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# VALIDATION REPORT

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## “VAAYU INDIA WIND POWER PROJECT IN ANDHRA PRADESH” IN INDIA

REPORT No. 2010-0502

REVISION No. 02

DET NORSKE VERITAS



## VALIDATION REPORT

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Recommended for approval Hendrik W. Brinks	Approved by Michael Lehmann	Organisational unit: DNV Climate Change and Environmental Services
Client: Vaayu (India) Power Corporation Private Limited		Client ref.: Yogesh Mehra

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### Summary:

**Project Name:** Vaayu India Wind Power Project in Andhra Pradesh

**Country:** India

**Methodology:** ACM0002

**Version:** 11

**GHG reducing Measure/Technology:** Grid connected renewable electricity generation

**ER estimate:** 92 971tCO<sub>2</sub>e per year (average)

### 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 project activity "Vaayu India Wind Power Project in Andhra Pradesh" in India, as described in the PDD, version 04 of 3 February 2011, meets all relevant UNFCCC requirements for the CDM and all relevant host Party criteria and correctly applies the baseline and monitoring methodology ACM0002, version 11. Hence DNV requests the registration of the project as a CDM project activity.

Report No.: 2010-0502	Subject Group: Environment	
Report title: Vaayu India Wind Power Project in Andhra Pradesh		
Work carried out by: Ravi Kumar Prabhu, G.Murali, P. Kannan		
Work verified by: Zhang Xiaojun, Johnsen		
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### Indexing terms

#### Key words

Climate Change

Kyoto Protocol

Validation

Clean Development Mechanism

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## Abbreviations

APTRANSCO	Transmission Corporation of Andhra Pradesh Limited
APERC	Andhra Pradesh Electricity Regulatory Commission
BSE	Bombay Stock Exchange
CAPM	Capital Asset Pricing Model
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEA	Central Electricity Authority
CER	Certified Emission Reduction(s)
CH <sub>4</sub>	Methane
CL	Clarification request
CO <sub>2</sub>	Carbon dioxide
C-WET	Centre for Wind Energy Technology
CO <sub>2</sub> e	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
EIL	Enercon India Limited
FAR	Forward Action Request
GBI	Generation Based Incentive
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IDFC	Infrastructure Development Finance Company Limited
IPCC	Intergovernmental Panel on Climate Change
IPP	Independent Power Producer
IREDA	Indian Renewable Energy Development Authority Limited
LoA	Letter of approval
MoEF	Ministry of Environment & Forests, Government of India
NEDCAP	Non Conventional Energy Development Corporation of Andhra Pradesh Limited
NGO	Non-governmental Organisation
ODA	Official Development Assistance
PDD	Project Design Document
PLF	Plant Load Factor
RBI	Reserve Bank of India
tCO <sub>2</sub> e	Tonnes of CO <sub>2</sub> equivalents
UNFCCC	United Nations Framework Convention on Climate Change
WEG	Wing Energy Generator
VIPCPL	Vaayu (India) Power Corporation Private Limited



## 1 EXECUTIVE SUMMARY – VALIDATION OPINION

*DNV Climate Change Services AS (DNV) has performed a validation of the project activity “Vaayu India Wind Power Project in Andhra Pradesh” in India. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism, 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 host Party is India and the project participant is Vaayu (India) Power Corporation Private Limited. The DNA from India confirmed that the project assists in achieving sustainable development.*

*The project correctly applies the baseline and monitoring methodology ACM0002, version 11 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”.*

*The project activity is intended to generate power from the 50.4 MW wind project and 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 the average 92 971 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 plan provides for the monitoring of the project’s emission reductions. The monitoring arrangements described in the monitoring plan are feasible within the project design and it is DNV’s opinion that the project participants are able to implement the monitoring plan.*

*In summary, it is DNV’s opinion that the project activity “Vaayu India Wind Power Project in Andhra Pradesh” in India, as described in the PDD, version 04 dated 3 February 2011, meets all relevant UNFCCC requirements for the CDM and all relevant host Party criteria and correctly applies the baseline and monitoring methodology ACM0002, version 11. Hence, DNV requests the registration of the project as a CDM project activity.*

Chennai and Oslo, 8 April 2011

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DNV Climate Change Services AS



## 2 INTRODUCTION

Vaayu (India) Power Corporation Private Limited has commissioned DNV Climate Change Services AS (DNV) to perform a validation of the *Vaayu India Wind Power Project in Andhra Pradesh* project in India (hereafter called “the project”). 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 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. The validation was based on the recommendations in the Validation and Verification Manual /24/.

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



### 3 METHODOLOGY

The validation consists 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 tables list the documentation that was reviewed during the validation.

##### 3.1.1 Documentation provided by the project participants

- /1/ VIPCL: *CDM-PDD for project activity "Vaayu India Wind Power Project in Andhra Pradesh" in India*, initial version 01 dated 31 May 2010 and final PDD version 04 dated 3 February 2011.
- /2/ Enercon: Commercial offer for supply of 63 WEGs of 800 kW for the project activity, Ref:VIPCPL/2009-10/EIL-076, dated 20 November 2009
- /3/ Enercon: Technical specification of E-53 model WEG of 800 kW capacity and its life expectancy.
- /4/ VIPCPL: Detailed Project Report, dated 26 November 2009
- /5/ VIPCPL: Extracts of Board resolution to proceed with the project activity with CDM consideration, dated 28 November 2009
- /6/ VIPCPL: Purchase order for 63 WEGs of 800 kW placed on Enercon, Ref: VIPCPL/EIL/09-10/03 dated 5 December 2009
- /7/ VIPCPL: Letter authorizing EIL to manage CDM activities and transaction of CERs for the project activity, dated 8 December 2009
- /8/ APTRANSCO: Administrative approval for power evacuation facilities to the newly proposed wind power projects in Kurnool and Ananthpur districts, No. T.O.O. (CE-CONSTN) Ms. No.286, dated 28 March 2005
- /9/ NEDCAP: Approval for transfer of 50.4 MW capacity wind farm in favour of VIPCL out of the 59.2 MW allotted to EIL and their group companies, Ref: NEDCAP/WE/8253/2010 dated 30 March 2010.
- /10/ VIPCPL: Agreement with NEDCAP for setting up the 50.4 MW wind project at Kurnool district, dated 30 March 2010.
- /11/ C-WET: Report on site validation & generation estimate of proposed (70x800 kW) wind farm projects at Krishna, Kurnool district in Andhra Pradesh, Ref: CWET-WR-CF-08-2010-11, dated 26 April 2010
- /12/ VIPCPL: E-mail on intimation on developing the project activity as CDM to UNFCCC, dated 4 May 2010 and confirmation from UNFCCC on receipt of the email dated 11 June 2010.
- /13/ VIPCPL: E-mail on intimation on developing the project activity as CDM to DNA,



- dated 24 March 2010 and confirmation from DNA on receipt of the email dated 6 April 2010.
- /14/ VIPCPL: Loan application submitted to IDFC, dated 18 March 2010
  - /15/ IDFC: Loan sanction letter, dated 30 April 2010
  - /16/ VIPCPL: Letter of undertaking for non usage of official development assistance, dated 16 June 2010
  - /17/ VIPCPL: PPAs signed with Central Power Distribution Company of Andhra Pradesh Ltd., for Phase 1(4.8 MW) dated 7 July 2010, Phase 2(4.8MW) dated 22 July 2010, Phase 3(4.8 MW) dated 22 July 2010, Phase 4(11.2 MW) dated 22 July 2010, Phase 5(4.8 MW) dated 22 July 2010, Phase 6 (9.6 MW) dated 22 July 2010, Phase 7 (10.4 MW) dated 22 July 2010
  - /18/ VIPCPL: Investment analysis spreadsheet, Vaayu Andhra\_Investment Analysis ver 2.0.xls
  - /19/ VIPCPL: Benchmark calculation spreadsheet, Vaayu Andhra\_Benchmark\_Cost of equity version 2.0.xls
  - /20/ VIPCL: Attendance sheet, questionnaire and minutes of the meeting of stakeholder consultation, dated 27 February 2010.
  - /21/ VIPCPL: Invitation letters sent out for local stakeholder meeting.
  - /22/ VIPCPL: Land lease agreement with EIL, dated 1 July 2010.

### 3.1.2 Letters of approval

- /23/ DNA of India: *Letter of approval* dated 16 November 2010.

### 3.1.3 Methodologies, tools and other guidance by the CDM Executive Board

- /24/ CDM Executive Board: *Validation and Verification Manual*. version 1.2
- /25/ CDM Executive Board: Baseline and monitoring methodology ACM0002, version 11, “*Consolidated baseline methodology for grid-connected electricity generation from renewable sources*”
- /26/ CDM Executive Board: *Tool for demonstration and assessment of additionality*, version 5.2.
- /27/ CDM Executive Board: *Tool to calculate the emission factor for an electricity system*, version 2.
- /28/ CDM Executive Board: *Guidance on Assessment of Investment Analysis*, version 3.1
- /29/ CDM Executive Board: Guidelines on the demonstration and assessment of the prior consideration of CDM, version 3
- /30/ CDM Executive Board: Guidelines for the reporting and validation of plant load factors, version 1.

### 3.1.4 Documentation used by DNV to validate / cross-check the information provided by the project participants

- /31/ CEA: *CO<sub>2</sub> Baseline Database for the Indian Power Sector dated 1 November 2009, version 5*, [www.cea.nic.in](http://www.cea.nic.in)
- /32/ CDM prior consideration : Intimation receipt at UNFCCC date 30 April 2010  
<http://cdm.unfccc.int/Projects/PriorCDM/notifications/index.html>





- /33/ MOEF notification with respect to EIA dated 14 September 2006  
(<http://envfor.nic.in/legis/eia/so1533.pdf>)
- /34/ APERC: Tariff order on new wind based projects, dated 1 May 2009
- /35/ Bloomberg: Historical Beta value snapshots of Tata Power Co Ltd, CESC Ltd, Reliance Infrastructure Ltd, Gujarat Indus Power Co Ltd and Energy Development Co for the period of 31 Oct 2004 to 25 Oct 2009
- /36/ Centre for Wind Energy Technology: Revised list of models and manufacturers of wind turbines, possessing valid approval, Ref. No.C-WET/S&C/RLMM/2010-11/06, dated 18 May 2010
- /37/ Indian Income Tax Act 1961, Section 32 (Rule 5) Appendix 1 and Section 80-1A, paragraph 2.0
- /38/ RBI: Weekly statement on cash reserve ratio and interest rates, dated November 2010
- /39/ Bombay stock exchange: <http://www.bseindia.com/about/abindices/bse30.asp> - list of companies taken for computing the beta value, <http://www.bseindia.com/stockinfo/indices.aspx> - historical data of BSE indices October 2009, and <http://www.bseindia.com/about/abindices/sectoralindices.asp> for data on BSE POWER Index.
- /40/ IRDEA: Operational guidelines for implementation of generation based incentive for grid connected wind power projects, dated 17 December 2009 and 26 May 2010  
<http://www.ireda.gov.in/pdf/OPERATIONAL%20GUIDELINES%20for%20Wind%20GBI%20and%20AD%20as%20on%2026.05.2010.doc>
- /41/ Indian Wind Power Directory 9<sup>th</sup> edition, published in year 2009
- /42/ National CDM authority of India: Website for the approved projects,  
[http://cdmindia.in/project\\_details\\_view.php?id=160&oid=1&page=3&reporttype=1](http://cdmindia.in/project_details_view.php?id=160&oid=1&page=3&reporttype=1)

The main changes from the web hosted and the final version of the PDD are:

- a) The start date of crediting period has been revised from 1 April 2011 to 1 July 2011 with the progress of validation.
- b) The monitoring procedure in the section B.7.2 has been revised in line with the billing methodology used by state utility.
- c) The unique identification details of the individual WEGs has been provided under Appendix 1 of the PDD.

### 3.2 Follow-up interviews with project stakeholders

On 29 July 2010, Ravi Kumar Prabhu of DNV conducted on-site visit to the project site at Kurnool district of Andhra Pradesh and performed interviews with project stakeholders. The main topics of the interviews are summarized below.

	Date	Name	Organization	Topic
/43/	29 July 2010	Mr. Puneet Katyal, Head, CDM Corporate Mr. Himanshu	Enercon (India) Limited, Mumbai	<ul style="list-style-type: none"> <li>➤ Proof of CDM consideration</li> <li>➤ Applicability of methodology</li> <li>➤ Review of project design and technology used</li> </ul>



Bhatnagar, Asst. Manager, CDM Corporate		➤ Review of monitoring and verification procedure, management structure of the organization.
Mr. Saujanya Kumar, CDM Corporate		➤ Environmental consents and permits
		➤ Review of the stakeholder consultation process.
Mr. A.V. Bhargava	Enercon (India)	➤ Joint meter reading procedure
Mr. N.V.S. Chakravarthy	Limited, Hyderabad	➤ Operation & maintenance procedures.
		➤ Determination of baseline
		➤ Third party assessment of PLF
		➤ Assessment of project additionality, benchmark determination, financial analysis
		➤ Emission reduction calculations and data used
		➤ Determination of baseline

### 3.3 Resolution of outstanding issues

The objective of this phase of the validation is to resolve any outstanding issues which need be clarified prior to DNV's positive conclusion on the project design. In order to ensure transparency a validation protocol was customised for the project. The protocol shows in a transparent manner the 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 four tables. The different columns in these tables are described in the figure below. The completed validation protocol for the project activity "Vaayu India Wind Power Project in Andhra Pradesh" in India is enclosed in Appendix A to this report.

A corrective action request (CAR) is raised if one of the following occurs:

- (a) The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;
- (b) The CDM requirements have not been met;
- (c) There is a risk that emission reductions cannot be monitored or calculated.

A clarification request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.



A forward action request (FAR) is raised during validation to highlight issues related to project implementation that require review during the first verification of the project activity. FARs shall not relate to the CDM requirements for registration.



<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 (OK) or a <b>corrective action request (CAR)</b> if a requirement is not met.</i>		

  

<b>Validation Protocol Table 2: Requirement Checklist</b>				
<b>Checklist question</b>	<b>Reference</b>	<b>Means of verification (MoV)</b>	<b>Assessment by DNV</b>	<b>Draft and/or Final Conclusion</b>
<i>The various requirements in Table 1 are linked to checklist questions the project should meet. The checklist is organised in different sections, following the logic of the CDM-PDD</i>	<i>Gives reference to documents where the answer to the checklist question or item is found.</i>	<i>Means of verification (MoV) are <b>document review (DR)</b>, <b>interview (I)</b> or any other follow-up actions (e.g., on site visit and telephone or email interviews) and <b>cross-checking (CC)</b> with available information relating to projects or technologies similar to the proposed CDM project activity under validation.</i>	<i>The discussion on how the conclusion is arrived at and the conclusion on the compliance with the checklist question so far.</i>	<i>OK is used if the information and evidence provided is adequate to demonstrate compliance with CDM requirements. A <b>corrective action request (CAR)</b> is raised when project participants have made mistakes, the CDM requirements have not been met or there is a risk that emission reductions cannot be monitored or calculated. A <b>clarification request (CL)</b> is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met. A <b>forward action request (FAR)</b> during validation is raised to highlight issues related to project implementation that require review during the first verification of the project activity.</i>

  

<b>Validation Protocol Table 3: Resolution of Corrective Action and Clarification Requests</b>			
<b>Corrective action and/or clarification requests</b>	<b>Ref. to checklist question in table 2</b>	<b>Response by project participants</b>	<b>Validation conclusion</b>
<i>The CARs and/or CLs raised in Table 2 are repeated here.</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 to address the CARs and/or CLs.</i>	<i>The validation team's assessment and final conclusions of the CARs and/or CLs.</i>

  

<b>Validation Protocol Table 4: Forward Action Requests</b>		
<b>Forward action request</b>	<b>Ref. to checklist question in table 2</b>	<b>Response by project participants</b>
<i>The FARs raised in Table 2 are repeated here.</i>	<i>Reference to the checklist question number in Table 2 where the FAR is explained.</i>	<i>Response by project participants on how forward action request will be addressed prior to first verification.</i>

**Figure 1: Validation protocol tables**



### 3.4 Internal quality control

The final validation report has undergone a technical review performed by a technical reviewer qualified in accordance with DNV's qualification scheme for CDM validation and verification.

### 3.5 Validation team

<i><b>Role</b></i>	<i><b>Last Name</b></i>	<i><b>First Name</b></i>	<i><b>Country</b></i>	<i><b>Type of involvement</b></i>						
				Desk review	Site visit / Interviews	Reporting	Supervision of work	Technical review	TA 1.2 competence	Financial expertise
Team leader (Validator)	Govindarajulu	Murali	India	✓		✓	✓		✓	
Validator	Prabhu	Ravi Kumar	India	✓	✓	✓				
Person with sectoral competence	Parthasarathy	Kannan	India	✓		✓			✓	
Technical reviewer	Zhang	Xiaojun, Johnsen	China					✓	✓	

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



## 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 final validation findings relate to the project design as documented and described in the PDD, version 04 dated 3 February 2011.

### 4.1 Participation requirements

The project is being developed by Vaayu (India) Power Corporation Private Limited of host Party of India and no other project participant from Annex I Party is identified yet. The host Party (India) meets all relevant participation requirements.

A letter of approval (LoA) /23/ was issued by DNA of India on 16 November 2010 authorizing Vaayu (India) Power Corporation Private Limited of India as project participant and confirming that the project assists in achieving sustainable development. The letter of approval was received from the project participant. DNV verified the approval of the project from the official web site of the national CDM Authority of India /42/. DNV considers the letter is in accordance with paragraphs 45- 48 of the VVM /24/.

The project participant has given an undertaking for non usage of overseas development assistance (ODA) /16/. The validation did not reveal any information that indicates that the project can be seen as a diversion of ODA.

### 4.2 Project design

The project activity consists of installation of 63 Wind Energy Generators (WEGs) of the Enercon E-53 make, with capacities of 800 kW each, with gearless horizontal axis, variable speed rotor and independent electromechanical pitch system for each blade. The project is spread across Petnikota, Tummalapenta, Itikyala, Abdullapuram, Chintalayapalli, Venkatampalli & Bhogasamudram villages in Kurnool district in Indian state of Andhra Pradesh. The project area extends between latitude 14° 59' 10.2" and 15° 05' 2.5" North and longitude 77° 59' 15.7 and 78° 05' 18.3 East. The WEGs generate 3 phase power at 400 V, which is stepped up to 33 kV. The project activity can operate in the frequency range of 47.5 to 51.5 Hz and in the voltage range of 400 V  $\pm$  12.5%. The average life time of the WEG is stated to be around 20 years /3/. A fixed crediting period of 10 years has been chosen with the starting date of the crediting period as 1 July 2011 or the date of registration of the project activity whichever is later.

The entire power generated by the project is supplied to the local grid of APTRANSCO, which is part of the southern regional grid of India. By the implementation of the project activity, energy generated using renewable energy will displace equivalent energy generation from the fossil fuel dominated southern grid of India. Therefore, the project activity results in an equivalent amount of 92 971 tCO<sub>2e</sub> emission reduction per annum during the crediting period of 10 years.

The starting date of the project activity has been selected as 5 December 2009 which is the date on which the purchase order was placed on EIL for 63 number of WEGs /6/. This is the



first as well as the major financial commitment for the project activity, with the scope including installation of WEGs on engineering, procurement and commissioning (EPC) basis. The installation, commissioning, operation and maintenance of the WEGs are under the scope of Enercon (India) Limited (EIL). The technology used in the project activity is indigenously available in India and no transfer of technology is envisaged. The technology applied is deemed current good practice and is not expected to be replaced within the crediting period.

DNV considers the project description of the project contained in the PDD to be complete and accurate. The PDD complies with the relevant forms and guidance for completing the PDD.

### 4.3 Application of selected baseline and monitoring methodology

The project correctly applies the approved baseline methodology ACM0002, version 11 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” /25/. The applicability of this methodology is justified as:

- The project is a new installation of wind electricity generators at a site where no renewable energy power plant was operated prior to the implementation of the project activity. This has been verified during the site visit /43/ and from the purchase order for WEGs /6/.
- No retrofit or capacity additions or replacements at the existing plants are involved. This has been verified during the site visit and from the purchase order for WEGs /6/.
- The project activity is connected to the southern grid of India, and the system boundaries are clearly identified and information on the characteristics of this grid is available on the web site central electricity authority (CEA), Government of India /31/.
- No hydro or biomass project is involved.
- The project does not involve an on-site switch from fossil fuels to a renewable source. This has been verified during the site visit /43/ and from the purchase order for WEGs /6/.

The assessment of the project’s compliance with the applicability criteria of ACM0002 (version 11) /25/ are documented in detail in section B.2 of Table 2 in the validation protocol in Appendix A to this report.

### 4.4 Project Boundary

The project system boundary consists of the WEGs at the project site, and the pooling sub-stations. The spatial boundary of the project includes the southern grid of India.

	GHGs involved	Description
Baseline emissions	CO <sub>2</sub>	Emissions equivalent to the amount of net electricity supplied by the project activity that would otherwise be generated by the power plants connected to the southern grid.
Project emissions	CO <sub>2</sub>	NA



Leakage	NA	NA
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The identified boundary and selected sources and gases are justified for the project activity. The validation of the project activity did not reveal other greenhouse gas emissions occurring within the proposed CDM project activity boundary as a result of the implementation of the proposed project activity which are expected to contribute more than 1% of the overall expected average annual emission reduction, which are not addressed by ACM0002 (version 11) /25/.

#### 4.5 Baseline identification

As this project installs a new grid connected renewable power plant and the project is additional, cf. Section 4.6, the baseline scenario is in accordance with ACM0002, version 11 /25/, that the electricity delivered to the grid by the project activity that otherwise would have 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 system* /27/.

The approved baseline methodology has been correctly applied to identify realistic and credible baseline scenarios, and the identified baseline scenario most reasonably represents what would occur in the absence of the proposed CDM project activity.

All the assumption and data used by the project participants are listed in the PDD and/or supporting documents. All documentation relevant for establishing the baseline scenario are correctly quoted and interpreted in the PDD. Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable. Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD.

#### 4.6 Additionality

The project's additionality is demonstrated using "Tool for the demonstration and assessment of additionality", version 5.2 /26/.

##### 4.6.1 Evidence for prior CDM consideration and continuous actions to secure CDM status

The starting date of the project activity has been selected as 5 December 2009 which is the date on which the purchase order was placed on EIL for 63 number of WEGs /6/. This is the first as well as major financial commitment for the project activity, with the scope including installation of WEGs on engineering, procurement and commissioning (EPC) basis.

Early consideration of CDM is evidenced from the e-mail notification to UNFCCC secretariat on 4 May 2010 /12/ regarding commencement of the project activity and the project participant's intention to seek CDM status for the project. DNV verified the notification from the UNFCCC website /32/ and the confirmation email from UNFCCC dated 11 June 2010 /12/. The project participant also notified the DNA of India by e-mail on 24 March 2010 regarding commencement of the project activity and received e-mail confirmation dated 6 April 2010 /13/.

Further, the Board of VIPCPL discussed the viability of the project and suggested to get the project registered under CDM, so that the additional revenues from the sale of emission reductions will help the project to be financially viable /5/. CDM was therefore seriously





considered in the decision to proceed with the project activity. Enercon (India) Limited was authorized to manage the CDM activities and CERs /7/ of the project activity on behalf of VIPCPL.

DNV consider that the evidences demonstrate CDM consideration for the project activity, since the start date of the project activity (5 December 2009) is after 2 August 2008 and that PP notified the UNFCCC secretariat and DNA of India within six months of the start date. Further, the PDD has been published for global stakeholder consultation on 10 June 2010, within 2 years from the initial notification to the UNFCCC and the DNA, thereby complying with the guidelines of EB 49 Annex 22 /29/.

It is DNV's opinion that the proposed CDM project activity complies with the requirements of the latest version of the guidance on prior consideration of CDM.

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

The applied methodology ACM0002 version 11 /25/ specifies that, for the grid connected new renewable power plants, the baseline scenario is that the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of the grid connected power plants and by the addition of new generation sources, as reflected by the combined margin.

The realistic and credible alternatives to the project activity are the project being undertaken without registering it as a CDM activity and equivalent amount of electricity being generated through operation of grid-connected power plants and addition of new generation sources. Both alternatives are in compliance with the laws and regulations of India.

#### **4.6.3 Investment analysis**

##### **Choice of approach**

As the project activity generates revenue without CDM and the alternative to the project does not involve investments, the selected benchmark analysis and financial indicator of post tax equity-IRR is deemed appropriate.

##### **Benchmark selection**

The project activity being an electricity generation project based on wind energy, which could also be developed by an entity other than the project participant, the benchmark should be based on publicly available data sources /26/. In line with this, the benchmark of expected return on equity derived from the Capital Asset Pricing Model (CAPM) considering beta values of power generating companies in India, that were listed at the time of the investment decision have been considered for arriving at the benchmark of 16.84% for the post tax equity-IRR /19/.

The risk free bond rate of 7.98% per annum, taken for arriving at the benchmark considered (the average rate for the period of June to September 2009) has been checked to be correct from the latest RBI published data that was available at the time when the proposal was considered /38/.

At the time of decision making, data on the listed companies having core business in wind power generation was not available. Hence, the data available from listed companies involving a wider sector of power generation, including renewable and non renewable energy was considered for beta value calculation.



The equity beta (coefficient reflecting the volatility of the stock relative to the market) is calculated using BSE 200 index since its inception. The 5 year BSE data (2004 to 2009) of Tata Power Company Ltd., Reliance Energy/Infrastructure Ltd, CESC and Gujarat Industrial Power Company Ltd., Energy Development Company Ltd. was considered for beta calculation. The beta value thus calculated works out to 1.17.

The market return of 15.55% is the compounded annual return of BSE 200 index since its inception, which is the least among the Bombay Stock Exchange indices - SENSEX, BSE 100, BSE 200 and BSE 500. The input values used for the computation of market return was verified from the official website of Bombay Stock Exchange /39/. Similarly the list of companies taken for computing the beta value was verified from the web site of Bombay stock exchange /39/. The beta values are sourced from Bloomberg web site and screenshots /35/ of the same are provided in the PDD /1/.

In India, power sector indices with long term data is not available. The stock exchanges have only recently started publishing index for power sector comprising of companies in the power sector business and one such index available is BSE POWER index /39/, launched in November 2007 with index data available from January 2005. Since this index had less than 5 year data available at the time of decision, project participant did not consider it for benchmark determination. DNV verified that CAGR return of BSE Power index for 5 year period from January 2005 to December 2009 workouts to 24.4% against the 18.1% used in benchmark calculation (15.5% return of BSE200 \* beta of 1.17), hence the choice of the benchmark is conservative.

The worksheet for benchmark calculation /19/ has been evidenced and all input parameters and calculations have been verified by DNV to be correct. The benchmark identified to compare the financial attractiveness of the project activity has been verified and found to be appropriate.

### Input parameters

The investment analysis has been performed for 20 years, which is the expected life time of the project activity /3/ and the input parameters considered are investment cost, annual operation and maintenance costs, income tax and revenue from power generation.

The assumptions used in the investment analysis are deemed appropriate and the values were verified/cross-checked from the documents shown in the following table.

Inputs values	Value used for financial analysis	Documents verified/cross-checked
Total investment cost of 63 WEGs of 800 kW each	INR 2 990.61 million	The investment cost was verified from the commercial offer of EIL /2/ and from the detailed project report /4/. The investment cost was also cross checked against the orders placed on EIL for the supply, civil works, erection and commissioning of the WEGs /6/, aggregating to INR 2 872.4 million, which is 96% of the project cost. Based on the above discussion DNV concludes that the investment cost is appropriate.
Electricity Tariff	fixed tariff of INR 3.5/kWh	The tariff was verified from the detailed project report /4/ and was cross-checked against the power purchase



		<p>agreements /17/ and APERC tariff order on new wind energy projects /34/. As per the tariff order of APERC, the calculated levelized tariff for 20 years is 3.43 INR /kWh. However commission approved a tariff of INR 3.50/kWh for the first ten years and the tariff for the next ten years to be decided thereafter /34/. Considering APERC's cost plus approach for tariff and the levelized cost of generation estimated for the 20 years being 3.43 INR/kWh, the consideration of 3.5 INR/kWh for the financial analysis from 11<sup>th</sup> year onwards is justified.</p> <p>Generation based incentive (GBI) of 0.50 INR/kWh with cap of INR 6.2 Million per MW applicable for the independent power producers (IPPs) supplying to the grid was verified from the web site of IREDA /40/. Though GBI was not considered at the time of decision making, consideration of revenue from GBI in the financial analysis is deemed conservative.</p>
Plant load factor	22.28%	<p>The PLF of 22.28% was verified from the report of third party consultant M/s Centre for Wind Energy Technology(C-WET) /11/ and is in line with the <i>Guidance on reporting and validation of PLF</i> /30/. Since the PLF of the project determined by the third party at 22.28% is marginally higher than the 22.12% available to the PP at the time of decision making, the PP used PLF of 22.28% for financial analysis conservatively.</p>
Operation and maintenance cost	1.3% of the project cost from 2 <sup>nd</sup> year with an annual escalation of 6%	<p>The O&amp;M cost is based on the EIL's proposal /2/, according to which no charges are payable for the 1<sup>st</sup> year, INR 0.617 million/WEG (1.3%) for the 2<sup>nd</sup> year and 6% yearly escalation up to the end of 10<sup>th</sup> year. Since the escalation in O&amp;M cost for 10<sup>th</sup> year onwards is not stated in EIL's proposal, PP has considered the same 6% for the remaining period as well. The O&amp;M cost was crosschecked against the APERC tariff order dated 1 May 2010 /34/, which considered the normative O&amp;M cost of 1.25% with an annual escalation of 5%. The values considered by APERC are marginally higher than the values considered for investment analysis, but have no material impact on investment analysis as discussed in sensitivity analysis.</p>
Debt: equity ratio	70:30	<p>The debt: equity ratio of 70:30 was verified from the detailed project report /4/ dated 26 November 2009 and the same was available with the investors at the time of decision to proceed with the project on 28 November 2009 /5/. The debt: equity ratio was cross checked</p>



## VALIDATION REPORT

		against the loan sanction letter from IDFC dated 30 April 2010 /15/ and the value was found to be same.
Interest rate on loan	11.5%	The interest rate on the term loan (11.5%) was verified from the detailed project report /4/. The interest rate was cross checked against the loan sanction letter from IDFC dated 30 April 2010 /15/, in which the interest rate was stated to be 11.11% (benchmark lending rate of IDFC, 7.81% + 3.3%). The marginal difference in the actual interest rate has no material impact on the additionality.
Loan tenure	8 years	The loan repayment period of 8 years was verified from the detailed project report /4/ dated 26 November 2009. The loan tenure was cross checked against the loan sanction letter from IDFC /15/, which provides a 12 year repayment period. The sensitivity analysis with a loan repayment period of 12 years shows that the equity-IRR comes down from 5.05% to 4.19%.
Depreciation & salvage value	Straight line depreciation was considered in line with the prevailing national regulation and the residual value (10%) is accounted during the 20 <sup>th</sup> year.	The straight line depreciation and salvage values are verified from the detailed project report /4/ and cross-checked against the Indian Income Tax Act 1961 /37/. The accelerated depreciation rate is not claimed by PP, since it proposes to claim GBI and is not eligible for the accelerated depreciation /40/. 10 year tax holiday available for the power projects has been considered. Residual value (10% of the project cost) has been accounted during the 20 <sup>th</sup> year.
Taxes	The income tax @ 33.99% and minimum alternative tax @ 17% has been considered	The income tax rates were verified from the detailed project report /4/ and cross-checked against the Indian Income Tax Act 1961 /37/.

In line with the Guideline on Investment Analysis /28/, which states the “*Input values used in all investment analysis should be valid and applicable at the time of the investment decision taken by the project participant*”, DNV verified the input parameters to be valid at the time of decision making based on the above mentioned documents.

### Calculation and conclusion

Based on the input parameters stated above, the post tax equity-IRR without CDM revenues has been calculated to be 5.05%, which is lower than the applied benchmark of 16.84% (post tax). The IRR calculations were provided in a spreadsheet /18/. The calculation was verified by DNV and has been found to be correct.

### Sensitivity analysis

A sensitivity analysis has been performed in order to check the robustness of the financial analysis for reasonable variations in parameters contributing more than 20% to the project



costs or project revenues. The values were varied till the benchmark was reached and the likelihood for that to happen was assessed. No significant positive correlations between the parameters are anticipated.

a) **Project cost:** The equity-IRR touches the benchmark with a 37.5% decrease in the project cost. Since the purchase order has already been placed on EIL and the actual investment cost verified from the purchase orders totals INR 2 872.3 million, (96.04% of the estimated cost), such reduction in investment cost is not possible.

b) **Plant load factor:** The equity-IRR touches the benchmark with a PLF of 37.03% (66.2% increase). The plant load factor of 22.28% considered in the financial analysis is based on the PLF determined by C-WET /11/, the third party consultant and marginally higher than the PLF of 22.12% used in detailed project report /4/. Thus, 66.2% increase in plant load factor is deemed unlikely.

c) **Tariff:** The equity-IRR crosses the benchmark if the tariff increases by 66.2%. The tariff is fixed at INR 3.5/kWh for the first 10 years, as verified from the PPAs /17/ and APERC tariff order /34/. Considering that APERC fixed a higher tariff of INR 3.5/kWh for the first 10 years against the estimated levelized cost of generation for the 20 years at INR 3.43/kWh, tariff for the 11<sup>th</sup> year onwards is unlikely to be fixed higher than INR 3.5/kWh.

Based on the assessment of the above, it was DNV opinion that the increase in tariff by 66.2% increase is unlikely.

d) **Operation and maintenance cost:** The O&M costs are very small and have insignificant impact on the IRR. It has been verified that even with O&M cost of 0%, the equity-IRR improves only to 8.34%, which is lower than the benchmark. Since the operation and maintenance quality is essential to achieve the objectives of the project activity, reduction in O&M costs to 0% is not possible.

The spreadsheet for financial analysis including the assumptions for the sensitivity analysis /18/ has been verified by DNV and no material mistakes were found. The sensitivity analysis shows that even with likely variations of the key input parameters, the post tax equity-IRR of the proposed project is lower than the benchmark. In conclusion, the assessment of the arguments presented is deemed to sufficiently demonstrate that the project is not financially attractive.

#### 4.6.4 Common practice analysis

For assessing the common practice analysis, large scale wind energy projects (with capacities of 15 MW or more) in the state of Andhra Pradesh in India are considered. Since the policies and tariff regime is consistent throughout the state of Andhra Pradesh, DNV considers the choice of the region, scale and technology for the common practice analysis is deemed justified. As per the data from Indian Wind Power Directory 9<sup>th</sup> edition published in year 2009 /41/, there is only one large scale wind energy project in the state of Andhra Pradesh. This project was installed during 1999-2000, at a time when the Central tariff regime of MNES was applicable. The wind power projects governed by MNES policy were provided with the tariff of INR 2.25/kWh for the base year 1994-95 with a 5% annual escalation. The proposed project activity is being implemented under the latest tariff order issued by APERC /34/, which provides the tariff of INR. 3.50/kWh for 10 years under long term PPA /17/.



Hence it can be concluded that large scale wind energy projects are not a common practice in the state of Andhra Pradesh and the installation of such projects are feasible only with CDM benefit.

From the above discussion it can be concluded that the project is not a business-as-usual scenario and thus additional.

## 4.7 Monitoring

The project applies the approved monitoring methodology ACM0002 version 11, *Consolidated Baseline methodology for grid connected electricity generation from renewable sources* /25/. Given that the emission factor is calculated *ex-ante* and according to the monitoring methodology ACM0002 version 11, the data to be monitored is the net electricity supplied to the grid ( $EG_{PJ,y}$ ) by the project.

The net electricity supplied to the grid ( $EG_{PJ,y}$ ) is stated to be calculated from electricity exported by project activity to grid, after apportioning of transmission losses ( $EG_{Export,y}$ ) between the 33 kV and 132 kV metering points, electricity export recorded at 33 kV cluster metering points ( $EG_{pe}$ ), electricity import recorded at 33 kV cluster metering points ( $EG_{pi}$ ), electricity export recorded at 132 kV meters at Enercon pooling substation ( $EG_e$ ) and total percentage of transmission loss for export between the metering point at 33 kV metering points and the metering point at 132 kV at the Enercon pooling substation ( $Lep$ ).

The PP will make clusters of WEGs at the project site for the purpose of metering. Each cluster will have main and the check meter. All the clusters of the project activity will exclusively be connected to WEGs of the project activity - no WEGs of other project owners are connected to these clusters. The clusters of project activity and clusters of other customers are connected to the Enercon pooling sub-station at Ankireddypalli with a bulk metering point at 132 kV. State utility calculates the net electricity supplied to the grid at the 132 kV Enercon substation by apportioning of transmission loss to the meter reading recorded at the 33 kV. The total % of transmission loss for export between 132 kV metering point at Enercon sub-station and all the WEGs connected to sub-station is calculated by the state utility is endorsed jointly by the representatives of Enercon and the state utility. The transmission loss applied to the project activity by the state utility is reflected in transmission loss calculation sheet signed by the representatives of Enercon and state utility.

The procedure for calculation of the transmission loss is as follows:

Each project developer has dedicated individual metering systems at 33 kV. Energy export ( $X_{Export,N}$ ) and import ( $X_{Import,N}$ ) is recorded for the individual developers at 33 kV metering point; where N is number of project developers connected to 132 kV metering point of the Enercon substation. Total % of transmission loss for export ( $Lep$ ) is calculated as per following formula:

$$Lep (\%) = \frac{\{(X_{Export,1} + X_{Export,2} + X_{Export,3} + \dots + X_{Export,N}) - EG_e\} * 100}{(X_{Export,1} + X_{Export,2} + X_{Export,3} + \dots + X_{Export,N})}$$

The electricity exported by project activity to the grid after apportioning transmission losses between 33kV metering point (Cluster meter) & 132kV metering point (Bulk meter)





$$EG_{\text{export}, y} = EG_{pe} * (1 - Lep (\%))$$

The electricity export and import by the project activity is recorded in the joint meter reading report and can be cross checked from the certified statement of electricity export and import signed by Discom/State Utility.

Net Electricity supplied to the Grid is calculated as:

$$EG_{PJ,y} = EG_{\text{export}, y} - EG_{pi}$$

The monitoring plan stated in the PDD is feasible and the project participants have ability to implement it. The monitoring plan is in accordance with the monitoring methodology and will give opportunity for real measurements of achieved emission reductions. Since the project involves electricity generation from wind sources, no monitoring is required for project emissions or leakages due to the project activity.

The project monitoring plan is in compliance with the monitoring methodology ACM0002 (version 11).

It is DNV's opinion, that the project participant is able to implement the monitoring plan.

#### 4.7.1 Parameters determined ex-ante

Data available at the time of validation is the CO<sub>2</sub> emission factor of the southern grid, combined margin value, taken from version 5 of CEA published data in November 2009 /31/.

DNV has verified the value used against the sources and concluded that the data used are appropriate and conservative. This has been further described in section 4.8 of the report.

#### 4.7.2 Parameters monitored ex-post

The parameter that will be monitored *ex-post* are the net electricity exported to the grid by the project activity  $EG_{PJ,y}$ , electricity exported by project activity to grid after apportioning of transmission losses  $EG_{\text{export},y}$ , electricity Export recorded at 33kV cluster meter  $EG_{pe}$ , Electricity Import recorded at 33kV cluster meter  $EG_{pi}$ , electricity Export recorded at 132 kV meters  $EG_e$  and the transmission losses between the 33 kV and 132 kV metering points  $Lep$ .

#### 4.7.3 Management system and quality assurance

The main and check electricity meters of 0.2S class accuracy will be used. Monthly Joint Meter Readings will be recorded at all the meters (cluster meters and at pooling substations) by Discom utility in the presence of VIPCL/Enercon. Maintenance and calibration of electricity meters will be calibrated once in a year, which has been verified from the PPAs /17/.

EIL is responsible for the complete operation and maintenance of the power plant. EIL is an ISO 9001:2000 certified quality management system from Germanischer Lloyd. The meter readings are noted in the form of joint meter report and are signed jointly by the representatives of Enercon and the state utility.

The accuracy of monitoring parameter is ensured by adhering to the calibration and testing of the metering equipment once each year. Enercon provides the daily generation report to the project proponent. The project proponent also maintains the records of daily generation report and joint meter report.



The responsibilities and authorities for project management, procedures for monitoring and reporting, and QA/QC procedures have been established and formalized. The data monitored under the monitoring plan would be kept for 2 years after the end of crediting period or till the last issuance of CERs for this project activity, whichever occurs later.

#### 4.8 Algorithms and/or formulae used to determine emission reductions

The calculations and formulae as addressed in the approved baseline and monitoring methodology ACM0002 (version 11) have been applied. All aspects related to the direct and indirect GHG emissions as relevant to the project activity have been addressed and are presented in a transparent manner, in line with the approved methodology.

Baseline emission: The combined margin emission coefficient for the southern grid of India is 0.94515 tCO<sub>2</sub>e/MWh, has been derived from Central Electricity Authority data version 5 /31/. DNV verified that this is the latest version of CEA data available at the time of publishing the PDD for global stakeholder consultation. The CEA, Ministry of Power, Government of India has published a database of carbon dioxide emission factors from the power sector in India based on detailed authenticated information obtained from all operating power stations in the country. This database i.e. the 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 of 0.98756 tCO<sub>2</sub>e/MWh is calculated *ex-ante* using the simple OM approach based on the generation-weighted average emissions per electricity unit of all fossil-fuelled generating sources serving the system over a three year period of 2006-2007, 2007-2008 and 2008-2009. BM of 0.81792 tCO<sub>2</sub>e/MWh is calculated *ex-ante* based on 20% most recent capacity additions in the grid based on net generation as described in ACM0002. Actual calorific values of coal and lignite have been used and their emission factors were based on the values provided in India's Initial National Communication under the UNFCCC. For all other fuels, default emission factors were derived from the IPCC 2006 guidelines. In line with the "Tool to calculate the grid emission factor for an electricity system" /27/, the low end values of the 95% confidence intervals indicated by IPCC were used.

DNV was able to verify the value of combined margin from the OM and BM values for southern grid stated in the version 5 of Central Electricity Authority published data /31/.

The GHG emission reduction due to the project activity has been calculated as the product of net electricity exported to the grid and the combined margin grid emission factor. The electricity supplied to the grid will be measured by the main electricity meter and cross checked against check meter. Discom/state utility calculates the net electricity exported to the grid after accounting for the transmission and imports and issues a certified statement. The amount of net electricity supplied to the grid will be verified against the certified statement issued by the Discom/state utility.

The baseline emission estimate can be replicated using the data and parameter values referenced to in the PDD. The data sources mentioned have been verified by DNV. The emissions sources not foreseen by the methodology is unlikely to contribute more than 1% of the estimated emission reductions of the project.

Project emission: Project emissions are not applicable for the wind energy generators.





**Leakage:** It has been addressed and verified by DNV that no transfer of equipment has taken place in the project activity, thus leakage is not involved in the project activity as per the methodology.

Based on the calculations and results presented in the sections above the implementation of the project activity will result in an average *ex-ante* estimation of emission reduction conservatively calculated to be 92 971 tCO<sub>2</sub>e per year for the selected crediting period.

All assumptions and data used by the project participants are listed in the PDD and/or supporting documents, including their references and sources. All documentation used by the project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PDD. All values used in the PDD are considered reasonable in the context of the proposed CDM project activity. The baseline methodology has been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions. All estimates of the baseline, project and leakage emissions can be replicated using the data and parameter values provided in the PDD.

## 4.9 Environmental impacts

As per the Ministry of Environment and Forests (MoEF), notification S.O. 1533 dated 14 September 2006 /33/, wind power projects are not covered under any Schedule and thus EIA is not required for the project activity. Further, the proposed project being a wind energy generation, no adverse impact on the environment is envisaged from the project activity. Thus, the project activity is expected to have only beneficial impacts and no adverse impacts are foreseen. All the PPAs /17/, land lease agreements /22/, approval of APTRANSCO for power evacuation /8/, approval of NEDCAP for transfer of 50.4 MW from EIL to VIPCL /9/, agreement with NEDCAP to set up 50.4 MW wind farm at the project site /10/ etc. have been provided and verified by DNV.

## 4.10 Comments by local stakeholders

The project participants have conducted stakeholders meeting at the project site on 27 February 2010 /20/. The stakeholders were invited through invitation letters /21/. The meeting was attended among others by project participant, employees of EIL, village panchayat members, representatives from NEDCAP and APTRANSCO and local residents. The copy of the minutes of the stakeholder meeting /20/ and photographs were made available for verification. There were no negative comments from the participants.

DNV considers the local stakeholder consultation carried out is adequately.

## 4.11 Comments by Parties, stakeholders and NGOs

The PDD, version 01 dated 31 May 2010, was made publicly available on the CDM website <http://cdm.unfccc.int/Projects/Validation/DB/C9CVJJABGUR4SNKEH591BYS9F108F3/view.html> and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 10 June 2010 to 9 July 2010.

No comments were received.

APPENDIX A

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CDM VALIDATION PROTOCOL

**Table 1 Mandatory requirements 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	OK
2. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC.	Kyoto Protocol Art.12.2.	<del>CAR-1</del> 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 with Kyoto Protocol Article 5 and 7.	CDM Modalities and Procedures §31b	NA
<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	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	<del>CL-4</del> <del>CL-5</del>

Requirement	Reference	Conclusion
anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.		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	OK
<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. 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	Assessment by DNV	Draft Concl.	Final Concl.
<b>A General description of project activity</b>						
<b>A.1 Title of the project activity (VVM para 55-57)</b>						
A.1.1	Does section A.1 of the PDD include a clearly identifiable project title, version number of the PDD and date of the PDD?	/1/	DR	<input checked="" type="checkbox"/> Clearly identifiable title of the project activity <input checked="" type="checkbox"/> Version number of the PDD is included <input checked="" type="checkbox"/> Date of the PDD is included.		OK
A.1.2	Is the PDD is in accordance with the applicable requirements for completing PDDs?	/1/	DR	<input checked="" type="checkbox"/> Yes <i>If no, list where the PDD is not in accordance:</i>		OK
<b>A.2 Description of the project activity (VVM para 58-64)</b>						
A.2.1	How was the design of the project assessed?	/1/	DR	<i>What type is the project?</i> <input type="checkbox"/> Project in existing facility or utilizing existing equipment(s) <input checked="" type="checkbox"/> Large scale project <input type="checkbox"/> bundled small scale projects, each with emission reductions not exceeding 15 000 tCO <sub>2</sub> e per year <input type="checkbox"/> individual small scale project activity with emission reductions not exceeding 15 000 tCO <sub>2</sub> e per year <input checked="" type="checkbox"/> Greenfield project  <i>How was the design of the project assessed?</i> <input checked="" type="checkbox"/> Physical site inspection <input checked="" type="checkbox"/> Reviewing available designs and feasibility studies		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				<p>The proposed CDM project activity entails installation of 63 numbers of Wind Energy Generators each of 800 kW capacities (E-53 model) totaling 50.4 MW. The WEGs to be installed under the project have been designed, installed and commissioned by Enercon India Limited. The electricity generated will be exported to the southern grid of India.</p> <p>The site visit of the project was done on 29 July 2010.</p>		
A.2.2	If a greenfield project, describe the physical implementation of the project when the validation was commenced.	/1/	DR	During the site visit, civil foundation works, installation and commissioning of wind energy generators and transmission lines were seen progressing at the site.		OK
A.2.3	If physical site visits were performed based on sampling (only applicable for bundled small scale projects, each with emission reductions not exceeding 15 000 tCO <sub>2</sub> e per year), justify the sampling through a statistical analysis:	/1/	DR	Not applicable since the project activity is not a bundled small scale project.		OK
A.2.4	Is the description of the proposed CDM project activity as contained in the PDD sufficiently covers all relevant elements, is accurate and that it provides the reader with a clear understanding of the nature of the proposed CDM project activity?	/1/	DR	<p>Yes. The proposed CDM project activity entails installation of 63 numbers of Wind Energy Generators each of 800 kW capacities (E-53 model) totaling 50.4 MW. The electricity generated will be exported to the southern grid of India.</p> <p>Unique identification number of WEGs and their geographical co-ordinates to be indicated in the PDD. Name of the substations to which the project activity are connected also to be indicated.</p>	CL-1	OK
A.2.5	Does the project activity involve alteration of existing installations? If so, have the differences between pre-project and post-project activity been clearly described in the PDD?	/1/	DR	The project is a green field project activity and so this is not applicable.		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A.2.6	Does the project design engineering reflect current good practices?	/1/ /36/	DR	The wind farm utilizes 63 machines of Enercon model E-53 WEG of 800 kW capacities which are approved by Centre for Wind Energy Technology, Government of India.		OK
A.2.7	Would the technology result in a significantly better performance than any commonly used technologies in the host country? Is any transfer of technology from any Annex-I Party involved?	/1/ /6/	DR	Yes. The equipment supply and erection are by suppliers and contractors who are experienced in the field. There is no technology transfer from Annex-I party.		OK
<b>A.3 Participation requirements (VVM para 51-54, 123-125)</b>						
A.3.1	Do all participating Parties fulfil the participation requirements as follows:  a) Party has ratified the Kyoto Protocol b) Party has designated a Designated National Authority c) The assigned amount has been determined	/1/ /23/	DR	Letter of Approval from the DNA of India need to be presented for verification.  India (host) <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	<del>CAR-1</del>	OK
A.3.2	Do the letters of approval meet the following requirements?  a) LoA confirms that Party has ratified the Kyoto Protocol b) LoA confirms that participation is voluntary c) The LoA confirms that the project contributes to the sustainable development of the host country? d) The LoA refers to the precise project activity title in the PDD e) The LoA is unconditional with respect to (a) to (d) above f) The LoA is issued by the respective Party's DNA g) The LoA was received directly by the DNA or the PP h) In case of doubt regarding the authenticity of the letter of	/1/ /23/	DR	India (host) <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> DNA <input type="checkbox"/> PP	<del>CAR-1</del>	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
approval, describe how it was verified that the letter of approval is authentic					
A.3.3 Have all private/public project participants been authorized by an involved Party?	/1/	DR	Letter of Approval from the DNA of India need to be presented for verification.	<del>CAR-I</del>	OK
<b>A.4 Technical description of the project activity (VVM para 58-64)</b>					
A.4.1 Is the project's location clearly defined?	/1/	DR	Yes, the project's spatial boundaries are defined. The project activity is spread across Petnikota, Tummalapenta, Itikyala, Abdullapuram, Chintalayapalli, Venkatampalli & Bhogasamudram villages in Kurnool district in state of Andhra Pradesh, India.  Unique identification number of WEGs and their geographical co-ordinates to be indicated in the PDD. Name of the substations to which the project activity are connected also to be indicated.	<del>CL-I</del>	OK
<b>A.5 Public funding of the project activity</b>					
A.5.1 In case public funding from Parties included in Annex I is used for the project activity, have these Parties provided 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?	/1/ /16/	DR	The project does not involve any public funding and hence no diversion of funds from official development assistance is expected. VIPCPL has also given an undertaking on non usage of official development assistance for the project activity.		OK
<b>B Application of a baseline and monitoring methodology</b>					
<b>B.1 Methodology applied (VVM para 65-76)</b>					
B.1.1 Does the project apply an approved methodology and the correct version thereof?	/1/ /25/	DR	The project correctly applies the approved baseline methodology "Consolidated baseline methodology for grid-connected electricity		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				generation from renewable sources” ACM 0002, version 11 for large scale CDM projects.		
<b>B.2 Applicability of methodology (and tools) (VVM para 65-76)</b> <i>Insert a row for each applicability criteria of the applied methodology (and tools)</i>						
B.2.1	How was it validated that project complies with the following applicability criteria: The methodology is applicable to grid connected renewable power generation project activities that (a) install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s).	/1/ /25/	DR	The project activity is installation of WEG for generation of power from wind energy to supply to the grid and is a green field project.		OK
B.2.2	How was it validated that project complies with the following applicability criteria: The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit;	/1/ /25/	DR	The project activity is a green field project that uses wind energy to generate electricity and so this clause is not applicable.		OK
B.2.3	How was it validated that project complies with the following applicability criteria: In the case of capacity additions, retrofits, replacements: the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the	/1/ /25/	DR	The project activity is a green field project that uses wind energy to generate electricity and so this clause is not applicable		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
project activity.						
B.2.4	How was it validated that project complies with the following applicability criteria: The methodology is not applicable to the following a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site b) Biomass fired power plants c) Hydro power plants that result in new reservoir or increase in existing reservoirs where the power density of the power plant is less than 4 W/m <sup>2</sup> .	/1/ /25/	DR	The project activity is a green field project that uses wind energy to generate electricity and so this clause is not applicable		OK
B.2.5	Is the selected baseline on of the baseline(s) described in the methodology and this hence confirms the applicability of the methodology?	/1/ /25/	DR	Yes. The baseline selected is the equivalent addition of new generation capacity to the grid generating emissions in the absence of the project activity.		OK
<b>B.3 Project boundary (VVM para 77-79)</b>						
B.3.1	What are the project's system boundaries (components and facilities used to mitigate GHGs)? Are they clearly defined and in accordance with the methodology?	/1/	DR	Yes, the project's spatial boundaries are defined. The project activity is spread across Petnikota, Tummalapenta, Itikyala, Abdullapuram, Chintalayapalli, Venkatampalli & Bhogasamudram villages in Kurnool district in state of Andhra Pradesh, India. The spatial boundary of the project also includes transmission network for the evacuation of electricity to the southern grid of India, to which the project activity is connected.		OK
B.3.2	Which GHG sources are identified for the project? Does the identified boundary cover all possible sources linked to the project activity? Give reference to documents considered to arrive at this conclusion.	/1/ /6/ /31/	DR/I	The project system boundaries are clearly defined and consist of the 63 machines of Enercon model E-53 WEG of 800 kW capacities each. The spatial boundary also includes the southern regional grid of India to which the project is connected. This is as per the version 5 of CEA data.		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				Since the power is being generated from wind energy there are no GHG emission sources in the project activity.		
B.3.3	Does the project involve other emissions sources not foreseen by the methodologies that may question the applicability of the methodology? Do these sources contribute with more than 1% of the estimated emission reductions of the project?	/1/	DR/I	No. The project activity is generation of electricity for supply to grid using wind energy and so does not involve any other emission source not foreseen by the methodology.		OK
<b>B.4 Baseline scenario determination (VVM para 80-87, 103-105)</b>						
B.4.1	Which baseline scenarios have been identified? Is the list of baseline scenarios complete?	/1/	DR/I	Yes the baseline alternatives identified are inline with applied methodology ACM0002 version 11 and tool to demonstrate additionality version 5.2. As per the tool to demonstrate additionality version 5.2 in context of approved consolidated methodology ACM0002, project proponent only need to identify that there is at least one credible and feasible alternative that would be more attractive than the proposed project activity. Inline with tool and methodology project proponent has identified following alternatives: <ul style="list-style-type: none"> <li>• Project activity not taken up as CDM project he project.</li> <li>• Equivalent amount of electricity being generated through operation of grid-connected power plants and addition of new generation sources.</li> </ul>		OK
B.4.2	How have the other baseline scenarios been eliminated in order to determine the baseline?	/1/	DR/I	According to the methodology, there is only one baseline scenario. Hence this is not applicable.		OK.
B.4.3	What is the baseline scenario?	/1/ /31/	DR/I	The baseline scenario identified is the emissions generated by the operation of grid-connected power plants and by the addition of new		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
		/27/		generation sources, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system”. The combined margin emission factor for the southern regional grid of India has been sourced from CEA database version 05.		
B.4.4	Is the determination of the baseline scenario in accordance with the guidance in the methodology?	/1/ /25/	DR	Yes the baseline scenario identified is inline with applied methodology ACM0002 version 11.		OK
B.4.5	Has the baseline scenario been determined using conservative assumptions where possible?	/1/ /25/	DR	Yes the baseline scenario identified is inline with applied methodology ACM0002 version 11.		OK
B.4.6	Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/ /25/	DR	Yes, national and sectoral policies have been taken into consideration for selecting the baseline scenario.		OK
B.4.7	Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/ /25/ /31/	DR	The combined margin emission factor for the southern regional grid of India has been sourced from CEA database version 05 and the value applied is 0.94515 tCO <sub>2</sub> e/MWh.		OK
B.4.8	Is the baseline determination adequately documented in the PDD? <ul 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> </ul>	/1/ /25/ /27/ /31/	DR	Inline with the applied methodology ACM0002 version 11, the baseline scenario identified 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 system”. The combined margin emission factor for the southern regional grid of India has been sourced from CEA database version 05 and the value applied is 0.94515 tCO <sub>2</sub> e/MWh.		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
<ul style="list-style-type: none"> <li>The methodology has been correctly applied to identify what would occurred in the absence of the proposed CDM project activity</li> </ul>					
<b>B.5 Additionality determination (VVM para 93-119)</b>					
B.5.1 What approach/tool does the project use to assess additionality? Is this in line with the methodology?	/1/ /26/	DR	The tool for demonstration and assessment of additionality version 5.2 has been used. Yes this is in line with the methodology		OK
B.5.2 Have the regulatory requirements correctly been taken into account to evaluate the project activity and the alternatives?	/1/	DR	Yes the regulatory requirements have been taken into account to evaluate the alternatives to the project activity.		OK
B.5.3 Is sufficient evidence provided to support the relevance of the arguments made?	/1/	DR	Yes. The relevant approvals have been provided for verification and this has been verified and found to be in order by DNV.		OK
B.5.4 What is the project additionality mainly based on (Investment analysis or barrier analysis)?	/1/ /18/ /19/	DR	The project additionality has been mainly based on investment analysis.		OK
<b>Prior consideration of CDM (VVM para 96-102)</b>					
B.5.5 What is the evidence for serious consideration of CDM prior to the time of decision to proceed with the project activity?	/1/ /6/ /12/ /13/ /32/	DR	The start date of the project activity (5 December 2009) is after 2 August 2008 and the PP has notified the DNA and UNFCCC of the intention to seek CDM status for the project activity on 24 March 2010 and 4 May 2010 respectively. The confirmation email was received from DNA and UNFCCC on 6 April 2010 and 4 June 2010 respectively. This demonstrates prior consideration of CDM for the project activity.		OK
B.5.6 If the starting date is after 2 August 2008 and before the global stakeholder consultation, has the DNA and UNFCCC confirmed that the project participants have informed in writing of the project's intention to seek CDM status?	/1/ /6/ /12/ /13/	DR	The start date of the project activity (5 December 2009) is after 2 August 2008 and the PP has notified the DNA and UNFCCC of the intention to seek CDM status for the project activity on 24		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	/32/		March 2010 and 4 May 2010 respectively. The confirmation email was received from DNA and UNFCCC on 6 April 2010 and 4 June 2010 respectively. This demonstrates prior consideration of CDM for the project activity.		
<b>Continuous efforts to secure CDM status</b> (only to be completed if starting date is before 2 August 2008)					
B.5.7 What initiatives were taken by the project participants from the starting date of the project activity to the start of validation in parallel with the physical implementation of the project activity?	/1/ /6/	DR	The start date of the project activity is 5 December 2009, which is after 2 August 2008 and so this is not applicable.		OK
B.5.8 When did the construction of the project activity start?	/1/ /6/	DR	The start date of the project activity is 5 December 2009, which is after 2 August 2008 and so this is not applicable.		OK
B.5.9 When was the project commissioned?	/1/	DR	The start date of the project activity is 5 December 2009, which is after 2 August 2008 and so this is not applicable.		OK
B.5.10 Does the timeline of the project confirm that continuous actions in parallel with the implementation were taken to secure CDM status?	/1/	DR	The start date of the project activity is 5 December 2009, which is after 2 August 2008 and so this is not applicable.		OK
<b>Investment analysis (VVM para 106-112)</b> <i>The list of questions below must be adjusted to the parameters in the investment analysis relevant to the project under validation.</i>					
B.5.11 Does the project activity or any of the remaining alternatives generate revenues apart from CDM? Is this reflected in the PDD?	/1/ /18/ /26/	DR	Yes. The project activity generates revenue from sale of power to the grid and the same is mentioned in the PDD.		OK
B.5.12 Do any of the alternatives to the project activity involve investment? Is this reflected in the PDD?	/1/	DR	Yes. The alternative to the project activity does require investment and this is indicated in the PDD.		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.5.13 Is the choice of benchmark analysis, investment comparison or simple cost analysis correct?	/1/ /19/ /26/	DR	Yes. The benchmark analysis has been chosen by PP to demonstrate the additionality of the project. However, further elaboration on sub-step 2a and 2b of the additionality tool in selecting the choice of investment analysis need to be presented in the PDD. The details of the benchmark calculation including the risk free rate, equity returns and beta values applied also need to be detailed in the PDD.	<del>CAR-2</del>	OK
B.5.14 Is the benchmark/discount rate the latest available at the time of decision?	/1/ /19/ /28/	DR	The cost of equity is stated to be used as benchmark for the project. The PLR and equity returns considered are that at the time of decision making.		OK
B.5.15 What is the financial indicator? Is it on equity/project basis? Before/after tax? Is the financial indicator in correspondence with the benchmark?	/1/ /18/	DR	The financial indicator selected by the PP for the investment analysis is the post tax equity-IRR. However, the use of post tax equity-IRR as the benchmark need to be justified, since the equity portion is only 30%.	<del>CAR-2</del>	OK
B.5.16 Are the underlying assumptions appropriate, e.g. what is considered as waste in the baseline is considered to have zero value?	/1/	DR	This is not applicable as the project activity is electricity generation from wind energy.		OK
B.5.17 Does the income tax calculation take depreciation into account? Is the depreciation year in accordance with normal accounting practice in the host country?	/1/ /37/	DR	Yes. Income tax calculation considers depreciation as permissible under the income tax act. The depreciation considered is as per the accounting practice allowable for such type of projects as per the Income tax act.		OK
B.5.18 Is the time period of the investment analysis and operating time of the project realistic? Has salvage value been taken into account? Is working capital returned in the last year of operation?	/1/ /3/	DR	20 years operating life has been considered which is realistic for WEG. Enercon has given an undertaking on this. Salvage value has been added back during the 20 <sup>th</sup> year. The working capital has also been added back in the last year of operation.		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.5.19	When a feasibility study report or similar approved by the government is used as the basis for the investment analysis: Can it be confirmed that the values used in the PDD are fully consistent with the FSR and is the period of time between finalization of the FSR and the investment decision adequate?	/1/ /4/ /5/	DR	The investment decision was made on the basis of the detailed project report (DPR). However, in India, the DPR does not require the approval of the government. The DPR for the project activity was prepared on 26 November 2009, whereas the purchase order was placed on 5 December 2009. Considering the short period of time between the DPR and the decision to proceed with the project activity, it is reasonable to assume that the DPR was the basis for the investment decision. The value of PLF indicated in the DPR (22.12%) and the PDD (22.28%) are different.	<del>CL-2</del>	OK
B.5.20	How was the amount of output (e.g. sales of electricity) assessed? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/ /11/	DR	<input type="checkbox"/> The plant load factor provided to banks and/or equity financiers while applying the project activity for project financing, or to the government while applying the project activity for implementation approval <input checked="" type="checkbox"/> The plant load factor determined by a third party contracted by the project participants (e.g. an engineering company) <input type="checkbox"/> Other approach. The PLF is determined by C-WET, the third party engaged by the PP. Copy of the report of C-WET was provided for verification. However, the reasons for the difference in the value of PLF indicated in the DPR (22.12%) and in the report of C-WET (22.28%) used in the investment analysis need to be clarified.	<del>CL-2</del>	OK
B.5.21	How was the output price (e.g. electricity price) assessed? Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in	/1/ /38/	DR	<input type="checkbox"/> Cross-check against third-party or publicly available sources (e.g. invoices or price indices) <input type="checkbox"/> Review of feasibility reports, public announcements and annual financial reports	<del>CL-3</del>	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
accordance with VVM paragraph 95.			<p>related to the project and the project participants</p> <p>The electricity tariff considered is based on the latest tariff order of APERC as at the time of decision making.</p> <p>However, APERC order fixes the tariff for first 10 years only. The basis for tariff used in financial analysis for the years 11 to 20 needs to be provided.</p>		
B.5.22 How were the investment costs assessed? Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/ /2/ /4/ /6/	DR	<input type="checkbox"/> Cross-check against third-party or publicly available sources (e.g. invoices or price indices) <input checked="" type="checkbox"/> Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants <p>The investment costs were assessed based on the offer from Enercon for the supply of WEGs and the DPR. It was cross checked against the purchase order placed on Enercon.</p>		OK
B.5.23 How were the O&M costs assessed? Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/ /2/ /4/	DR	<input type="checkbox"/> Cross-check against third-party or publicly available sources (e.g. invoices or price indices) <input checked="" type="checkbox"/> Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants <p>The other input parameters were also sourced from DPR and are relevant at the time of decision. The references to the input parameters are indicated in the PDD and IRR spreadsheet.</p> <p>The O&amp;M costs were assessed based on the offer from Enercon for the same and with that considered in the DPR.</p> <p>However, the copies of the PPA and O&amp;M</p>	<del>CL</del> 4	OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				contract awarded need to be submitted for verification.		
B.5.24	Describe the assessment of the other input parameters. Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/ /4/ /15/	DR	<input type="checkbox"/> Cross-check against third-party or publicly available sources (e.g. invoices or price indices) <input checked="" type="checkbox"/> Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants The other input parameters such as debt to equity ratio, interest on loan, depreciation and salvage value were also sourced from DPR and are relevant at the time of decision. The references to the input parameters are indicated in the PDD and IRR spreadsheet. However, the mismatch in the loan re-payment period of 12 years stated in the loan sanction letter of IDFC and 10 years considered in the DPR and financial analysis needs to be clarified. It needs to be clarified whether all the available incentives have been considered and why the generation based incentive of Rs. 0.50/kWh is not considered in the financial analysis.	<del>CL</del> 4	OK
B.5.25	Was the financial calculation spreadsheet verified and found to be correct?	/1/ /18/	DR	The financial calculation spread sheet has been checked and clarifications raised.		OK
B.5.26	Sensitivity analysis: Have the key parameters contributing to more than 20% of the revenue/costs during operating or implementation been identified? Has possible correlation between the parameters been considered?	/1/ /18/	DR	PP has carried a sensitivity analysis to analyse the effect of $\pm 10\%$ variation in electricity generation, debt equity ratio and capital cost of the project. Sensitivity analysis of the major identified parameters to be performed till the point at which they reach the benchmark and provide the justification on why such a scenario is unlikely. The sensitivity analysis also to be done for tariff	<del>CL</del> 4	OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				since the tariff is fixed for a period of 10 years only.		
B.5.27	Sensitivity analysis: Is the range of variations is reasonable in the project context?	/1/ /18/	DR	Please refer to B.5.26	<del>CL</del> 4	OK
B.5.28	Have the key parameters been varied to reach the benchmark and the likelihood of this to happen been justified to be small?	/1/ /18/	DR	Please refer to B.5.26	<del>CL</del> 4	OK
<b>Barrier analysis (VVM para 113-116)</b>						
B.5.29	Are the barriers identified complimentary to a potential investment analysis? Does the barrier have a clear impact on the financial returns so that it can be assessed in an investment analysis? Each barrier is discussed separately.	/1/	DR	PP has not identified other barriers for the project activity.		OK
B.5.30	How were the <u>investment barriers</u> assessed to be real? Are the investment barriers substantiated by a source independent of the project participants?	/1/	DR	The project does face barrier due to insufficient financial returns.		OK
B.5.31	How does CDM alleviate the investment barriers?	/1/ /18/	DR	Revenues from CDM help to improve the returns from the project activity and bridge the gap with the benchmark.  The IRR with CDM need to be presented in the PDD and excel sheet and the same to be compared with the bench mark. Furthermore, justification for investing in unviable projects need to be provided.	<del>CL</del> 4	OK
B.5.32	Is the project activity prevented by the investment barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	The project activity does face investment barrier and none of the possible alternatives to the project activity are feasible under the same circumstances.		OK
B.5.33	How were the <u>technological barriers</u> assessed to be real? Are the technological barriers substantiated by a source independent of the project participants?	/1/	DR	The project activity does not face any technological barrier and so this is not applicable.		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.5.34 How does CDM alleviate the technological barriers?	/1/	DR	The project activity does not face any technological barrier and so this is not applicable.		OK
B.5.35 Is the project activity prevented by the technological barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	The project activity does not face any technological barrier and so this is not applicable		OK
B.5.36 How were the <u>barriers due to prevailing practise</u> assessed to be real? Are the barriers due to prevailing practise substantiated by a source independent of the project participants?	/1/	DR	The project activity does not face any barrier due to prevailing practice and so this is not applicable.		OK
B.5.37 How does CDM alleviate the barriers due to prevailing practise?	/1/	DR	The project activity does not face any barrier due to prevailing practice and so this is not applicable.		OK
B.5.38 Is the project activity prevented by the barriers due to prevailing practise and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	The project activity does not face any barrier due to prevailing practice and so this is not applicable.		OK
B.5.39 How were the <u>other barriers</u> assessed to be real? Are the other barriers substantiated by a source independent of the project participants?	/1/	DR	The project activity does not face any barrier due to prevailing practice and so this is not applicable.		OK
B.5.40 How does CDM alleviate the other barriers?	/1/	DR	The project activity does not face any barrier due to prevailing practice and so this is not applicable.		OK
B.5.41 Is the project activity prevented by the other barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	The project activity does not face any barrier due to prevailing practice and so this is not applicable.		OK
<b>Common practice analysis (VVM para 117-119)</b>					
B.5.42 What is the geographical scope of the common practice analysis? Is this justified?	/1/	DR	The geographical scope considered is the wind mill project of above 15MW in the state of Andhra Pradesh.		OK
B.5.43 What is the scope of technology and size (e.g. capacity of power plant) for the common practice analysis and how has	/1/	DR	The choice of the capacity is projects having total wind mill capacity of 15 MW and above.		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
this been justified?						
B.5.44	What is the data source(s) used for the common practice analysis?	/1/	DR	The data source used for common practice analysis needs to be specified in the PDD.	<del>CL-5</del>	OK
B.5.45	How many similar non-CDM-projects exist in the region within the scope?	/1/	DR	There is only one non CDM project within the specified scope, RCI Power Ltd., having a capacity of 16 MW.		OK
B.5.46	How were possible essential distinctions between the project activity and similar activities assessed?	/1/	DR	The particular project was set up under the MNES policy with the tariff of INR 2.25 per unit for the base year 1994-95 with a 5% annual escalation, whereas the project activity being set up is with a fixed tariff of INR 3.5 for 10 years.		OK
B.5.47	What is the conclusion of the common practice analysis?	/1/	DR	To conclude after receipt of the data and clarifications sought from the PP and its subsequent analysis.	<del>CL-5</del>	OK
<b>Conclusion</b>						
B.5.48	What is the conclusion with regard to the additionality of the project activity?	/1/	DR	To conclude after receipt of the data and clarifications sought from the PP and its subsequent analysis.	<del>CL-4</del> <del>CL-5</del> CAR-2	OK
<b>B.6 Calculations of GHG emission reductions</b>						
<b>Data and parameters that are available at validation and that are not monitored (VVM para 198-200)</b>						
B.6.1	How was the $EF_{OM,y}$ Operating Margin Emission Factor of southern Electricity Grid verified?	/1/ /31/	DR	The OM emission factor has been computed using the simple OM approach based on the generation-weighted average emissions per electricity unit over a three year period of 2006-2007, 2007-2008 and 2008-2009 available in the CEA database version 5, for the southern grid. The <i>ex-ante value</i> is 0.98756 t CO <sub>2</sub> /MWh. DNV verified the website of CEA and find the calculation to be in order.		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.6.2	How was the $EF_{BM,y}$ Build Margin Emission Factor of the southern Electricity Grid verified?	/1/ /31/	DR	The BM emission factor using the simple OM approach in accordance with "Tool to calculate the emission factor for an electricity system from CEA database version 5. The <i>ex-ante</i> value for the southern electricity grid is 0.81792 t CO <sub>2</sub> /MWh. DNV verified the website of CEA and find the calculation to be in order.		OK
B.6.3	How was the $EF_y$ Emission Factor for the southern grid of India verified?	/1/ /31/	DR	The baseline emission factor for the project has been calculated as the weighted average of the operating margin (OM) and the build margin (BM) in the ratio of 75:25 as applicable for wind projects. The CM thus arrived is 0.94515 t CO <sub>2</sub> /MWh. DNV verified the calculation and found it to be in order.		OK
B.6.4	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /31/	DR	<p>Baseline emissions have been estimated as the product of net electricity supplied to the southern regional grid by the project activity per year and grid emission factor of the southern regional grid, which has been obtained from the official website of the Central Electricity authority (CEA) <i>CO<sub>2</sub> Baseline Database for the Indian Power Sector User Guide - Version 5.0.</i></p> <p>Baseline emission factor for the southern regional grid is established ex-ante based on the approved methodology using a combined margin approach consisting 75% operating margin and 25% build margin approach.</p> <p>The baseline emission factor for the project has been calculated as the weighted average of the operating margin (OM) and the build margin (BM) in the ratio of 75:25 as applicable for wind</p>		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				projects. The CM thus arrived is 0.94515 t CO <sub>2</sub> /MWh.		
<b>Baseline emissions (VVM para 88-92)</b>						
B.6.5	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	Yes. The baseline emission calculations is in accordance with the baseline methodology		OK
B.6.6	Have conservative assumptions been used when calculating the baseline emissions?	/1/	DR	Yes. Conservative assumptions have been used while calculating the baseline emissions.		OK
B.6.7	Are uncertainties in the baseline emission estimates properly addressed?	/1/	DR	There are no uncertainties in the baseline emissions.		OK
<b>Project emissions (VVM para 88-92)</b>						
B.6.8	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	Since the project activity is electricity generation from wind energy there is no project GHG emission and this complies with the methodology with respect to project emission computation.		OK
<b>Leakage (VVM para 88-92)</b>						
B.6.9	Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	This is not applicable as the project activity is electricity generation from wind energy.		OK
<b>Emission Reductions (VVM para 88-92)</b>						
B.6.10	Algorithms and/or formulae used to determine emission reductions: <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 of the project activity</li> <li>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</li> </ul>	/1/	DR	All the assumptions and data used by the project participants are listed in the PDD and the data are properly referenced.		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
submitted for registration.						
<b>B.7 Monitoring plan (VVM para 120-122)</b>						
<b>Data and parameters monitored</b>						
B.7.1	Do the means of monitoring described in the plan comply with the requirements of the methodology?	/1/	DR	Yes. The monitoring described meets the requirement of the methodology. However, it needs to be substantiated that the monitoring procedure stated in the PDD is in accordance with the PPA and the billing methodology of the APTRANSCO.	<del>CL-6</del>	OK
B.7.2	Does the monitoring plan contains all necessary parameters, and are they clearly described?	/1/	DR	Yes. The monitoring plan contains all parameters that are to be monitored and are clearly described.		OK
B.7.3	In case parameters are measured, is the measurement equipment described? Describe each relevant parameter.	/1/	DR	Yes. All energy meters (main and check meter) used for metering in the project activity are of 0.5%/0.2% accuracy class and are of electronic trivector type meters. It needs to be clarified whether the accuracy class of the meters proposed to be used for monitoring is 0.2 or 0.5 class. Whether main and check meters are provided for the individual WEGs or a common meter is provided for a group of WEGs also needs to be clarified.	<del>CL-7</del>	OK
B.7.4	In case parameters are measured, is the measurement accuracy addressed and deemed appropriate? Describe each relevant parameter.	/1/	DR	The measurement accuracy is adequate for the measurement of electricity fed to the grid and is in keeping with the practice adopted for such measurements in the region. It needs to be clarified whether the accuracy class of the meters proposed to be used for monitoring is 0.2 or 0.5 class.	<del>CL-7</del>	OK
B.7.5	In case parameters are measured, are the requirements for maintenance and calibration of measurement equipment described and deemed appropriate? Describe each relevant	/1/	DR	It is mentioned that officials of the state utility carries out the calibration and periodical testing of the meter. It is also stated that the frequency of		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
parameter.				meter testing is annual.		
B.7.6	Is the monitoring frequency adequate for all monitoring parameters? Describe each parameter.	/1/	DR	<p>The electricity fed to the grid is measured continuously and this is adequate. The joint meter reading at sub station taken every month forms the basis for determining the quantity of electricity fed to the grid.</p> <p>The parameters monitored are:</p> <p>(a) The electricity export and import recorded at 33 kV metering point connecting 63 machines of the project activity (<b>EGpe &amp; EGpi.</b>)</p> <p>(b) The electricity export and import recorded at 220 kV at ENERCON substation, connecting machines of the other project developers also (<b>EGe &amp; EGj.</b>)</p> <p>(c) The transmission loss calculated for export and import between the metering point at 33 kV level and the metering point at 220 kV at the Enercon substation (<b>Le &amp; Li.</b>)</p> <p>(d) The net electricity supplied to the grid by the project (<b>EGy.</b>)</p>		OK
B.7.7	Is the recording frequency adequate for all monitoring parameters? Describe each parameter.	/1/	DR	The electricity generation is measured and captured on real time basis and recorded monthly.		OK
<b>Ability of project participants to implement monitoring plan</b>						
B.7.8	How has it been assessed that the monitoring arrangements described in the monitoring plan are feasible within the project design?	/1/	DR	The monitoring arrangements detailed in the PDD are executable.		OK
B.7.9	Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)?			Yes. For the operation and maintenance of the facility contract has been entered with Enercon (India) Limited.	<del>CAR-3</del>	OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				The QA/QC procedures indicated in Annex 4 need to be further formalized by including the roles and responsibilities of the officials of Enercon and PP, data archival, internal audits, procedures to correct erroneous readings etc.		
B.7.10	Are the data management and quality assurance and quality control procedures sufficient to ensure that the emission reductions achieved by/resulting from the project can be reported ex post and verified?	/1/	DR	Yes. The systems and procedures detailed are adequate to ensure the verification of emissions reductions from the project activity.		OK
B.7.11	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/	DR	Please refer to B.7.9	<del>CAR-3</del>	OK
<b>Monitoring of sustainable development indicators/ environmental impacts</b>						
B.7.12	Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country?	/1/	DR	The recent DNA approvals for large scale CDM projects in India mentions that 2% of the revenue be spent for sustainable development, including society/community development. Accordingly, action plan for the same is required to be made and included in the PCN & PDD.  The DNA approval and PCN needs to be submitted for verification. Further, the action plan needs to be included in the PDD.	<del>CAR-1</del> <del>CL-8</del>	OK
B.7.13	Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR	The monitoring plan does not provide for the collection and archiving of relevant data concerning environmental, social and economic impacts and this is not warranted by the current legislation.  The action plan for monitoring 2% of the CER revenue to be spent on sustainable development	<del>CL-8</del>	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			activities for the local population needs to be presented in the PDD and provide a copy of the PCN for verification.		
B.7.14 Are the sustainable development indicators in line with stated national priorities in the host country?	/1/	DR	The Letter of approval from the DNA of India needs to be submitted for verification	CAR-1	OK
<b>C Duration of the project activity / crediting period</b>					
<b>C.1.1 Start date of project activity (VVM para 96-97, 102)</b>					
C.1.2 How has the starting date of the project activity been determined? What are the dates of the first contracts for the project activity? When was the first construction activity?	/1/	DR	The start date of the project activity is stated to be 5 December 2009, which is the date of issue of work order for supply of WEGs.		OK
C.1.3 Is the stated expected operational lifetime of the project activity reasonable?	/1/ /3/	DR	Operational lifetime of the project has been mentioned as 20 years which is reasonable and has been verified by DNV from certificate provided by technology supplier.		OK
C.1.4 Is the start date, the type (renewable/fixed) and the length of the crediting period clearly defined and reasonable?	/1/	DR	The start date of the crediting period is 1 July 2011 or registration date whichever is later. PP has opted for a fixed crediting period of 10 years duration.		OK
<b>D Environmental Impacts (VVM para 129-131)</b>					
D.1.1 Are there any host country requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved? Does the approval contain any conditions that need monitoring?	/1/ /8/ /10/	DR	Indian legislation in vogue does not warrant an EIA to be done for this type of project activity. The PP has provided copies of agreement with NEDCAP to set up the wind farm and power evacuation agreement with APTRANCO.		OK
D.1.2 Does the project comply with environmental legislation in the host country?	/1/ /33/	DR	As per the Ministry of Environment and Forests (MoEF), India Environment Impact Notification		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			S.O. 1533 dated 14 September 2006, wind power projects are not covered under any schedule and thus environmental impact assessment is not required for the project activity. As per the present statutes no specific environmental clearances are required for wind energy based power generation projects in India.		
D.1.3 Will the project create any adverse environmental effects?	/1/	DR	Being wind energy based power project, the project is not expected to have any significant impact on the environment.		OK
D.1.4 Have identified environmental impacts been addressed in the project design?	/1/	DR	No negative impact has been identified.		OK
<b>E Stakeholder Comments (VVM para 126-128)</b>					
E.1.1 Have relevant stakeholders been consulted?	/1/ /20/ /21/	DR	Yes. Stake holders meeting was held at Kurnool on 27 February 2010.		OK
E.1.2 Have appropriate media been used to invite comments by local stakeholders?	/1/ /20/ /21/	DR	Yes. The stake holders were invited for the meeting through personal invitations.		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/	DR	Stakeholder consultation process is not specifically required for wind power projects as per current Indian legislation.		OK
E.1.4 Is a summary of the stakeholder comments received provided?	/1/	DR	A summary of the comments received has been provided in section E3 of the PDD.		OK
E.1.5 Has due account been taken of any stakeholder comments received?	/1/	DR	No adverse comments have been received		OK

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**Table 3 Resolution of corrective action requests and clarification requests**

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
<b>CAR 1</b> Letter of Approval from the DNA of India need to be presented for verification.	A.3.1 A.3.2 A.3.3 B.7.12 B.7.14	DNA approval from host country has been provided to DoE.	OK Copy of the host country approval from DNA of India has been provided for verification /23/. CAR 1 is closed.
<b>CAR 2</b> Further elaboration on sub-step 2a and 2b of the additionality tool in selecting the choice of investment analysis need to be presented in the PDD. The details of the benchmark calculation including the risk free rate, equity returns and beta values applied also need to be justified and detailed in the PDD. Further, selection beta values used needs to be justified.	B.5.13 B.5.15 B.5.48	<p><b>The following have been inserted in the revised PDD.</b></p> <p>In accordance with the additionality tool version 5.2, sub-step 2(a), <i>“If the CDM project activity and the alternatives identified in Step 1 generate no financial or economic benefits other than CDM related income, then apply the simple cost analysis (Option I). Otherwise, use the investment comparison analysis (Option II) or the benchmark analysis (Option III).”</i></p> <p>Since the project activity earns revenues from sale of generated electricity, option I can not be considered.</p> <p>Further in accordance with paragraph 16 of the Guidance to Investment Analysis version 03.1, <i>“If the alternative to the project activity is the supply of electricity from a grid this is not to be considered an investment and a benchmark approach is considered appropriate”</i></p> <p>The baseline to the project activity is the electricity generated by grid connected power plants, represented by the combined margin emissions of the Southern grid. Therefore, the benchmark approach is appropriate.</p> <p>The project proponent is the equity investor in the project. Therefore, the decision to invest or not to invest is based on the returns generated by the equity investment, represented by the post tax Equity IRR. Accordingly, the post tax Equity IRR has been considered as the relevant financial</p>	OK. The revised PDD /1/ presents the elaboration of sub-step 2a and 2b in selection of investment analysis, in accordance with the additionality tool. PP has selected post tax equity-IRR as the benchmark for the investment analysis and the justification of its selection is detailed in the updated PDD /1/. The selection of the risk free rate, equity returns and beta values applied in the calculation of benchmark for investment analysis have been presented in the updated PDD /1/. The selection of benchmark and the input values used in its calculation are in line with the additionality tool and guidance on investment analysis /26/, /28/. CAR 2 is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion														
		<p>indicator for Investment Analysis.</p> <p>Para 12 of the Guidance to Investment Analysis states that required returns on equity is appropriate benchmark for Equity IRR. Therefore the cost of equity appropriate for the project type i.e. power generation has been considered as the relevant benchmark.</p> <p>The details of the benchmark calculation including the risk free rate, equity returns and beta values have been added in Appendix 2 &amp; 3 of revised PDD.</p> <p>The applicable Beta has been determined on the basis of Beta values of listed power generating companies in India. Data on beta values have been sourced from Bloomberg database.</p> <table><tr><th>Company Name</th><th>Beta</th></tr><tr><td>CESE</td><td>1.11</td></tr><tr><td>Energy Dev</td><td>1.19</td></tr><tr><td>Gujarat Industries</td><td>0.96</td></tr><tr><td>Reliance</td><td>1.57</td></tr><tr><td>Tata Power</td><td>1.03</td></tr><tr><td>Average</td><td>1.17</td></tr></table> <p>Principles of corporate finance require that Beta need to be adjusted to reflect the change in financing mix between the project and the listed power companies. However, since the power company’s debt-equity ratios are lower than that of the project activity, any subsequent adjustment on account of change in debt:equity mix will result in a higher beta value and higher benchmark.</p> <p>Hence the use of raw beta values for calculation of benchmark is conservative.</p>	Company Name	Beta	CESE	1.11	Energy Dev	1.19	Gujarat Industries	0.96	Reliance	1.57	Tata Power	1.03	Average	1.17	
Company Name	Beta																
CESE	1.11																
Energy Dev	1.19																
Gujarat Industries	0.96																
Reliance	1.57																
Tata Power	1.03																
Average	1.17																

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
<b>CAR 3</b> The QA/QC procedures indicated in Annex 4 of the PDD need to be further formalized by including the roles and responsibilities of the officials of Enercon and PP, data archival, internal audits, procedures to correct erroneous readings etc.	B.7.9 B.7.11	The project proponent is Vaayu (India) Power Corporation Private Limited. The PP will be keeping and monitoring the data for electricity generation and calibration reports post project implementation. Enercon (India) Limited will be the O&M contractor who will be having the responsibility of activities such as maintaining electricity generation records, calibration records and maintenance of the WEGs (Wind Energy Generators). The QA/QC procedures has been revised to detail the responsibility of the PP and Enercon in respect of data archiving, internal audits and procedures to address data uncertainty in annex 4 of the PDD.	OK The annex 4 of the PDD has been updated /1/ to describe the roles and responsibilities of PP and Enercon with respect to data archiving, internal audits and procedures to address erroneous data. CAR 3 is closed.
<b>CL 1</b> Unique identification number of WEGs and their geographical co-ordinates to be indicated in the PDD. Name of the substations to which the project activity are connected also to be indicated.	A.2.4 A.4.1	We have provided all 63 coordinates in the PDD (Appendix 1). Name of sub-station is Ankireddypalli which is mentioned in Annex -4 of revised PDD.	OK The coordinates of all the 63 WEGs are provided in the revised PDD /1/ as Appendix 1. The PDD /1/ is revised to include the name of Ankireddypalli substation, to which the project activity will be connected. CL 1 is closed.
<b>CL 2</b> The reasons for the difference in value of PLF indicated in the DPR (22.12%) and in the investment analysis (22.28%) need to be clarified.	B.5.19 B.5.20	The PLF of 22.12% was provided by the WEG supplier and was used in the DPR for evaluation of the project. To corroborate the PLF estimates of the supplier, the PP had commissioned an independent study by C-WET Centre for Wind Energy Technology (Independent third party). CWET provided an estimate of 22.28% PLF at the selected project site. The CWET estimate was considered for Investment. EB 48, annex 11 states that PLF estimated by third party shall be used for substantiating additionality. Accordingly, the PLF of 22.28% has been selected for substantiating	OK PP clarified that the PLF of 22.12% indicated in the DPR /4/ is based on the details provided by Enercon, the WEG supplier. Thereafter, PP engaged the third party consultant C-WET to undertake study on the PLF at the site. The PLF estimated by C-WET for the project activity - 22.28% /11/ has been used in the financial analysis /18/ and is

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		additionality.	conservative. CL 2 is closed.
<b>CL 3</b> In the financial analysis, a fixed tariff of INR 3.5/kWh is used. However, APERC order fixes the tariff for first 10 years only. The basis for tariff used in financial analysis for the years 11 to 20 needs to be provided.	B.5.2.1	APERC has determined the tariff based on cost plus ROE principle (return on equity). As per tariff order dated 1 May 2009; the levelized tariff for period of 20 years is Rs. 3.43 per unit.  For carrying the Investment Analysis, we have considered a tariff of Rs.3.50 per unit for 20 years. This is conservative.	APERC tariff order dated 1 May 2009 /34/ adopts a cost plus return on equity to determine the tariff for new wind mills. The levelized cost determined by APERC for the 20 years is INR 3.43/kWh and fixed a tariff of INR 3.50/kWh for the first 10 years. PP used the same value of INR 3.50/kWh for remaining period as well and is justified. CL 3 is closed.
<b>CL 4</b> The copies of the O&M contract awarded need to be submitted for verification. The mismatch in the loan re-payment period of 12 years stated in the loan sanction letter of IDFC and 10 years considered in the DPR and financial analysis need to be clarified. It needs to be clarified whether all the available investment incentives have been considered and why the generation based incentive of Rs. 0.50/kWh is not considered in the financial analysis. The sensitivity analysis also to be done for tariff since the tariff is fixed for a period of 10 years only. Sensitivity analysis of the major identified parameters to be performed till the point at which they reach the benchmark and provide the justification on why such a scenario is	B.5.22 B.5.23 B.5.24 B.5.25 B.5.26 B.5.27 B.5.28 B.5.31	The project is at its nascent stage, the O&M contract will be signed during implementation and will be made available during the first verification. The loan was envisaged for 8 years at the time of decision making. However actual loan sanction letter provides the loan for 12 years. Therefore we have conducted the sensitivity on loan tenure (considering 12 year loan tenure). The equity IRR with loan tenure of 12 years is 4.19% which is lower than the benchmark.  As per order on generation based incentive, the PP can get incentive of Rs. 0.50 per kWh which is capped to the extent of 6.2 Million per MW and maximum of 1.55 Million per MW each year. Further, generation based incentive does not allow for accelerated depreciation of 80% in case of which normal depreciation of 15% will apply. GBI is included in investment analysis in the revised spreadsheet.	OK PP clarified that O&M contract is yet to be signed and the same will be made available during the 1 <sup>st</sup> verification of the project activity.  PP clarified that the loan sanction letter from IDFC /15/ provides for a loan repayment period of 12 years, though 8 year repayment period was considered in the DPR /4/. The sensitivity analysis shows that with 12 year loan repayment tenure, the IRR falls to 4.19% against 5.05% with 8 year repayment tenure /18/.  The revised PDD /1/ and financial



Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
<p>unlikely.</p> <p>The IRR with CDM need to be presented in the PDD and excel sheet and compare the same with the bench mark.</p>		<p>The regulatory commission has approved a tariff of Rs. 3.50 for the first ten years which frontloads the benefits to the WEG generators. It therefore stands to reason that the tariff after 10th year would be lower than Rs.3.43/unit in order to ensure that the levelized benefits are equivalent to Rs.3.43/kWh.</p> <p>Thus any tariff increase after the 10th year is highly unlikely. However, a sensitivity analysis on tariff beyond the 10th year is conducted at a variation of +/-10%.</p> <p>Sensitivity analysis on major identified parameters have been done as follows:-</p> <ol style="list-style-type: none"> <li><b>1. Capital cost: -</b> Sensitivity analysis on capital cost is conducted at +/-10%. At 10 % decrease in capital cost project the IRR comes 7.25%. The total project cost at 10% decrease is Rs. 2691.55 Million which is less than original PO cost of Rs. 2772.00 million. To conduct the sensitivity at a variation of more than 10% is not reasonable and hence sensitivity on capital cost is conducted at 10% variation.</li> <li><b>2. Plant Load Factor:-</b> The equity IRR crosses the benchmark at PLF of 37.03% which is not a reasonable assumption.</li> <li><b>3. Debt-Equity ratio:-</b> It may also be noted that even at 100% equity, the Equity IRR is 5.67% which is less than the benchmark.</li> <li><b>4. O&amp;M Cost: -</b> The equity IRR at considering no O&amp;M cost is 8.34% which below than the benchmark.</li> <li><b>5. Tariff :-</b> APERC has determined the tariff based on cost plus ROE principle (return on equity). As per tariff order dated 1 May 2009; the levelized tariff for period</li> </ol>	<p>analysis spreadsheet takes into account GBI of INR 0.5/kWh /18/ capped to the extent of 6.2 Million per MW.</p> <p>PP revised the financial analysis to include the sensitivity analysis for capital cost, PLF, debt-equity ratio, O&amp;M cost and tariff.</p> <p>Further, PP has presented the IRR with CDM revenues in the revised financial spreadsheet.</p> <p>CL 4 is closed.</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		<p>of 20 years is Rs. 3.43 per unit. However, constant tariff of Rs.3.50 for the period beyond the term of PPA is used conservatively for investment analysis. Further, sensitivity is conducted at a variation of 10% over the tariff rate of Rs. 3.50 per unit.</p> <p>As per the PDD guide version 07, the IRR with CDM is not required. However, for DOE's information we have presented below the IRR with carbon revenues. The Excel spreadsheet is also submitted to the DOE.</p> <p>IRR with Carbon revenues – 15.36%</p>	
<b>CL 5</b> The data source used for common practice analysis needs to be specified in the PDD.	B.5.44 B.5.45 B.5.46 B.5.47	The data used for common practice analysis has been sourced from website Wind Power India (URL: - <a href="http://www.windpowerindia.com/index.php?option=com_content&amp;view=article&amp;id=21&amp;Itemid=26">http://www.windpowerindia.com/index.php?option=com_content&amp;view=article&amp;id=21&amp;Itemid=26</a> ) and the data from Indian Wind Power Directory 9th edition published in year 2009. The details of sources have been added in revised PDD.	OK The revised PDD identifies the web site of Wind Power India /41/ as the source of data used in the common practice analysis. CL 5 is closed.
<b>CL 6</b> It needs to be substantiated that the monitoring procedure stated in the PDD is in accordance with the PPA and the billing methodology of the APTRANSCO.	B.7.1	We have revised the section B.7.2 to explain monitoring procedure in detail as per billing methodology of state utility.	OK PP modified the monitoring plan /1/ in line with the billing methodology adopted by the state utility. CL 6 is closed.
<b>CL 7</b> It needs to be clarified whether the accuracy class of the meters proposed to be used for monitoring is 0.2 or 0.5 class. Whether main and check meters are provided for the individual WEGs or a common meter is	B.7.3 B.7.4	<p>The accuracy class of the meters will be 0.2 and same has been corrected in the PDD.</p> <p>The PP will make clusters of WEGs at the project site for the purpose of metering. Each cluster will have one main and one check meter. The clusters will exclusively cater to</p>	OK PP clarified that the electricity meters (main and check) used for the project activity will be of 0.2 class and the same has been stated in the PDD /1/ as well. PP further

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
provided for a group of WEGs also needs to be clarified.		the WEGs that are part of the project activity. No other WEGs will be connected to these clusters. Summation of meter reading for all the clusters (connecting 63 machines) will provide total electricity generated by the project activity.	clarified that clusters will be formed for a group of WEGs and each cluster will have separate meters. CL 7 is closed.
<b>CL 8</b> The action plan for monitoring 2% of the CER revenue to be spent on sustainable development activities for the local population needs to be presented in the PDD and provide a copy of the PCN for verification.	B.7.12 B.7.13	The action plan for monitoring 2% of the CER revenue to be spent on sustainable development activities for the local population has been incorporated in revised PDD. The copy of PCN is provided for reference of DoE.	OK The revised PDD /1/ details the proposal to spend 2% of the CER revenue on sustainable development activities for the local population. Copy of the PCN provided for verification. CL 8 is closed.

**Table 4 Forward action requests**

Forward action request	Reference to Table 2	Response by project participants
No FAR is raised		

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## **APPENDIX B**

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

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

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

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

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

His qualification, industrial experience and experience in CDM projects demonstrate sufficient sectoral competence in Chemical Process Industries, Thermal Energy Generation from fossil fuels, Heat distribution and Waste handling and disposal.

**Kannan Parthasarathy:**

Handled various projects on Wind Turbine requirements since 1993 onwards as on date in DNV. This includes the following:

- Wind Turbine Generator - various inspection and projects Covering WTG capacity 250KW to 1.5MW and various manufacturer (Various services provided to different manufacturer - Vestas RRB/AWT/NEG Micon/Vestas/Poineer Wincon/Poineer Asia/Gamesa/Suzlan/GE/Siva Electric/Wind Win etc)
- Vendor inspection of various items and component assessments. Castings Hub & Extender/ Tower/ Nacelle/ Gear box/Generator/Forging-Shaft/Yawing system etc
- safety Testing of Over speed machine and Breaking system
- Installation Commissioning of Machines and Power curve at specific site studies. Analysis of Plant Load factor (PLF) - actual Vs plant capacity

- Design services and Co-ordination with DNV Principle Denmark Office.
- CWET Centre for Wind Energy Testing - providing technical support in establishing the system & procedures. Also Wind Monitoring Mast installation and assessments at CWET Testing Location.
- Wind Turbine Array arrangement and studies; Conducted Micro-siting studies (Wind) and arrive at power curve (Theoretical) requirements.
- Type testing of 1 MW Gear Box and Generator and manufacturing assessments.
- Management System Certificate audits  
(Experience of above also performed during the work at NEPC-Micon)

**Xiaojun Johnsen Zhang**, holds a Master Degree in Metallurgical Physical Chemistry and obtained his MBA in project management. Also he majored in Chemistry, which involves organic, inorganic, structure and analysis chemistry as bachelor degree. He has an overall experience of 26 years. Prior to joining DNV, Johnsen had an overall experience of 4 years in glass manufacturing industry covering production, energy efficiency improvement and commissioning. Later on he gained combined experience of more than 15 years in the iron and steel industry, while he worked as researcher and management personnel in Central Iron and Steel Institute, the sector covering the refractory, iron & steel, waste heat recovery, solid waste disposal, waste fuel treatment, waste energy efficiency and relevant environmental affairs. His experience also covers the fields of environmental management, resource conservation and cleaner production in various manufacturing and metallurgical industries. He has also gained the experience in Management System Audits such as ISO 9001, ISO 140001 standards in various industrial sectors for more than 3 years for industrial plants.

For financial analysis and investment, he has gained the relevant knowledge through his MBA course; and through the feasibility case study in the iron and steel sector while he worked as management personnel, he gradually gained concerted experience in cost accounting, financial analysis and investment input parameter assessment.

He has experience of more than 3 years in validation and verification of numerous CDM projects in DNV in China.

His qualification, industrial and investment experience and experience in CDM demonstrate him sufficient sectoral competence in “Glass”, “Iron and Steel” and “Energy Generation from Renewable Energy Sources”.