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# VALIDATION REPORT

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## “Roaring 40’s Wind Farms (Khandke) Private Limited – Phase III” in India

REPORT NO. 2009-0329

REVISION No.: 02

DET NORSKE VERITAS



## VALIDATION REPORT

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Approved by: <b>Michael Lehmann</b>	Organisational unit: <b>Climate Change Services</b>
Client: <b>Roaring 40s Wind Farms (Khandke) Private Limited</b>	Client ref.: <b>Mr. Mahesh Makhija</b>

**Project Name:** Roaring 40's Wind Farms (Khandke) Private Limited – Phase III  
**Country:** India  
**Methodology:** ACM0002  
**Version:** 10  
**GHG reducing Measure/Technology:** Grid-connected electricity generation from renewable energy sources (wind energy)  
**ER estimate:** 24 085 tCO<sub>2</sub>e/annum  
**Size**  
☐ Large Scale  
☒ Small Scale  
**Validation Phases:**  
☒ Desk Review  
☒ Follow up interviews  
☒ Resolution of outstanding issues  
**Validation Status**  
☐ Corrective Actions Requested  
☐ Clarifications Requested  
☒ Full Approval and submission for registration  
☐ Rejected  
 In summary, it is DNV's opinion that the "Roaring 40's Wind Farms (Khandke) Private Limited – Phase III" project in India, as described in the PDD of 25 March 2010, meets all relevant UNFCCC requirements for the CDM and all relevant host Party criteria and correctly applies the baseline and monitoring methodology ACM0002 version 10. DNV thus requests the registration of the "Roaring 40's Wind Farms (Khandke) Private Limited – Phase III" project in India as a CDM project activity.

Report No.: <b>2009-0329</b>	Date of this revision: <b>25 March 2010</b>	Rev. No. <b>02</b>
Report title: <b>"Roaring 40's Wind Farms (Khandke) Private Limited – Phase III" in India</b>		
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## VALIDATION REPORT

### Abbreviations

BM	Build margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEA	Central Electricity Authority
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CL	Clarification request
CM	Combined margin
CO <sub>2</sub>	Carbon dioxide
CO <sub>2</sub> e	Carbon dioxide equivalent
DNA	Designated National Authority
DNV	Det Norske Veritas
EIL	Enercon India Limited
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
HSBC	Hongkong and Shanghai Banking Corporation Limited
INR	Indian Rupee
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal rate of return
LoA	Letter of Approval
MEDA	Maharashtra Energy Development Agency
MERC	Maharashtra Electricity Regulatory Commission
MNES	Ministry of Non-conventional Energy Sources
MoEF	Ministry of Environment and Forests
MP	Monitoring Plan
MSEDCL	Maharashtra State Electricity Distribution Company Limited
NEWNE	Integrated Northern, Eastern, Western and North Eastern Electricity Grid
NGO	Non-governmental Organisation
O&M	Operations & Maintenance
ODA	Official Development Assistance
OM	Operating margin
PDD	Project Design Document
PLF	Plant load factor
PPA	Power purchase agreement
UNFCCC	United Nations Framework Convention on Climate Change
WEG	Wind Energy Generator



# VALIDATION REPORT

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## **1 EXECUTIVE SUMMARY – VALIDATION OPINION**

*Det Norske Veritas Certification AS (DNV) has performed a validation of the “Roaring 40’s Wind Farms (Khandke) Private Limited – Phase III” in India. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host Party criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.*

*The review of the project design documentation and the subsequent follow-up interviews have provided DNV with sufficient evidence to determine the fulfilment of stated criteria.*

*The project participant is Roaring 40s Wind Farms (Khandke) Private Limited of India. No Annex I project participant has yet been identified. The host Party India meets all participation requirements and the DNA of India has approved the project on 12 November 2009 and authorized the project participant. The DNA of India also confirmed via the letter of approval that the project assists in achieving sustainable development /2/.*

*The validation did not reveal any information that indicates that the project can be seen as a diversion of official development assistance (ODA) funding towards India.*

*The project correctly applies ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”, version 10 /3/.*

*By generating electricity from wind energy sources and exporting it to the integrated NEWNE grid, the project activity displaces an equivalent amount of grid power, which is predominantly fossil fuel based. Hence, the project results in reductions of CO<sub>2</sub> emissions that are real, measurable and gives long-term benefits to the mitigation of climate change. It is demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.*

*The total emission reductions from the project are estimated to be on average 24 085 tCO<sub>2</sub>e per year over the selected 10 year fixed crediting period. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given that the underlying assumptions do not change.*

*The monitoring methodology ACM0002 version 10 has been applied correctly. The procedures for monitoring, operating and maintenance have been elaborated as per the requirement of the methodology. Adequate training and monitoring procedures have been implemented.*

*In summary, it is DNV’s opinion that the “Roaring 40’s Wind Farms (Khandke) Private Limited – Phase III” project in India, as described in the PDD version 3 dated 25 March 2010 /1/, meets all relevant UNFCCC requirements for the CDM and all relevant host Party criteria and correctly applies the baseline and monitoring methodology ACM0002 version 10 /3/. DNV thus requests the registration of the “Roaring 40’s Wind Farms (Khandke) Private Limited – Phase III” project in India as a CDM project activity.*

## **2 INTRODUCTION**

Roaring 40s Wind Farms (Khandke) Private Limited has commissioned Det Norske Veritas Certification AS (DNV) to perform a validation of the “Roaring 40’s Wind Farms (Khandke) Private Limited – Phase III” project in India. This report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures and the subsequent decisions by the CDM Executive Board.

### **2.1 Objective**

The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, monitoring plan, and the project's compliance with relevant UNFCCC and host Party criteria are validated in order to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. Validation is a requirement for all CDM projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of certified emission reductions (CERs).

### **2.2 Scope**

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords, and the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology ACM0002, version 10 /3/. The validation was based on the recommendations in the Validation and Verification Manual /4/.

The validation is not meant to provide any consulting towards the project participant. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project design.

### 3 METHODOLOGY

The validation consisted of the following three phases:

- I a desk review of the project design documents
- II follow-up interviews with project stakeholders
- III the resolution of outstanding issues and the issuance of the final validation report and opinion

The following sections outline each step in more detail.

#### 3.1 Desk Review of the Project Design Documentation

The following table outlines the documentation reviewed during the validation:

- /1/ Roaring 40s: *CDM-PDD initial version 01 dated 10 September 2009 and final version 3 dated 25 March 2010.*
- /2/ Letter of Approval from DNA of India dated 12 November 2009.
- /3/ CDM Executive Board: ACM0002, “*Consolidated baseline methodology for grid-connected electricity generation from renewable sources*”, version 10.
- /4/ CDM Executive Board: “*Validation and Verification Manual*”, version 1.1.
- /5/ CDM Executive Board: Tool for demonstration and assessment of additionality, Version 5.2.
- /6/ Confirmation Letter from HSBC bank that project activity was evaluated against the interest rate of 12.5% and that CDM revenue was considered as a part of cash flow while evaluating the project activity, dated 26 May 2009.
- /7/ Purchase Order placed for Wind Energy Generators on Enercon India Limited, dated 19 April 2007.
- /8/ CEA: CO<sub>2</sub> Baseline Database for the Indian Power Sector, version 4, October 2008.  
[www.cea.nic.in](http://www.cea.nic.in)
- /9/ Detailed Project Report prepared by Roaring 40s Wind Farms (Khandke) Private Limited dated 2 March 2007.
- /10/ Minutes of meeting of board of director’s held on 19 March 2007.
- /11/ Rapid Environmental Impact Assessment carried out by Care Sustainability dated January 2007.
- /12/ Roaring 40s generation estimate from Enercon India limited dated 14 February 2007.
- /13/ Final budgetary offers received from the Enercon India Limited dated 28 December 2006.
- /14/ MSEDCL: Commissioning certificates of Wind Energy Generators dated 30 March 2009, 31 March 2009, 17 April 2009, 28 May 2009 3 June 2009 & 12 June 2009.
- /15/ CDM Executive Board: Guidance on Investment Analysis, version 3.
- /16/ Maharashtra Electricity Regulatory Commission tariff order dated 24 Nov 2003.
- /17/ Financial analysis spreadsheet for roaring 40s phase III: Project IRR Phase-III\_29-June-2009.xls
- /18/ MEDA wind power generation for year 2004-05: electricity generation data of Ahmednagar for year 2004-05.

- /19/ Electricity generation data of Tata 17 MW wind power project for year 2002-03 & 2004-05 available with project proponent.
- /20/ <http://www.windpowerindia.com/statyear.html> to demonstrate wind capacity in state of Maharashtra at the time of start date of the project activity (19 April 2007) and latest date till 31 March 2008.
- /21/ Maharashtra wind power policy 1998 to demonstrate sales tax benefits for wind power projects.  
<http://www.mercindia.org.in/pdf/Clarificatory%20Order-Wind%20Energy%20%5BCase%20Nos%207,%2015%20&%2016%20of%202004%5D.pdf>
- /22/ Detailed spreadsheet with CDM links of all CDM projects or projects under CDM pipeline to demonstrate common practice analysis dated 31 March 2008.
- /23/ A notice published in the local newspaper, *Sarvmat* on 29 October 2006 inviting stakeholders to comment on the project.
- /24/ Minutes of local stakeholder meeting conducted on 15 November 2006.
- /25/ HSBC Hedging Agreement with project proponent dated 5 July 2007.
- /26/ Roaring 40s Wind Farms (Khandke) Private Limited: Loan Payment sheet dated 28 March 2009.
- /27/ MEDA Clearance for the project activity dated 25 March 2009, 30 March 2009, 31 March 2009, 15 April 2009, 13 May 2009, 25 May 2009, 27 May 2009 & 2 June 2009.
- /28/ Declaration letter from Enercon India Limited for Stakeholder consultation for the project activity dated 8 October 2009.
- /29/ MEDA Infrastructure refund document for refund of revenue spent in building power evacuation facility.
- /30/ CDM consulting agreement signed between project proponent and Enercon India Limited dated 23 February 2007.
- /31/ Decision to implement the 50.4 MW project in three phases in view of the difficulty in getting the nodal agency clearance from MEDA, 15 October 2007.
- /32/ Receipt of the nodal agency clearance from MEDA for Roaring 40s phase III, 02 June 2009.
- /32/ The presentation on project activity of Roaring 40s Phase III to DNA of India, 06 March 2009.
- /34/ Income Tax Act 1961, sourced from Income Tax Department, Ministry of Finance.  
<http://law.incometaxindia.gov.in/TaxmannDit/DisplayPage/dpage1.aspx>
- /35/ CDM Executive Board: Tool to calculate the emission factor for an electricity system, version 2.
- /36/ State Bank of India: Lending rates for the period of March 1992 to December 2008, dated 23 November 2008.
- /33/ The Ministry of Environment and Forests (MoEF), India: Environment Impact Notification S.O. 1533 (<http://envfor.nic.in/legis/eia/so1533.pdf>) dated 14 September 2006
- /38/ Letter from HSBC bank (lender for the project activity) dated 26 February 2010 that the bank had considered the plant load factor of 21.07% while conducting the due diligence for the project activity.



/39/ Designated National Authority of India Website (CDM India):  
<http://www.cdmindia.nic.in/cdmindia/projectList.jsp?search=search>

Main changes between the version of the PDD published for the 30 days stakeholder commenting period and the final version of the PDD submitted for registration:

- Change in start date of crediting period.
- Changes to monitoring plan
- Correction in Built Margin value applied for year 2007-08

### 3.2 Follow-up Interviews with Project Stakeholders

On 23-24 October 2009, DNV conducted a visit to the project site at Ahmednagar to resolve issues identified in the desk review. Representative of the project participant and Enercon India Limited (responsible for operation & maintenance) were interviewed. The main topics of the interviews are summarized in Table 1:

**Table 1 Interview topics**

Name	Organization	Topic
Mr. Sanjay Pawar Manager-Commercial (Renewables)	Roaring 40s Wind Farms (Khandke) Private Limited	<ul style="list-style-type: none"> <li>➤ Financials of the project activity</li> <li>➤ Environmental compliance</li> <li>➤ Estimated emission reductions</li> <li>➤ Project additionality</li> </ul>
Mr. Puneet Katyal, Head-CDM, EIL		<ul style="list-style-type: none"> <li>➤ Stakeholders consultation process</li> <li>➤ Technology applied and operational lifetime</li> </ul>
Mr. Himanshu Bhatnagar, CDM- Corporate, EIL	Enercon India Limited (EIL)	<ul style="list-style-type: none"> <li>➤ Monitoring and reporting procedures</li> <li>➤ Calibration, internal audit and corrective action procedures</li> </ul>
Mr. Chinchole, site incharge, EIL		<ul style="list-style-type: none"> <li>➤ Provisions for training, operation and maintenance</li> </ul>
Mr. Rohit Joshi CDM- Corporate, EIL		
Ms. Sapna Pednekar CDM-Corporate, EIL		

### 3.3 Resolution of Outstanding Issues

The objective of this phase of the validation was to resolve any outstanding issues which needed be clarified prior to DNV's positive conclusion on the project design. In order to ensure transparency a validation protocol is customised for the project. The protocol shows in

transparent manner criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organises, details and clarifies the requirements a CDM project is expected to meet;
- It ensures a transparent validation process where the validator will document how a particular requirement has been validated and the result of the validation.

The validation protocol consists of three tables. The different columns in these tables are described in the figure below. The completed validation protocol for the “Roaring 40’s Wind Farms (Khandke) Private Limited – Phase III” is enclosed in Appendix A to this report.

Findings established during the validation can either be seen as a non-fulfilment of CDM criteria or where a risk to the fulfilment of project objectives is identified. Corrective action requests (CAR) are issued, where:

- mistakes have been made with a direct influence on project results;
- CDM and/or methodology specific requirements have not been met; or
- there is a risk that the project would not be accepted as a CDM project or that emission reductions will not be certified.

A request for clarification (CL) may be used where additional information is needed to fully clarify an issue.

### 3.4 Internal Quality Control

The validation report underwent a technical review before requesting registration of the project activity. The technical review was performed by a technical reviewer qualified in accordance with DNV’s qualification scheme for CDM validation and verification.

### 3.5 Validation Team

The validation team consisted of the following personnel:

<i>Role/Qualification</i>	<i>Last Name</i>	<i>First Name</i>	<i>Country</i>	<i>Type of involvement</i>					
				Desk review	Site Interviews	Reporting	Supervision of work	Technical review	Expert input
Technical team leader (CDM validator)	Murali	Govindarajulu	India	√		√	√		
GHG auditor	Srivastava	Gaurav	India	√	√	√			
Sector knowledge	Němeček	Lumir	Czech Republic	√					√
Technical reviewer	Yang	Weidong	USA					√	

The qualification of each individual validation team member is detailed in Appendix B to this report.

<b>Validation Protocol Table 1: Mandatory Requirements for CDM Project Activities</b>				
<b>Requirement</b>	<b>Reference</b>	<b>Conclusion</b>		
<i>The requirements the project must meet.</i>	<i>Gives reference to the legislation or agreement where the requirement is found.</i>	<i>This is either acceptable based on evidence provided (<b>OK</b>), a <b>Corrective Action Request (CAR)</b> of risk or non-compliance with stated requirements or a request for <b>Clarification (CL)</b> where further clarifications are needed.</i>		

  

<b>Validation Protocol Table 2: Requirement checklist</b>				
<b>Checklist Question</b>	<b>Reference</b>	<b>Means of verification (MoV)</b>	<b>Comment</b>	<b>Draft and/or Final Conclusion</b>
<i>The various requirements in Table 2 are linked to checklist questions the project should meet. The checklist is organised in different sections, following the logic of the large-scale PDD template, version 03 - in effect as of: 28 July 2006. Each section is then further sub-divided.</i>	<i>Gives reference to documents where the answer to the checklist question or item is found.</i>	<i>Explains how conformance with the checklist question is investigated. Examples of means of verification are document review (DR) or interview (I). N/A means not applicable.</i>	<i>The section is used to elaborate and discuss the checklist question and/or the conformance to the question. It is further used to explain the conclusions reached.</i>	<i>This is either acceptable based on evidence provided (<b>OK</b>), or a <b>corrective action request (CAR)</b> due to non-compliance with the checklist question (See below). A request for clarification (CL) is used when the validation team has identified a need for further clarification.</i>

  

<b>Validation Protocol Table 3: Resolution of Corrective Action and Clarification Requests</b>			
<b>Draft report clarifications and corrective action requests</b>	<b>Ref. to checklist question in table 2</b>	<b>Summary of project owner response</b>	<b>Validation conclusion</b>
<i>If the conclusions from the draft Validation are either a CAR or a CL, these should be listed in this section.</i>	<i>Reference to the checklist question number in Table 2 where the CAR or CL is explained.</i>	<i>The responses given by the project participants during the communications with the validation team should be summarised in this section.</i>	<i>This section should summarise the validation team's responses and final conclusions. The conclusions should also be included in Table 2, under "Final Conclusion".</i>

**Figure 1: Validation protocol tables**

## 4 VALIDATION FINDINGS

The findings of the validation are stated in the following sections. The validation criteria (requirements), the means of verification and the results from validating the identified criteria are documented in more detail in the validation protocol in Appendix A.

The validation findings relate to the project design as documented and described in the final project design documentation dated 25 March 2009 /1/.

### 4.1 Participation Requirements

The project participant is Roaring 40's Wind Farms (Khandke) Private Limited of India. The project is proposed as a unilateral project and no project proponent from any Annex I Party has yet been identified. The host Party India meets all the requirements for participating in a CDM project. It has been cross checked from the CDM India website that the project has indeed been approved by the DNA of India /39/. The Ministry of Environment and Forests, the DNA of India has approved the project with a letter of approval dated 12 November 2009, which also confirms that the project assists in achieving sustainable development in India /2/.

No public funding from an Annex I Party is involved in the project and the validation did not reveal any information that indicates that the project can be seen as a diversion of official development assistance (ODA) funding towards India.

### 4.2 Project Design

The project participant had initially designed to construct the project activity "Roaring 40s Wind Farms (Khandke) Private Limited" as a 50.4 MW wind farm in the state of Maharashtra, India. Hence an initial PDD for the project was webhosted for 50.4 MW capacity on UNFCCC website on 16 October 2008. The DNA of India approval is conditional upon the submission of clearances from Maharashtra Energy Development Agency (MEDA: nodal agency for development of renewable energy in the state of Maharashtra), which can only be achieved once the land acquisition for all phases are completed. The project proponent thus decided to develop all three phases of 16.8 MW, 19.2 MW and 14.4 MW capacities, respectively, as separate CDM projects, so that the DNA approval can be secured in phases and CDM registration of project activities can be achieved timely.

The 14.4 MW project activity (phase III) consists of 18 wind energy generators (WEGs) each of 800 kW rating, in the Mathani, Ranjani, Baradari, Sonewadi, Sarolabaddi and Madadgaon villages in Khandke Taluka of Ahmednagar District of Maharashtra state in India. All the WEG's in the project activity have been supplied by Enercon India Limited (EIL), who is also responsible for the operation, maintenance and management of the project. The energy generated will be supplied to the NEWNE grid of India via the Maharashtra state electricity grid. By the implementation of the project activity, energy generated using renewable energy will displace equivalent energy generation from the fossil fuel dominated integrated NEWNE grid. The project is expected to generate 26.578 GWh of energy per annum at a plant load factor of 21.07%, which has been verified from the generation data provided by Enercon India Limited (equipment supplier) for the project activity /12/ and has also verified with the letter from HSBC bank (lender for the project activity) dated 26 February 2010 that the bank had considered the plant load factor of 21.07% while conducting due diligence for the project activity /38/.

The start date of the project activity has been identified as 19 April 2007, which is the date of purchase order placed for the wind turbines of the project activity, and was evidenced from the purchase order document /7/. The lifetime of the project is 20 years which is reasonable for a WEG. The project has selected a fixed crediting period of 10 years with the start date of the crediting period to be 01 July 2010 (or on the date of registration of the CDM project activity, whichever is later). The project is expected to result in 24 085 tCO<sub>2</sub>e emission reductions per annum over the fixed crediting period.

The project description is to the consideration of DNV complete and accurate.

### 4.3 Baseline Determination

The project correctly applies the approved baseline methodology ACM0002, version 10 “*Consolidated baseline methodology for grid-connected electricity generation from renewable sources*” /3/. The applicability of this methodology is justified as:

- The project is a new installation of wind electricity generators which harnesses the wind potential available in the region and it displaces fossil fuel based electricity from the integrated NEWNE grid of India /7/.
- The project activity is connected to the integrated NEWNE grid of India, and the system boundaries are clearly identified and information on the characteristics of this grid is available /8/.
- The project does not involve an on-site switch from fossil fuels to a renewable source /27/.

The project being a wind energy generation activity, the rest of the applicability conditions as mentioned in the methodology do not apply to this project activity.

**Baseline Scenario:** Two alternatives to the project activity have been considered as the baseline scenario. These are i) the project activity without CDM benefits and ii) continuation of current scenario of power generation from existing grid-connected power plants. Both alternatives are in compliance with the laws and regulations of India and might be considered as baseline scenarios.

However, as discussed later (section B.4.4), the implementation of the project activity without CDM benefits faces investment barriers and hence the selected baseline scenario is that an equivalent amount of electricity would, in the absence of the project activity, have been generated by the operation of grid connected power plants and by the addition of new generation sources. The selection of the baseline is in line with the EB guidance provided in “*Validation and Verification Manual*”, version 1.1 /4/, which states that in case the applied methodology prescribes the baseline scenario no further analysis is required.

DNV considers the list of realistic and credible alternatives to be complete and the determination of the baseline transparent.

As the project activity supplies electricity to the Maharashtra state electricity grid which forms a part of the integrated NEWNE grid, the baseline for this project activity is a function of the generation mix of the NEWNE grid. The selection of the NEWNE grid as the grid system boundary for the project activity is in line with the EB guidance for large countries such as India. In line with the guidance provided in the “Tool to calculate the emission factor for an electricity system” /35/, the weights for OM and BM have been taken as 75:25. The combined margin emission coefficient for the NEWNE grid of India has been calculated at

0.90618 tCO<sub>2</sub>e/MWh and is fixed *ex ante* for the entire fixed crediting period. The CM emission factor value has been sourced from data by the Central Electricity Authority (CEA) of the Ministry of Power, Government of India. CEA has published a database of carbon dioxide emission factors for the power sector in India based on detailed authenticated information obtained from all operating power stations in the country /8/. This CO<sub>2</sub> baseline database provides information about the OM and BM factors of all the regional electricity grids in India. DNV confirms that the database is an official publication of the Government of India for the purpose of CDM baselines. The OM in the CEA database is calculated *ex-ante* using the simple OM approach based on the generation-weighted average emissions per electricity unit over a three year period of 2005-06, 2006-07 and 2007-08. BM is calculated *ex ante* based on the 20% most recent capacity additions in the NEWNE grid based on net generation for the year 2007-08 /8/. The operating margin has been determined to be 1.009 tCO<sub>2</sub>e/MWh and the build margin to be 0.5977 tCO<sub>2</sub>e/MWh. The selected sources and gases are justified for the project activity.

	GHGs involved	Description
Baseline emissions	CO <sub>2</sub>	The major emission source. The GHG emission reduction is achieved by displacing the electricity generated by fossil fuel based power plants in the NEW & NE grid of India.
Project emissions	No project emissions	NA
Leakage	No leakage	NA

#### 4.4 Additionality

The additionality of the project activity is demonstrated by applying the “Tool for demonstration and assessment of additionality”, version 5.2 /5/, and primarily through a financial analysis.

##### 4.4.1 Prior CDM consideration and continued action to secure CDM status

The start date of the project activity has been identified as 19 April 2007, which is the date of purchase order placed for the wind turbines of the project activity, and was evidenced from the purchase order document /7/. The project activity was commissioned in phases starting from 30 March 2009 and ending on 12 June 2009 /14/.

Prior CDM consideration: The CDM consideration for the project activity has been demonstrated from the following milestones.

- On 23 February 2007 project proponent signed CDM agreement with Enercon India Limited /30/.
- The Board of Directors of Roaring 40s Wind Farms (khandke) Private Limited approved the project activity during the meeting dated 19 March 2007 /10/. The decision has been taken based on the Detailed Project Report (DPR) which indicates that the project activity is financially attractive with CDM revenue. The detailed project report for the project activity dated 2 March 2007 /9/ has been verified. The relevance of the input parameters used in the financial analysis of the DPR is found to

be appropriate since the DPR has been prepared based on the final budgetary offer received from the WTG supplier /13/ dated 28 December 2006.

- CDM consideration for the project was also verified from the confirmation letter from HSBC bank (lender for the project activity) dated 26 May 2009 which states that Bank had considered the CDM revenue as a part of project cash flows /6/.

Continued action to secure CDM status:

- The PDD for the initial 50.4 MW project was webhosted for global stakeholder consultation process on 7 June 2007, within a period of less than 2 months from the starting date of the project activity, 19 April 2007.
- In view of the difficulty in getting the nodal agency clearance from MEDA, project proponent decided to implement the 50.4 MW project in three phases on 19 March 2007 /31/.
- The project proponent submitted PDD to DNA of India for letter of approval for phase I on 22 April 2008.
- On 05 May project proponent received the Nodal clearance for the phase II.
- The project proponent received letter of approval from DNA of India for phase I on 28 May 2008.
- The project proponent received letter of approval from DNA of India for phase II on 04 August 2008.
- The project proponent submitted PDD to DNA of India for letter of approval for phase III in Jan 2009.
- On 06 March 2009 PP was invited to give a presentation on project activity by DNA of India for Letter /33/.
- The project activity received the nodal agency clearance from MEDA on 02 June 2009 /32/.
- The PDD for Phase III was webhosted on 17 September 2009 for global stakeholder consultation.
- The project proponent received letter of approval from DNA of India for phase III on 12 November 2009 /2/.

Since there were no gaps of more than two years between actions to secure CDM status for the period between the project start date to the start of validation, the efforts to secure CDM status was considered sufficient.

#### ***4.4.2 Identification of alternatives to the project activity***

**Step 1:** Two alternatives to the project activity have been considered as the baseline scenario. These are i) the project activity without CDM benefits and ii) continuation of current scenario, in this case that an equivalent amount of electricity would, in the absence of the project activity, have been generated by the operation of grid connected power plants and by the addition of new generation sources. Both alternatives are in compliance with the laws and regulations of India and might be considered as baseline scenarios. However, as discussed below (section 4.4.3), the project without CDM benefits faces barriers in implementation.

#### ***4.4.3 Investment analysis: Choice of approach***

The project proponent has selected benchmark analysis for demonstrating additionality. The project generates revenues without CDM and the alternative of grid based electricity generation does not involve any investment on the part of the project proponent. Therefore the

selected benchmark analysis is considered suitable for demonstrating the additionality of the project.

#### **4.4.4 Investment analysis: Benchmark selection**

The benchmark applied by the project proponent at the time of decision making (for the initial 50.4 MW project) was the post tax 16% equity IRR as per the Maharashtra Electricity Regulatory Commission (MERC) of India to determine the tariff /16/ and has been verified by DNV from the detailed project report for the project activity /9/. In view of the EB guidelines via EB 40 paragraph 40 that this benchmark is applicable for tariff calculation and hence cannot be used as a benchmark for financial evaluation of project activity, the project participant has assessed the financial attractiveness of the project against a revised benchmark. Therefore, the PP has selected the lending rate of 12.5% applicable for the project activity as the benchmark, which is deemed conservative compared with the 16% used in the DPR. The applicable lending rate has been verified from the commercial lending rate of 12.5% quoted by HSBC (lender for the project activity), in the hedging agreement and actual loan payment sheet /25/ /26/. Further, the lending rate of HSBC (12.5%) was cross checked with the lending rate of the State Bank of India (12.75%) /36/, the largest public sector bank in India and the rate of HSBC is deemed conservative. Also the investment decision for the project activity was taken based on the DPR of 2 March 2007 /9/, which clearly discusses that the loan for the project activity will be provided by HSBC bank. It has been verified by DNV from confirmation letter provided by HSBC bank dated 26 May 2009 /6/ that the project activity was evaluated against applied benchmark of 12.5%.

Post tax internal rate of return of the project (IRR) has been chosen as the financial indicator and is compared against benchmark.

#### **4.4.5 Investment analysis: Input parameters**

The input parameters used in the financial analysis of the project activity has been sourced from the DPR developed by Roaring 40s Wind Farms (Khandke) Private Limited of 2 March 2007 /9/. The tariff used in the DPR has been sourced from the MERC tariff order of 24 November 2003 /16/. Prior to investment decision for the project activity, project proponent had invited the quotation from different wind turbine manufacturers and based on the final budgetary offer (final bid) from Enercon India limited dated 28 December 2006 /13/, the project proponent has prepared a DPR on 2 March 2007 /9/. The actual purchase order value matches the investment cost considered for the financial analysis. Given this short period of time between the preparation of DPR and the decision to proceed with the project activity, it is thus reasonable to assume that the DPR has been the basis of the decision to proceed with the investment in the project. DNV has compared the investment cost per MW, the percentage of operation and maintenance costs relative to total investment costs, the electricity tariff and the load factor considered in DPR against the final bid received from Enercon India Limited /7/ with values proposed by MERC in its tariff order dated 24 November 2003 /16/. The input values were found to be consistent.

The incentives from the Government of India for the renewable energy projects such as accelerated depreciation and tax holidays have been taken into consideration for the financial analysis, and income tax benefits due to accelerated depreciation has been considered in the financial analysis /34/. The following documents have been cross checked for confirming the figures used in the financial calculations:



- Final budgetary offer received from the Enercon India Limited (WTG Supplier) dated 28 December 2006 /13/ for investment cost.
- Detailed letter of intent (purchase order) placed on Enercon India Limited for investment cost, O&M costs dated 19 April 2007 /7/.
- Electricity tariff considered for the project activity against Maharashtra Electricity Regulation commission tariff order dated 24 November 2003 /16/.
- MEDA Infrastructure refund - the revenue spent in building infrastructure for power evacuation will be refunded by MEDA over a period of five years.
- Generation data provided by Enercon India Limited dated 14 February 2007 /12/ is compared against average PLF considered by Maharashtra Electricity Regulatory Commission (MERC) in its tariff order dated 24 November 2003 for group three projects (project commissioned after 2003) for the purpose of tariff working and application of electricity generation data from equipment supplier was found to be conservative and same has been applied while conducting investment analysis and has also been verified with letter from HSBC bank (lender for the project activity) dated 26 February 2010 that the bank had considered the plant load factor of 21.07% while conducting the due diligence for the project activity /38/.
- Income tax has been calculated at the rate of 30%, minimum alternate tax at the rate of 10%, surcharge of 10% and cess of 3%. All the taxes and incentives are confirmed to be applied correctly and as per the Indian Income Tax Act /34/. Straight line depreciation has been calculated in line with the prevailing national regulation and industrial practice.
- As per the Indian tax structure, interest on debt should be treated as an expense for computation of profit and tax payable thereon. Therefore for the purpose of tax computation the Project Proponent has considered the interest on debt as an expense which has been added back in the cash flow before computation of project IRR and is inline with the EB's guidance on investment analysis Para 11 /15/. DNV confirms that the actual interest rate has been applied to calculate tax and has been verified by DNV from the Hedging Agreement signed between project proponent and HSBC bank dated 5 July 2007 /25/ and actual loan payment sheet /26/. DNV has also checked the interest rate applied with lending rate of country largest public sector bank the State Bank of India (12.75%), and found it to be conservative /36/.

#### ***4.4.6 Investment analysis: Calculation and conclusion***

The IRR calculations & assumptions provided in a spreadsheet are consistent with the DPR of 2 March 2007 /9/. The calculations were verified and found to be in line with EB's guidance on investment analysis /15/. The assumptions used in the calculations are appropriate and have been verified by DNV. The project IRR of the project over 20 years is 8.87% without the income from CERs /17/. The project is therefore not financially attractive compared to the benchmark of 12.5% in the absence of CDM benefits. With CDM revenues, the project IRR improves to 12.68%, which is above the benchmark and thus makes the project feasible.

#### ***4.4.7 Investment analysis: Sensitivity analysis***

A sensitivity analysis has been carried out for parameters contributing to more than 20% to revenues or costs to check the robustness of the financial analysis. Reasonable variations of

the project cost, annual operation & maintenance costs, annual electricity generation and on-grid tariff were checked by calculating the variation necessary to reach the benchmark and then discussing the likelihood for that to happen.

**Increase in generation:** With an increase in generation by 25.55% (to 26.45% PLF) the project IRR touches the benchmark of 12.5% adopted by the project participant. The PLF of 21.07% considered in the financial analysis is based on the generation data provided by Enercon India Limited /12/ and has also verified with letter from HSBC bank (lender for the project activity) dated 26 February 2010 that the bank had considered the plant load factor of 21.07% while conducting due diligence for the project activity /38/. Moreover, the average PLF considered by Maharashtra Electricity Regulatory Commission (MERC) in its tariff order dated 24 November 2003 from group three projects (project commissioned after 2003) for the purposes of tariff working is only 20% /16/. The project activity is located in the district of Ahmednagar in Maharashtra where the observed historical PLF is 19.07% in the year 2004-05 /18/. However, maximum observed PLF in the area of project activity during the year 2004-05 is 19.62% /18/. Hence an increase of 25.55% in electricity generation to achieve a PLF of 26.45% is highly unlikely. Hence the PLF of 21.07% considered by the project participant for the IRR calculations is deemed reasonable.

**Decrease in O&M cost:** Even after 100% decrease in the O&M costs the IRR for the project activity is 10.63%, which is lower than the benchmark return. Hence this parameter has not been considered for the sensitivity analysis and this is deemed reasonable.

**Increase in electricity tariff:** The tariff considered for the project activity was based on Maharashtra Electricity Regulation Commission tariff order dated 24 November 2003 /16/. As per MERC tariff order electricity tariff is fixed at INR 3.50/kWh with annual escalation of INR 0.15/kWh and is valid only for 13 years. Thereafter, it is clearly stated in the tariff order that the tariff is subject to revision at the end of the period. Therefore, any assumption on the tariff applicable from 14<sup>th</sup> year onwards is uncertain.

### **Assessment of accuracy of assumptions taken after year 13**

In line with the CDM Executive Board guidance on investment analysis, the IRR analysis has been done for a time horizon of 20 years in the financial calculation sheet. There has been *no change* in the assumptions made for the IRR calculations except the tariff. The PPA is only for 13 years and hence the tariff of INR 2.34/kWh after 13<sup>th</sup> year has been used.

Electricity tariff after 13<sup>th</sup> year is estimated based on a "cost-plus" approach, i.e., based on the expected operating costs incurred in year 14 and return on equity. This is the approach followed by MERC /16/, in determining tariff and is justified as:

*"The commission notes that in cost plus approach, which the commission has adopted for tariff proposal, rate per unit charged by such projects during initial period of 10 years is bound to be higher as during this period the project has various debt related obligations. However it is essential that the consumer is able to enjoy the benefit of cheaper power once all debt related obligations are paid off and project has virtually no variable costs".* (Page no.14)

*"The rate payable gets reduced after 10 years (i.e. after repayment of loan) so that the net average cost of energy gets reduced".* (Page no.135)

*"To ensure that developer does not remove the machine after availing higher purchase rate for 10 years, an agreement may be signed allowing MSEB to have second charge for first 10 years (when the lender institution shall have first charge on the machine) and subsequently MSEB shall have first charge for the balance 10 years".* (Page no.141)

The above extracts from the tariff order of MERC /16/ indicate that the tariff will reduce after 13<sup>th</sup> year and even after considering base year tariff of INR 3.50/kWh without any annual escalation till 20 year the project IRR becomes 9.61% and is still well below the applied benchmark of 12.5% for the project activity. There has been no change in any of the assumptions while making the projections for 20 years except the tariff, the 'cost plus approach' adopted for determining the tariff from 14<sup>th</sup> year onwards is found reasonable. There has been no deviation from the accepted principles in making projections or computing IRR and that there are no arithmetical inaccuracies in the calculation of the Project IRR.

**Decrease in Investment cost:** With a decrease in investment cost by 20% the project IRR becomes 12.58% and thus exceeds the benchmark adopted by the project participant. However in DNV's opinion, a decrease of 20% in investment cost is deemed not realistic considering the fact that the project has been contracted on a turn key basis to Enercon India Limited by the project proponent Roaring 40s Wind Farms (Khandke) Private Limited and the actual project cost has been cross checked by DNV by reviewing the purchase order /7/. In DNV's opinion, the project cost is not likely to have any increase or decrease. In the worst case scenario, there can only be an escalation in the project cost (which decreases the IRR) and not a decrease. Hence this parameter has not been considered for the sensitivity analysis and this is deemed reasonable.

The above discussion establishes that the project activity is financially not viable without the benefits from CDM.

#### **4.4.8 Common Practice Analysis**

The state of Maharashtra has been considered for assessing the common practice. Since the policies and tariff regime are consistent throughout the state of Maharashtra; DNV considers the selection of the region is appropriate. Wind project capacity additions after March 2003 has been considered for the common practice analysis. In the state of Maharashtra, till the year 2002-03 the installation of wind based power projects were at peak due to sales tax benefits of INR 10 million per MW per year for a period of 5 years from the date of commissioning as per Maharashtra wind power policy 1998 /21/; whereas in order to make investment in wind attractive on a stand alone basis, MERC had withdrawn the sales tax benefits from wind power projects in March 2002. Hence it is deemed reasonable that wind power projects installed prior to March 2002 are not considered for common practice analysis.

At the time of investment decision of the proposed project, the total installed wind power capacity in Maharashtra was verified to be 1 001 MW /20/ and at the time of commissioning of the proposed project the installed capacity in Maharashtra was verified at 1 756.38 MW /20/. In the period 2003-2008 a total capacity of 1359.875 MW was added out of which 476 MW capacity was added from wind projects with capacity more than 15 MW size (comparable size), and this entire 476 MW capacity is under CDM pipeline and detailed spreadsheet with CDM links of all these projects has been verified by DNV /22/.

In conclusion, it is DNV's opinion that it has been correctly demonstrated that the project activity does not represent a common practice and thus the emission reductions achieved by the project are additional to any would happen in absence of the project.

## 4.5 Monitoring

The monitoring plan is in accordance with the monitoring methodology ACM0002, version 10 /3/. The monitoring plan will give opportunity for real measurement of emission reductions achieved. Since the project is a wind energy generation activity, no indicators have been defined regarding project emissions. Leakage accounting has not been considered for the project since the renewable energy technology equipment used is new equipment and not transferred from another activity.

Monitoring of sustainable development indicators is not required by the Indian DNA. There are no environmental impacts due to the project activity.

### 4.5.1 Parameters determined ex-ante

The combined margin emission coefficient for the NEWNE grid of India has been calculated at 0.90618 tCO<sub>2</sub>e/MWh and is fixed *ex-ante* for the entire crediting period. The CM emission factor value has been sourced from data by the Central Electricity Authority (CEA) of the Ministry of Power, Government of India. CEA has published a database of carbon dioxide emission factors for the power sector in India based on detailed authenticated information obtained from all operating power stations in the country /8/. This CO<sub>2</sub> baseline database provides information about the OM and BM factors of all the regional electricity grids in India, which has been established as per the *Tool to calculate the emission factor for an electricity system* /35/. DNV confirms that the database is an official publication of the Government of India for the purpose of CDM baselines and the OM in the CEA database is calculated *ex-ante* using the simple OM approach based on the generation-weighted average emissions per electricity unit over a three year period of 2005-06, 2006-07 and 2007-08 /8/. BM is calculated *ex-ante* based on the 20% most recent capacity additions in the grid based on net generation for the year 2007-08 /3/. The operating margin has been determined to be 1.009 tCO<sub>2</sub>e/MWh and the build margin to be 0.5977 tCO<sub>2</sub>e/MWh /8/.

### 4.5.2 Parameters monitored ex-post

The net electricity supplied to the grid by the project to the integrated NEWNE grid will be monitored continuously. The net electricity exported to the grid will be reported on monthly basis and cross-checked with the electricity sales receipt. All data will be archived for 2 years after the crediting period. Since the project involves electricity generation from wind sources, no monitoring is required for project emissions or leakages due to the project activity.

### 4.5.3 Management system and quality assurance

The responsibility of overall project management lies with Roaring 40s Wind Farms (Khandke) Private Limited. The project operation and maintenance is outsourced to Enercon India Limited. The main and check meters at the uploading station are two way meters with an accuracy class of 0.5% and are in custody of State Electricity Board. The readings in these meters are taken by State Electricity Board officials and used for billing purposes. These meters are periodically tested and calibrated by officials of State Electricity Board. The monthly electricity sales receipts will also be archived until 2 years after the crediting period to facilitate cross-checking during the crediting period.

## 4.6 Estimate of GHG Emissions

The GHG emission calculations are well documented in line with the consolidated baseline and monitoring methodology ACM0002, version 10 /3/. The project is electricity generation from the wind power and no project emissions and leakage is associated with the project

activity. As the project activity supplies electricity to the NEWNE integrated electricity grid, the baseline emissions have been estimated based on net electricity supplied to the grid by the project activity and the combined margin emission factor of NEWNE integrated grid. In line with the guidance provided in the *Tool to calculate the emission factor for an electricity system* /35/, the weights for OM and BM have been taken as 75:25. The CM for the NEWNE integrated grid of India has been calculated at 0.90618 t CO<sub>2</sub>e/MWh in section 4.5.1 and is fixed *ex-ante* for the entire fixed crediting period. The project activity is expected to displace 26 578 MWh of electricity from the NEWNE regional grid of India, resulting in emission reductions of 24 085 tCO<sub>2</sub> per year during the fixed crediting period.

The baseline emission estimates can be replicated using the data and parameter values provided in the PDD. The data sources mentioned have been verified by DNV. The calculations are transparently documented and verified to be correct.

#### **4.7 Environmental Impacts**

As per the Ministry of Environment and Forests (MoEF), India Environment Impact Notification S.O. 1533 dated 14 September 2006 /33/, wind power projects are not covered under any Schedule and thus Environmental Impact Assessment is not required for the project activity. However, Enercon India Limited, the equipment supplier and operation and maintenance contractor for the wind farm has voluntarily conducted a rapid environmental impact assessment study for the wind power project in the project activity area. Enercon India Limited has appointed Care Sustainability to conduct rapid environmental impact assessment study for the wind power project to assess the impact of the project on the local environment /11/. The project is not likely to create any adverse environmental effects /11/. The project complies with environmental regulations in India. A detailed description of rapid environmental impact assessment study has been sufficiently discussed in PDD.

#### **4.8 Comments by Local Stakeholders**

The local stakeholders were invited through local newspaper advertisement in *Sarvmat* on 29 October 2006 /23/ by Enercon India Limited, the equipment supplier and operation and maintenance contractor for the project activity. Enercon India Limited has also conducted a local stakeholder meeting in Ahmednagar District on 15 November 2006 for the 50.4 MW project of the project proponent /24/. The authorities of the local administration, local communities, farmers, officials of Gram Panchayat and contractors were invited to comment on the project activity. A detailed description of stakeholder consultation has been provided in Appendix 2 of PDD.

The questions raised during the stakeholder consultation showed that the proposed project received support from the local people. DNV considers the local stakeholder consultation carried out adequately.

#### **4.9 Comments by Parties, Stakeholders and NGOs**

The PDD of 10 September 2009 was made publicly available on UNFCCC website<sup>1</sup> and Parties, stakeholders and NGOs were invited to provide comments through the CDM website during a 30 days period from 18 September 2009 to 17 October 2009. No comments were received during this period.

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<sup>1</sup> <http://cdm.unfccc.int/Projects/Validation/DB/2VGWPQ65PPNLTTPHXXM0W1Q8PGB0XQ/view.html>

## **APPENDIX A**

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### **CDM VALIDATION PROTOCOL**

**Table 1 Mandatory Requirement for Clean Development Mechanism (CDM) Project Activities**

Requirement	Reference	Conclusion
<b>About Parties</b>		
1. The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3.	Kyoto Protocol Art.12.2	NA
2. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC.	Kyoto Protocol Art.12.2.	OK
3. The project shall have the written approval of voluntary participation from the designated national authority of each Party involved.	Kyoto Protocol Art. 12.5a, CDM Modalities and Procedures §40a	<del>CAR-1</del> OK
4. The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof.	Kyoto Protocol Art. 12.2, CDM Modalities and Procedures §40a	<del>CAR-1</del> OK
5. In case public funding from Parties included in Annex I is used for the project activity, these Parties shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties.	Decision 17/CP.7, CDM Modalities and Procedures Appendix B, § 2	OK
6. Parties participating in the CDM shall designate a national authority for the CDM.	CDM Modalities and Procedures §29	OK
7. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol.	CDM Modalities §30/31a	OK
8. The participating Annex I Party's assigned amount shall have been calculated and recorded.	CDM Modalities and Procedures §31b	NA
9. The participating Annex I Party shall have in place a national system for estimating GHG emissions and a national registry in accordance	CDM Modalities and Procedures §31b	NA

Requirement	Reference	Conclusion
with Kyoto Protocol Article 5 and 7.		
<b>About additionality</b>		
10. Reduction in GHG emissions shall be additional to any that would occur in the absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	<del>CL-3</del> <del>CL-4</del> OK
<b>About forecast emission reductions and environmental impacts</b>		
11. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.	Kyoto Protocol Art. 12.5b	OK
<b>For large-scale projects only</b>		
12. Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	CDM Modalities and Procedures §37c	OK
<b>About stakeholder involvement</b>		
13. Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received.	CDM Modalities and Procedures §37b	OK
14. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available.	CDM Modalities and Procedures §40	The PDD of version 01 dated 10 September 2009 was made publicly available on UNFCCC website and Parties, stakeholders and NGOs were through the CDM



Requirement	Reference	Conclusion
		website invited to provide comments during a 30 days period from 18 September 2009 to 17 September 2009. No comments were received during this period.
<b>Other</b>		
15. The baseline and monitoring methodology shall be previously approved by the CDM Executive Board.	CDM Modalities and Procedures §37e	OK
16. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances.	CDM Modalities and Procedures §45c,d	OK
17. The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure.	CDM Modalities and Procedures §47	OK
18. The project design document shall be in conformance with the UNFCCC CDM-PDD format.	CDM Modalities and Procedures Appendix B, EB Decision	OK
19. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP.	CDM Modalities and Procedures §37f	OK

**Table 2 Requirements Checklist**

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<b>A. General Description of Project Activity</b> <i>The project design is assessed.</i>					
<b>A.1. Project Boundaries</b> <i>Project Boundaries are the limits and borders defining the GHG emission reduction project.</i>					
A.1.1. Are the project's spatial boundaries (geographical) clearly defined?	/1/	DR/I	The project activity sites are located at Mathani, Ranjani, Baradari, Sonewadi, Sarolabaddi and Madadgaon villages in Khandke Taluka of Ahmednagar District of Maharashtra state in India.  The name of the village shall be clearly indicated against the WEG number in the PDD. The PP is also requested to rectify the number of WEGs as mentioned in Annex-4 of the PDD as it does not match with rest of the PDD.	CL-1	OK
A.1.2. Are the project's system boundaries (components and facilities used to mitigate GHGs) clearly defined?	/1/ /7/ /9/	DR	The projects system boundaries include the 14.4 MW wind power project comprising of 18 numbers of Wind Energy Generators (WEG) of Enercon make, each of 800 kW capacity, the metering, switchgear, transformers etc and the western regional electricity grid to which the plant is connected.		OK
<b>A.2. Participation Requirements</b> <i>Referring to Part A, Annex 1 and 2 of the PDD as well as the CDM glossary with respect to the terms Party, Letter of Approval, Authorization and Project</i>					

\* MoV = Means of Verification, DR= Document Review, I= Interview  
 CDM Validation Protocol – Report No.2009-0329, rev. 02

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<i>Participant.</i>					
A.2.1. Which Parties and project participants are participating in the project?	/1/ /2/	DR/I	India is the host Party in the project activity and the project participant is Roaring 40s Wind Farms (Khandke) Private Limited.  It needs to be clarified as to whether Tata Power (mentioned in the section B.5 of the PDD) and Enercon are project participants in the project activity.  No Annex-1 Party project participant has been identified as yet.	<del>CL-2</del>	OK
A.2.2. Have all involved Parties provided a valid and complete letter of approval and have all private/public project participants been authorized by an involved Party?	/1/ /2/	DR	Host Country Approval letter needs to be provided for verification.	<del>CAR-1</del>	OK
A.2.3. Do all participating Parties fulfil the participation requirements as follows: - Ratification of the Kyoto Protocol - Voluntary participation - Designated a National Authority	/1/ /2/	DR	India fulfils the participation requirements, having ratified the Kyoto Protocol on the 26 August 2002 and has established a DNA - National Clean development Mechanism Authority, Ministry of Environment and Forests (MoEF).  The voluntary participation of the project needs to be confirmed against the letter of approval from the DNA	<del>CAR-1</del>	OK
A.2.4. Potential public funding for the project from Parties in Annex I shall not be a diversion of official development assistance.	/1/	DR/I	The project does not involve any public funding and hence no diversion of funds from official development assistance is expected.		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<b>A.3. Technology to be employed</b> <i>Validation of project technology focuses on the project engineering, choice of technology and competence/ maintenance needs. The validator should ensure that environmentally safe and sound technology and know-how is used.</i>					
A.3.1. Does the project design engineering reflect current good practices?	/1/ /7/ /9/	DR/I	The WEGs installed under the project has been designed and commissioned by Enercon India Limited. The salient features of the E-48 models implemented under the project activity include gearless construction, variable speed and pitch functions and independent braking technology. The project design thus reflects current good practice.		OK
A.3.2. Does the project use state of the art technology or would the technology result in a significantly better performance than any commonly used technologies in the host country?	/1/ /7/	DR/I	The technology is already available and widely used in the host country.		OK
A.3.3. Does the project make provisions for meeting training and maintenance needs?	/1/	DR/I	Since the project operation and maintenance are contracted to Enercon, the suppliers of the machines, no special training needs are anticipated.		OK
<b>A.4. Contribution to Sustainable Development</b> <i>The project's contribution to sustainable development is assessed.</i>					
A.4.1. Has the host country confirmed that the project assists it in achieving sustainable development?	/1/ /2/	DR	The letter of approval from the DNA confirming that the project assists in achieving sustainable development needs to	<del>CAR-1</del>	OK

\* MoV = Means of Verification, DR= Document Review, I= Interview  
 CDM Validation Protocol – Report No.2009-0329, rev. 02

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			be submitted.		
A.4.2. Will the project create other environmental or social benefits than GHG emission reductions?	/1/	DR	The project will help to decrease the dependence on fossil fuels for power generation. The project activity will create employment opportunities during construction and also operation phases.		OK
<b>B. Project Baseline</b> <i>The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.</i>					
<b>B.1. Baseline Methodology</b> <i>It is assessed whether the project applies an appropriate baseline methodology.</i>					
B.1.1. Does the project apply an approved methodology and the correct version thereof?	/1/ /3/	DR	Yes. The approved methodology – ACM0002 Version 10 - “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” has been applied.		OK
B.1.2. Are the applicability criteria in the baseline methodology all fulfilled?	/1/ /3/ /4/	DR/I	Yes, the project activity meets the applicability criteria of ACM0002 and is justified as under : <ul style="list-style-type: none"> <li>The project activity involves grid connected electricity generation using renewable source (wind based) and provides power to the MSETCL grid.</li> <li>The geographic and system boundaries</li> </ul>		OK

\* MoV = Means of Verification, DR= Document Review, I= Interview  
CDM Validation Protocol – Report No.2009-0329, rev. 02

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			for the relevant electricity grid have been clearly identified to be the Western electricity grid of India.  The project activity will displace fossil fuel based power generation that would otherwise have been generated in the MSETCL grid by already connected power plants or by new capacity additions in the grid.		
<b>B.2. Baseline Scenario Determination</b> <i>The choice of the baseline scenario will be validated with focus on whether the baseline is a likely scenario, and whether the methodology to define the baseline scenario has been followed in a complete and transparent manner.</i>					
B.2.1. What is the baseline scenario?	/1/ 3/ /4/	DR	The baseline scenario is that in the absence of the project activity, equivalent amount of energy would have been generated from the existing grid connected plants or newer plants by using fossil fuels in the western grid to which the project activity is connected.		OK
B.2.2. What other alternative scenarios have been considered and why is the selected scenario the most likely one?	/1/ /3/ /4/ /8/	DR/I	No other alternatives have been considered as the methodology states that for renewable power projects the baseline is "Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity	CAR-2	OK

\* MoV = Means of Verification, DR= Document Review, I= Interview  
CDM Validation Protocol – Report No.2009-0329, rev. 02

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			system. It needs to be justified as to why the alternative of fossil fuel based power plant or a hydro is not a feasible alternative and how /why this alternative selected in the additionality step 1a has been eliminated.		
B.2.3. Has the baseline scenario been determined according to the methodology?	/1/ /3/ /4/ /8/	DR	The baseline selection is not as per the methodology. Please refer to B.2.2  As per the methodology, the baseline should be equivalent amount of electricity generation from existing and future grid connected power plants. As the project activity exports power to the western regional grid, the emission factor of the western regional grid has been considered and sourced from the official published CEA website.	<del>CAR-2</del>	OK
B.2.4. Has the baseline scenario been determined using conservative assumptions where possible?	/1/	DR	Yes.		OK
B.2.5. Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/	DR	Yes, national and sectoral policies have been taken into consideration for selecting the baseline scenario.		OK
B.2.6. Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/ /8/	DR	Yes.		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.2.7. Have the major risks to the baseline been identified?	/1/	DR	There are no major risks perceived to the proposed baseline.		OK
<b>B.3. Additionality Determination</b> <i>The assessment of additionality will be validated with focus on whether the project itself is not a likely baseline scenario.</i>					
B.3.1. Is the project additionality assessed according to the methodology?	/1/	DR/I	Yes, the project’s additionality is demonstrated using “Tool for the demonstration and assessment of additionality”, version 5. <b>Step 1a:</b> Three alternatives to the project activity have been considered. These are i) project not undertaken as a CDM project activity ii) Setting up of equivalent capacity of fossil fuel or hydro power based plants and supply electricity to the Maharashtra grid and ii) continuation of current scenario without the project activity. While the three alternatives have been given and it is stated that all three are in compliance with the regulation, it needs to be justified as to why the alternative of fossil fuel/hydro has not been considered further and how it has been eliminated. <b>Step 1b:</b> All the alternatives are in compliance with the laws and regulations of India. The alternatives have not been discussed	CAR-2	OK
	/4/				
	/5/				
	/6/				
	/7/				
	/9/				
	/10/				
	/12/				
	/13/				
	/14/				
	/15/				
	/16/				
	/17/				
	/18/				
	/19/				
	/20/				
	/21/				
	/22/			CAR-2	OK
/25/					
/26/					
/27/					

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
	/29/ /34/ /35/ /36/ /38/		<p>further to arrive at the baseline scenario. The baseline scenario needs to be clearly brought out with proper justification.</p> <p><b>Step 2:</b> Investment analysis: To demonstrate the additionality of the project, PP has chosen Option III – benchmark analysis. The benchmark chosen is the 12.5% post tax project IRR, since the interest rate applicable to the project activity is 12.5%. The project IRR of the project activity without CDM revenues is 10.69% which is lower than the benchmark selected. The IRR improves to 13.31 % with CDM revenues.</p> <p>A sensitivity analysis has been conducted for 10% variations in PLF, which shows that IRR is not crossed.</p> <p>However, PP is requested to justify the reasonableness of the benchmark selected and provide proof for the interest rate applicable to the project.</p> <p>The spread sheets for IRR and sensitivity analysis need to be provided for verification. Proof for project cost, O&amp;M costs and interest rate on loans needs to be provided. Further, sensitivity analysis needs to be done for investment and O&amp;M costs also. It also</p>	<p><del>CL3</del></p> <p><del>CL4</del></p>	<p>OK</p> <p>OK</p>

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			<p>needs to be demonstrated at what point of variation the project IRR crosses the benchmark and why this is not plausible.</p> <p>While PP has taken the PLF of 20%, as per MERC order, it needs to be justified why it cannot be higher. The PP is requested to provide the PLF guaranteed by Enercon and the microsites details for the project.</p> <p>To conclude on the additionality, the following details are also requested:</p> <ul style="list-style-type: none"> <li>• Whether any incentives are offered by the Government of Maharashtra for wind power generation? Have these been considered in the financial analysis?</li> <li>• Copy of PPA to be furnished.</li> <li>• All statutory clearances need to be provided for verification.</li> <li>• Salvage value of the machines at the end of life to be considered in financials.</li> </ul> <p>The PP is further requested to note that since the decision to implement the project was based on information available before the start of the project activity, purchase orders, O&amp;M, PPA was not available at the time of decision making. Thus these documents cannot be considered as the basis for the financial analysis. The project proponent is requested to provide the basis documents for</p>		

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			<p>the financial analysis that were available at the time of the investment decision.</p> <p><b>Step 3:</b> This step has not been selected</p> <p><b>Step 4:</b> Common practice analysis:</p> <p>It has been demonstrated that as per the data the energy generation by wind power plants in 2004-05 was 495.36 GWh as against the total generation of 82075.33 GWh. This works out to be around 0.6% and cannot be considered as a common practice scenario in the region. Apart from this, it has been demonstrated that as on 31 March 2005 of the total capacity of 13368.59 MW, only 411.2 MW is wind power projects in Maharashtra.</p> <p>The common practice analysis provided at present is generic. It should include all the projects of similar capacity in Ahmednagar area, number of projects registered under CDM or in the process of validation and a justification as to how the project activity is different from the other non CDM projects that are operating in the region. Further, step 4b of additionality tool needs be described in the PDD.</p>	CL-5	OK
B.3.2. Are all assumptions stated in a transparent and conservative manner?	/1/ /3/ /4/	DR	Please refer to B.3.1	CL-3 CL-4 CL-5	OK
B.3.3. Is sufficient evidence provided to support the	/1/	DR	Please refer to B.3.1	CL-3	OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
relevance of the arguments made?	/3/ /4/			<del>CL-4</del> <del>CL-5</del>	
B.3.4. If the starting date of the project activity is before the date of validation, has sufficient evidence been provided that the incentive from the CDM was seriously considered in the decision to proceed with the project activity?	/1/ /4/ /6/ /7/ /9/ /10/	DR	The starting date of the project activity is stated as 19 April 2007, date of placement of purchase order for WEGs.  The project proponent is requested to provide evidence for the starting date. Since the start date is before the date of validation, serious consideration of incentives from CDM is to be demonstrated by the board note etc. Chronological order of events from the conceptualization of the project activity till approaching the DOE for validation along with reasons for delay need to be provided with supporting evidence. The chronological order also needs to be described under section B.5 of PDD.	<del>CL-6</del>	OK
<b>B.4. Calculation of GHG Emission Reductions – Project emissions</b>  <i>It is assessed whether the project emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i>					
B.4.1. Are the <b>calculations documented</b> according to the approved methodology and in a complete and transparent manner?	/1/ /3/ /4/	DR	No project emissions are likely as this is a wind energy power project.		OK
<b>B.5. Calculation of GHG Emission Reductions – Baseline emissions</b>					

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<i>It is assessed whether the baseline emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i>					
B.5.1. Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /6/ /9/ /12/ /13/ /38/	DR/I	Baseline emissions have been estimated as the product of electricity generated in the project activity per year and grid emission factor of the western regional grid, which has been obtained from the official website of the Central Electricity Authority (CEA) The installed capacity of project plant is 14.4 MW and the plant is expected to export an average of 26.578 GWh electricity to the grid per year at a PLF of 21.07%.		OK
B.5.2. Have conservative assumptions been used when calculating the baseline emissions?	/1/ /3/ /4/ /8/	DR	Yes. The selected baseline is in accordance with the baseline methodology ACM0002. The baseline is transparent and the choice of emission factor of the current generation mix used for estimation of emission coefficient is conservative.  It is clearly mentioned in the PDD that, the baseline estimation will consider an <i>ex-ante</i> emission factor throughout the crediting period. Hence, monitoring of OM and BM is not required.		OK
B.5.3. Are uncertainties in the baseline emission estimates properly addressed?	/1/ /8/	DR	Since the emission factors have been selected from authentic sources, there are no uncertainties in the baseline emission estimates.		OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<b>B.6. Calculation of GHG Emission Reductions – Leakage</b> <i>It is assessed whether leakage emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i>					
B.6.1. Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /3/ /4/	DR	No leakages are to be considered as this is a wind energy power project.		OK
<b>B.7. Emission Reductions</b> <i>The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.</i>					
B.7.1. Are the emission reductions real, measurable and give long-term benefits related to the mitigation of climate change.	/1/ /3/ /4/	DR	The project activity, on implementation as stated, is expected to result in emission reduction of 24 085 tCO <sub>2</sub> e annually through out the 10 year fixed crediting period.		OK
<b>B.8. Monitoring Methodology</b> <i>It is assessed whether the project applies an appropriate monitoring methodology.</i>					
B.8.1. Is the monitoring plan documented according to the approved methodology and in a complete and transparent manner?	/1/ /3/	DR	Yes, the monitoring plan is in accordance with the approved baseline methodology.		OK
B.8.2. Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later?	/1/ /3/	DR	PDD does not mention about the period for which the monitored data will be archived. The same may be added in the monitoring plan.	<del>CAR-3</del>	OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<b>B.9. Monitoring of Project Emissions</b> <i>It is established whether the monitoring plan provides for reliable and complete project emission data over time.</i>					
B.9.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for estimation or measuring the greenhouse gas emissions within the project boundary during the crediting period?	/1/ /3/ /4/	DR	No project emissions are likely as this is a wind energy power project.		OK
<b>B.10. Monitoring of Baseline Emissions</b> <i>It is established whether the monitoring plan provides for reliable and complete baseline emission data over time.</i>					
B.10.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining baseline emissions during the crediting period?	/1/ /3/ /4/	DR	For baseline calculations, net electricity supplied to the western regional grid by the project activity will be monitored by dedicated electricity meters. The power generated is recorded by meters and same will be documented.  As the baseline emission factor is fixed <i>ex-ante</i> , monitoring of the baseline emission factor is not necessary.		OK
B.10.2. Are the choices of baseline GHG indicators reasonable and conservative?	/1/ /3/	DR	Yes, the choice of baseline GHG indicator of CO <sub>2</sub> is reasonable.		OK
B.10.3. Is the measurement method clearly stated for each baseline indicator to be monitored and also deemed appropriate?	/1/ 3/ /4/	DR	As per section B.7.1 the project proponent will use one main meter and one check meter to monitor the net electricity exported to the grid. However Annex-4 of the PDD mentions	CL-7	OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			that the project will be connected to two evacuation bays and each bay will have one main meter and one check meter. The PP is thus requested to clarify the actual number of meters that will be used for monitoring the electricity exported from the project.		
B.10.4. Is the measurement <i>equipment</i> described and deemed appropriate?	/1/ /3/	DR	Yes, trivector electronic meters will be used for monitoring the electricity exported by the project.		OK
B.10.5. Is the measurement <i>accuracy</i> addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?	/1/ /3/ /4/	DR	Yes, all main and check meters will have 0.5% accuracy.		OK
B.10.6. Is the measurement <i>interval</i> for baseline data identified and deemed appropriate?	/1/	DR	Yes, The measurement interval is mentioned as once in a month, kWh reading will be recorded and document will be maintained.		OK
B.10.7. Is the registration, <i>monitoring, measurement</i> and <i>reporting</i> procedure defined?	/1/	DR	Yes		OK
B.10.8. Are procedures identified for <i>maintenance</i> of monitoring equipment and installations? Are the calibration intervals being observed?	/1/	DR/I	Maintenance procedures for the monitoring equipments and the installation have been addressed in the PDD.  Yes, the meters will be calibrated periodically, if there is any difference between the main and check meter readings.		OK
B.10.9. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	/1/	DR/I	Procedures for day-to-day record handling including type of records to be stored, the storage area, etc need to be established.	<del>CAR-3</del>	OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<b>B.11. Monitoring of Leakage</b> <i>It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.</i>					
B.11.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining leakage?	/1/ /3/ /4/	DR	No leakages are to be considered as this is a wind energy power project.		OK
<b>B.12. Monitoring of Sustainable Development Indicators/ Environmental Impacts</b> <i>It is assessed whether choices of indicators are reasonable and complete to monitor sustainable performance over time.</i>					
B.12.1. Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country?	/1/ /2/	DR	The monitoring of sustainable development indicators is not warranted by the legislation of India.		OK
B.12.2. Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/ /2/	DR	This is not required as per the legislation and hence not applicable.		OK
B.12.3. Are the sustainable development indicators in line with stated national priorities in the Host Country?	/1/ /2/	DR	This is not required as per the legislation and hence not applicable.		OK
<b>B.13. Project Management Planning</b> <i>It is checked that project implementation is properly prepared for and that critical arrangements are addressed.</i>					

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.13.1. Is the authority and responsibility of overall project management clearly described?	/1/	DR/I	As per PDD, the authority and responsibility of the project management is entirely with Enercon. There is no role for the project proponent, which does not appear to be a logical. The project proponent is requested to clarify the project management and the PP's role in the same.	<del>CL-8</del>	OK
B.13.2. Are procedures identified for training of monitoring personnel?	/1/	DR/I	The operation and maintenance of the project activity is contracted to Enercon, who are the suppliers of the machines, by the project proponent. Hence training needs are not anticipated. Copy of the contract between PP and Enercon need to be provided.	<del>CL-8</del>	OK
B.13.3. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/1/ /3/	DR/I	No emergencies related to unintended emissions are expected from a wind mills. Therefore procedures for emergency preparedness are not required.		OK
B.13.4. Are procedures identified for review of reported results/data?	/1/	DR	Yes.		OK
B.13.5. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	/1/	DR	Please refer to B.13.1		OK
<b>C. Duration of the Project/ Crediting Period</b> <i>It is assessed whether the temporary boundaries of the project are clearly defined.</i>					

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
C.1.1. Are the project's starting date and operational lifetime clearly defined and evidenced?	/1/ /7/ /9/	DR	The start date of the project activity has been defined as 19 April 2007 and operational lifetime cycle is 20 years. Documentary evidence for the project starting date needs to be provided.	<del>CL-6</del>	OK
C.1.2. Is the start of the crediting period clearly defined and reasonable?	/1/	DR	The project has selected a fixed crediting period of 10 years with the start date of the crediting period being 31 December 2010. As the crediting period cannot start before the registration of the project activity, the start date of the crediting period needs to be revised.	<del>CAR-4</del>	OK
<b>D. Environmental Impacts</b> <i>Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the validator.</i>					
D.1.1. Has an analysis of the environmental impacts of the project activity been sufficiently described?	/1/ /11/ /37/	DR	While Indian legislation does not warrant an EIA to be done for this type of project activity, the PDD sufficiently describes the possible impacts during construction & operation.		OK
D.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	/1/ /11/ /37/	DR	No, EIA is not needed for this project.		OK
D.1.3. Will the project create any adverse environmental effects?	/1/ /11/	DR	As, it is a wind farm project, the impacts are expected to be minimal.		OK
D.1.4. Are transboundary environmental impacts	/1/	DR	No trans-boundary environmental impacts		OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
considered in the analysis?			are expected from this project activity.		
D.1.5. Have identified environmental impacts been addressed in the project design?	/1/ /11/	DR	No negative environmental impacts have been identified.		OK
D.1.6. Does the project comply with environmental legislation in the host country?	/1/	DR	No specific environmental clearances are required for wind farm projects in India.		OK
<b>E. Stakeholder Comments</b> <i>The validator should ensure that stakeholder comments have been invited with appropriate media and that due account has been taken of any comments received.</i>					
E.1.1. Have relevant stakeholders been consulted?	/1/ /23/ /24/ /28/	DR/I	All relevant stakeholders were invited for the meeting conducted on 15 November 2006.		OK
E.1.2. Have appropriate media been used to invite comments by local stakeholders?	/1/ /23/ /24/	DR/I	An advertisement was placed in a local news paper <i>Sarvmat</i> inviting the stakeholders and a meeting of the local representatives was conducted on 15 November 2006. Copy of the advertisement needs to be provided.	<del>CL-9</del>	OK
E.1.3. If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?	/1/ /37/	DR	Not specifically required for wind farm projects under host country legislation.		OK
E.1.4. Is a summary of the stakeholder comments received provided?	/1/	DR	Yes. A minute of the meeting is included in the PDD.		OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
E.1.5. Has due account been taken of any stakeholder comments received?	/1/	DR	No adverse comments were received from local stakeholders.		OK

**Table 2b: Additional requirements checklist for VVM version 1 (EB 44)**

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<b>A.6. Letter of approval</b>					
A.6.1. Is the LoA received directly from the DNA or through the project participant.	/1/ /39/	DR/I	The LOA has been provided by the project participant. However, it has been validated from the CDM India website ( <a href="http://cdmindia.nic.in/cdmindia/projectList.jsp?search=search">http://cdmindia.nic.in/cdmindia/projectList.jsp?search=search</a> ) that the project has indeed been approved by the DNA of India.		OK
<b>A.7. Project design</b>					
A.7.1. Does the PDD describe the CDM project activity with all relevant elements in a transparent and accurate way?	/1/	DR/I	Yes, the project description in the PDD is transparent.		OK
A.7.2. Has the CDM project activity at the start of the validation been constructed or does the CDM project activity use existing facilities or equipment?	/1/ /4/ /	DR/I	The project activity was under construction at the time of the start of the validation.		OK
A.7.3. Is the project a large scale project, a small scale project with average annual emission reductions above 15 000 tonnes or a bundled small scale project? Has on-site visit been carried out?	/1/ /4/	DR/I	The project is a large scale project with average annual emission reductions above 15000 tonnes CO <sub>2</sub> e. Site visit has been carried out at the actual project location.		OK
A.7.4. Does the project activity involved alteration of existing installations? If so, have the differences between pre-project and post-project activity been clearly described in the PDD?	/1/	DR/I	The project activity is new installation and does not involve any alteration to any existing facility.		OK
<b>A.8. Project emissions not addressed by the methodology</b>					
A.8.1. Does the methodology describe all project emission source for the project activity that contributes all 1%	/1/ /4/	DR/I	The project being a wind energy generation activity, there are no emissions from the		OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
of the emission reductions? Sources that the methodology considers not to take into account are not relevant (e.g. cement and iron consumption for building hydropower plants).			project activity.		
<b>A.9. Documentation of baseline emissions</b>					
<b>A.9.1 Documentation of the baseline determination:</b> <ol style="list-style-type: none"> <li>All assumptions and data used by the project participants are listed in the PDD and related document to be submitted for registration. The data are properly referenced.</li> <li>All documentation is relevant as well as correctly quoted and interpreted.</li> <li>Assumptions and data can be deemed reasonable</li> <li>Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD.</li> <li>The methodology has been correctly applied to identify what would occurred in the absence of the proposed CDM project activity.</li> </ol>	/1/	DR/I	<p>All assumptions used in the PDD are correctly quoted and the supporting documents have been properly interpreted.</p> <p>The assumptions regarding the PLF, project cost, O&amp;M cost and electricity tariff are deemed reasonable</p> <p>The methodology has been correctly applied in the context of the project activity.</p> <p>National policies regarding benefits allowable to renewable energy projects have been considered and listed in the PDD.</p>		OK
<b>A.10. Documentation of the calculations</b>					
<b>A.10.1 Algorithms and/or formulae used to determine emission reductions</b> <ul style="list-style-type: none"> <li>All assumptions and data used by the project participants are listed in the PDD and related document submitted for registration. The data are properly referenced</li> <li>All documentation is correctly quoted and interpreted.</li> <li>All values used can be deemed reasonable in the context</li> </ul>	/1/	DR/I	All formulae and data used in calculating the emission reductions have been correctly referred and the emission reductions have been calculated in accordance with the methodology.		OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
of the project activity The methodology has been correctly applied to calculate the emission reductions and this can be replicated by the data provided in the PDD and supporting files to be submitted for registration.					
<b>A.11. Implementation of the monitoring plan</b>					
A.11.1. How were the plans for implementation of the monitoring plan, data management, QA/QC procedures assessed? To what extent can the emission reductions achieved by the project be monitored ex-post and verified later by a DOE?	/1/	DR/I	The monitoring plan described in the PDD is sufficient for accurate reporting and verification of the emission reductions from the project. The electricity generation will be cross-checked from the electricity bills as per the QA/QC procedures. The suitability of the monitoring plan has been assessed through physical verification of the monitoring system on-site.		OK
<b>A.12. CDM consideration prior to starting date</b>					
A.12.1. The prior consideration of CDM for the project activity complies with EB41 annex 46	/1/	DR/I	Yes. It has been demonstrated that the project proponent had prior knowledge of CDM and real and continuous actions were taken for ensuring CDM benefits.		OK



**Table 3 Resolution of Corrective Action and Clarification Requests**

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
<b>CAR 1:</b> The Host country approval from the DNA confirming that the project assists in achieving sustainable development needs to be submitted.	A.2.2 A.2.3 A.4.1	Host Country Approval has been provided to the validator.	OK. The Letter of Approval from DNA of India dated 12 November 2009, has been verified by DNV. CAR 1 is closed.
<b>CAR 2:</b> While the three alternatives have been given and it is stated that all three are in compliance with the regulation, it needs to be justified as to why the alternative of fossil fuel based power plant or a hydro is not a feasible alternative and how / why this alternative selected in the additionality step 1a has been eliminated.	B.2.2 B.3.1	<p>The additionality tool version 5.2, step 2, “determine whether the proposed project activity is not the most economically and financially attractive”.</p> <p>As per sub-step 2b of the additionality tools, the appropriate analysis method can be either investment comparison analysis (wherein IRRs of all the alternatives are compared) or benchmark analysis wherein the IRR is compared to an appropriate benchmark financial indicator. Sub-step 2c states that, if the CDM project activity has a less favorable indicator (e.g. lower IRR) than the benchmark, then the CDM project activity cannot be considered as financially attractive.</p> <p>Further in accordance with VVM, the baseline as per applied methodology ACM0002 is fixed and there is no need to discuss the alternatives. Therefore we</p>	OK. The PP has justified the alternatives considered to determine the baseline as per methodology and VVM and necessary changes have been incorporated in revised PDD version 02. Revised PDD version 02 dated 23 December 2009 has been reviewed by DNV.  CAR 2 is closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		<p>have limited the realistic and credible alternatives to the project activity to the following two options:</p> <p>(a) The Project is not undertaken as a CDM project activity.</p> <p>(b) Equivalent amount of electricity being generated through operation of grid-connected power plants and addition of new generation sources</p> <p>The PDD has been revised accordingly.</p>	
<p><b>CAR 3:</b></p> <p>PDD does not mention about the period for which the monitored data will be archived. The same may be added in the monitoring plan.</p> <p>Procedures for day-to-day record handling need to be established, address the type of records to be stored, the storage area, etc.</p>	<p>B.8.2</p> <p>B.10.9</p>	<p>The data will be stored in hard format. Joint meter report is taken in the presence of the persons representing Enercon [Operation and Maintenance Contractor] and MSETCL. The copies of the joint meter report will be presented to the validator during the verification exercise. The archive will be kept for the period up to two years after the completion of the crediting period. The same is incorporated in section B.7.1 of the PDD.</p> <p>Training procedure has been detailed under section B.7.2 of the PDD. Enercon is an ISO certified company and the service department, which is responsible for activities related to monitoring of the data. The Operations and service</p>	<p>OK. The day to day monitoring and record handling has been entrusted to the O&amp;M contractor Enercon India Limited. The procedure for the same is described in the version 2 of the PDD. The records will be kept for the period up to two years after the completion of the crediting period.</p> <p>CAR 3 is closed.</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		procedures of Enercon are ISO certified. The procedure for day to day handling of records would be as per its ISO manual.	
<b>CAR 4</b> The start of the crediting period stated in the PDD (31 December 2009) needs to be revised.	C.1.2	Start date of the crediting period is revised to 01 July 2010 in the revised PDD.	OK. The Start date of the crediting period is revised to 1 July 2010 in the revised PDD. CAR 4 is closed.
<b>CL 1:</b> The name of the village shall be clearly indicated against the WEG number in the PDD.	A.1.1	The village name, location number, unique identification number and longitude and latitude details are provided in section A.4.1.4.	OK. The location details of each of the WEGs have been detailed in the updated PDD. CL 1 is closed.
<b>CL 2:</b> Whether Tata Power (mentioned in the section B.5 of the PDD) and Enercon are project participants in the project activity needs to be clarified.	A.2.1	Roaring 40s wind farms (Khandke) Pvt. Limited is the only project proponent. Typological errors are corrected in the revised PDD.	OK. The correction has been made in the revised PDD, deleting the name of Tata Power. CL 2 is closed.
<b>CL 3:</b> PP is requested to justify the reasonableness of the benchmark selected and provide proof for the interest rate applicable to the project.	B.3.1 B.3.2 B.3.3	Commercial lending rate is considered as a reasonable benchmark in accordance with the additionality tool version 5.2, para 6(b) sub step 2(b) of the Additionality tool. The additionality of the project has therefore been evaluated against a benchmark of 12.5%.	OK. The interest rate of 12.5% has been verified from HSBC letter. The use of lending rate as the benchmark is in accordance with the Additionality Tool version 5.2. CL 3 is closed.
<b>CL 4:</b> The spread sheets for IRR and sensitivity	B.3.1 B.3.2	The spreadsheet for IRR and Sensitivity has been provided to validator for verification. The proof for the project cost	OK. The PP has provided spreadsheet for IRR calculations and copies of DPR, purchase order for WEGs,

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
<p>analysis need to be provided for verification. Proof for project cost, O&amp;M costs and interest rate on loans needs to be provided. Further, sensitivity analysis needs to be done for investment and O&amp;M costs also. It also needs to be demonstrated at what point of variation the IRR is crossed and why it is not unlikely to happen.</p> <p>While PP has taken the PLF of 20%, it needs to be justified. Please provide the PLF guaranteed by Enercon and the micro-siting details for the project.</p> <p>To conclude on the additionality, the following details are also requested:</p> <ul style="list-style-type: none"> <li>• Whether any incentives are offered by the Government of Maharashtra for wind power generation? Have these been considered in the financial analysis?</li> <li>• Copy of PPA to be furnished.</li> <li>• All statutory clearances need to be provided for verification.</li> <li>• Salvage value of the machines at the end of life to be considered in financials.</li> </ul>	B.3.3	<p>and operation &amp; Maintenance cost in the form of DPR, Negotiated Enercon offer, Purchase orders and O&amp;M contract has been provided to the validator. The letter from HSBC confirming interest on loan, debt equity ratio and tenure has been provided to validator for verification. The HSBC letter also confirms that the project has been evaluated considering CDM revenues.</p> <p>The sensitivity analysis has been carried out considering reasonable variation over the base case.</p> <p><b>Sensitivity Analysis</b></p> <p>The investment in wind power project shall be tested based on three parameters:</p> <ul style="list-style-type: none"> <li>• Capital Cost</li> <li>• Tariff</li> <li>• Plant Load Factor</li> <li>• O&amp;M cost</li> </ul> <p><b>Capital Cost</b></p> <p>In accordance with the investment guidance, the additionality for the project activity is demonstrated at the time of</p>	<p>O&amp;M contract, PPA, interest rate for the loan availed from HSBC, the generation estimate of the project by Enercon, clearance from MEDA and the MERC tariff orders. The documents have been verified for the calculations and the input parameters used.</p> <p>Reasonable variations of the project cost, annual O&amp;M costs, annual output and on-grid tariff were checked by calculating the variation necessary to reach the benchmark and then discussing the likelihood for that to happen.</p> <p>None of the parameters in the sensitivity analysis are considered to have any significant positive correlation.</p> <p>CL 4 is closed.</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		<p>decision making. The price is taken from the detailed project report that is based on the final negotiated offer from Enercon. The price bid was final price given by Enercon. The price given in the detailed project note can be crosschecked from the purchase order for verification. Therefore, it is considered appropriate not to conduct sensitivity on the project cost.</p> <p><b>Tariff</b>  Maharashtra state electricity commission has fixed the tariff for the period of 13 years. The tariff is subject to change at the end of the term of PPA. The tariff order states that the consumer will be eligible for the lower tariff after the debt obligation of the project is fulfilled. The excerpts from the tariff order are as follows:</p> <p><i>“The Commission notes that in Cost Plus Approach, which the Commission has adopted for tariff proposal, rate per unit charged by such projects during initial period of 10 years is bound to be higher as during this period the project has various debt related obligations. However, it is essential that the consumer</i></p>	

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		<p><i>is able to enjoy the benefit of cheaper power once all debt related obligations are paid off and project has virtually no variable costs”</i></p> <p>The sale income needed and sale income approved by the commission have a differential amount of INR 6.317 Million which is required to be adjusted in the latter year to keep it consistent with the fixed return provided by the commission. Therefore to arrive at the tariff that may be applied by the commission at the end of the 13th year will be computed after adjusting the surplus provided by the commission. The tariff from the 13th year onwards therefore shall be adjusted for the surplus provided by the regulator in the initial years.</p> <p>On computation the average tariff after 13th year onwards based on MERC assumptions works out to be INR 1.80 per unit. On the upside if MERC does not consider adjustment of the surplus gained which is extremely unrealistic, the average tariff will be INR 2.34 per Unit. For the purpose of substantiating additionality, the project proponent has</p>	

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		<p>conducted sensitivity assuming the tariff of INR 2.34 per unit of electricity generated.</p> <p><b>Plant Load Factor</b>  Plant Load Factor is the key variable encompassing variation in wind profile, variation in off-take (including grid availability) including machine downtime. The project activity is located in the district of Ahmednagar in Maharashtra. The observed historical PLF of the project activities that are operating in the district of Ahmednagar is 19.07% in 2004-05.</p> <p>Maharashtra State Electricity Commission has set the 20% PLF for the state of Maharashtra. Historically, maximum observed PLF for region of Ahmednagar is 19.62%. Plant load factor for the project activity provided by Enercon India Limited is 20.07%%. Sensitivity analysis of the Project IRR is therefore carried out at 23.50% (P-25 level) which is very unlikely to be achieved considering maximum of the highest observed PLF in the district of Ahmednagar, 10% increase over the PLF given by MERC in tariff</p>	

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		<p>order dated 23-Nov-2003 and generation estimate given by Enercon India Limited at P-25 level [Max (19.62%, 22%, 23.5%)]. The return that the project is expected to generate at PLF of 23.50 % is 10.53%, which is less than the benchmark.</p> <p>The project proponent has taken PLF from MERC order dated 23 November 2003. The PLF is revised as per generation estimate provided by Enercon India Limited. The copy of the generation estimate by Enercon has been provided to the validator. The micro siting details have been incorporated in section A.4.1.4.</p> <p>There are no financial incentives offered by Maharashtra government for wind power projects.</p> <p>Copy of PPA and statutory clearances (Meda Clearance for infrastructure and commissioning) has been provided to the validator for review.</p> <p>Salvage value at the rate of 10% has been considered in the financial analysis.</p>	
<b>CL 5:</b> The common practice analysis provided at	B.3.1	The investment decision for the project was taken in March 2007 and purchase	OK. Since generation of wind energy depends on local or region specific



Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
<p>present is generic. It should include all the projects of similar capacity in Ahmednagar area, number of projects registered under CDM or in the process of validation and a justification as to how the project activity is different from the other non CDM projects that are operating in the region. Further, step 4b of additionality tool needs be described in the PDD.</p>		<p>order was placed in April 2007. At the time of investment decision the total installed wind power capacity in Maharashtra was 1,001 MW and at the time of commissioning the installed capacity in Maharashtra was 1756.38 MW. We want to submit that even at the time of commissioning our project was not part of the common practice.</p> <p>Paragraph 4(a) of additionality tool version 5.2 states that projects are considered similar they take place in a comparable environment. Till the year 2002-03, wind power developers in Maharashtra enjoyed sales tax benefits (Source: MERC order dated 23 November 2003; page-5 (2.3.1)), making investment in wind attractive on a stand alone basis. The sales tax benefits were withdrawn in March-2002. Therefore wind capacity additions before March 2002 have not been considered.</p> <p>Paragraph 4(a) also states that projects can be considered similar if they rely on a broadly similar technology and are of a similar scale. The roaring 40s wind farms (Khandke) private limited has a total</p>	<p>wind patterns, the state of Maharashtra has been considered for assessing the common practice. At the time of start date of the project activity the total installed wind power capacity in Maharashtra was 1,001 MW and at the time of commissioning, it was 1756.38 MW.</p> <p>As detailed in the PDD, till the year 2002-03, the installation of wind based power projects were at peak due to sales tax benefit of Rs. 10 million per MW per year for a period of 5 years from the date of commissioning. MERC had withdrawn the sales tax benefits from wind power projects in March-2002. Hence wind power projects installed prior to March 2003 can not be considered for common practice analysis. During 2002-2008 only 476 MW was added from wind projects with more than 15 MW size and this entire 476 MW capacity is under CDM. A detailed spreadsheet, with CDM links of all these projects has been verified by DNV.</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		<p>capacity of 50.4 MW and is designed to be installed in three phases and hence the project is categorized as large scale project activity (&gt;15MW). The proposed Roaring 40s Wind Farms (Khandke) Private Limited – Phase II wind power project involves the installation of 24 wind turbines, each of which has rated output of 800 kW, providing a total capacity of 19.2 MW. Therefore in accordance with Paragraph 4(a), we have analysed wind projects of more than 15 MW capacities. During the period 2002-2008 a total of 476 MW was added from wind projects with more than 15 MW size. We would like to submit that the entire 476 MW is under CDM. We have provided the spreadsheet with CDM links of all these projects to the DoE.</p> <p>As can be seen, all comparable projects have come up only with the benefit of CDM. Hence our project is without CDM benefits is not a common practice.</p>	CL 5 is closed.
<b>CL 6:</b> Proof needs to be provided for the starting date of the project. Since the start date is	B.3.4 C.1.1	The start date of the project is the placement of work order to Enercon. Copy of the purchase order is provided to DOE for verification.	OK. The start date has been verified from the purchase order for WEGs placed on Enercon India Limited. The CDM consideration, continued

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
<p>before the date of validation, serious consideration of incentives from CDM has to be demonstrated by the board note etc. Chronological order of events from the conceptualization of the project activity till approaching the DOE for validation along with reasons for delay need to be provided with supporting evidence. The chronological order also needs to be described under section B.5 of PDD.</p>		<p>The project activity was initially web-hosted on 7-June-2007 for entire 50.4 MW capacity of the project activity. The project activity was scheduled to be implemented in three phases and was expected to be completed in June-2007, November-2007 and December-2007 respectively. The nodal agency clearance for the first phase of the project activity was secured in October-2007.</p> <p>The DNA approval for the project activity is contingent upon submission of the nodal agency clearance and land documents. The third phase of the project is scheduled to be implemented in June-2009 respectively. Therefore Roaring 40s management decided to spilt the PDDs in three parts on 19-March-2008 so that the CDM process is not delayed for the first phase for which the required statutory clearance are in place for requesting DNA approval. The management also decided to prepare the PDD and file the second and third phase of the project activity for DNA approval once the statutory clearance for the respective phases of the project activity are in place.</p>	<p>real action, and chronology of events have been adequately stated in the revised PDD. CL 6 is closed.</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		The nodal agency clearance for the third phase of the project activity was received in June-2009. The PDD for the third phase was prepared in June-2009. The DNA meeting for the project activity was scheduled on 19 March 2009 and DNA approval was finally received on 12-November-2009. PDD was finally web-hosted by DOE on 17-September-2009.	
<b>CL 7:</b> As per PDD, the authority and responsibility of the project management is entirely with Enercon. There is no role for the project proponent, which does not appear to be logical.	B.13.1	Enercon is Operation and Maintenance contractor for the project activity and provides the daily generation report to the Project proponent. The project proponent also maintains the records of daily generation report and joint meter report.	OK. The O&M activities of the project have been outsourced to Enercon India Limited. It has been verified during the site visit that the daily reports and joint meter reports are made available to the PP for monitoring. CL 7 is closed.
<b>CL 8:</b> Copy of the contract between PP and Enercon needs to be provided for review.	B.13.1 B.13.2	The copy of the O&M contract between Enercon and PP has been provided to the validator for review.	OK. The O&M contract between Roaring 40s and Enercon has been provided for review. CL 8 is closed.
<b>CL 9:</b> Copy of the newspaper advertisement for stakeholder consultation needs to be provided.	E.1.2	The copy of news paper advertisement and stakeholder consultation has been provided to the validator for review.	Copy of the advertisement on the local newspaper <i>Sarvmat</i> and the minutes of the stakeholder consultation meeting have been verified.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
			CL 9 is closed.

## **APPENDIX B**

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### **CERTIFICATES OF COMPETENCE**



## CERTIFICATE OF COMPETENCE

***Gaurav Srivastava***

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-8-1-CDMJ1-i1)

<b><i>GHG Auditor:</i></b>	Yes				
<b><i>Technical Area</i></b>	<b><i>CDM Validator</i></b>	<b><i>CDM Verifier</i></b>	<b><i>Sector Expert</i></b>	<b><i>Methodology Expert</i></b>	<b><i>Technical Reviewer</i></b>
<i>Landfill gas</i>					
<i>Hydro power</i>					
<i>Renewables</i>					
<i>Wind power</i>					
<i>Other renewable</i>					
<i>Biomass</i>					
<i>Grid connection of isolated system</i>					
<i>Cement</i>					
<i>Waste-heat / waste-gas recovery</i>					
<i>Efficiency of thermal power plants</i>					
<i>Coal mine methane</i>					
<i>Fuel switch</i>					
<i>Manure management</i>					
<i>Waste / wastewater treatment</i>					
<i>Energy efficiency</i>					
<i>N<sub>2</sub>O</i>					
<i>HFCs</i>					
<i>Flare reduction</i>					
<i>PFCs</i>					
<i>Charcoal</i>					
<i>CO<sub>2</sub> recovery</i>					
<i>Transport</i>					
<i>Non-renewable biomass</i>					
<i>Biofuel</i>					
<i>Pipeline leakage reduction</i>					
<i>SF<sub>6</sub></i>					

Høvik, 5 November 2009

*Michael Lehmann*

Michael Lehmann

Technical Director, Climate Change Services



# CERTIFICATE OF COMPETENCE

***Murali Govindarajulu***

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-8-1-CDMJ1-i1)

<b><i>GHG Auditor:</i></b>	Yes				
<b><i>Technical Area</i></b>	<b><i>CDM Validator</i></b>	<b><i>CDM Verifier</i></b>	<b><i>Sector Expert</i></b>	<b><i>Methodology Expert</i></b>	<b><i>Technical Reviewer</i></b>
<i>Landfill gas</i>					
<i>Renewables</i>	<i>Hydro power</i>	Aug 2009	Aug 2009		
	<i>Wind power</i>	Jan 2009	Jan 2009		
	<i>Other renewable</i>		Sept 2009		
<i>Biomass</i>					
<i>Grid connection of isolated system</i>		Sept 2009			
<i>Cement</i>					
<i>Waste-heat / waste-gas recovery</i>					
<i>Efficiency of thermal power plants</i>					
<i>Coal mine methane</i>					
<i>Fuel switch</i>					
<i>Manure management</i>					
<i>Waste / wastewater treatment</i>					
<i>Energy efficiency</i>	Jan 2009	Sept 2009			
<i>N<sub>2</sub>O</i>					
<i>HFCs</i>					
<i>Flare reduction</i>					
<i>PFCs</i>					
<i>Charcoal</i>					
<i>CO<sub>2</sub> recovery</i>					
<i>Transport</i>					
<i>Non-renewable biomass</i>					
<i>Biofuel</i>					
<i>Pipeline leakage reduction</i>					
<i>SF<sub>6</sub></i>					

Høvik, 8 September 2009

*Michael Lehmann*

Michael Lehmann  
Technical Director, Climate Change Services





# CERTIFICATE OF COMPETENCE

***Lumir Nemecek***

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-8-1-CDMJi-i1)

<b>GHG Auditor:</b>						
<b>Technical Area</b>		<b>CDM Validator</b>	<b>CDM Verifier</b>	<b>Sector Knowledge</b>	<b>Sector Expert</b>	<b>Technical Reviewer</b>
Landfill gas						
Renewables	Hydro power			Nov 2009		
	Wind power			Nov 2009		
	Other renewable			Nov 2009		
Biomass						
Grid connection of isolated system						
Cement						
Waste-heat / waste-gas recovery						
Efficiency of thermal power plants				Nov 2009		
Coal mine methane						
Fuel switch						
Manure management						
Waste / wastewater treatment						
Energy efficiency				Nov 2009		
N <sub>2</sub> O						
HFCs						
Flare reduction						
PFCs						
Charcoal						
CO <sub>2</sub> recovery						
Transport						
Non-renewable biomass						
Biofuel						
Pipeline leakage reduction						
SF <sub>6</sub>						

Høvik, 9 November 2009

*Michael Lehmann*

Michael Lehmann  
Technical Director, Climate Change Services



## CERTIFICATE OF COMPETENCE

**Weidong Yang**

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-8-1-CDMJ1-i1)

<b>GHG Auditor:</b>	Yes				
<b>Technical Area</b>	<b>CDM Validator</b>	<b>CDM Verifier</b>	<b>Sector Knowledge</b>	<b>Sector Expert</b>	<b>Technical Reviewer</b>
Landfill gas					
Renewables					Jan 2009
Hydro power					
Wind power					
Other renewable					
Biomass					
Grid connection of isolated system					
Cement					
Waste-heat / waste-gas recovery					
Efficiency of thermal power plants					
Coal mine methane					
Fuel switch					
Manure management					
Waste / wastewater treatment					
Energy efficiency					
N <sub>2</sub> O					
HFCs					
Flare reduction					
PFCs					
Charcoal					
CO <sub>2</sub> recovery					
Transport					
Non-renewable biomass					
Biofuel					
Pipeline leakage reduction					
SF <sub>6</sub>					

Høvik, 9 January 2009

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