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# VALIDATION REPORT

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## GREEN HOUSE GAS ABATEMENT THROUGH INSTALLATION OF A WIND POWER PROJECT FOR EXPORT TO THE GRID IN INDIA

REPORT No. 2010-0090

REVISION No. 02

DET NORSKE VERITAS



## VALIDATION REPORT

Date of first issue: 19 January 2010	ConCert Project No.: PRJC-188789-2009-CCS-IND
Approved by: Michael Lehmann	Organisational unit: DNV Climate Change and Environmental Services
Client: India Power Corporation Limited	Client ref.: Mr. D. Chattopadhyay

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### Summary:

**Project Name:** Green House Gas Abatement through installation of a wind power project for export to the Grid

**Country:** India

**Methodology:** ACM0002

**Version:** 12.1.0

**GHG reducing Measure/Technology:** Grid-connected electricity generation from wind power

**Sectoral scope:** 1

**ER estimate:** 48 380 tCO<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 "Green House Gas Abatement through installation of a wind power project for export to the Grid" in India, as described in the PDD, version 4 of 8 December 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 12.1.0. Hence DNV requests the registration of the project as a CDM project activity.

Report No.: 2010-0090	Subject Group: Environment
Report title: Green House Gas Abatement through installation of a wind power project for export to the Grid in India	
Work carried out by: Sasim Chattopadhyay, Soumik Biswas, Parthasarathy Kannan	
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Date of this revision: 2011-12-14	Rev. No.: 02
Number of pages: 29	

### Indexing terms

Key words Climate Change Kyoto Protocol Validation Clean Development Mechanism	Service Area Validation
	Market Sector
	Energy Industry
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## ***Abbreviations***

BM	Build margin
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 di-oxide
CO <sub>2</sub> e	Carbon di-oxide equivalent
CUF	Capacity utilization factor
C-WET	Center for Wind Energy Technology
DNA	Designated National Authority
DNV	Det Norske Veritas
EIL	Enercon (India) Limited
FAR	Forward action request
GEDA	Gujarat Energy Development Agency
GHG	Greenhouse gas(es)
GUVNL	Gujarat Urja Vikas Nigam Limited
GWP	Global warming potential
IPCC	Intergovernmental Panel on Climate Change
IPCL	India Power Corporation Limited
LoA	Letter of approval
MoEF	Ministry Of Environment and Forest
NEWNE	North-East-West and North East
NGO	Non-governmental organisation
ODA	Official development assistance
OM	Operating margin
PDD	Project design document
PLF	Plant load factor
PPA	Power purchase agreement
tCO <sub>2</sub> e	Tonnes of CO <sub>2</sub> equivalents
TWIC	True Wind International Certification
UNFCCC	United Nations Framework Convention on Climate Change
WEG	Wind energy generator



## 1 EXECUTIVE SUMMARY – VALIDATION OPINION

*DNV Climate Change Services AS (DNV) has performed a validation of the project activity “Green House Gas Abatement through installation of a wind power project for export to the Grid” 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. India fulfils the participation criteria and has approved the project and authorized the project participant India Power Corporation Limited. The DNA from India confirmed that the project assists in achieving sustainable development.*

*The project correctly applies ACM0002, version 12.1.0 “Consolidated baseline and monitoring methodology for grid-connected electricity generation from renewable sources”.*

*The project activity involves generation of renewable energy by installing 31 wind energy generators (WEGs). The installed capacity of each unit is 800 kW, constituting a total installed capacity of 24.8 MW, which will displace the electricity generation in the fossil fuel dominated NEWNE regional grid of India, thereby resulting in the reduction of GHG emissions that are real, measurable and give 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 48 380 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 “Green House Gas Abatement through installation of a wind power project for export to the Grid” in India, as described in the PDD, version 4 dated 8 December 2011, meets all relevant UNFCCC requirements for the CDM and correctly applies the baseline and monitoring methodology ACM0002, version 12.1.0. Hence, DNV requests the registration of the project as a CDM project activity.*

Bangalore and Oslo, 2011-12-14

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## 2 INTRODUCTION

India Power Corporation Limited has commissioned DNV Climate Change Services AS (DNV) to perform a validation of the Green House Gas Abatement through installation of a wind power project for export to the Grid in India. This report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures, and the subsequent decisions by the CDM Executive Board.

### 2.1 Objective

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

### 2.2 Scope

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords and the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology ACM0002 (version 12.1.0) /40/. The validation was based on the recommendations in the Validation and Verification Manual /39/.

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 consisted of the following three phases:

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

The following sections outline each step in more detail.

#### 3.1 Desk review of the project design documentation

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

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

- /1/ IPCL: CDM-PDD for project activity “Green House Gas Abatement through installation of a wind power project for export to the Grid” in India, version 1 dated 14 October 2009 version 3 dated 1 June 2011 and version 4 dated 8 December 2011.
- /2/ IPCL: IRR calculation spread sheet IRR\_IPCL\_Version3\_08122011.xls.
- /3/ IPCL: Power purchase agreement with GUVNL dated 24 April 2007.
- /4/ IPCL: Order for supply of 31 Nos. WEG in the state of Gujarat dated 6 December 2006 (Amendment to order dated 5 September 2006).
- /5/ IPCL: Purchase order for 31 nos. WEG in the state of Karnataka dated 5 September 2006.
- /6/ IPCL: Amendment to the purchase order of 5 September 2006 for civil & industrial works of 31 nos. of WEG dated 13 December 2006.
- /7/ GEDA: Commissioning certificates for 27 nos. WEG dated 23 March 2007 and commissioning certificates for 4 nos. WEG dated 25 April 2007.
- /8/ GEDA: Permission for setting up of wind farm dated 22 February 2007.
- /9/ IPCL: Invoice for sale of electricity dated 3 December 2009.
- /10/ GEDA: Electricity generation share certificate for April 2007 to January 2011.
- /11/ IPCL: Power purchase agreement between IPCL and GEDA dated 24 April 2007.
- /12/ IPCL: Minutes of the board meeting of IPCL dated 26 August 2006.
- /13/ IPCL: Minutes of board meeting of IPCL on 27 October 2006.
- /14/ Enercon: Offers for WEGs dated 20 July 2006.
- /15/ TWIC: Report on determination of plant load factor for wind energy generators dated 12 January 2011.
- /16/ IPCL: Lease rental agreement between IPCL & Srei Infrastructure Finance Limited dated 5 September 2006 and as amended on 22 August 2007.
- /17/ Singhi & Co., Chartered Accountant: Audited balanced sheet for IPCL dated 20 August 2008 for the fiscal year 2007 – 2008
- /18/ IPCL: Letter from IPCL to Enercon India Limited enquiring about the progress of their CDM power project dated 10 April 2007.



- /19/ GEDA: Electrical inspection receipts dated 30 March 2011 for the fiscal year 2010-2011.
- /20/ GEDA: O&M charges for dedicated transmission lines dated 18 May 2011 for the fiscal year 2010-2011.
- /21/ Enercon: Receipt dated 26 November 2010 for lease rent of Government land for the fiscal year 2010-2011.
- /22/ IPCL: Letter to GEDA dated 18 August 2010 enclosing cheque Energy certification charges for the fiscal year 2010-2011.
- /23/ Enercon: Letter to IPCL dated 26 September 2006 on problem in immediate availability of electricity evacuation system in Karnataka.
- /24/ IPCL: Letters to local stakeholders dated 4 December 2006 inviting to attend in discussion on CDM aspects.
- /25/ IPCL: Stakeholder's responses dated 27 December 2006.
- /26/ IPCL: Letter of appointment of M/s Enercon India Limited as CDM consultant for the wind power project dated 27 February 2007
- /27/ IPCL: Letter from IPCL to M/s Enercon India Limited stating that neither PIN nor PDD has been received dated 23 May 2007
- /28/ Enercon: Reply to IPCL on their constraints to fulfill commitment dated 14 June 2007
- /29/ IPCL: Letter to Enercon cancelling the work order for CDM consultancy dated 29 December 2007
- /30/ DNV: Offer for validation services dated 18 July 2007
- /31/ Carbon Management Consulting Limited: Offer for CDM consultancy services dated 6 Nov 2007
- /32/ PriceWaterHouse Coopers: Offer for CDM consultancy services dated 19 Nov 2007
- /33/ Ernst & Young: Offer for CDM consultancy services dated 4 January 2008
- /34/ IPCL: Agreement between Ernst & Young and IPCL for CDM consultancy services dated 27 August 2008
- /35/ Ernst & Young: i) E-mail communication to IPCL dated 1 Nov 2008 sending draft CDM procedural documents  
ii) E-mail from to IPCL dated 4 November 2008 sending final CDM procedural documents  
iii) E-mail communication to IPCL dated 29 December 2008 sending final project concept note for submission to the MoEF, the DNA of India
- /36/ DNV: Offer for validation services dated 11 May 2009
- /37/ DNV: Contract agreement between DNV & IPCL for CDM validation services dated 16 September 2009

### 3.1.2 Letters of approval

- /38/ Ministry of Environment & Forest (DNA of India): *Letter of approval* for Green House Gas Abatement through installation of a wind power project for export to the Grid dated 29 September 2009.  
It is confirmed by <http://envfor.nic.in/cdm/>





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

- /39/ CDM Executive Board: *Validation and Verification Manual*. Version 1.2, EB55 Annex 1 dated 30 July 2010. [http://cdm.unfccc.int/Reference/Manuals/accr\\_man01.pdf](http://cdm.unfccc.int/Reference/Manuals/accr_man01.pdf).
- /40/ CDM Executive Board: *Baseline and monitoring methodology ACM0002, "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"*, version 12.1.0 adopted at EB58.
- /41/ CDM Executive Board: *Tool for demonstration and assessment of additionality*, version 5.2 adopted at EB39 Annex 10.
- /42/ CDM Executive Board: *Tool to determine remaining lifetime of equipment*, version 1.
- /43/ CDM Executive Board: *Guidance on Assessment of Investment Analysis*, version 3.1 adopted at EB 62 Annex 5.
- /44/ CDM Executive Board: *Guidance on the demonstration and assessment of prior consideration of the CDM*, version 4 adopted at EB62 Annex 13.
- /45/ CDM Executive Board: *Tool to calculate the emission factor for an electricity system*, version 2.2.0 adopted at EB 61 Annex 12.
- /46/ 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

- /47/ CEA: *CO<sub>2</sub> Baseline Database version 4.0 of September 2008* ([http://cea.nic.in/reports/planning/cdm\\_co2/cdm\\_co2.htm](http://cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm)).
- /48/ CWET: *Approved list of models and manufactures of wind electric generators/ wind of wind turbine equipments* dated 11 July 2007.
- /49/ MNES: *Provisional Type certification scheme for wind turbine generator systems in India* April 2003 ([http://www.cwet.tn.nic.in/Docu/TAPS\\_2000amended.pdf](http://www.cwet.tn.nic.in/Docu/TAPS_2000amended.pdf)).
- /50/ RBI: <http://www.rbi.org.in/scripts/WSSview.aspx?ID=10532>, - Reserve Bank of India bulletin for prime lending rate dated 11 October 2006. and <http://www.rbi.org.in/scripts/WSSView.aspx?Id=10279> Reserve Bank of India bulletin for prime lending rate dated 25 August 2006.
- /51/ SLDC Gujarat: *Total Wind energy project till date* [http://www.sldcguj.com/energyaccount/energy\\_block.asp](http://www.sldcguj.com/energyaccount/energy_block.asp).
- /52/ Indian Wind Energy Association: *Installed wind power capacity per state in India "Year 2009"* <http://www.inwea.org/installedcapacity.htm>.
- /53/ IGES : *CDM project data base* (updated on 29 April 2011), [http://www.iges.or.jp/en/cdm/report\\_cdm.html](http://www.iges.or.jp/en/cdm/report_cdm.html).
- /54/ The Ministry of Environment and Forests (MoEF), Government of India: *Notification vide S.O. 1533 (E), dated 14 September 2006 that lists the project activities requiring an Environmental clearance*. <http://envfor.nic.in/legis/eia/so1533.pdf>
- /55/ Government of India: *The Companies Act, 1956*.
- /56/ Government of India: *The Income Tax Act 1961*.
- /57/ IPCC: *2006 IPCC Guidelines for National Greenhouse Gas Inventories*.
- /58/ <http://universimmedia.pagesperso-orange.fr/geo/loc.htm>
- /59/ Gujarat Electricity Regulatory Commission: *Order No.5 of 2010, for straight line*



*depreciation*

*rate*

[http://geda.gujarat.gov.in/policy\\_files/GERC%20Order%205%20of%202010%20Biomass.pdf](http://geda.gujarat.gov.in/policy_files/GERC%20Order%205%20of%202010%20Biomass.pdf)

/60/ GETCO: Letter no. ACE(R&C)/GETCO/EE-C/242 dated 29 January 2011 on energy meter calibration frequency

The main changes between the PDD version 1 dated 14 October 2009 published for the 30 days stakeholder commenting period and the version 3 dated 1 June 2011 initially submitted for registration are as follows:

- i) The webhosted PDD was prepared as per ACM0002 version 10. However version 10 of ACM0002 was out-dated at the time of submission to UNFCCC requesting registration. The project proponent has revised the PDD to accommodate all requirements of ACM0002 version 12.1.0
- ii) Project-IRR has been revised from 10.16% to 9.61%. This change is due to change in the input values and accounting of MAT credit
- iii) The baseline determination was revised
- iv) Common practise analysis was revised
- v) Monitoring plan has been revised to include procedure for calculating net electricity generation

After reviewing the PDD version 4 dated 8 December 2011, DNV issued this final validation report and opinion.

The following revisions have been made in the PDD version 4 dated 8 December 2011 in response to the incompleteness check message received from UNFCCC secretariat:

- 1) The IRR has been further changed to 9.38% after considering net electricity generation for revenue calculation and incorporation of salvage value corrections (4.5% depreciation rate in place of 5.28%). Subsequent changes in sensitivity analysis have also been incorporated in the revised PDD.
- 2) Frequency of energy meter calibration has been changed to once in three years as per GETCO guidelines.
- 3) Crediting period start date has been revised

### 3.2 Follow-up interviews with project stakeholders

On 18 December 2009 Sasim Chattopadhyay and Soumik Biswas of DNV performed interviews with project stakeholders at IPCL's office in Kolkata, India to confirm selected information and to resolve issues identified in the document review followed by a physical verification at the project location. Soumik Biswas of DNV conducted the on-site visit on 12 May 2010 and representatives of India Power Corporation Limited and Enercon (India) Limited were interviewed. The main topics of the interviews are summarized below:

	Date	Name	Organization	Topic
/61/	18 Dec 2009	Mr. Prabal K. Basu	IPCL	➤ Proof of CDM consideration ➤ Applicability of
/62/	18 Dec 2009	Mr. Debasish Chattopadhyay	IPCL	



/63/	18 Dec 2009	Mr. Arijit Bera	IPCL	methodology
/64/	18 Dec 2009	Mr. Shomik Dutta	IPCL	➤ Determination of baseline
/65/	18 Dec 2009	Joymalya Bandyopadhyay	Ernst & Young	➤ Assessment of project additionality and common practice analysis ➤ Emission reduction calculations and data used ➤ Environmental consents and permits ➤ Review of the stakeholder consultation process.
/66/	12 May 2010	Mr. Kishore Vasara	Enercon	➤ Review of project design and technology used
/67/	12 May 2010	Mr. K. D. Baria	Enercon	
/68/	12 May 2010	Mr. Debasish Chattopadhyay	IPCL	➤ Review of monitoring and verification procedure of the organisation and management structure of the organization for the project activity.

### 3.3 Resolution of outstanding issues

The objective of this phase of the validation was to resolve any outstanding issues which needed be clarified prior to DNV's positive conclusion on the project design. In order to ensure transparency a validation protocol 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 "Green House Gas Abatement through installation of a wind power project for export to the Grid" 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 validation report underwent 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
Team leader (Validator)	Chattopadhyay	Sasim	India	✓	✓	✓	✓		✓
Validator	Biswas	Soumik	India	✓	✓	✓			
Person with sectoral competence	Parthasarathy	Kannan	India						✓
Technical reviewer	Leiroz	Andrea	Brazil					✓	✓
Technical reviewer	Srivastava	Gaurav	India					✓	✓

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 4 dated 8 December 2011 /1/.

### 4.1 Participation requirements

The project participant is India Power Corporation Limited of host Party India. The host Party (India) meets all relevant participation requirements. No participating Annex I Party is yet identified.

A letter of approval (LoA) /38/ was issued by DNA of India on 29 September 2009, authorizing India Power Corporation Limited of host Party (India) as project participant and confirming that the project assists in achieving sustainable development.

The letter of approval was received from the project participant. The authenticity of LoA from India has been verified from the website of DNA of India's /38/. DNV considers the letters to be in accordance with paragraphs 45- 48 of the VVM /39/

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

### 4.2 Project design

The project activity involves the installation and operation of 31 wind energy generators (WEGs). The installed capacity of each unit is 800 kW, constituting a total installed capacity of 24.8 MW.

The WEGs have been installed at Haripar, Umralla and Methan villages in Jamnagar District and Vadali village in Rajkot District, in the state of Gujarat in India. This has been confirmed from the commissioning certificates issued by Gujarat Energy Development Authority (GEDA) /7/. The geographical coordinates of the project site are as follows:

Place	Latitude	Longitude
Haripar	21° 59' 24" North	71° 31' 59" East
Umralla	21° 50' 42" North	71° 48' 23" East
Methan	22° 58' 59" North	71° 39' 0" East
Vadali	23° 56' 34" North	73° 2' 16" East

The geographical coordinates of the villages have been confirmed from the Google maps /58/.

All WEGs installed under the project are supplied by Enercon India Limited /4/. The installation, commissioning, operation and maintenance of the WEGs are in the scope of M/s Enercon (India) Limited. The technology used in the project activity is indigenously available in India and no transfer of technology is envisaged. It was confirmed by DNV that the project design engineering reflects current good practices in India.



Proposed project is expected to generate 53 165 MWh per year at a plant load factor (PLF) of 24.97%. This has been confirmed from the offer letters of Enercon /14/. The power generated from the project is sold to the state grid which is part of the NEWNE regional grid thereby replacing an equivalent amount of fossil fuel based power generation. Therefore, the project activity results in an equivalent amount of CO<sub>2</sub> emission reduction which otherwise would have been resulted from fossil fuel combustion.

The expected operational lifetime of the project activity is 20 years which could be evidenced from the approved list of WEG's published by CWET /48/ and MNES /49/ and is deemed reasonable for new wind energy generators. The starting date of the project activity has been indicated as 5 September 2006, the date of first purchase order for the project. It is imperative to mention here that this purchase order was issued for installation of the WEGs in Karnataka state /5/ which was later amended for the shift to Gujarat state /4/ /6/. Hence the mentioned date is considered as the earliest financial commitment for the project activity.

The project activity has already been commissioned at the time of validation. The wind energy generators have been commissioned on 13 March 2007 (27 turbines) and 27 March 2007 (4 turbines). Operations of the WEGs have been verified during site visit and commissioning dates of the WEGs have been validated from the commissioning certificates issued by the Gujarat Energy Development Agency (GEDA) /39/.

The project has selected a fixed crediting period of 10 years starting from 1 January 2012 or the date of submission requesting registration, whichever is later. The project is estimated to reduce 48 380 tCO<sub>2</sub>e per year and 483 800 tCO<sub>2</sub>e over the fixed 10-years crediting period.

DNV considers the project description 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 approved consolidated baseline methodology ACM0002, "Consolidated baseline methodology for grid-connected electricity generation from renewable sources", version 12.1.0 has been correctly applied for the project activity.

In order to verify applicability of the methodology, DNV validated the followings:

- i) The project activity is a greenfield project that involves the installation of 31 WEGs for wind energy generation and intended to supply electricity to the NEWNE grid of India. Grid connection has been assessed from the PPA /3/ and the electricity generation share certificates /10/. The land required for the project activity has been allotted for installation of WEGs as revealed from the letter from GEDA dated 22 February 2007 /8/.
- ii) The above mentioned letter from GEDA eventually confirms that the project activity does not involve capacity addition or retrofit or replacement of an existing plant /8/.
- iii) The project activity does not involve hydro power generation /8/.
- iv) The project activity neither involves switching from fossil fuel to renewable energy at the project site nor a biomass nor a hydro power plant which has been verified by DNV through the follow-up interview /45/ - /52/ and the permission for setting up of wind farm /8/.
- v) The project activity is not a retrofit, replacement or capacity addition activity /8/.

The application of the baseline methodology is transparent and conservative.





The assessment of the project's compliance with the applicability criteria of ACM0002 (version 12.1.0) 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 activity supply electricity to the Gujarat state electricity grid which is part of the NEWNE region electricity grid. This has been confirmed from the power purchase agreement /11/. It is imperative to mention here that the Gujarat state electricity grid was part of the western regional electricity grid. In India there are now two regional electricity grid namely NEWNE region and Southern region. Thus the baseline for this project activity is a function of the generation mix of the NEWNE region grid.

The spatial extent of the project boundary is clearly defined as the site of project activity and all power plants connected physically to the NEWNE region grid including Gujarat state electricity grid to which the project is connected. All WEGs under the project activity are physically connected to the NEWNE region grid through the Gujarat state electricity grid. This is in line with the delineation of grid boundaries as provided by the EB guidance for large countries as India /45/. The defined project boundary is in line with ACM0002 (version 12.1.0) /40/.

Emission sources and gases included in the project boundary are:

	<i>GHGs involved</i>	<i>Description</i>
Baseline emissions	CO <sub>2</sub>	The major emission source.  The GHG emission reduction is achieved by replacing the electricity generated by fossil fuel powered plants in the NEWNE regional grid of India.
Project emissions	N/A	Project emission is regarded as zero as the project is a renewable energy (wind source) project.
Leakage	N/A	There are no leakages that need to be considered in applying this methodology.

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 12.1.0).

#### 4.5 Baseline determination

##### A) Baseline determination

Since the project is demonstrated to be additional, cf. Section 4.6, the baseline is in accordance with ACM0002 (version 12.1.0) /40/ that electricity delivered to the grid by the project 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)



calculated described in the “Tool to calculate the emission factor for an electricity system” /45/.

The CM emission factor has been determined *ex-ante* based on the most recent information available at the time of the PDD was web-hosted /1/. It is the weighted average of the operating margin (OM) emission factor and the build margin (BM) emission factor. The weighting is set to be 75% and 25% for OM and BM emission factors respectively, which is in line with the “Tool to calculate the emission factor for an electricity system”, version 2.2.0 /45/.

The NEWNE grid is dominated by coal-fired power plants /47/. It is deemed likely that coal-fired power plants will continue to dominate the power sector due to the local availability of low-cost coal. It is expected that renewable capacity additions will have no significant effects on the mix of the NEWNE during the crediting period.

Therefore, DNV confirms that the baseline determination is transparent and conservative.

The approved baseline methodology has been correctly applied to identify a complete list of 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 participant 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 /1/. 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 /1/.

## 4.6 Additionality

The additionality of the project has been demonstrated using the “Tool for the demonstration and assessment of additionality”, version 5.2 /41/.

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

#### Project start date

The start date of the project activity has been identified as 5 September 2006, the date of earliest purchase order /5/ for the project activity. As discussed above, initially the project was supposed to be installed in the state of Karnataka, however later the same project has been shifter to the state of Gujarat. This has been validated from the amended purchase orders dated 6 December 2006 /4/ and 13 December 2006 /6/. Thus DNV considers that the purchase order issued on 5 September 2006 /5/ has been found to be the earliest date of commitment to expenditure.

#### Prior CDM consideration

The project activity was initially decided to come up at Hullaevannur in Karnataka state. IPCL received offer for wind farm from Enercon on 20 July 2006 /14/ and based on the same decided for installation of wind farm in its meeting of the Board of Directors dated 26 August 2006 /12/. It has been noted from the minutes of the board meeting of IPCL dated 26 August 2006 /12/ that the decision of installation of wind farm in Karnataka was taken considering



potential revenue from CDM in order to make the project financially viable. Accordingly, purchase order was issued on 5 September 2006 /5/. However, Enercon further offered IPCL vide letter dated 26 September 2006 /23/ to shift the project from Karnataka to Gujarat State due to problem in immediate availability of electricity evacuation system in Karnataka and also better financial health of Gujarat discom than the Karnataka discom. Accordingly the board of Directors of IPCL on 27 October 2006 /13/ decided to shift the project to Gujarat. Potential CDM benefit was also part of consideration while taking this decision /13/ for shifting of project site.

The “Guidance on the demonstration and assessment of prior consideration of the CDM, version 4 adopted at EB62 Annex 13” /44/ in Para 6(a) states that *“The project participant must indicate awareness of the CDM prior to the project activity start date, and that the benefits of the CDM were a decisive factor in the decision to proceed with the project. Evidence to support this would include, inter alia, minutes and/or notes related to the consideration of the decision by the Board of Directors, or equivalent, of the project participant, to undertake the project as a CDM project activity.”*

DNV has verified the above mentioned decisions by IPCL from the original minutes book of the meetings of IPCL Board of Directors. Thus DNV opines that IPCL management considered CDM benefits seriously during its’ decision making process (26 August 2006) /12/ prior to project activity start date (5 September 2006) /5/. It is thus in DNV’s opinion demonstrated that the benefits of the CDM were a decisive factor in the decision to proceed with the project in compliance with the requirements of the “Guidance on the demonstration and assessment of prior consideration of the CDM, version 4 adopted at EB62 Annex 13” /44/.

#### Efforts to secure CDM status

DNV was able to verify by reviewing relevant evidence that the following events occurred between the starting date and commencement of validation as efforts to secure CDM status:

Date	Description of event	Source of validation
5 September 2006 (Project start date)	P.O. for project activity to be installed in Karnataka state	This has been validated from the purchase order issued by IPCL /5/.
27 February 2007	IPCL appointed M/s Enercon India Limited as CDM consultant for the wind power project.	This has been validated from the letter of appointment for CDM consultant for the project activity /26/.
10 April 2007 to 18 July 2007	Communications between IPCL and Enercon India Limited on progress of CDM status of the project activity and obtaining validation offer from DOE.	i) 10 April 2007: Letter from IPCL to Enercon India Limited /18/ enquiring about the progress of their CDM power project. ii) 23 May 2007: Letter from IPCL to Enercon India



		<p>Limited stating that neither PIN nor PDD has been received till that date /27/.</p> <p>iii) 14 June 2007: Enercon replied to IPCL stating their constraints to fulfill commitment /28/.</p> <p>iv) IPCL obtained offer from DNV for validation services. This has been validated from DNV's offer dated 18 July 2007. It needs to be mentioned here that this offer became invalid as no response was received within the validity period of the offer /30/.</p>
29 December 2007	Cancellation of agreement with CDM consultant due to lack of progress in consultancy service.	<p>IPCL cancelled /29/ the work order /25/ for CDM consultancy for the project activity.</p> <p>While the above mentioned activities indicate that there was no effective progress on CDM status, DNV considers that IPCL has put efforts to secure CDM status for the project activity, though failed.</p>
6 Nov 2007 to 4 January 2008	Obtaining offer for CDM consultancy services.	<p>i) IPCL obtained offer from M/s Carbon Management consulting Limited for CDM consultancy services, validated from the offer letter /31/.</p> <p>ii) IPCL obtained offer from M/s PriceWaterHouse Coopers for CDM consultancy services, validated from the offer letter /32/.</p> <p>iii) IPCL obtained offer from M/s Ernst &amp; Young for CDM consultancy services, validated from the offer letter /33/.</p>



27 August 2008	IPCL appoints Ernst & Young as CDM consultant	<p>This is validated from the agreement between Ernst &amp; Young and IPCL /34/.</p> <p>Further to the appointment of CDM consultant as stated above, DNV noted from the following e-mail communications /35/ on progress of CDM status for the project activity:</p> <p>i) 1 Nov 2008: E-mail communication to IPCL from Ernst &amp; Young sending draft CDM procedural documents.</p> <p>ii) 4 November 2008: E-mail from Ernst &amp; Young to IPCL final CDM procedural documents.</p>
29 December 2008	Preparation of final project concept note for submission to MoEF.	<p>This is validated from the e-mail communication from Ernst &amp; Young to IPCL sending final project concept note for submission to the MoEF, the DNA of India.</p> <p>DNV has obtained copies of all of the above mentioned e-mails /35/ from IPCL.</p>
11 May 2009	Offer obtained from DNV for validation	This has been validated from DNV offer /36/.
16 September 2009	Signing of the contract agreement with DNV for CDM validation services	This has been validated from the contract agreement between DNV & IPCL /37/
28 October 2009	Webhosting of the PDD for global stakeholder consultation	Commencement of Global Stakeholder Consultation

DNV has validated the above mentioned actions through reviewing documented evidences for the referred events. In order to assess the authenticity of the evidence, DNV has verified all events from original documents retained by IPCL.



It is further observed that there are no gaps of more than two years between two consecutive events demonstrating efforts to secure CDM status.

Thus, in accordance to the “Guidance on the demonstration and assessment of prior consideration of the CDM, version 4 adopted at EB62 Annex 13” /44/, It is DNV’s opinion that continuing and real actions were taken to secure CDM status for the project activity.

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

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

#### **4.6.3 Investment analysis**

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

As the project generates financial and economic benefits other than CDM related income through the sales of electricity and also since the alternative to the project activity is not a similar investment project, DNV considers a benchmark analysis selected for conducting the investment analysis is appropriate.

##### **Benchmark selection**

The prime lending rate of the Reserve Bank of India at the time of decision making for implementation of the project activity in Gujarat (27 October 2006) /13/ has been considered as the benchmark project-IRR after tax and the same has been noted to be 11.25%. This has been validated from the official website of the Reserve Bank of India /50/. However, DNV has further verified and found that the PLR value was the same (11.25%) /50/ while IPCL initially decided to implement the project in Karnataka on 26 August 2006 /12/. Hence DNV considers that the applied benchmark value is appropriate.

##### **Input parameters**

DNV has validated the input parameters used for calculation of project IRR in the following manner and found that the assumptions are appropriately applied for each of the WTGs.

In this context, DNV reiterates that the starting date of the project activity has been indicated as 5 September 2006, the date of first purchase order for the project. This purchase order was issued for installation of the WEGs in Karnataka state /5/ which was later amended for the shift to Gujarat state /4/ /6/. The reason for shifting the project from the state of Karnataka to the state of Gujarat was due to problem in immediate availability of electricity evacuation system in Karnataka and also better financial health of Gujarat discom than the Karnataka discom; these were highlighted in the letter from Enercon to IPCL dated 26 September 2006 /23/. As the first purchase order dated 5 September 2006 is the earliest financial commitment by the project proponent for the project activity, it is reasonably considered as the starting date. However due to amendment of location and purchase orders thereof, date of some input sources are after the project start date. Considering the chronology of events occurred due to the amendments, DNV found all input sources appropriate.



Parameter	Validation route
WTG capacity (MW) – 24.8 MW (800 kW x 31 WEGs)	This has been obtained from the offers /14/ and the purchase orders /4/-/6/. DNV has further validated this value from the commissioning certificates /7/.
Project cost – INR 1271.0 Million	<p>This has been validated from the offers for WEGs dated 20 July 2006 /14/ and further cross checked against the purchase orders /4/-/6/.</p> <p>It is to be noted that IPCL initially obtained the offer /14/ for installation of 24.8 MW wind farm in Karnataka state and decided to install the same considering CDM benefits /12/. Subsequently, the purchase order /5/ was issued for installation of the WEGs in Karnataka state. Later the purchase order was amended for shifting the wind farm to Gujarat state /4//6/. Amendment of purchase order (6 &amp; 13 December 2006) took place once the IPCL management decided the shifting of wind farm to Gujarat state after evaluating project return with CDM consideration on 27 October 2006 /13/. Thus DNV considers that the project cost, as provided in the offers /14/ was appropriate.</p>
Operating & maintenance cost – INR 15.674 million per year with 5% annual escalation	This has been validated from the offers for WEGs /14/ and further cross checked against the purchase orders /4/-/6/. No expenses for the first two years are considered as per Enercon proposal /14/.
Tax rate – 33.26%	As per the Income Tax Act of India /62/. It is required to be mentioned here that tax holidays for first 10 years has been considered for IRR calculations as per Govt. of India stipulations.
MAT - 11.22%	As per The Indian Company Act /63/
Electricity tariff – INR 3.37 per kWh	<p>The electricity price was taken to be standard rate for GUVNL at the time of decision making /12/. The same has also been validated from the PPA signed between IPCL and GUVNL on 24 April 2007 /3/. The electricity price has been defined to be fixed for the entire operation life of WEGs (20 years) /3/.</p> <p>Depreciation has been considered in tax calculation over the estimated operational life of the project activity (20 years). This is in compliance with the Gujarat Electricity Regulatory Commission order No.5 of 2010 /59/ which states “The Terms and Conditions of the Tariff Regulations, 2005 notified by the Commission provides that depreciation should be calculated on straight line method for 90% of assets leaving the salvage value as 10%. Accordingly the depreciation rate works out to be 4.5% per annum”. This has been incorporated in the IRR calculations and hence found to be correct.</p>
Depreciation For straight line depreciation (SLM) – 4.50% and for accelerated depreciation – 80%	
CUF – 24.9%	The capacity utilisation factor (CUF), in other words plant load factor (PLF) has been provided by Enercon in their offer letters /14/. During the IRR calculation, 24.9% CUF was considered. Annex 11 of CDM EB 48th meeting report /46/ gives a guideline for validation of plant load factor for renewable energy. One option is





to use plant load factor determined by a third party contracted by the project participant. The project proponent has conducted a third party survey for determination of plant load factor for wind turbine generators. The survey has been carried out by M/s True Wind International Certification (TWIC) /15/. TWIC is a renowned organisation engaged in analysis of sites, estimation of generation and prognosis of various technical features of wind power projects and for micro-siting in various states in India. It has been noted that the survey has been carried out on actual energy generation as well as using database published by C-WET. The survey report indicates that the probable PLF of the project activity is 20.30%. Hence DNV considers that the CUF value used for IRR estimation was appropriate.

Lease rental – INR 146.691 mln per year for 8 years The project is funded through lease rental facility from Srei Infrastructure Finance Limited. This has been confirmed from the lease rental agreement between IPCL and M/s Srei Infrastructure Finance Limited dated 5 September 2006 and amended on 22 August 2007 /16/.

Administrative cost (1% of capital cost), annual escalation on administrative charges (4.5%) and other expenses (INR 0.9 mln) These administrative expense have been validated from the audited balance sheet of IPCL for the fiscal year 2007 – 2008 /17/. The other expenses, constitutes of (i) electrical inspection fees to GEDA /18/ (INR 103 500), (ii) O&M charges for dedicated transmission lines GEDA /19/ (INR 361 828), (iii) land lease rent for the WEGs to GEDA /20/ (INR 188 000) and (iv) energy certification charges to GEDA /21/ (INR 248 000). These charges initially were estimated based on Enercon's estimates. DNV did verify the values with actual expenses for the fiscal year 2010-2011 through verification of documents the referred documents.

Auxiliary consumption: 2% This value has been estimated. DNV from its experience of validating and verifying other wind energy projects considers that this value is appropriate. Further, considering this parameter to be zero, the IRR becomes 9.69%.

### Calculation and conclusion

The IRR calculations and assumptions provided in a spreadsheet /2/ are consistent with source of the data verified and the calculations were checked and found to be in line with EB's guidance on investment analysis /43/. The assumptions used in the calculations were deemed to be correct and have been verified by DNV. The after tax project-IRR of the project over 20 years is 9.38% which is less than the benchmark IRR of 11.25%. With CER revenues, the project-IRR (post-tax) increases to 12.20%, which is above the benchmark of 11.25% /2/.

### Sensitivity analysis

A sensitivity analysis has been carried out for the major parameters PLF and project investment cost which contribute to more than 20% of revenues or costs to check the robustness of the financial analysis. The O&M cost and annual escalation thereto are fixed as per the contract between IPCL and Enercon /4//5//6/ and hence there is no chance of change in





this component. Similarly, the tariff structure is fixed for 20 years as per the power purchase agreement /3/ with the GUVNL and it does not provide any compensation to the developer in case of generation shortfall. Hence, electricity tariff and O&M cost have not been considered under the scope of sensitivity analysis by the project proponent. However DNV has assessed sensitivity for the project activity for these two parameters and the same is provided below. The level of variation assumed for the sensitivity analysis has been suitably justified with relevant documents pertaining to the presented analysis and has been verified by DNV, such as:

- **Plant load factor (PLF):** It has been noted that with an increase of 12.35% in the PLF, the project IRR reaches the benchmark of 11.25%. However, the third party survey report /15/ for site specific PLF determination prepared by TWIC indicates that the probable PLF is determined to be 20.30%. Thus the PLF considered based on offer from EIL (24.9%) /14/ is already on much higher side in comparison to value provided in independent third party report (20.30%) /15/. Hence increase in PLF by 12.35% over the lifetime is deemed unlikely. It is therefore deemed unlikely that the annual generation/plant load factor would increase to the level required to cross the benchmark.
- **Project cost:** The project cost (INR 1271.0 million) assumed for the financial analysis was based on the offer from suppliers /14/. DNV has cross checked the actual project cost with the orders placed and the final costs are as given in the purchase orders (INR 1255.5 million) /4/6/. Nevertheless the benchmark will be reached if there is a decrease of 11.1%. However, based on the actual project cost (INR 1255.5 million), the project IRR has been found to be 9.72%. As reported earlier, the project activity has been already implemented and commissioned; hence there is no chance of further decrease in project cost.
- **Operation and maintenance (O&M) cost:** The O&M cost and annual escalation thereto are fixed as per the contract between IPCL and Enercon and hence there is no chance of change in this component. However DNV has checked and found that the project IRR for the project activity improves only to 10.74% even in a situation of having no expenditure on this account. Thus it is DNV's opinion that this scenario is highly unlikely as the agreement for O&M is in place /4/-/6/.
- **Electricity Tariff:** The project IRR crosses the benchmark if the tariff increases by 12.35%. The tariff for the power sold to the grid is INR 3.37 per kWh as per the PPA with GUVNL dated 24 April 2007 /3/. The tariff structure is fixed for 20 years as per the power purchase agreement /3/ with the GUVNL and it does not provide any compensation to the developer in case of generation shortfall. DNV has also further verified the actual electricity tariff through the share certificates and corresponding invoices /10/ for the period April 2007 to September 2011 and noted that the tariff is the same i.e., INR 3.37 per kWh. Thus tariff increase by 12.35% is unlikely.

The sensitivity analysis shows that even with likely variations of the key input parameters, the post-tax project 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

The generation of wind energy depends on local or region specific wind patterns and the tariff regime prevalent in the region/state. The wind energy tariff and other regulations concerning installations are governed by different state regulatory authorities in India. The project activity is located in the state of Gujarat and power generated is sold to the state grid. Since the policies and tariff regime is consistent throughout the state of Gujarat, DNV considers the selection of the region is appropriate. The installed capacity of the project activity is 24.8 MW which is above the limit of 15 MW for small scale projects, the project activity falls under the category of large scale projects as per CDM methodology. So the wind power projects with installed capacities higher than 15 MW in the state of Gujarat have been considered to demonstrate common practice analysis. It has also been evidenced from the total WEG under operation in the state of Gujarat /51/ that small scale projects (< 15 MW) are typically bundled together to obtain scale and volume, hence they would not be a correct representation of a similar scale like the project activity where investment has done by single owner. Therefore project activities with installed capacity above 15 MW have been considered to be similar to the project activity and have been used for the common practice analysis.

The total installed wind energy generation capacity in Gujarat, as on March 2006, was 338 MW and as on March 2007 was 636.6 MW /52/ (the project activity was also commissioned in March - April 2007 /7/).

As the official website of GEDA /51/ provides developer wise wind generation data since 2009, DNV has noted the following projects by individual developers with capacities exceeding 15 MW as a single project activity, as of April 2011. CDM status of these projects is also described below.

Sl. no.	Developer	Capacity (MW)	CDM status
1.	Gujarat Guardian Ltd.	31.6	Considered carbon finance options and has already received carbon benefits through the voluntary emission reductions (VER) route:- <a href="http://www.carbonneutral.com/cnregistry/uploaded/Jamnagar%20Wind%20Power%20Projects%20PDDs.pdf">http://www.carbonneutral.com/cnregistry/uploaded/Jamnagar%20Wind%20Power%20Projects%20PDDs.pdf</a> .
2.	Patnaik Minerals Pvt. Ltd.	30.2	Under CDM validation <a href="http://cdm.unfccc.int/Projects/Validation/DB/GQ56N39MLSZ9QDRL6RUF5YJSFDPD1U/view.html">http://cdm.unfccc.int/Projects/Validation/DB/GQ56N39MLSZ9QDRL6RUF5YJSFDPD1U/view.html</a>
3.	Indian Petrochemicals Company Limited	15.315	This particular project is a captive power project which can be identified from the following web-link:- <a href="http://sebidifar.nic.in/documents/IPCL/ar032002.pdf">http://sebidifar.nic.in/documents/IPCL/ar032002.pdf</a>  Hence, this project has been left out from the domain of common practice analysis



4.	Gujarat NRE Coke	1.25+26.25=27.5	Under CDM validation <a href="http://cdm.unfccc.int/Projects/Validation/DB/2W/HFROEPK85ARNQ1TVKJV4WC8ATMAB/view.html">http://cdm.unfccc.int/Projects/Validation/DB/2W/HFROEPK85ARNQ1TVKJV4WC8ATMAB/view.html</a>
5.	Ratnamani Metals and tubes Limited	13.25 MW	The second phase consisting of 13.25 MW has been registered as a CDM project. UNFCCC ref. no. 2247
6.	Hindustan Zinc Ltd.	88.8 MW	CDM registered, UNFCCC ref no. 1856
7.	GACL	23.75 MW	Under CDM validation <a href="http://cdm.unfccc.int/UserManagement/FileStorage/AE5VZYW142306BCUXKHM8IDOS9NTLJ">http://cdm.unfccc.int/UserManagement/FileStorage/AE5VZYW142306BCUXKHM8IDOS9NTLJ</a>
8.	Gujarat Paguthan Energy Corp. Ltd.	50.4 MW	Under CDM validation <a href="http://cdm.unfccc.int/UserManagement/FileStorage/JNH59TDF3CO61AYG7XZWSKELR8VP2I">http://cdm.unfccc.int/UserManagement/FileStorage/JNH59TDF3CO61AYG7XZWSKELR8VP2I</a>
9.	Gujarat Flurochemicals Ltd.	23.1 MW	Under CDM validation <a href="http://cdm.unfccc.int/Projects/Validation/DB/QRR/SZJM73N47W1JXJTC60X1ZN151C8/view.html">http://cdm.unfccc.int/Projects/Validation/DB/QRR/SZJM73N47W1JXJTC60X1ZN151C8/view.html</a>
10.	MSPL Group	30 MW	Under CDM validation <a href="http://cdm.unfccc.int/UserManagement/FileStorage/TQ6XACL8AORS2WS6EJFK1DMCWKPT0H">http://cdm.unfccc.int/UserManagement/FileStorage/TQ6XACL8AORS2WS6EJFK1DMCWKPT0H</a>
11.	IPCL	24.8 MW	Under CDM validation <a href="http://cdm.unfccc.int/Projects/Validation/DB/K0Z/TRSQUQH8WZN76AA11ZAZW16BPNH/view.html">http://cdm.unfccc.int/Projects/Validation/DB/K0Z/TRSQUQH8WZN76AA11ZAZW16BPNH/view.html</a>
12.	IOCL	21 MW	Under CDM validation <a href="http://cdm.unfccc.int/UserManagement/FileStorage/1YRNA0GPF9KME6XHIT23OUJZQB8SV4">http://cdm.unfccc.int/UserManagement/FileStorage/1YRNA0GPF9KME6XHIT23OUJZQB8SV4</a>
13.	Nishkalp Investment & Trading	21.5 MW	Under CDM validation <a href="http://cdm.unfccc.int/Projects/DB/.../X2ED94JW/NJUGOK0C13ALQG6BWSQNES">http://cdm.unfccc.int/Projects/DB/.../X2ED94JW/NJUGOK0C13ALQG6BWSQNES</a>
14.	Aarvee Denims & Exports Ltd.	18 MW	Under CDM validation <a href="http://cdm.unfccc.int/UserManagement/FileStorage/87A0BK6EZUR53VIFMHCQNDJO9PX4LG">http://cdm.unfccc.int/UserManagement/FileStorage/87A0BK6EZUR53VIFMHCQNDJO9PX4LG</a>
15.	Surajbari Windfarm Development	16.5 MW	Under CDM validation <a href="http://cdm.unfccc.int/UserManagement/FileStorage/XV9ZK78N40SLABET6UMFJPG3OW2YHQ">http://cdm.unfccc.int/UserManagement/FileStorage/XV9ZK78N40SLABET6UMFJPG3OW2YHQ</a>



	Private Ltd.		
16.	ONGC	51 MW	Under CDM validation <a href="http://cdm.unfccc.int/UserManagement/FileStorage/IL7MJ2816HX5VE0PTQWBNKAGOUZ4S">http://cdm.unfccc.int/UserManagement/FileStorage/IL7MJ2816HX5VE0PTQWBNKAGOUZ4S</a>
17.	CLP Wind Farms	50.4 MW	Under CDM validation <a href="http://cdm.unfccc.int/UserManagement/FileStorage/XABP8WN7Q0TMYZLKE9D1I2HCR543S6">http://cdm.unfccc.int/UserManagement/FileStorage/XABP8WN7Q0TMYZLKE9D1I2HCR543S6</a>
18.	Indian Renewable Energy Foundation	16.875 MW	Under CDM validation <a href="http://cdm.unfccc.int/Projects/Validation/DB/1DSKUBDHD0AFU0HA7VDPTW2JM8CZ8E/view.html">http://cdm.unfccc.int/Projects/Validation/DB/1DSKUBDHD0AFU0HA7VDPTW2JM8CZ8E/view.html</a>
19.	DLF Ltd.	150 MW	Under CDM validation <a href="http://cdm.unfccc.int/UserManagement/FileStorage/OX25BNHS6G10CG1TRTH48C0XYTDT0P">http://cdm.unfccc.int/UserManagement/FileStorage/OX25BNHS6G10CG1TRTH48C0XYTDT0P</a>

All similar projects under similar conditions have sought for CDM benefits except for two projects. One project (Sl. no. 1) has gone through voluntary emission reduction scheme and hence reasonably excluded from the list. Another project (Sl. no. 3) is a captive power project that is essentially implemented to meet the power requirements of the industry, the baseline scenario will be different for captive investor and the risk undertaken by a captive investor will be different from an investor selling power to the grid. Hence, DNV considers that installation of wind energy project with more than 15 MW generation capacity is not a common practice in Gujarat in India.

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

## 4.7 Monitoring

The project applies the approved monitoring methodology ACM0002, version 12.1.0 "Consolidated baseline methodology for grid-connected electricity generation from renewable source" /40/.

The monitoring plan will give opportunity for a real measurement of achieved emission reductions. The project monitoring plan is in compliance with the monitoring methodology ACM0002 (version 12.1.0).

The Ministry of Environment and Forest (MoEF), the DNA of India, has defined that 2% of CER revenues would be incurred as expenditure for sustainable development activities. The project proponent has included an action plan in the PDD defining proposed mode of expenditure. The expenditure will be provided in the annual report of the company for verification purposes.

It is DNV's opinion, IPCL is able to implement the monitoring plan.



#### 4.7.1 Parameters determined ex-ante

Baseline emission factor for the NEWNE grid is established *ex-ante* based on the approved methodology using a combined margin approach /45/. The combined margin emission coefficient for the NEWNE regional grid of India has been determined to be 0.91 tCO<sub>2</sub>e/MWh based on the data sourced from CEA /47/. CEA has published a database of carbon dioxide emission factors from the power sector in India based on the detailed authenticated information obtained from all operating power stations in the country. This CO<sub>2</sub> baseline database provides information about the OM and BM factors of all the regional electricity grids in India. DNV confirms that the database is an official publication of the Government of India for the purpose of CDM baseline and the latest version available at the time of validation has been used. The operating margin has been estimated to be 1.01 tCO<sub>2</sub> /MWh and the build margin to be 0.60 tCO<sub>2</sub>/MWh. The calculations and assumptions have been verified and found to be correct by DNV.

#### 4.7.2 Parameters monitored ex-post

The net electricity generation supplied to the NEWNE grid as a result of the implementation of the project activity in year *y* will be monitored continuously *ex-post*. Share certificates issued by GEDA (Gujarat Energy Development Agency) for electricity generated by the WEGs will be used as source for monitoring this parameter.

The procedures for the metering of electricity supplied to the NEWNE grid are found to be as per the power purchase agreement /3/. Each WEG is equipped with local control system that continuously monitors electricity generation by the particular individual WEG. All WEGs under the project activity are connected to the energy meters maintained at the substation. At present there are 3 sets of substation meters (two way tri-vector meters for monitoring of both import and export of electricity), each set having one main meter and one check meter. All substation meters are of 0.2 accuracy class, which has been confirmed during the site visit. The electricity meters at the substation are meant for the entire wind farm, to which the project activity belongs. Joint meter reading are taken from the substation meters by GEDA and Enercon personnel. Responsibility for maintenance and calibration of substation meters lies with GETCO. The meters will be calibrated once in 3 years. This has been confirmed from the communications from GETCO to the wind farm operators dated 29 January 2011 /60/ that all meters at the power evacuation sites are calibrated once in three years period. Hence DNV found that that the calibration frequency is appropriate. WEGs belonged to a particular project proponent are connected to cluster meters (of accuracy class 0.2). Electricity generation by individual project proponent is then determined from the joint meter readings by apportioning of import and export of electricity monitored by the substation meters. Apportioning is carried out from the electricity generation data obtained from each cluster meter.

The net electricity supplied by the project activity (by all WEGs of project activity) to the north east west north eastern grid will be calculated as:

**Net Electricity Exported to the grid by the project activity will be calculated as:**

$$EGPJ_y = EGPJ_{\text{export},y} - EGPJ_{\text{Import},y}$$

Where,



$EGPJ_y$  = Net Electricity exported by the project activity to the grid (by all the WEGs of the project activity)

$EGPJ_{export,y}$  = Electricity exported by the project activity to the grid (by all the WEGs of the project activity)

$EGPJ_{import,y}$  = Electricity imported from the project activity to the grid (by all the WEGs of the project activity)

**Electricity Exported to the Grid by the project activity will be calculated as:**

$$EGPJ_{export,y} = EG_{GETCO, Export} \times EG_{Cluster, Export} / EG_{Cluster, WF, Export}$$

Where,

$EG_{GETCO, Export}$  = Electricity exported, as recorded by the main meter at Enercon substation

$EG_{Cluster, Export}$  = Electricity exported by the project activity, as measured at Cluster Meter

$EG_{Cluster, WF, Export}$  = Electricity exported by all the project owners connected to Enercon substation, as provided in shared certificate issued by GETCO.

**Electricity Imported to the Grid by the project activity will be calculated as:**

$$EGPJ_{Import,y} = EG_{GETCO, Import} \times EG_{Cluster, Import} / EG_{Cluster, WF, Import}$$

Where,

$EG_{GETCO, Import}$  = Electricity imported, as recorded by the main meter at Enercon substation

$EG_{Cluster, Import}$  = Electricity imported by the project activity, as measured at Cluster Meter

$EG_{Cluster, WF, Import}$  = Electricity imported by all the project owners connected to Enercon substation, as provided in shared certificate issued by GETCO

GEDA thus issues monthly share certificates for individual project owners that indicate net electricity supplied by the project activity to the grid. DNV confirmed this calculation procedure during site visit and through share certificates /10/. The emission reductions will be calculated based on the net electricity supplied to the grid as depicted in the share certificates issued by GEDA on a monthly basis.

Details of data collection and frequency of data recording and associated formats are described and found to be adequate as verified during the site visit and complies with the requirements of the methodology. Since the project involves electricity generation from wind sources, no monitoring is required for project emissions or leakages due to the project activity.





All data monitored will be archived electronically and will be kept at least for 2 years after the crediting period.

#### 4.7.3 Management system and quality assurance

The responsibilities and authorities for project management, procedures for monitoring and reporting, and QA/QC procedures have been systematically established and formalized as mentioned in the PDD /1/. Data will be saved and archived until 2 years after the end of the crediting period.

All the meters are under the purview of GETCO and will be calibrated by GETCO on a regular basis as mentioned in the power purchase agreement. The frequency of calibration will be once in three year as per GETCO communication to wind farm operators /60/. The net electricity exported can be cross checked with the sales receipts. During the site visit DNV cross checked the sales receipts /9/.

The application of the monitoring methodology is transparent and DNV considers the project participants able to implement the monitoring plan.

#### 4.8 Estimation of GHG emissions

The calculations are well documented in line with the consolidated baseline and monitoring methodology ACM0002, version 12.1.0 /40/. 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.

Baseline emission: In accordance with ACM0002, version 12.1.0 /40/ the baseline emissions have been calculated as the product of net electricity supplied to the grid and the grid emission factor.

The grid emission factor of the NEWNE regional grid has been determined *ex-ante* for the fixed 10 years crediting period according to the “Tool to calculate the emission factor for an electric system”, version 2 /45/ based on the most recent data available at the start of validation. It has been calculated as the weighted average ( $w_{OM} = 0.75$ ;  $w_{BM} = 0.25$ ) of the operating margin and the build margin emission factors.

The resulting combined margin emission factor for the NEWNE grid of India has been calculated as 0.91 tCO<sub>2</sub>e/MWh, and has been sourced from Central Electricity Authority data /47/. The Central Electricity Authority, Ministry of Power, Government of India has published a database of carbon dioxide emission factors from the power sector in India based on detailed authenticated information obtained from all operating power stations in the country. This database i.e. the 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 and the OM in the CEA database is calculated *ex-ante* using the simple OM approach based on the generation-weighted average emissions per electricity unit over a three year period of 2005-2006, 2006-2007 and 2007-2008. BM is calculated *ex-ante* and obtained from the CEA database /47/. The CEA database is a Government of India source and confirms that the BM calculations is based on 20% most recent capacity additions in the grid based on net generation. The CEA database /47/ also confirms that, the emission factors for coal and lignite were based on the values provided in India’s Initial National Communication under the UNFCCC (Ministry of Environment & Forests, 2004). The emission factor for coal is



supported by the results of an analysis of approx. 120 coal samples collected from different Indian coal fields. For all other fuels, default emission factors were derived from the IPCC 2006 Guidelines /57/. In line with the “Tool to calculate the emission factor for an electricity system” /45/, the low end values of the 95% confidence intervals indicated by IPCC were used. The operating margin has been determined to be 1.01 tCO<sub>2</sub>e/MWh and the build margin to be 0.60 tCO<sub>2</sub>e/MWh. DNV was able to verify the value of combined margin from the Central Electricity Authority published data /47/.

Project emission and leakage: The project is electricity generation from the wind power and no project emissions and leakage is associated with the project activity.

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 48 380 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 /1/ 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 /1/. 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), India Environment Impact Notification S.O. 1533 dated 14 September 2006 /54/, wind power projects are not covered under any schedule and thus an environmental impact assessment is not required for the project activity. The project is not likely to create any adverse environmental effects. The proposed project activity contributes to generation of electricity from renewable source and the investment is expected to contribute to the economic development of the region. The project activity is in compliance with all current, applicable legislations in India.

### 4.10 Comments by local stakeholders

The following parties have been consulted as part of stakeholders consultation:

- i) Elected bodies of representatives involved in the administration of the local area (village Panchayats)
- ii) Finance providers (SREI) for the project activity
- iii) Equipment manufacturers (Enercon) and entities involved in maintenance and operation of the project activity.

The project proponent invited the local stakeholders to comment on the project activity through individual letters on 4 December 2006 /24/ for attending discussion on CDM aspects of the project activity. The discussion was held on 27 December 2006 and all the mentioned stakeholders provided their written feedback through letters /25/.

All the comments /25/ have been verified by DNV and it was observed that there were no adverse comments by local stakeholders.

DNV considers the local stakeholder consultation carried out adequately.





#### **4.11 Comments by Parties, stakeholders and NGOs**

The PDD, version 1 dated 14 Oct 2009 /1/, was made publicly available on the CDM website (<http://cdm.unfccc.int/Projects/Validation/DB/K0ZTRSQUQH8WZN76AA11ZAZW16BPNH/view.html>) and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 28 Oct 2009 to 26 Nov 2009.

No comments were received.

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## 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.	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	NA
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 anthropogenic emissions of greenhouse gases by sources are reduced below those	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	<del>CAR-3</del> <del>CAR-4</del>

Requirement	Reference	Conclusion
that would have occurred in the absence of the registered CDM project activity.		<del>CAR-5</del> <del>CAR-6</del> <del>CAR-7</del> <del>CL-1</del> <del>CL-2</del> OK
<b>About forecast emission reductions and environmental impacts</b>		
11. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.	Kyoto Protocol Art. 12.5b	OK
<b>For large-scale projects only</b>		
12. Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	CDM Modalities and Procedures §37c	OK
<b>About stakeholder involvement</b>		
13. Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received.	CDM Modalities and Procedures §37b	OK
14. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available.	CDM Modalities and Procedures §40	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	CDM Modalities and Procedures §47	OK

Requirement	Reference	Conclusion
levels outside the project activity or due to force majeure.		
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</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		OK
<b>A.2 Description of the project activity (VVM Para 58-64 and VVM Para 135 and 136 (a) &amp; (c) for small-scale project activities, as applicable)</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 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		OK

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

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<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		
A.2.2 If a greenfield project, describe the physical implementation of the project when the validation was commenced.	/1/	DR	The project activity has already been commissioned at the time of validation. The wind energy generators have been commissioned on 13 March 2007 (27 nos.) and 27 March 2007 (4 nos.). This has been validated from the commissioning certificates issued by the Gujarat Energy Development Agency (GEDA).		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.		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	Yes. The proposed CDM project activity involves installation of 31 wind energy generators each of 0.800 MW generating capacity in the state of Gujarat. The project activity is intended to supply electricity to the NEWNE regional grid of India. (erstwhile western regional grid).		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	No. The project activity does not involve alteration of the existing facility.		OK
A.2.6 Does the project design engineering reflect current good practices?	/1/	DR	The project activity involves installation of		OK

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



Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			wind energy generators. The WEGs have been manufactured and installed by the Enercon (India) Limited, a reputed organisation in wind energy technology.		
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/	DR	The technology applied for the project activity is a well established and widely used technology for wind power generation in India. Transfer of technology from Annex-I Party is not involved.		OK
<b>A.3 Participation requirements (VVM Para 51-54, 125-127)</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/	DR	India is the only Party involved in the project activity as the host country.  India (host)  <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		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?	/1/	DR	The project proponent is requested to submit a copy of the host country approval to the validator.  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

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

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
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 approval, describe how it was verified that the letter of approval is authentic		<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			
A.3.3 Have all private/public project participants been authorized by an involved Party?	/1/	DR	The project proponent is yet to submit LoA from the host Party.	CAR-1	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 WEGs have been installed at Haripar, Umralla and Methan villages in Jamnagar District and Vadali village in Rajkot District, in the state of Gujarat in India. This has been confirmed from the commissioning certificates issued by GEDA.		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/	DR	The validation did not reveal any public funding from Annex-I Party.		OK

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

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
<b>B Application of a baseline and monitoring methodology</b>					
<b>B.1 Methodology applied (VVM Para 65-76 and VVM Para 136 (b) for small-scale project activities, as applicable)</b>					
B.1.1 Does the project apply an approved methodology and the correct version thereof?	/1/	DR	The approved consolidated baseline and monitoring methodology ACM0002, "Consolidated baseline methodology for grid-connected electricity generation from renewable sources", version 10 has been applied for the project activity. The methodology version was pertinent at the time of web-hosting of the PDD.  However, the project proponent is requested to revise the PDD as per ACM0002 version 12.1.0 as version 10 has been expired.	CAR-11	OK
B.1.2 If applicable, has any specific guidance provided by the CDM EB in respect to the applied methodology been considered?	/1/	DR	In line with the methodology following specific guidance provided by CDM EB has been followed <ul style="list-style-type: none"> <li>• Tool to calculate the emission factor for an electricity system;</li> <li>• Tool for the demonstration and assessment of additionality;</li> </ul>		OK
<b>B.2 Applicability of methodology (and tools)</b>					
B.2.1 How was it validated that project complies with the following applicability criteria: <i>"This 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</i>	/1/	DR	The project activity is a greenfield project that involves installation of 31 WEGs for wind energy generation. The land required for the project activity has been allotted for		OK

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

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
<i>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).</i>			installation of WEGs as revealed from the letter from GEDA dated 22 February 2007.		
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/ /8/	DR	The project is a greenfield activity involving installation of wind energy generation units.		OK
B.2.3 How was it validated that project complies with the following applicability criteria: "In the case of capacity additions, retrofits or 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 project activity."	/1//4/ /5//6 //8/	DR	The project activity does not involve capacity addition or retrofit or replacement of an existing plant.		OK
B.2.4 How was it validated that project complies with the following applicability criteria: "In case of hydro power plants, one of the following conditions must apply: - The project activity is implemented in an existing reservoir, with no change in the volume of reservoir. - The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given	/1//4/ /5//6 //8/	DR	The project activity does not involve hydro power generation.		OK

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

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
in the Project Emissions section, is greater than 4 W/m <sup>2</sup> . - The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m <sup>2</sup> .”					
B.2.5 How was it validated that project complies with the following applicability criteria: “The methodology is not applicable to the following: - 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; - Biomass fired power plants; - Hydro power plants <sup>3</sup> that result in new reservoirs or in the increase in existing reservoirs where the power density of the power plant is less than 4 W/m <sup>2</sup> .”	/1//4/ /5//6 //8/	DR	The project activity neither involves switching from fossil fuel to renewable energy at the project site nor a biomass nor a hydro power plant.		OK
B.2.6 How was it validated that project complies with the following applicability criteria: In the case of retrofits, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is “the continuation of the current situation, i.e. to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance”	/1//4/ /5//6 //8/	DR	The project activity is not a retrofit, replacement or capacity addition activity.		OK
B.2.7 Is the selected baseline one of the baseline(s) described in the methodology and this hence confirms the applicability of the methodology?	/1//4/ /5//6 //8/	DR	The selected baseline of electricity generation from existing and future power plants connected to the NEWNE grid is one of the baselines described in the applied methodology ACM0002, version 12.1.0 and hence confirms that the applied methodology		OK

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

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			is applicable for the project activity.		
<b>B.3 Project boundary (VVM Para 78-80)</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	The system boundary of the project activity comprises of the WEGs including related auxiliaries and the NEWNE grid. This is in line with the applied methodology.		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/	DR	CO <sub>2</sub> is the sole GHG indicator for the project activity. This is in line with the applied methodology ACM0002, version 10.		OK
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	The project activity does not involve any other GHG emission sources.		OK
<b>B.4 Baseline scenario determination (VVM para 81-88, 105-107)</b> <i>Ensure that the evaluation of all alternatives provided in the PDD and required by the methodology and also possible alternatives/offshoots of alternatives are discussed. Check that all alternatives required to be considered by the methodology are included in the final PDD. If baseline alternatives required to be considered by the methodology are considered not applicable, please assess the justification for this.</i>					
B.4.1 Which baseline scenarios have been identified? Is the list of baseline scenarios complete?	/1/	DR	The project proponent has identified thermal power plant, both fossil fuel and biomass based, of comparable capacity to the project activity. However, the applied methodology		

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			ACM0002 version 10 defines that “If the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following: 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”.  Thus the project proponent is requested to determine the baseline as per the requirements of the applied methodology.	<del>CAR-2</del>	OK
B.4.2 How have the other baseline scenarios been eliminated in order to determine the baseline?	/1/	DR/I	Refer B.4.1.	<del>CAR-2</del>	OK
B.4.3 What is the baseline scenario?	/1/	DR/I	The baseline scenario is the amount of electricity displaced from the NEWNE grid by the project activity.		OK
B.4.4 Is the determination of the baseline scenario in accordance with the guidance in the methodology?	/1/	DR	Refer B.4.1.	<del>CAR-2</del>	OK
B.4.5 Has the baseline scenario been determined using conservative assumptions where possible?	/1/	DR	Refer B.4.1.	<del>CAR-2</del>	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/	DR	Yes. The baseline scenario has been determined according to the national sectoral policy. The concerned NEWNE grid is the national regional grid in India and the emission factor for the grid is determined by		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			CEA on behalf of the Ministry of Power, Government of India.		
B.4.7 Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/	DR	Refer B.4.1.	CAR-2	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> <li>• The methodology has been correctly applied to identify what would occurred in the absence of the proposed CDM project activity</li> </ul>	/1/	DR	Refer B.4.1.	CAR-2	OK
<b>B.5 Additionality determination. (VVM Para 94-121 and VVM Para 137 for small-scale project activities, as applicable)</b>					
B.5.1 What approach/tool does the project use to assess additionality? Is this in line with the methodology?	/1/	DR	The project proponent has opted for investment analysis route for demonstrating additionality. This is in line with the applied methodology.		OK
B.5.2 Have the regulatory requirements correctly been taken into account to evaluate the project activity and the alternatives?	/1/	DR	There are no legislative obligations for the project or the baseline scenario of grid		OK

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			connected power generation from existing and future power plants.		
B.5.3 Is sufficient evidence provided to support the relevance of the arguments made?	/1/	DR	The PP has provided sufficient evidences to support the relevance of the arguments made		OK
B.5.4 What is the project additionality mainly based on (Investment analysis or barrier analysis)?	/1/	DR	The project additionality has been demonstrated on the basis of investment analysis.		OK
<b>Prior consideration of CDM (VVM Para 98-103)</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/	DR/I	<p>The project activity was initially decided to come up at Hullaevannur in Karnataka state. It has been noted from the minutes of the board meeting of IPCL dated 26 August 2006 that the decision of installation of wind farm in Karnataka was taken considering potential revenue from CDM. However, the same project later was decided to shift to Gujarat state. This decision was taken by the board of Directors of IPCL on 27 October 2006. CDM benefit was also part of consideration while taking this decision. DNV has verified these decisions from the minute's book of IPCL and considers that IPCL management has considered CDM benefits seriously prior to taking decision of installation of the project activity.</p> <p>The project proponent is requested to submit a copy of the decision taken on 26 August 2006 to the validator.</p>	<del>CL-1</del>	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
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/	DR/I	This is not applicable for this project activity as the starting date is before 2 August 2008.		OK
<b>Continuous efforts to secure CDM status (only to be completed if starting date is before 2 August 2008)</b>					
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/	DR/I	The start date of the project activity has been mentioned as 6 December 2006 in the PDD which was noted to be the amendment of the purchase order dated 5 September 2006 (date of issuance of first purchase order). The PDD dated 14 October 2009 was web hosted for global stakeholder consultation on 28 October 2009. In between, the project proponent has initiated several actions to attain CDM benefit like, appointment of CDM consultant, appointment of validator, submission of application to MoEF for obtaining HCA. DNV has verified supporting documents regarding these events and found satisfactory.		OK
B.5.8 When did the construction of the project activity start?	/1/	DR/I	This date could not be revealed as installation and commissioning of the project activity was entrusted with Enercon (India) limited with target commissioning date of 15 March 2007. This has been validated from the purchase order dated 5 September 2006. The first phase of the project was commissioned		OK

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			on 23 March 2007 as observed from the commissioning certificates..		
B.5.9 When was the project commissioned?	/1/	DR/I	The wind energy generators have been commissioned on 23 March 2007 (27 nos.) and 27 March 2007 (4 nos.). This has been validated from the commissioning certificates issued by the Gujarat Energy Development Agency (GEDA).		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/I	DNV could validate the events occurring between project start date and validation commencement date through verification of documents.  However, the project proponent is requested to revise the timeline of events provided in the PDD to include only those related to CDM activities.	<del>CC</del> AR-3	OK
<b>Investment analysis (VVM Para 108-114)</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/	DR	The project activity is supposed to generate revenue from selling of electricity. This has been 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	The alternative to the project activity being grid based electricity generation, no investment is necessary.		OK
B.5.13 Is the choice of benchmark analysis, investment comparison or simple cost analysis correct?	/1/	DR	The project proponent has used benchmark analysis for assessing the additionality. As		OK

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			the project activity will generate revenue from sale of electricity, the simple cost approach is not suitable. Also the alternative of grid based power generation does not involve any investment on the part of the PP, hence investment comparison is not suitable. Thus the selected approach of benchmark analysis is suitable.		
B.5.14 Is the benchmark/discount rate the latest available at the time of decision?	/1/	DR	The prime lending rate of the Reserve Bank of India at the time of decision making (26 August 2006) has been considered as the benchmark IRR and the same has been noted to be 11.25%. This has been validated from the official website of the Reserve Bank of India.		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/	DR	The financial indicator is the project IRR calculated after tax. The financial indicator corresponds to the benchmark considered as per the "Guidelines On The Assessment Of Investment Analysis", version 3.		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	The project proponent is requested to mention the source of the assumptions for the investment analysis in the PDD and provide documentary evidences to substantiate the same. In doing so, the project proponent is requested to provide evidences to justify that the input values were suitable and valid at the time of decision making.	CAR-4	OK

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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/	DR	Depreciation has been considered in tax calculation over the estimated operational life of the project activity (20 years). This is in compliance with the Indian legislations. However the project proponent is requested to account MAT credit in IRR calculation.	CL-2	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/	DR	The operating life of the project activity has been considered to be 20 years and this is in line with the PPA signed between IPCL and GUVNL. The IRR has also been calculated over 20 years and hence salvage value is not required to be considered.		OK
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/	DR	Refer B.5.16.	CAR-4	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 version 1 paragraph 95.	/1/	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 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. <i>Provide details on how the load factor was</i>		

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			<i>validated::</i> It has been observed that the electricity generation from the project activity has been taken from that estimated by the manufacturer. The project proponent is requested to consider the value for electricity generation/PLF as per CDM-EB guidelines and use the same for IRR and emission reduction calculation purposes.	<del>CAR-5</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 accordance with VVM version 1 paragraph 95.	/1/	DR	<input checked="" 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 related to the project and the project participants <i>Provide details on how the output price was validated:</i> The electricity price has been validated from the PPA signed between IPCL and GUVNL. The electricity price has been defined to be fixed for the entire operation life of WEGs (20 years).		OK
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 version 1 paragraph 95.	/1/	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		

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			related to the project and the project participants <i>Provide details on how the investment costs were validated:</i> Refer B.5.16	<del>CAR-4</del>	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 version 1 paragraph 95.	/1/	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 related to the project and the project participants <i>Provide details on how the O&amp;M costs were validated:</i> Refer B.5.16	<del>CAR-4</del>	OK
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 version 1 paragraph 95.	/1/	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 related to the project and the project participants <i>Provide details on how other input parameters were validated:</i> Refer B.5.16	<del>CAR-4</del>	OK
B.5.25 Was the financial calculation spread sheet verified and found to be correct?	/1/	DR	It has been learnt from IPCL documentation that the project activity was initially decided to come up in Karnataka and later shifted to	<del>CAR-6</del>	OK

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			Gujarat state. Thus at the initial decision making time the project was meant to come up in Karnataka. Hence, the project proponent (PP) is requested to provide IRR calculations meant for the project at Karnataka along with that at Gujarat and also on actual cost basis.		
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/	DR	Capital cost and total electricity generation have been identified as the parameters for sensitivity analysis as these parameters have more than 20% contribution in total revenue or cost. Tariff and O&M costs have not been included in the sensitivity analysis since the tariff is fixed for 10 years and O&M cost is also fixed as per contract for O&M.		OK
B.5.27 Sensitivity analysis: Is the range of variations is reasonable in the project context?	/1/	DR	Refer B.5.28.		
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/	DR	Sensitivity analysis does not specifically indicate the input values of capital cost and electricity generation at which the project IRR crosses the benchmark and justification for probability of occurrence of those events.	CL-3	OK
<b>Barrier analysis (VVM Para 115-118)</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	Barrier analysis has not been opted for demonstration of the project activity.		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
<b>Common practice analysis (VVM Para 119-121)</b>					
B.5.30 What is the geographical scope of the common practice analysis? Is this justified?	/1/	DR	The state of Gujarat in India has been considered to be the geographical scope for the project activity. This has been found to be justified as installation of WEG depend wind energy potential at specific geographical locations and tariff policies differ between the states.		OK
B.5.31 What is the scope of technology and size (e.g. capacity of power plant) for the common practice analysis and how has this been justified?	/1/	DR	The project proponent is requested to align common practice analysis to the requirements stipulated in the additionality tool. In doing so the project proponent should analyse similar project activities in the region and discuss on the essential distinction between the project and such similar activities.	<del>CAR-7</del>	OK
B.5.32 What is the data source(s) used for the common practice analysis?	/1/	DR	Refer B.5.31.	<del>CAR-7</del>	OK
B.5.33 How many similar non-CDM-projects exist in the region within the scope?	/1/	DR	Refer B.5.31.	<del>CAR-7</del>	OK
B.5.34 How were possible essential distinctions between the project activity and similar activities assessed?	/1/	DR	Refer B.5.31.	<del>CAR-7</del>	OK
B.5.35 What is the conclusion of the common practice analysis?	/1/	DR	Refer B.5.31.	<del>CAR-7</del>	OK
<b>Conclusion</b>					
B.5.36 What is the conclusion with regard to the additionality of the project activity?	/1/	DR	DNV will arrive at a conclusion on additionality of the project after receipt of responses against the CARs & CLs from the project proponent.		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
<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 199-203)</b>					
B.6.1 How was the CO <sub>2</sub> emission factor of the NEWNE grid verified?	/1/	DR	The CO <sub>2</sub> emission factor of the NEWNE electricity grid has been obtained from the CEA database for combined margin factor. DNV confirms that CEA database is the official database for Indian power sector on behalf of the Ministry of Power, Government of India and is publicly available. The value has been taken from the CEA database version-4 which was pertinent at the time of webhosting of the PDD.		OK
<b>Baseline emissions (VVM Para 89-93)</b>					
B.6.2 Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	The procedure for calculation of baseline emissions corresponds to that stipulated in the applied methodology.		OK
B.6.3 Have conservative assumptions been used when calculating the baseline emissions?	/1/	DR	Refer B.6.2.		OK
B.6.4 Are uncertainties in the baseline emission estimates properly addressed?	/1/	DR	There are no uncertainties envisaged for the baseline emissions.		OK
<b>Project emissions (VVM Para 89-93)</b>					
B.6.5 Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	The project activity being a wind based power generation activity, there is no project emission and this is as per the applied methodology.		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
<b>Leakage (VVM Para 89-93)</b>					
B.6.6 Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	As there is no transfer of equipment from or to the project activity, leakage emissions will not arise.		OK
<b>Emission Reductions (VVM Para 89-93)</b>					
B.6.7 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 submitted for registration.</li> </ul>	/1/	DR	Refer B.5.20. It has also been noted that the aggregate emission reductions over 10 year period has been mentioned as the average annual reductions in Para A.4.4 in the PDD. The project proponent is requested to rectify the same.	<del>CAR-5</del>  <b>CAR-8</b>	OK
<b>B.7 Monitoring plan (VVM Para 122-124)</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 plan as described in the PDD corresponds to the requirements of the applied methodology.		OK
B.7.2 Does the monitoring plan contains all necessary parameters, and are they clearly described?	/1/	DR	Yes. All necessary parameters have been considered for the monitoring plan.		OK
B.7.3 In case parameters are measured, is the measurement equipment described? Describe each relevant parameter.	/1/	DR	$EG_{facility,y}$ : The net electricity export to the grid by the project activity will be measured by energy meters. The value for calculation purposes will be taken from the electricity		OK

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			export bills. The project proponent is requested to provide monthly electricity generation data from April 2007 till date to the validator. The project proponent is also requested to clarify whether the electricity meter installed will provide the electricity generation from this project activity only.	CL-4	
B.7.4 In case parameters are measured, is the measurement accuracy addressed and deemed appropriate? Describe each relevant parameter.	/1/	DR	The project proponent is requested to provide monitoring system details e.g., VCB details, accuracy of meters, calibration control procedure etc. in the PDD.	CAR-9	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 parameter.	/1/	DR	Refer B.7.4.	CAR-9	OK
B.7.6 Is the monitoring frequency adequate for all monitoring parameters? Describe each parameter.	/1/	DR	Refer B.7.4.	CAR-9	OK
B.7.7 Is the recording frequency adequate for all monitoring parameters? Describe each parameter.	/1/	DR	Refer B.7.4.	CAR-9	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	It has been physically verified during the site visit that the wind farm is equipped with energy meters to measure electricity export to the grid.		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)?	/1/		Yes. Operation and maintenance responsibility of the WEGs have been entrusted with EIL and monitoring of		OK

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			electricity export to the grid will be jointly monitored by GEDA and EIL. The electricity export bills will be the data source for emission reductions calculations.		
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	Refer B.7.9.		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	Yes. All monitored data will be retained for two years after the end of the last crediting period.		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	MoEF, the DNA of India, has defined that 2% of CER revenue would be incurred as expenditure for sustainable development activities. The expenditure will be provided in the annual report of the company for verification purposes.		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	Yes. The action plan for this purpose has been depicted in the PDD.		OK
B.7.14 Are the sustainable development indicators in line with stated national priorities in the host country?	/1/	DR	The sustainable development indicators presented in the PDD follows the four main branches of sustainable development as indicated by the MoEF: technological well-being, social well-being, economic well-being and environmental well-being. The	CAR-4	OK

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			project itself contributes to the environmental well-being and technological well-being. The contribution of the project towards economic well-being and social well-being has also been depicted in the PDD since 2% of the revenues from CERs will be contributed to the same. However the action plan depicted in the PDD has also been submitted to MoEF for approval. DNV will be able to confirm the project's contribution to sustainable development of India once the project is approved by the MoEF.		
<b>C Duration of the project activity / crediting period (VVM Para 99-100, 104)</b>					
<b>C.1.1 Start date of project activity</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 has been mentioned as 6 December 2006 in the PDD which was noted to be the amendment of the purchase order dated 5 September 2006 (date of issuance of first purchase order). The project proponent is hence requested to clarify the start date of the project activity, as the date mentioned in the PDD (6 December 2006) is not matching with that of the referred purchase orders (5 September 2006).	<del>CAR-10</del>	OK
C.1.3 Is the stated expected operational lifetime of the project activity reasonable?	/1/	DR	The operational life of the WEGs has been considered to be 20 years. This is acceptable		OK

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			by the GUVNL and the same has been considered as the operational life of the WEGs in the PPA.		
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 project proponent has opted for 10 years fixed crediting period and the start date of crediting period has been mentioned as 2 April 2010 or on registration with the UNFCCC whichever is later. Considering the WEGs are new installations and operational life is 20 years, this has been found to be reasonable.		OK
<b>D Environmental Impacts (VVM Para 131-133 and VVM Para 136 (d) for small-scale project activities, as applicable)</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/	DR	Environmental impact assessment for this project has not been mandated by the Indian legislations.		OK
D.1.2 Does the project comply with environmental legislation in the host country?	/1/	DR	Yes.		OK
D.1.3 Will the project create any adverse environmental effects?	/1/	DR	The project is unlikely to create adverse environmental effects.		OK
D.1.4 Have identified environmental impacts been addressed in the project design?	/1/	DR	Not required by the Indian legislations.		OK
<b>E Stakeholder Comments (VVM Para 128-130)</b>					
E.1.1 Have relevant stakeholders been consulted?	/1/	DR	The following parties have been consulted as		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			part of stakeholders consultation: 1) Local civic authorities (panchayats) 2) Financier for the project 3) WEG manufacturer.		
E.1.2 Have appropriate media been used to invite comments by local stakeholders?	/1/	DR	The project proponent invited comments from the identified stakeholders on implementation of the project activity through individual letters.		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	Stakeholders consultation is not mandated by the Indian legislations.		OK
E.1.4 Is a summary of the stakeholder comments received provided?	/1/	DR	Yes.		OK
E.1.5 Has due account been taken of any stakeholder comments received?	/1/	DR	DNV has verified all comments and found no adverse comment.		OK

**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
<p><b>CAR 1</b></p> <p>The project proponent is requested to submit a copy of the host country approval to the validator.</p>	A.3.2	The same has been submitted to the Validator	<p>OK.</p> <p>A letter of approval (LoA) /38/ was issued by DNA of India on 29 September 2009, authorizing India Power Corporation Limited of host Party (India) as project participant and confirming that the project assists in achieving sustainable development.</p> <p>CAR 1 is closed.</p>
<p><b>CAR 2</b></p> <p>It has been observed that the electricity generation from the project activity has been taken from that estimated by the manufacturer. The project proponent is requested to consider the value for electricity generation/PLF as per CDM-EB guidelines and use the same for IRR and emission reduction calculation purposes.</p>	B.4.1	The PP took a note of the query raised by the validator and contracted a third party consultant to assess the PLF as per the “Guidelines for the reporting and validation of plant load factors”, Annex 11, EB 48. The report has been provided to the validator for their reference on the actual calculated PLF figure based on the wind data (Source: CWET-Chennai, Govt. Of India) for the period of 1st March 2004 to 1st March 2007.	<p>OK.</p> <p>The project proponent has conducted a third party survey for determination of plant load factor for wind turbine generators. The survey has been carried out by M/s True Wind International Certification /15/. It has been noted that the survey has been carried out on actual energy generation and well as using database published by C-WET. The survey report indicates that the probable PLF of the project activity is 20.30%. Hence DNV considers that the CUF value used for IRR estimation was appropriate.</p> <p>CAR 2 is closed.</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
<p>CAR 3</p> <p>The project proponent is requested to mention the source of the assumptions for the investment analysis in the PDD and provide documentary evidences to substantiate the same. In doing so, the project proponent is requested to provide evidences to justify that the input values were suitable and valid <i>at the time of decision making</i>.</p>	B.5.9	<p>The investment analysis for the project activity of IPCL was conducted based on the following assumptions:</p> <p>1. Capital Investment: INR 12710 Lakhs – Source Document: Purchase Orders for Karnataka project:</p> <ul style="list-style-type: none"> <li>- SREICORE/IPCL/001/2006-07 – Dated 05.09.2006 – Supply of Enercon Machine</li> <li>- SREICORE/IPCL/002/2006-07 – Dated 05.09.2006 – Supply of Steel Tower</li> <li>- SREICORE/IPCL/003/2006-07 – Dated 05.09.2006 – Supply of Transformer</li> <li>- SREICORE/IPCL/004/2006-07 – Dated 05.09.2006 – Erection, Commissioning and Installation</li> <li>- SREICORE/IPCL/005/2006-07 – Dated 05.09.2006 – Statutory Expenses and transportation charges</li> <li>- SREICORE/IPCL/006/2006-07 – Dated 05.09.2006 – Civil and Electrical Works</li> </ul> <p>2. Total Capacity: 24.8MW – Source Document: Purchase Order Drafts:</p> <ul style="list-style-type: none"> <li>- SREICORE/IPCL/001/2006-07 – Dated 05.09.2006 – Supply of Enercon Machine</li> </ul>	<p>OK.</p> <p>The PDD has been revised to include the sources of assumptions for the input values. Copies of supporting documents have been submitted to the validator.</p> <p>CAR 3 is closed.</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		<p>3. Total Estimated Generation: 54250000 kWh-provided earlier- the operating lease proposal</p> <p>4. Power Selling Rate: INR 3.37/kWh – Source Document: <a href="http://www.gercin.org/docs/Orders/Nonconv%20orders/Year%202006/wind%20enrrgy%20tariff.pdf">http://www.gercin.org/docs/Orders/Nonconv%20orders/Year%202006/wind%20enrrgy%20tariff.pdf</a></p> <p>5. Others</p> <p>(a)Energy certification charges of Rs.248000 per year (GEDA permission; document reference no. GEDA/IPCL/PWF/UMARALA/2006-07/7935</p> <p>(b)Transmission lines O&amp;M charges (associated payment document to GETCO submitted to the DOE)</p> <p>(c) Other charges of Rs. 99000 (payment document submitted to the DOE)</p> <p>6. O&amp;M Expenses: INR 00 for the 1st two years, INR 156.74 Lakhs/ INR 15.674 Millions from 3rd year with 5% escalation – Source Document: Operation Contract between ENERCON and IPCL</p> <p>7. Depreciation: 5.28% for Straight Line Method and 80% for WDV Method – Source Document:</p>	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		<p>www.fastfacts.co.in/resources/DepCoAct.rtf and  <a href="http://personal.vsnl.com/arunhomepage/business.htm">http://personal.vsnl.com/arunhomepage/business.htm</a></p> <p>The above sources which are the basis of the assumptions made to do the financial calculations have already been included in the PDD and the financial excel sheet. Please refer to the Section B.5 of the PDD Version 03.</p>	
<p>CAR 4</p> <p>DNV could validate the events occurring between project start date and validation commencement date through verification of documents.</p> <p>However, the project proponent is requested to revise the timeline of events provided in the PDD to include only those related to CDM activities.</p>	B.5.16	<p>The same has been revised. Please refer to Version 03 of the PDD.</p>	<p>OK.</p> <p>The PDD has been revised, found to be satisfactory.</p> <p>CAR 4 is closed.</p>
<p>CAR 5</p> <p>The project proponent has identified thermal power plant, both fossil fuel and biomass based, of comparable capacity to the project activity. However, the applied methodology ACM0002 version 10 defines that “If the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:</p>	B.5.20	<p>The same rectification has been made. Please refer to Section B.4. of Version 03 of the PDD.</p>	<p>OK.</p> <p>The baseline determination section in the PDD has been revised as per the requirement of the methodology.</p> <p>CAR 5 is closed.</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
<p>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”.</p> <p>Thus the project proponent is requested to determine the baseline as per the requirements of the applied methodology.</p>			
<p><b>CAR 6</b></p> <p>It has been learnt from IPCL documentation that the project activity was initially decided to come up in Karnataka and later shifted to Gujarat state. Thus at the initial decision making time the project was meant to come up in Karnataka. Hence, the project proponent (PP) is requested to provide IRR calculations meant for the project at Karnataka along with that at Gujarat and also on actual cost basis.</p>	B.5.25	<p>The same has been provided to the Validator. Please refer to the documents:</p> <p>1.IPCL_Karnataka_IRR.xlsx for the Karnataka IRR and 2. IRR_IPCL_Final.xls for the financial calculation based on the actual purchase orders placed to the WEC supplier.</p>	<p>OK.</p> <p>Initial IRR estimation for installation of the project in Karnataka state has been submitted to the validator. It has been noted that there was no change in the assumed values except for the electricity tariff, INR 3.40 per kWh instead of _INR 3.37 per kWh in Gujarat. The PP has also submitted IRR calculations with actual purchase orders for the project activity.</p> <p>CAR 6 is closed.</p>
<p><b>CAR 7</b></p> <p>The project proponent is requested to align common practice analysis to the requirements stipulated in the additionality tool. In doing so the project proponent should analyse similar</p>	B.5.31	<p>The same has been modified. Please refer to Section B.5 of the Version 03 of the PDD.</p>	<p>OK.</p> <p>Common practice analysis has been carried out as per additionality tool and the revised demonstration has been found to be appropriate.</p>



Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
project activities in the region and discuss on the essential distinction between the project and such similar activities.			CAR 7 is closed.
<p>CAR 8</p> <p>It has also been noted that the aggregate emission reductions over 10 year period has been mentioned as the average annual reductions in section A.4.4 of the PDD. The project proponent is requested to rectify the same.</p>	B.6.7	The same has been rectified. Please refer to Section A.4.4 of Version 03 of the PDD.	<p>OK.</p> <p>PDD is corrected.</p> <p>CAR 8 is closed.</p>
<p>CAR 9</p> <p>The project proponent is requested to provide monitoring system details e.g., VCB details, accuracy of meters, calibration control procedure etc. in the PDD.</p>	B.7.4	There are a total of three feeders at the Sadodar substation and there are six energy meters (each feeder with 1 main meter and 1 test meter) to measure the electricity generated from all WTGs in that wind farm including those of IPCL's. The electricity is apportioned by GEDA by taking the cluster meter data to which WTGs of a particular project proponent is connected. Individual and then summing up all such cluster meters data for the wind farm. The ratio thus arrived is multiplied to the total exported energy reading to arrive at the energy exported by each project proponent. The PDD is revised to describe the meter details including accuracy and calibration control.	<p>OK.</p> <p>The monitoring system in place has been demonstrated in the revised PDD. This has been physically verified during site visit and found to be correct. The meters will be calibrated once in 3 years. This has been confirmed from the communications from GETCO to the wind farm operators' dated 29 January 2011 /60/ that all meters at the power evacuation sites are calibrated once in three years period. Hence DNV found that that the calibration frequency is appropriate</p> <p>CAR 9 is closed.</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
<p>CAR 10</p> <p>The start date of the project activity has been mentioned as 6 December 2006 in the PDD which was noted to be the amendment of the purchase order dated 5 September 2006 (date of issuance of first purchase order). The project proponent is hence requested to clarify the start date of the project activity, as the date mentioned in the PDD (6 December 2006) is not matching with that of the referred purchase orders (5 September 2006).</p>	C.1.2	<p>The same has been corrected in the revised PDD. The start date or the date of the first purchase orders have been accordingly revised from 6th December, 2006 to 5 September 2006.</p>	<p>OK.</p> <p>The start date of the project activity has been revised to 5 September 2006.</p> <p>CAR 10 is closed.</p>
<p>CAR 11</p> <p>However, the project proponent is requested to revise the PDD as per ACM0002 version 12.1.0 as version 10 has been expired. The crediting period start date is also to be revised realistically.</p>	B.1.1	<p>The PDD has been revised as per ACM0002 version 12.1.0.</p> <p>Crediting period start date has been revised to 1 January 2012 of date of submission, whichever is later.</p>	<p>OK.</p> <p>The PDD version 3 complies with the requirements of ACM0002 version 12.1.0.</p> <p>Revision of crediting period is also found to be justified.</p> <p>CAR 11 is closed.</p>
<p>CAR 12</p> <p>The project IRR calculations have been found to be incorrect with respect to the followings:</p> <ol style="list-style-type: none"> <li>1) Gross electricity generation has been considered for revenue calculation</li> <li>2) Straight line depreciation rate has been assumed to be 5.28% over the operational life of the project activity (920 years) whereas as per Gujarat Electricity Regulatory Commission's</li> </ol>	B.5.17	<ol style="list-style-type: none"> <li>1) The IRR calculation has been corrected to consider net electricity generation for calculation of revenue.</li> <li>2) The depreciation rate at 5.28% was assumed as per the Income Tax Act with no salvage value. However the same is corrected with 4.5% as per GERC order.</li> </ol> <p>The PDD has been revised</p>	<p>OK.</p> <p>The IRR calculation has been corrected as stated in the response. The PDD has been revised to include the changed IRR value (9.38% in place of 9.61%) and subsequent changes in sensitivity analysis.</p> <p>CAR 12 is closed.</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
order the same is to be 4.5% with 10% salvage value.		accordingly	
CL 1 The project proponent is requested to submit a copy of the decision taken on 26 August 2006 to the validator.	B.5.5	The same has been submitted to the Validator.	OK. Copy of board decision has been submitted.  CL 1 is closed.
CL 2 Depreciation has been considered in tax calculation over the estimated operational life of the project activity (20 years). This is in compliance with the Indian legislations. However, the project proponent is requested to account MAT credit in IRR calculation.	B.5.17	The MAT credit has been accounted for in the IRR calculations. However, since there is overall loss MAT comes to be 0. Please refer to IRR_IPCL_Version03.xls.	OK. MAT credit has been accounted in the IRR calculations.  CL 2 is closed.
CL 3 Sensitivity analysis does not specifically indicate the input values of capital cost and electricity generation at which the project IRR crosses the benchmark and justification for probability of occurrence of those events.	B.5.28	The sensitivity analysis has been conducted as per the “Guidelines on the assessment of investment analysis”, EB 62, Annex 5. The results have been incorporated in the PDD and the financial calculation sheet as well. Please refer to the financial calculation sheet submitted and also Section B.5 of the Version 03 of the PDD.	OK. The sensitivity analysis has been provided in the excel worksheet, found to be correct.  CL 3 is closed.
CL 4 The project proponent is requested to provide monthly electricity generation data from April 2007 till date to the validator. The project proponent is also requested to clarify whether the electricity meter installed will provide the	B.7.3	The same has been provided to the Validator. No, the electricity meters installed do not provide the electricity generation from this project activity only. However, the share certificates issued	OK. Share certificates for the period April 2007 to January 2011 have been submitted to the validator. The PDD has been revised to address the procedure of calculating net electricity generation

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
electricity generation from this project activity only.		by GEDA every month form the basis for the electricity generated by IPCL WTGs and the billing for the same.	from the project activity. CL 4 is closed.

**Table 4 Forward action requests**

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

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## **APPENDIX B**

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

**Sasim Chattopadhyay** holds a Master Degree (M. Sc.) in Physics and a Master Degree (M. Tech.) in "Energy Science and Technology". Having an overall experience of around seventeen years. Prior to joining DNV having five years' experience in Energy Auditing in various industries like Engineering, Jute & Textile, Cement, Iron & Steel, Chemical, Automotive etc. covering Analysis of Energy Consumption pattern, Measurement of energy/fuel consumption & environmental emission parameters and Analysis for identifying Energy Conservation Opportunities.

He has experience of around three years in validation and verification of CDM projects and around six years in Management System Certification (QMS/EMS/OHSAS/SA) services.

His qualification, industrial experience and experience in CDM demonstrate him sufficient sectoral competence in "(1) 1.2 - Energy generation from renewable energy sources and (2) 3.1 - Energy Demand."

**Soumik Biswas** holds a Bachelor of Science Degree in Chemistry and a Post Graduate Bachelor of Technology Degree in Chemical engineering. Having an overall experience of around 7 and half years. Prior to joining DNV having 2 and a half years of experience in petrochemical industry covering process operations and monitoring with experience in handling DCS and advanced process control systems, handling heat recovery systems, waste handling systems and different types of rotating equipment. His experience also covers the fields of resource conservation and cleaner production in petrochemical industries. He has also received 6 Weeks in-plant training in thermal power plant operation, energy balance and efficiency assessment.

He has 5 years of experience in validation and verification of numerous CDM/JI/VCS 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 and waste handling and disposal to a reasonable degree.

**Kannan Parthasarathy** handled various projects on Wind Turbine requirements since 1993 onwards in DNV. This includes the following:

Wind Turbine Generator - various inspection and projects Covering WTG capacity 250 kW to 1.5 MW and various manufacturers (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).

**Andrea Leiroz:** holds a Bachelor's Degree in Chemical Engineering, Master Degree in Material Science and Doctor Degree in Mechanical Engineering having an overall experience of around thirteen years.

She has experience of around 4 years in validation and verification of numerous CDM projects in DNV, both in Brazil and abroad.

Her qualification, experience in CDM demonstrates her sufficient sectoral competence in "Energy Generation from renewable energy sources", "Waste handling and disposal" and "Animal waste management".

**Gaurav Srivastava:** CDM Validator/Verifier, DNV Bangalore, India holds a Master's Degree in Energy Systems. His educational qualification covers the fields of sustainable development, power plant technology, renewable energy technology, performance of thermal & electrical utilities and project financing. He has completed ISO 14001:2004 - Environmental Management System Auditor / Lead Auditor Program, certified by IRCA.

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