of individual WTGs from the controllers of each /8/. EIL, the focal point for the project activity cross-checks the calculation of CERs based on monitoring data made available through JMR, break up energy reports and CMS readings, on behalf of the owners of the sub projects.

The management system for the project has been verified to be in place on site by DNV. The organization structure with the responsibilities, personnel competencies, monitoring procedure and monitoring management have been properly identified and put into operation.

DNV confirms that the responsibilities and authorities in the management and operational system for monitoring and reporting are in accordance with the responsibilities and authorities stated in the registered PDD and monitoring plan.



#### 4 CERTIFICATION STATEMENT

*DNV Climate Change Services AS (DNV) has performed the verification of the emission reductions reported for the Enercon Wind farms in Karnataka Bundled Project-30.4 MW (UNFCCC Registration Reference No. 1291) for the period 18 March 2010 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 conducted the verification on the basis of the monitoring methodology ACM0002 Version 6, revised monitoring plan approved on 21 July 2011 and revised monitoring report, version 5 dated 5 December 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 emission reductions reported for the Enercon Wind farms in Karnataka Bundled Project-30.4 MW (UNFCCC Registration Ref. No. 1291) for the period 18 March 2010 to 31 August 2010 are fairly stated in the revised monitoring report, version 5 dated 5 December 2011.*

*The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology ACM0002 Version 6, Registered PDD version 5, dated 23 February 2009 and the revised monitoring plan approved on 21 July 2011.*

*DNV Climate Change Services AS is able to certify that the emission reductions from the Enercon Wind farms in Karnataka Bundled Project-30.4 MW during the period 18 March 2010 to 31 August 2010 amount to 28 114 tCO<sub>2</sub>equivalent.*

Bangalore and Oslo 9 December 2011

Murali Govindarajulu  
CDM Verifier  
DNV India.

Edwin Aalders  
Approver  
DNV Climate Change Services 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 version 1, dated 7 October 2010 and final revised monitoring report, version 5 dated 5 December 2011.*
- /2/ EIL: Spreadsheet for Emission reduction Calculations, version 4, dated 5 December 2011*
- /3/ EIL: Commissioning certificates of WEGs dated 29 March 2006, 31 March 2006, 6 May 2006 and 29 December 2006*
- /4/ EIL: Calibration certificates of the WEGs for the monitoring period of 18 March 2010 to 31 August 2010 and prior periods.*
- /5/ EIL: Records of invoices raised by the project participant for the sale of power for the period of 18 March 2010 to 31 August 2010.*
- /6/ EIL: Records of Joint meter readings at the wind farm site for the period of 18 March 2010 to 31 August 2010*
- /7/ EIL: Approval from Government of Karnataka to transfer the ownership of the 0.8 kW WEG from R.K. Marbles to Power Link Systems Private limited, dated 15 February 2008*
- /8/ EIL: Records of monthly generation details in CMS and maintenance records for the period of 18 March 2010 to 31 August 2010.*
- /9/ EIL: The generation certificates for the verification period 18 March 2010 to 31 August 2010*
- /10/ EIL: Power Purchase agreements signed by the investors with the state utility*
- /11/ EIL: The calibration certificates electricity meters located at the sub stations, for the monitoring period of 18 March 2010 to 31 August 2010 and prior periods.*

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

- /12/ CDM Executive Board: Validation and Verification Manual. Version 01.2*
- /13/ CDM Executive Board: ACM0002 version 06, Consolidated baseline methodology for grid connected electricity generation from renewable energy sources.*
- /14/ Registered PDD version 5, dated 23 February 2009 and revised PDD version 6, dated 16 April 2011 accepted by UNFCCC on 16 June 2011*
- /15/ CDM Executive Board: Guidelines for assessing compliance with the calibration frequency requirements Annex 60 of EB 52 dated 12 February 2010.*
- /16/ CDM Executive Board: Notification of changes in PDD, approved on 16 June 2011*
- /17/ CDM Executive Board: Request for revision of monitoring plan, approved on 21 July 2011*
- /18/ SGS: Validation report of the project activity, ver 3 dated 25 October 2009*
- /19/ CEA: Baseline carbon dioxide emission database version*



[http://cea.nic.in/reports/planning/cdm\\_co2/cdm\\_co2.htm](http://cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm)

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

- /20/ Mr. Chandra Mouli Kadali, CDM Executive, Enercon (India) Ltd, Mumbai
- /21/ Mr. Abhishek Jain, Site Engineer, Enercon (India) Ltd., Chitradurga
- /22/ Mr. Manjunath Etagimath, Sr. Technician, Enercon (India) Ltd., Gadag
- /23/ Mr. Ashok P. Shintre, Manager, Enercon (India) Ltd., Gadag

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## **APPENDIX A**

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

**Corrective action requests:**

CAR ID	Corrective action request	Response by Project Participants	DNV's assessment of response by Project Participants
CAR 1	<p>The energy meter calibration stated in the MR for meter numbers 5436130, 5436135, 5436122, 5436121, 5390229, 5390230, 5389981, 5389986, 5389904, 5463840, 5462963, 5437934, 5462964, 5463847, 5463838, 5437948, 5463853, 5463841, 6760772, 6607372, 5389381, 6675385, 6675392, 5463849, 6605127, 6675402, 6760764, 6675414 and 6675384 do not cover the entire monitoring period. In case of some of the meters, the calibration was not done as per the frequency specified in the monitoring plan.</p>	<p>The details of the calibration along with the frequency of monitoring have been incorporated in the revised spreadsheet. The accuracy class of all the meters is 0.2.</p> <p>The calibration frequency is not in conformance with the frequency mentioned in the registered PDD. However the calibration results do not show any error in the delayed calibration reports.</p> <p>Therefore as per the “Guidelines for assessing compliance with the calibration frequency requirements”, EB 52, Annex 60, version 01, the maximum permissible error of meters shall be applied to the meter readings for the period from the scheduled date of calibration up to the latest calibration test.</p> <p>However conservatively, we have applied the maximum permissible error to entire first monitoring period from 18/03/2010 to 31/08/2010.</p>	<p>The calibration records of the meters have been provided and the same is updated in the MR. The calibration records show that some of the calibrations were done late, but the delayed calibration results indicate that the error is within the maximum permissible limit of the meter /4/.</p> <p>In accordance with the Guidelines for assessing compliance with the calibration frequency requirements”, EB 52, Annex 60 /15/, PP applied the maximum permissible error of meters applied to the meter readings for all the meters, for the entire monitoring period conservatively. DNV verified the emission reduction calculations /2/ and found it to be in order.</p> <p>Accepted and CAR 1 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>
CAR 2	As per registered PDD, net electricity supplied to the grid by the project EGY is the only parameter to be monitored, which is to be sourced from the invoices raised on state utility. However, in emission reduction calculations, net electricity supplied to the grid calculated by subtracting the transmission losses and 115% of the electricity imported from the grid. This is not in line with the monitoring plan specified in the registered PDD.	The state utility determines the net electricity supplied to the grid calculated by subtracting the transmission losses and 115% of the electricity imported from the grid. In order to reflect the actual practice at site, Enercon has submitted a request for revision of monitoring plan, which was approved by UNFCCC on 21 July 2011.	Enercon revised the monitoring plan to include the monitoring of gross electricity generated; electricity imported from the grid and transmission losses, in addition to the net electricity exported. The formula for calculation of net electricity exported has also been included in the revised monitoring plan which was approved by UNFCCC on 21 July 2011.  Accepted and CAR 2 is closed
CAR 3	The name of Japan Carbon Finance's representative stated in MR and the latest F-CDM-MOC-Form Annex 2 available in UNFCCC web site does not match.	The name of Japan Carbon Finance's representative has been updated inline with the F-CDM-MOC-Form Annex 2 submitted to UNFCCC.	In the revised monitoring plan /1/, the name of Japan Carbon Finance's representative has been corrected as per the latest F-CDM-MOC-Form Annex 2 submitted to UNFCCC.  Accepted and CAR 3 is closed

**Clarification Request:**

CL ID	Clarification request	Response by Project Participants	DNV's assessment of response by Project Participants													
CL 1	The serial numbers of WEG electricity meter the owned by Balasahab Ladkat (both main and check meter) and MK Agrotech Private Ltd. (check meter) at the site were found to be different from those stated in the monitoring report. The reason for the difference needs to be clarified.	<p>The typological error for Sr. No. of main and check meters of Balasaheb Ladkat has been corrected in the MR.</p> <p>The typological error was made by the state utility which was corrected later. The correction made is cross signed by the representative of the state utility. Same has been provided to the DoE. The correct Sr. No. for check meter is 5436140.</p> <p>The serial number of WEG meters are as follows:</p> <table><tr><td>Project owner</td><td>Meter Type</td><td>Meter Sr. no</td></tr><tr><td rowspan="2">BlasahabLadkat</td><td>Main meter</td><td>5390421</td></tr><tr><td>Check meter</td><td>5341085</td></tr><tr><td rowspan="2">M.K.Agrotech Private Ltd</td><td>Main meter</td><td>5389904</td></tr><tr><td>Check meter</td><td>5436140</td></tr></table>	Project owner	Meter Type	Meter Sr. no	BlasahabLadkat	Main meter	5390421	Check meter	5341085	M.K.Agrotech Private Ltd	Main meter	5389904	Check meter	5436140	<p>The serial numbers of WEG electricity meter the owned by Balasahab Ladkat (both main and check meter) and MK Agrotech Private Ltd. (check meter) have been corrected in the revised MR /1/.</p> <p>Accepted and CL 1 is closed.</p>
Project owner	Meter Type	Meter Sr. no														
BlasahabLadkat	Main meter	5390421														
	Check meter	5341085														
M.K.Agrotech Private Ltd	Main meter	5389904														
	Check meter	5436140														
CL 2	DNV is unable to confirm the ER calculations, since calibration details of bulk meters located at the sub stations are not provided..	<p>The calibration detail of main and check meters located at substation has been incorporated in the revised MR version 02. The details of uploading substation for each of the WEG has been incorporated in the MR.</p>	<p>The calibration records of the substation meters relevant for the monitoring period /11/ have been verified and the details have been included in the revised MR /1/.</p> <p>Accepted and CL 2 is closed.</p>													

CL ID	Clarification request	Response by Project Participants	DNV's assessment of response by Project Participants
CL 3	Though the monitoring period starts from 18 March 2010, the CER calculation spreadsheet provides data from 1 April 2010 only. The reason for the same needs to be clarified.	The PDD does not describe the apportioning procedure in case the billing cycle does not coincide with the date of registration of the project. Therefore conservatively, we have excluded the generation from date of registration till the last day of that month in which the project was registered i.e. 18 March 2010 to 31 March 2010.	The PP has opted not to consider the generation data for the period of 18 to 31 March 2010 for ER calculation, since the apportioning procedure is not described in the PDD, which is conservative.  Accepted and CL 3 is closed.
CL 4	DNV is unable to complete the data verification of WEGs, since the details of 37 WEGs only are stated in MR against the total of 38 WEGs..	The revised MR is corrected to incorporate detail of 38 machines under section A.3 & B.1.	In updated MR /1/, the details of all the WEGs have been provided.  Accepted and CL 4 is closed.
CL 5	The net energy exported to the grid stated in Appendix 2 of the MR in the case of Panama Business Centre for the months of July and August does not match with the invoices.	The requisite corrections to the net energy exported to the grid have been made to Appendix 2 of the MR in the case of Panama Business Centre for the months of July and August.	The generation data of Panama Business Centre for the months of July and August in the revised MR /1/ was cross checked against the invoices /5/ and found to be in order.  Accepted and CL 5 is closed.

CL ID	Clarification request	Response by Project Participants	DNV's assessment of response by Project Participants
CL 6	<p>The geographical co-ordinates and the village names of some of the WEGs stated in MR are not matching with the registered PDD. Enercon is requested to substantiate the differences stated above.</p> <p>Further, ownership of one of the owner of one of the sub project (R.K Marbles) is stated to have changed. Enercon is requested to provide the supporting documents for transfer of ownership of WEG and demonstrate that the change does not have any impact on the additionality of the project.</p>	<p>Enercon has submitted a notification of change to the PDD to reflect actual geographical co-ordinates and the village names of the WEGs and the change in ownership of the WEG owned by R.K Marbles. The approval of state utility for change in ownership of WEG owned by R.K Marbles and the updated financial analysis of the WEG for the new owner is provided to the DoE.</p> <p>The notification of change in PDD was accepted by UNFCCC on 16 June 2011.</p>	<p>Enercon submitted the revised PDD version 6 and notification of change to UNFCCC through DNV. The notification of change in PDD was accepted by UNFCCC on 16 June 2011.</p> <p>Accepted and CL 6 is closed.</p>

### Forward action requests from Validation

FAR ID	Forward action request	Summary of how FAR has been addressed in this reporting period	Assessment of how FAR has been addressed
	<i>No FAR was issued in validation report</i>	NA	NA

### Forward action requests from this verification

FAR ID	Forward action request	Summary of how FAR has been addressed in this reporting period	Assessment of how FAR has been addressed
FAR 1	Procedures to address the reporting and other communication details in case of change in the investors involved in the project activity from time to time need to be implemented.	The change in the investor in case of sale of the WTG post project implementation is not a foreseeable event. Therefore the PP undertakes to intimate the DoE and UNFCCC of any such change in the MR as when it takes place. A procedure for the same will be established.	OK at this stage. The procedure will be verified during next verification.

## **APPENDIX B**

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

**Mr. Murali Govindarajulu** holds a Bachelor's Degree in Chemical Engineering and has done a Short term diploma course in Management. Having an overall experience of around twelve 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 5 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.

**Mr. Ravi Kumar Prabhu** holds Bachelor's Degree in Chemical Engineering and has done Post Graduate Diploma course in Management and has an overall working experience of around twenty six years. Prior to joining DNV has around twenty three years' experience in Chemical process industry (fertilizer & petrochemical manufacturing) covering production, technical services including energy audits and efficiency studies, waste heat recovery, efficiency studies of boilers, power plants, safety audits, pollution control activities and waste water treatment. With respect to the Thermal Power Plant, the job assignment included the monitoring of flue gas stack temperatures and excess air, efficiency of fuel additives, condition of boiler refractory and insulation of steam lines, residual life assessment of boilers etc. His experience also includes 7 years in the Process design of fertilizer & petrochemical plants, wherein he was involved in the development of process flow diagrams, development of P&IDs, equipment design, HAZOP studies, procurement and commissioning activities.

He has over three years experience in validation and verification of CDM projects in DNV and is also an EMS lead auditor.

His qualification, industrial experience and experience in CDM projects demonstrate sufficient sectoral competence in Chemical Process Industries (TA 5.1), Thermal Energy Generation from fossil fuels (TA 1.1), Heat distribution (TA 2.2), Energy generation from Renewable Energy sources (TA 1.2) and Waste handling and disposal (TA 13.1).

**Agnes Dudek** holds a PhD Degree in applied physics. Having an overall experience of around 10.5 years. Prior to joining DNV having 7 years experience in scientific research covering satellite remote sensing, mesoscale weather forecast modelling and air pollution dispersion modelling and monitoring.

She has experience of around 3.5 years in validation and verification of numerous CDM projects.

Her qualification, research experience and experience in CDM demonstrate her sufficient sectoral competence in energy generation from renewable energy sources.