



VALIDATION REPORT

52.50 MW WIND ENERGY FARM AT MOKLA,
RAJASTHAN BY HZL
IN
INDIA

REPORT No. 2012-0270

REVISION No. 01

DET NORSKE VERITAS



VALIDATION REPORT

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Approved by: Edwin Aalders	Organisational unit: DNV KEMA Energy & Sustainability Accredited Climate Change Services
Client: Hindustan Zinc Limited	Client ref.: Mr. V. Jayaraman

DNV CLIMATE CHANGE
SERVICES AS

Veritasveien 1,
1322 HØVIK, Norway
Tel: +47 67 57 99 00
Fax: +47 67 57 99 11
http://www.dnv.com
Org. No: NO 994 774 352 MVA

Summary:

Project Name: 52.50 MW wind energy farm at Mokla, Rajasthan by HZL

Country: India

Methodology: ACM0002

Version: 12.3.0

GHG reducing Measure/Technology: Electricity generation from wind energy.

ER estimate: 85 863 tCO₂e 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 "52.50 MW wind energy farm at Mokla, Rajasthan by HZL" in India, as described in version 03.2 of the PDD dated 11 September 2012 meets all relevant UNFCCC requirements for the CDM and correctly applies the baseline and monitoring methodology ACM0002, version 12.3.0. Hence, DNV requests the registration of the project as a CDM project activity.

Report No.: 2012-0270	Subject Group: Environment
Report title: 52.50 MW wind energy farm at Mokla, Rajasthan by HZL in India	
Work carried out by: Sharmistha Shome, Preeti Jolad, Nitin Kapoor.	
Work verified by: Murali Govindarajulu	
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Abbreviations

BSE	Bombay Stock Exchange
CAR	Corrective Action Request
CAPM	Capital Asset Pricing Model
CDM	Clean Development Mechanism
CEA	Central Electricity Authority
CER	Certified Emission Reduction(s)
CL	Clarification request
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
FAR	Forward Action Request
GBI	Generation Based Incentive
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
HZL	Hindustan Zinc Limited
IREDA	Indian Renewable Energy Development Agency
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal Rate of Return
LoA	Letter of approval
MNRE	Ministry of Non-renewable Energy
MoEF	Ministry of Environment and Forest
NGO	Non-governmental Organisation
ODA	Official Development Assistance
PDD	Project Design Document
tCO ₂ e	Tonnes of CO ₂ equivalents
UNFCCC	United Nations Framework Convention on Climate Change
VVM	Validation and verification manual
WEG	Wind Energy Generator
WDV	Written Down Value



1 EXECUTIVE SUMMARY – VALIDATION OPINION

DNV Climate Change Services AS (DNV) has performed a validation of the project activity “52.50 MW wind energy farm at Mokla, Rajasthan by HZL ” in India. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism as well as criteria given to provide for consistent project operations, monitoring and reporting.

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

The host Party is India and no Annex I Party is proposed. Host party India fulfils the participation criteria and have approved the project and authorized the project participants. The DNA from India has issued the Letter of Approval on 14 September 2012 and confirmed that the project assists in achieving sustainable development.

The project correctly applies the baseline and monitoring methodology ACM0002, version 12.3.0 “Grid-connected electricity generation from renewable sources”.

The project activity envisages installation of 25 WEGs with a capacity of 2.1MW each thereby aggregating to an installed capacity of 52.50 MW. The annual electricity delivered to the NEWNE grid of India is expected to be 90 506 MWh. The proposed project will achieve CO₂ emission reductions by displacing electricity generated by fossil fuel fired power plant connected into the NEWNE Grid. As a result, the project results in reductions of CO₂ 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 85 863 tCO₂e per year over the selected 7 renewable 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 “52.50 MW wind energy farm at Mokla, Rajasthan by HZL ” in India, as described in the PDD, version 03.2 dated 11 September 2012 , meets all relevant UNFCCC requirements for the CDM and correctly applies the baseline and monitoring methodology ACM0002, version 12.3.0. Hence, DNV requests the registration of the project as a CDM project activity.

Bangalore and Oslo, 2012-09-26

Sharmistha Shome
CDM Validator
DNV India

Edwin Aalders
Approver,
DNV Climate Change Services AS



2 INTRODUCTION

Hindustan Zinc Limited has commissioned DNV Climate Change Services AS (DNV) to perform a validation of the “52.50 MW wind energy farm at Mokla, Rajasthan by HZL project in India (hereafter called “the project”). This report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, 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 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 12.3.0). The validation was based on the recommendations in the Validation and Verification Manual, 1.2 /36/.

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/ Hindustan Zinc Limited : *CDM-PDD for project activity* “52.50 MW wind energy farm at Mokla, Rajasthan by HZL ” in India, Version 01 dated 21 September 2011 and version 03.2, 11 September 2012.
- /2/ HZL: Financial excel sheet and emission reduction estimation.
- /3/ MoEF: Acknowledgement to HZL with respect to securing CDM status for the project dated 7 March 2011
- /4/ UNFCCC: E-mail acknowledgement to HZL with respect to securing CDM status for the project ,dated 7 April 2011
(Since there was a typographical error, the project notification was re-submitted and received by UNFCCC on 16 May 2011)
http://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html
- /5/ HZL: Wind Resource Assessment Report by Power & Energy Consultants for 35.7 MW (phase I) and by Wind Force Management Service Pvt Ltd for 16.8 MW (phase II), dated November 2011 and February 2011 respectively.
- /6/ HZL: Email to MoEF (DNA of India) :Intend to seek CDM status for the project activity “52.50 MW wind energy farm at Mokla, Rajasthan by HZL ”, dated 7 March 2011.
- /7/ HZL: Email to UNFCCC :Intend to seek CDM status for the project activity “52.50 MW wind energy farm at Mokla, Rajasthan by HZL ”, dated 7 March 2011.
- /8/ HZL: Note for approval (NFA) to the HZL management for awarding the wind power project to Suzlon Energy Limited, dated 10 December 2010
- /9/ Suzlon Energy Limited: Technical data-sheet for the WEG (2.1 MW) for the project activity.
- /10/ Office of superintending engineer, Jaipur DISCOM: Commissioning certificates of 17 WEGs (35.7MW), Jaipur, dated 3 March 2011 and 22 March 2011.
- /11/ Office of superintending engineer, Jaipur DISCOM: Commissioning certificates of 8 WEGs (16.8 MW), Jaipur dated, 13 September 2011, 19 September 2011 and 30 September 2011.
- /12/ Power purchase agreement between Hindustan Zinc Limited , Suzlon Infrastructure Service Limited and Jaipur Vidyut Vitran Nigam Limited:
 - 1) for 16.8 MW, dated 22 June 2011;
 - 2) for 35.7 MW, dated 4 February 2011.
- /13/ HZL: Contract for power evacuation works with Suzlon Power Infrastructure Limited:
 - 1) for 35.7 MW (17 WEGs), dated 20 December 2010
 - 2) for 16.8 MW (8 WEGs), dated 28 March 2011.
- /14/ HZL: Contract for i) civil work-order, ii) unloading, erection and commissioning of WEGs, iii) supply of transformer, iv) Operation and maintenance service; v) acquisition of land and procuring necessary permission with Suzlon Infrastructure Service Limited:
 - 1) for 35.7 MW (17 WEGs), dated 20 December 2010
 - 2) for 16.8 MW (8 WEGs), dated 28 March 2011.
- /15/ HZL: Contract for supply of WEGs with Suzlon Energy Limited:
 - 1) for 35.7 MW (17 WEGs), dated 20 December 2010
 - 2) for 16.8 MW (8 WEGs), dated 28 March 2011.



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- /16/ Suzlon Energy Limited: Techno-commercial offer for the installation of the project activity to Hindustan Zinc Limited , dated 4 December 2010.
- /17/ The Oriental Insurance Company Limited: Insurance policy details for the Hindustan Zinc Limited , dated 3 March 2009 (for previously commissioned wind projects by the project proponent).
- /18/ The Companies Act, 1956: Rates of depreciation (W.D.V and S.L.M): <http://asa-india.com/asa/Depreciation%20Rates%20Companies%20Act.pdf>
Income tax department, Ministry of Finance: (Depreciation allowance as percentage of actual cost):
http://law.incometaxindia.gov.in/DIT/File_opener.aspx?page=ITRU&schT=rul&csId=2f13c0bd-dec4-4df6-a273-431e3b91a01b&rNo=&sch=&title=Taxmann%20-%20Direct%20Tax%20Laws
- /19/ HZL: Benchmark calculation excel sheet (BSE 200)
- /20/ Reserve Bank of India (weighted average yield of Government of India Securities): <http://rbi.org.in/scripts/AnnualReportPublications.aspx?Id=986>
- /21/ Bombay Stock Exchange India (for BSE 100, BSE 200 and BSE Sensex data): www.bseindia.com
- /22/ India's economic reforms: http://www.indiainbusiness.nic.in/economy/economic_reforms.htm
- /23/ HZL: CAPM calculation excel sheet for BSE 100, BSE 200 and BSE Sensex (data: January 1991 to 31 November 2010).
- /24/ Moneycontrol: power- generation and distribution-for individual companies debt: equity ratio and tax ratio data (open page of the individual company followed by 'financials'):
http://www.moneycontrol.com/stocks/company_info/sector_info.php?sub_sector=Power+-+Generation%2FDistribution
- /25/ Corporate tax and minimum alternate tax rates: Income tax act:
http://www.incometaxindia.gov.in/incometaxindiacr/contents/forms2010/pamphlets/COMPANIES_2012_13.htm
- /26/ Central Electricity Authority: CO₂ baseline database:
http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm
- /27/ Directory Indian Wind Power, dated August 2010 (The number of wind power plants in operation in Rajasthan during the start date of the project activity)
- /28/ Ministry of New and Renewable Energy, Government of India: (biomass power plants) <http://mnre.gov.in/schemes/grid-connected/biomass-powercogen/>
- /29/ HZL: Invoices for actual generation from October 2011 to March 2012
- /30/ Environment Protection Rule, 1986 (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii) Ministry of environment and forests: <http://envfor.nic.in/legis/eia/so1533.pdf>
- /31/ HZL: Minutes of the meeting: Local stakeholder consultation for the project activity, dated 31 March 2011.
- /32/ Notice in local newspaper (English and Hindi) for inviting the local stakeholder for consultation, dated 19 March 2011.
- /33/ Suzlon Energy Limited: WEG controller operation and maintenance (letter no.



SEL/CRM/PS/HZL/12-13), dated 1 September 2012.

- /34/ Indian Renewable Energy Development Agency Limited: GBI registration letter for the project activity, dated 21 September 2011.

3.1.2 Letters of approval

- /35/ Ministry of Environment and Forest (DNA of India): Letter of Approval, dated 14 September 2012.

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

- /36/ CDM Executive Board: Validation and Verification Manual, version 1.2
- /37/ CDM Executive Board: Baseline and monitoring methodology ACM0002, version 12.3
- /38/ CDM Executive Board: Tool to calculate the emission factor for an electricity system, Version 02.2.1
- /39/ CDM Executive Board: Guidance on assessment of investment analysis, version 05.
- /40/ CDM Executive Board: Guidelines on the demonstration and assessment of prior consideration of the CDM version 5.
- /41/ CDM Executive Board: Guidelines for the reporting and validation of plant load factors version 01, EB 48 Annex 11.
- /42/ CDM Executive Board: Guidelines for completing the project design document (CDM-PDD) and the proposed new baseline and monitoring methodologies (CDM-NM), version 7 dated 2 August 2008.
- /43/ CDM Executive Board: Tool for the demonstration and assessment of additionality, version 6.

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

- /44/ CRISIL advisory service report to CERC on “Cost of Capital for Central Sector Utilities”, dated April 2000 <http://www.cercind.gov.in/rep1304.pdf>
- /45/ Capital Asset Pricing Model – CAPM:
<http://www.investopedia.com/terms/c/capm.asp#axzz1wXtKA64k>
- /46/ Rajasthan Electricity Regulatory Commission: “In the matter of determination of tariff for sale of electricity from wind power plants in the State to Distribution Licensees”, dated 16 June 2009.
<http://www.erc.rajasthan.gov.in/TariffOrders/Order77.pdf>
- /47/ Rajasthan Electricity Regulatory Commission: Petition No. RERC-220,221/10; “In the matter of petition filed by M/s Indian Wind Power Association & M/s Enercon (India) Ltd. for removal of difficulties in tariff regulations and review of the order dated 31.3.10 regarding tariff for wind power plants”, dated 6 August 2010:
<http://www.erc.rajasthan.gov.in/Orders/Order101.pdf>
- /48/ Operational Guidelines for implementation of “Generation Based Incentive” for grid connected wind power projects by Indian Renewable Energy Development Agency Ltd. (IREDA) (To be read with the Scheme for implementation of GBI issued by MNRE dated 17 December 2009):
http://www.inwea.org/others/OPERATIONAL_GUIDELINES.pdf
- /49/ Reserve Bank of India: Annual average percentage change over the next ten years (WPI):



<http://rbi.org.in/scripts/PublicationsView.aspx?id=12477>

/50/ Rajasthan Electricity Regulatory Commission: Determination of tariff for sale of electricity from Wind Power Plants in the State to Distribution Licensees during FY 2011-12 of the control period 2009-14, dated 3 June 2011.

<http://www.erc.rajasthan.gov.in/>

Main changes in the final PDD from the webhosted PDD:

- The applied methodology version has been revised from ACM0002, version 12.1 to ACM0002, version 12.3.
- The version of 'Tool for the demonstration and assessment of additionality' has been revised from version 5 to version 6.
- The equity benchmark has been revised to 15.29% from 16.87% in the webhosted PDD.
- Monitoring plan has been adequately revised to include the parameters required for monitoring the net electricity supplied by the project activity.

3.2 Follow-up interviews with project stakeholders

On 17 to 19 January 2012 DNV performed the site visit and interviews with project participant (Hindustan Zinc Limited), Consultant (E & Y) and Suzlon (operation and maintenance contractor) to confirm the stated information and to resolve issues identified in the document review.

	Date	Name	Organization	Topic
/1/	2012-01-17 to 2012-01-19	Mr. Bhagwan Ahuja	Hindustan Zinc Limited	Discussion on CDM Management System
		Mr. Vishnu Khandelwal	Hindustan Zinc Limited	Review of project design and technology used
		Mr. Aditya Bhardwaj	E & Y	Review of monitoring and verifying procedure, management structure of the organization
		Mr. Sasanka Bhargava	E & Y	Joint Meter Reading Procedures



Mr. Naresh Suzlon	Operations and maintenance procedures
Prajapati	Third Party assessment of PLF
Mr. Alwar Singh	Proof of CDM consideration
Mr. Neeraj Sharma	Environmental Consents and permits
Mr. Lokesh Kumar	Review of stakeholder consultation process
Mr. Satish Sharma	Determination of baseline
Mr. Bharcia Mayor	Assessment of project
Mr. Amrender Mr. Shrimari Bhervik	Additionality, benchmark determination and financial analysis
	Emission reduction calculations and data used
	Determination of baseline

3.3 Resolution of outstanding issues

The objective of this phase of the validation is to resolve any outstanding issues which need be clarified prior to DNV's positive conclusion on the project design. In order to ensure transparency a validation protocol was customised for the project. The protocol shows in a transparent manner the criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

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

The validation protocol consists of four tables. The different columns in these tables are described in the figure below. The completed validation protocol for the project activity "52.50 MW wind energy farm at Mokla, Rajasthan by HZL " in India is enclosed in Appendix A to this report.

Table 2 of the validation protocol documents the findings of the desk review of the project design documentation and follow-up interviews with project stakeholders. Any findings raised in Table 2 are listed in Table 3 of the protocol, and changes to the description of the project design as a result of these findings will be addressed in Table 3. Table 2 thus may not reflect all aspects of the project as described in the final PDD submitted for registration.

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.



Validation Protocol Table 1: Mandatory Requirements for CDM Project Activities				
Requirement	Reference	Conclusion		
The requirements the project must meet.	Gives reference to the legislation or agreement where the requirement is found.	This is either acceptable based on evidence provided (OK) or a corrective action request (CAR) if a requirement is not met.		

Validation Protocol Table 2: Requirement Checklist				
Checklist question	Reference	Means of verification (MoV)	Assessment by DNV	Draft and/or Final Conclusion
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	Gives reference to documents where the answer to the checklist question or item is found.	Means of verification (MoV) are document review (DR) , interview (I) or any other follow-up actions (e.g., on site visit and telephone or email interviews) and cross-checking (CC) with available information relating to projects or technologies similar to the proposed CDM project activity under validation.	The discussion on how the conclusion is arrived at and the conclusion on the compliance with the checklist question so far.	OK is used if the information and evidence provided is adequate to demonstrate compliance with CDM requirements. A corrective action request (CAR) 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 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) during validation is raised to highlight issues related to project implementation that require review during the first verification of the project activity.

Validation Protocol Table 3: Resolution of Corrective Action and Clarification Requests			
Corrective action and/or clarification requests	Ref. to checklist question in table 2	Response by project participants	Validation conclusion
The CARs and/ or CLs raised in Table 2 are repeated here.	Reference to the checklist question number in Table 2 where the CAR or CL is explained.	The responses given by the project participants to address the CARs and/or CLs .	The validation team's assessment and final conclusions of the CARs and/or CLs .

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

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

Role	Last Name	First Name	Country	Type of involvement						
				Desk review	Site visit / Interviews	Reporting	Supervision of work	Technical review	TA 1.2 competence	Financial expertise
Team leader (Validator)	Shome	Sharmistha	India	✓	✓	✓	✓		✓	
Assessor under training	Jolad	Preeti	India	✓	✓	✓				
Expert	Kapoor	Nitin	India	✓		✓				✓
Technical reviewer	Govindarajulu	Murali	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 /1/.

4.1 Participation requirements

The project participants are Hindustan Zinc Limited of host Party India. No Annex I Party has been identified in the validation stage of the project activity. The sole project participant is Hindustan Zinc Limited from host Party India. The host Party India fulfils the participation requirements, having ratified the Kyoto Protocol on the 26 August 2002 and has established National Clean development Mechanism Authority, Ministry of Environment and Forests (MoEF) as its DNA.

A letter of approval (LoA) was issued by DNA of India on 14 September 2012/35/, authorizing Hindustan Zinc Limited of host Party as project participant and confirming that the project assists in achieving sustainable development.

The letters of approval were received from the project participants. DNV does not doubt the authenticity of the letters of approval. DNV considers the letters are in accordance with paragraphs 45- 48 of the VVM /36/.

4.2 Project design

The project activity involves the installation and operation of 52.50 MW (25 x 2.1MW) wind power plant located at villages namely Mokla, Sonu and Serawa in Jaisalmer district of Rajasthan, India. The geographical coordinates of each wind turbine generator (WEG) has been provided in Appendix 1 of the PDD /1/ and the same has been verified during the site visit from the database of the operation and maintenance service provider indicating the GPS co-ordinates of WTGs, Suzlon Infrastructure Services Limited. The project activity is a grid connected wind power plant and shall supply power to NEWNE regional grid of India.

The project activity consists of 25 numbers of wind energy generators (WEG) of model named S-88, each of capacity 2.1 MW. Each of the WEGs is an upwind rotor with active pitch control, single feed induction generator with slip-rings having three numbers of blades. The rotor diameter and hub height of each of the WEGs is 88 m and 80 m respectively. The technical details have been verified from the technical data-sheet of S-88 WEG provided by the WEG supplier, Suzlon Energy Limited /9/. The total capacity of the project activity has been commissioned in two phases, 17 WEGs (35.7 MW) as phase I and remaining 8 WEGs (16.8 MW) as phase II. Phase I of the project activity was commissioned in February - March 2011/10/ and phase II in August - September 2011/11/, as verified from the commissioning certificates /10//11/. The project activity is expected generate electricity at plant load factor of 19.46% and 19.7% for phase I and phase II respectively. The mentioned plant load factor for phase I and phase II has been considered for the estimation of net electricity supplied to the grid and emission reduction calculation. The same has been accepted due to the following:



- a) The plant load factor has been verified from the wind resource assessment report by Power & Energy Consultants for 35.7 MW (phase I) dated November 2011 and by Wind Force Management Service Pvt Ltd for 16.8 MW (phase II), dated February 2011 /5/.
- b) The mentioned plant load factor as verified from the wind resource assessment/5/ has been accepted in line with paragraph 3 (b) of “Guidelines for the reporting and validation of plant load factors”, version 01/41/.
- c) The assessment of the plant load factor is specific to the project activity region and thus, reflects the actual applicable scenario.

The start date of the project activity is 20 December 2010, which is the date of contract for supply of WEGs and other related works for implementation for phase I (35.7MW) of the project activity /13//14//15/. This has been demonstrated to be the earliest of any real action or investment towards the project activity (c.f 4.6.1). The lifetime of the project activity has been considered to be 20 years as verified from the technical data-sheet of WEGs /9/.

The project activity is envisaged to supply net electricity of 90 506 MWh per year resulting to estimated annual average emission reduction of 85 863 tCO₂ /2/ and a total of 601 041 tCO₂ /2/ over the first crediting period of 7 years renewal crediting period. The start date of the first crediting period has been chosen as 1 December 2012 or date of submission to UNFCCC for registration, whichever is later.

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

4.3 Application of selected baseline and monitoring methodology

The project activity is the installation and operation of 52.5 MW (25 x 2.1 MW) wind power plant. The applicability of methodology ACM 0002, version 12.3 /37/ is justified as follows:

- The project activity generates power using the wind energy and displaces the electricity in the NEWNE grid. The power purchase agreement has been signed on 4 February 2011 (phase I) and 22 June 2011 (phase II) /12/, confirming that the project activity shall supply power to Jaipur Vidyut Vitran Nigam Limited.
- The project activity is new 52.50 MW wind power plant and no capacity addition, retrofitting, replacement or fossil fuel switching is involved in the project activity.

As the project activity exports electricity to the Jaipur Vidyut Vitran Nigam Limited grid which forms a part of the NEWNE electricity grid, the baseline for this project activity is a function of the generation mix of the NEWNE regional grid.

The assessment of the project's compliance with the applicability criteria of ACM0002 (version 12.3.0) 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 system boundary for the project activity includes all the 25 WEGs, power evacuation system and the substation. The spatial boundary of the project includes the NEWNE regional grid. The selected sources and gases are justified for the project activity.

	GHGs involved	Description
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Baseline emissions	CO ₂	Emissions equivalent to the amount of net electricity supplied by the project activity that would otherwise be generated by Jaipur Vidyut Vitran Nigam Limited, which is a part of NEWNE grid of India.
Project emissions	CO ₂ (Not applicable)	In line with the applied methodology, no project emission is envisaged from the project activity.
Leakage	CO ₂ (Not applicable)	The project activity does not involve any transfer of equipment, as verified from the WEGs supply orders/13//14//15/. Thus, in line with the applied methodology, no leakage is applicable.

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 12.3.0).

4.5 Baseline identification

In view of the fact that the project activity is a new wind power plant connected to the NEWNE regional grid, the baseline scenario for the project activity has been determined to be the grid connected power plant of the NEWNE regional grid. The establishment of the baseline is in line with the applied approved methodology ACM 0002, version 12.3.0 /37/. As per paragraph 105 of the VVM, version 1.2 /36/, no analysis of the baseline alternative is required if the baseline scenario is proposed by the applied methodology. Thus, in line with the applied methodology, ACM 0002, version 12.3.0 and VVM, version 1.2, no further analysis for the baseline alternatives is performed.

The approved baseline methodology has been correctly applied to identify the baseline scenario that would occur in the absence of the proposed CDM project activity.

All the assumption and data used by the project participants are listed in the PDD and/or supporting documents. All documentation relevant for establishing the baseline scenario are correctly quoted and interpreted in the PDD. Relevant national and/or sectoral policies and circumstances are considered in the PDD.

4.6 Additionality

The additionality of the project has been established using the “Tool for the Demonstration and Assessment of Additionality”, version 6 /43/, as stipulated by ACM0002, version 12.3.0/37/, approved by the CDM-EB. Additionality is demonstrated through the investment analysis and common practice analysis.



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

Start date of the project activity: The start date of the project activity is 20 December 2010 which is the date of contract for supply of WEGs and other related works for implementation for phase I (35.7MW) of the project activity /13//14//15/. The start date of project activity is the earliest of any financial commitment or real action and this has been justified as follows:

- For the implementation of phase I (35.7 MW), following are the contract dates:
 - Contract for power evacuation works with Suzlon Power Infrastructure Limited, signed on 20 December 2010 /13/.
 - Contract for: i) civil work-order, ii) unloading, erection and commissioning of WEGs, iii) supply of transformer, iv) operation and maintenance service; v) acquisition of land and procuring necessary permission with Suzlon Infrastructure Service Limited, dated 20 December 2010 /14/.
 - Contract for supply of WEGs with Suzlon Energy Limited, dated 20 December 2010 /15/.
- For the implementation of phase II (16.8 MW), following are the contract dates:
 - Contract for power evacuation works with Suzlon Power Infrastructure Limited, signed on 28 March 2011 /13/.
 - Contract for: i) civil work-order, ii) unloading, erection and commissioning of WEGs, iii) supply of transformer, iv) Operation and maintenance service; v) acquisition of land and procuring necessary permission with Suzlon Infrastructure Service Limited, dated 28 March 2011 /14/.
 - Contract for supply of WEGs with Suzlon Energy Limited, dated 28 March 2011 /15/.

Prior CDM consideration: In view of the fact that the project activity, having the start date after 2 August 2008, the project proponent has notified DNA of India and UNFCCC via email communication , of their intension to secure CDM status for the project activity, on 7 March 2011 /6//7/. This is within six months from the project start date of 20 December 2010, as per the “Guidelines on the demonstration and assessment of prior consideration of the CDM”, version 4/40/. The acknowledgment from UNFCCC and DNA of India has also been provided for verification/3//4/. Thus, it has been concluded that CDM was seriously considered for the project activity. In addition to this, it has also been verified from the note for approval to the HZL management for awarding the wind power project (project activity) to Suzlon Energy Limited, dated 10 December 2010 /8/ that the CDM revenue was considered important for the project activity.

The PDD, dated 21 September 2011, of the project activity has been webhosted in UNFCCC website for global stakeholder consultation on 14 October 2011.

Thus, project activity confirms to the requirement of “Guidelines on the demonstration and assessment of prior consideration of the CDM”, version 4/40/.

4.6.2 Identification of alternatives to the project activity

The baseline scenario has been selected as per the applied methodology, ACM0002, version 12.3.0, /37/ as described in section 4.5.



4.6.3 Investment analysis

Investment analysis has been performed to demonstrate the additionality of the project activity.

Choice of approach

In view of the fact that the proposed project activity generates financial and economic benefits through the sales of electricity, other than CDM-related income and the selected baseline does not involve any investment, a benchmark analysis adopted for the project activity is appropriate.

Benchmark selection

The project participant has applied post tax return on equity as the benchmark for the project activity /19/. As per paragraph 12 of “Guidance on the Assessment of Investment Analysis”, version 5 /39/, expected return on equity (RoE) is considered to be an appropriate benchmark for equity IRR. The selection of the return on equity as a benchmark for the proposed project activity is justified and acceptable in view of the fact that the total investment for the project activity is equity financed, as verified from Note for approval (NFA) to the HZL management for awarding the wind power project to Suzlon Energy Limited, dated 10 December 2010 /8/. In order to evaluate the financial viability of the project, the project developer is required to assess the expected minimum returns on the total investment. Hence, the benchmark selected needs to consider the risks associated with each of the applicable component of the total investment. Thus, from an investor’s perspective, return on equity is the most appropriate benchmark for comparing equity IRR and the benchmark has been worked out as 15.29%. The project participant has adopted capital asset pricing model (CAPM) determined based on the parameters standard in the market for arriving at the benchmark.

Cost of equity: As per paragraph 14 of the “Guidance on the Assessment of Investment Analysis”, the company’s internal benchmark should only be applied in cases where the project proponent is the only credible project developer. As this project activity could have been developed by other developer or investors, the project proponent has calculated the return on equity or cost of equity as per the CAPM model, considering the risk free return, market return and the beta value for the power companies listed at the Bombay Stock Exchange at the time of investment decision, which are applicable to any investor investing in the Indian power sector. Thus, this approach for the calculation of benchmark has been accepted by DNV. The resulting equity benchmarks from BSE 100, BSE 200 and BSE Sensex have been calculated, compared and the lowest value among the three has been considered as the benchmark for the project activity. The assessment of the key parameters in arriving at the benchmark using CAPM method have been indicated below:

- Risk free return rate of 8.425% has been considered as per the weighted average yield of government security bond, applicable at the time of investment. The rate of government security bond has been verified from the Reserve Bank of India, weighted average yield of Government of India Securities for 20 years maturity period, published on 9 December 2010 /20/.
- Market return or Compound Accumulated Growth Rate (CAGR) is calculated for all the aforementioned BSE indices. The data for the same has been sourced and verified from Bombay Stock Exchange India /21/. The indices data for 19years and 11 months has been considered as the time period is comparable to the life time of the project activity is 20 years. Moreover, the economic reforms process was began in 1991for



systemic shift to a more open economy and a larger role for the private sector including foreign investment /22/. Thus, BSE indices data from January 1991 to 31 November 2010 has been considered and accepted by DNV. To nullify any unsystematic risk associated with the project activity, approximately 20 years period data from indices has been considered. As larger sample and a longer period data has been used, the average market return is deemed to be realistic and conservative. The market return from each indices /19//23/ are as follows:

BSE 100	BSE 200	BSE Sensex
16.37%	15.87%	16.19%

- The average un-levered beta has been calculated based on the debt: equity ratio, tax and beta values of all the power companies listed in the stock exchanges from 1 December 2005 to 30 November 2010. Since the beta availability of listed non-conventional power companies at the time of investment is very limited, all the conventional and non-conventional listed power companies have been considered to have a realistic value. The data for calculation of beta values has been sourced from BSE indices /21/ and debt: equity ratio and tax ratio data has been sourced from Moneycontrol website /24/. It has been verified from the CRISIL advisory service report to CERC on “Cost of Capital for Central Sector Utilities” /44/ that a complete CAPM formula based review of the Cost of Equity is suggested to be undertaken every five years. In view of this, beta value and debt: equity ratio of the listed power companies for the period of 5 years has been accepted by DNV. The average un-levered beta values /19//23/are:

BSE 100	BSE 200	BSE Sensex
0.9304	0.9201	0.9703

The calculation of equity benchmark has been provided and procedure of calculation has been verified by DNV /45/ and found to be adequate. The IRR analysis has been performed on the equity investment basis and thus, the equity benchmark is appropriate in line with the “Guidance on the Assessment of Investment Analysis”, version 5/39/. The cost of equity (CAPM) calculated based on aforementioned data for three BSE indices are /19//23/:

BSE 100	BSE 200	BSE Sensex
15.82%	15.29%	15.96%

Thus, cost of equity of 15.29% has been applied as equity IRR benchmark.

Further assessment of conservativeness of benchmark by DNV:

Conservativeness of the applied equity benchmark of 15.29% has been further assessed by DNV by comparing the same with the equity benchmark determined as per paragraph 7 and 8 of Appendix ‘Default values for the expected return on equity’ of “Guidance on the Assessment of Investment Analysis”, version 5 /39/. The equity benchmark calculated as per the mentioned approach (paragraph 7 and 8 of Appendix ‘Default values for the expected return on equity’ of “Guidance on the Assessment of Investment Analysis”, version 5 /39/) is 16.85%. The key parameters and calculation is as below:

- Default value for the expected return on equity for energy industries in India is 11.75%, as expressed in real terms, as mentioned in the “Guidance on the Assessment of Investment Analysis”, version 5 /39/.



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- Average forecasted inflation rate of India for next 10 years, after the start date of the project activity (December 2010) is 5.1%, as verified to be the mean inflation rate of WPI forecasted for 10 years starting from 2011 /49/. DNV can confirm that the inflation rate forecast is published by Reserve Bank of India for a maximum of 10 years period.

Thus, the applied equity benchmark of 15.29% is conservative compared to default benchmark of 16.85%.

Input parameters

HZL management approved the investment in the project activity on 10 December 2010 (as verified from note for approval (NFA) to the HZL management for awarding the wind power project to Suzlon Energy Limited, dated 10 December 2010 /8/). Thus, 10 December 2010 has been considered as the date of investment decision. The start date of the project activity is 20 December 2010 (c.f 4.6.1). In view of the fact that there is 10 days gap between date of investment decision and start date of the project activity, as per “Guidance on the Assessment of Investment Analysis”, version 5 /39/, input parameters available at the time of investment decision have been considered for financial analysis.

i) Installed capacity: The installed capacity of 52.50 MW has been verified from the techno-commercial offer for the installation of the project activity from Suzlon Energy Limited, dated 4 December 2010 /16/. The mentioned installed capacity has been cross-checked from the following and found to be same:

- a) Contract for WEGs supply and implementation with Suzlon Infrastructure Service Limited, dated 20 December 2010 and 28 March 2011 /15/.
- b) Commissioning certificates for phase I and phase II of the project activity/10//11/.
- c) The power purchase agreement for phase I (35.7 MW), dated 4 February 2011 and phase II (16.8 MW) on 22 June 2011/12/.

ii) Project cost: The project cost of INR 2770.27 million has been considered in IRR analysis /2/. It has been verified from the techno-commercial offer for the installation of the project activity from Suzlon Energy Limited, dated 4 December 2010 /16/, that cost of installation of each WEG (S-88) is INR 110.81 million, resulting to the cost of the total project activity (25 numbers of WEG (S-88) to INR 2770.27 million. As verified from the note for approval (NFA) to the HZL management/8/, the project proponent has assessed other wind farm developer, viz: Enercon, Vestas, Kenersys and based on the available capacity of the wind farm developer, the project proponent has obtained techno-commercial offer for the installation of the project activity from Suzlon Energy Limited.

The cost of INR 2770.27 million has been cross-checked from the actual contracts for supply of WEGs and other related works for implementation for phase I (35.7 MW) of the project activity /13//14//15/ and found to be same.

iii) Electricity generation/plant load factor: The plant load factor of 21% has been considered in IRR analysis. This results to 96 579 MWh of electricity supplied to the grid per year by the project activity. The applied plant load factor of 21% in the IRR analysis has been verified from the Rajasthan Electricity Regulatory Commission’s tariff order, dated 6 August 2010 /46/ and the same was available at the time of investment decision. It has been verified that the applied PLF of 21% in IRR analysis is higher than the estimated PLF of 19.46% and 19.7% for phase I and phase II respectively in wind resource assessment report /5/. Thus,



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based on the “Guidance on the Assessment of Investment Analysis”, version 5 /39/ and conservatively, the PLF of 21% has been considered for IRR analysis /2/.

Based on the principle of conservativeness and to avoid any over-estimation of emission reductions, plant load factor of 19.46% and 19.7% for phase I and phase II respectively, as verified from the wind resource assessment report/5/ (c.f 4.2), has been considered for emission reduction calculation /2/.

iv) Tariff: The tariff of 4.02 INR/kWh applied in the IRR analysis has been applied for the investment analysis. It has been verified from the order for the revised tariff; dated 6 August 2010 /46/ by Rajasthan Electricity Regulatory Commission that the tariff rate was INR 3.87 per kWh and accounting for 4% loss, the applied tariff is INR 4.02 per kWh. This tariff order was applicable and available at the time of investment decision.

v) Generation based incentives (GBI): The Ministry of New and Renewable Energy (MNRE) has announced the Generation Based Incentive (GBI) for grid connected wind power projects, commissioned after 17 December 2009, to encourage the investment in wind power projects in India. GBI of INR 0.5/kWh, to a maximum of INR 6.2 million per MW, has been applied in IRR analysis and the same has been verified from operational guidelines for implementation of “Generation Based Incentive” for grid connected wind power projects by Indian Renewable Energy Development Agency Ltd /48/. The project activity has registered for availing GBI and the same has been verified by DNV from the GBI registration letter by Indian Renewable Energy Development Agency Limited, dated 21 September 2011 /34/. The GBI is on and above the applicable tariff of electricity supplied to the grid. As per the operational guidelines /48/, accelerated depreciation has not been considered.

vi) Operation and maintenance cost: The operation and maintenance cost of INR 1.8 million per WEG, with an escalation of 5% per year, has been verified from the techno-commercial offer for the installation of the project activity from Suzlon Energy Limited, dated 4 December 2010/16/. It has also been verified from the techno-commercial offer /16/ the operation and maintenance cost is exempted for first two years of operation. The same has been considered in the IRR analysis.

vii) Insurance, depreciation, tax, residual value: The insurance cost of 0.1 million per WEG per year has been verified from the insurance policy details for the Hindustan Zinc Limited for previously commissioned wind power plants with Oriental Insurance Company Limited, dated 3 March 2009 /17/. The depreciation and tax rates are applied as per the Indian Company Act 1956 /18/ and Indian Income Tax rules /25/. Straight line depreciation of 5.28% of the cost of WEGs has been considered. Total book value depreciation over the operating years of 20 years has been considered as 90% of the cost of WEGs; no depreciation for the land cost has been considered. The residual value (salvage value), considered in the investment analysis, is 10% of the WEGs cost and 100% of the land value, as prescribed by the Companies Act, 1956 /18/. The depreciation value has been back added to the project cash flow in-line with the EB’s guideline on investment analysis /39/.

Calculation and conclusion

The equity IRR without CDM has been calculated to be 9.61% /2/ which is lower than the applied equity benchmark of 15.29%. The calculations were verified by DNV and found to be in line with EB’s guidance on investment analysis /39/.



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Sensitivity analysis

A sensitivity analysis has been performed for the key parameters in order to check the influence of the following factors used during the IRR calculations (without CDM contributions):

- a) Plant load factor (or electricity generation): It is demonstrated that if the plant load factor or electricity generation increases by 39%, then the project equity IRR crosses the equity benchmark of 15.29% /2/. The PLF considered in the IRR analysis /2/ has been verified from the tariff order, dated 6 August 2010 /46/ by Rajasthan Electricity Regulatory Commission. This is 7.3% (phase I) and 6.1% (phase II) more than the plant load factor expected for the project activity (19.46% and 19.7% for phase I and phase II respectively), as verified from the wind resource assessment report/5/. The PLF assessed in the wind resource assessment report /5/ specific to the project activity region and thus, gives reflects the actual applicable scenario. Thus, increase in the plant load factor by 39% is deemed unlikely.
- b) Project cost: The equity IRR of the project activity crosses the benchmark of 15.29% if the project cost is decreased by 27% /2/. The project cost, of INR 2770.27 million, incurred and considered in the investment analysis has been verified from the actual contracts for supply of WEGs and other related works for implementation for phase I (35.7 MW) of the project activity /13//14//15/. The project cost applied in the investment analysis is equal to the actual project cost as verified. Thus, decrease in the total project cost is not possible.
- c) Tariff: The equity IRR of the project activity crosses the benchmark if the tariff rate is increased by 40% /2/. The tariff rate of INR 4.02 per kWh applied in the investment analysis is as per the Rajasthan Electricity Regulatory Commission's tariff order dated 6 August 2010 /46/. The power purchase agreement of phase I, signed on 4 February 2011 /12/ was verified and confirmed. On 3 June 2011, RERC issued a revised tariff /50/ and the applicable tariff rate for wind projects is INR 4.22 per kWh, thus the power purchase agreement for phase II, dated 22 June 2011 /12/ has been signed for INR 4.22 per kWh. The tariff of INR 4.22 per kWh applicable for phase II is 5% higher than the tariff rate considered in the investment analysis and thus the equity IRR remain below the benchmark even after considering the actual tariff of INR 4.22 per kWh. It has been verified from the power purchase agreements that the respective tariff rates are fixed for 20 years of the project operating lifetime for both phase I and phase II. Thus, any further increase in the tariff rate fixed in power purchase agreement /12/ is deemed impossible.
- d) Operation and maintenance cost: The IRR does not cross the benchmark even by removing the O&M cost.. Hence, this scenario is deemed impossible.

In conclusion, it is DNV's opinion that it has been correctly demonstrated that the project activity does not represent a business as usual scenario, as it encounter barrier due to low return on equity..

4.6.4 Common practice analysis

Common practice analysis of the project activity has been performed as per paragraph 47 of the Additionality tool, version 6/43/.

Step 1: The installed capacity of the project activity being 52.50 MW, the applicable range for the common practice analysis is 26.25 MW to 78.75 MW.



Step 2: The project participant has selected the state of Rajasthan as the applicable geographical boundary for the assessment of common practice. In India, the regulatory environment among the states is not similar and each state has its own electricity regulatory commission which controls the tariff for the purchase of power. As per clause 4 of the Additionality tool, version 6/43/, the applicable geographical area can be considered smaller than the host country if the projects delivering same output differ in the investment climate arising out of legal regulations. Thus, in line with the definition of “different technology” in the Additionality tool, version 6, and in view of the different regulatory environment in each state, it can be concluded that it is appropriate to consider the state of Rajasthan as the geographical boundary.

N_{all} : It has been verified by DNV that the total number of power plants, operating in Rajasthan at the time of project start date, within the capacity range of 26.25 MW to 78.75 MW, is 12; comprising of 3 thermal power plants, 2 hydro power plants as verified from CEA CO₂ database, version 7 /26/ and 7 wind power plants verified from Indian wind directory /27/. All the 7 wind power plants are CDM project activity and are thus not considered in N_{all} . No biomass power plant and solar power plants, with the capacity range, are in operation in the geographical region prior to the start date of the project activity /28/. Thus, the value of N_{all} is 5.

Step 3: The power plants, applying different technology than the project activity are considered as N_{diff} . Since, the energy source of thermal and hydro power plants are different than the energy source of the project activity, 3 numbers of thermal power plants and 2 hydro power plants are considered under N_{diff} . Thus, N_{diff} is equal to 5.

Step 4: As aforementioned, N_{all} is 5 and N_{diff} is 5. Hence,

$$N_{all} - N_{diff} = 0$$

$$F = 1 - N_{diff}/N_{all} = 0$$

Thus, it is demonstrated that $N_{all} - N_{diff}$ is less than 3 and factor (F) is less than 0.2. Hence, it is concluded that the project activity is not a common practice in the applied geographical region.

Based on the demonstration of low return of investment and project activity not being a common practice in the region, DNV concludes that the project activity is additional.

4.7 Monitoring

The project monitoring plan is in compliance with the monitoring methodology ACM0002 (version 12.3.0). The monitoring plan will give opportunity for real measurement of emission reductions achieved. Since the project is a wind energy generation activity, no project emission is envisaged. Leakage accounting has not been considered for the project since the renewable energy technology equipment used is new and not transferred from another activity. It is DNV's opinion, that the project participant is able to implement the monitoring plan.

As required by the DNA of India, the project proponent has committed to spend 2% of the CERs revenue for Sustainable Development including society/community development. The implementation plan for the same has been included as Appendix 2 in the PDD.

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



4.7.1 Parameters determined ex-ante

Baseline emission factor for the integrated NEWNE grid is established *ex-ante* based on the approved methodology using a combined margin approach. The emission coefficients are determined from official data published by the Central Electricity Authority (CEA) of India in 'CO₂ Baseline Database for the Indian Power Sector' version 06 /26/ which was the latest published data available at the time of web hosting of the PDD.

The operating margin, build margin and combined margin for wind projects (as per the "Tool to calculate the emission factor for an electricity system"/38/, the weights for OM and BM have been taken as 75:25.) thus estimated are as follows.

Operating Margin ($EF_{grid, OM, y}$)	0.9962
Build Margin ($EF_{grid, BM, y}$)	0.8123
Combined Margin ($EF_{CO_2, grid, y}$)	0.9487

The calculations and assumptions have been elaborated under section 4.8 of this report and the same were verified and found to be correct by DNV.

4.7.2 Parameters monitored ex-post

The parameter that will be monitored *ex-post* is:

Net electricity supplied by the project activity to the grid: This parameter shall be sourced from the share certificates for the emission reduction calculation. The main meter and check meter, of accuracy class 0.2, at the substation shall be used to monitor and record the net electricity supplied by the wind farm to the grid. This net electricity supplied to the grid is used to apportion the electricity generated by each WEG owners. The apportioned value is mentioned in the share certificates issued to each WEG owner by the O&M service provider, Suzlon Infrastructure Service Limited.

The procedure for apportioning the electricity for each WEG owner is:

$$[(Y/X) \% * A] - [(Y/X) \% * B]$$

Where,

- $[(Y/X) \% * A]$ is the electricity exported by the project activity;
- $[(Y/X) \% * B]$ is the electricity imported by the project activity;
- X is the sum of gross electricity generated by all WEGs in the wind farm connected to substation;
- Y is sum of gross electricity generated by all WEGs owned by project proponent in project activity;
- A is total electricity exported to the grid measured at the substation;
- B is total electricity imported from the grid measured at the substation.

The following parameters shall be monitored for calculating and issuing the share certificate for the net electricity supplied by the project activity:

- a) Sum of gross electricity generated by all WEGs in the wind farm connected to substation (X): This shall be measured continuously by individual WEG controller and the reading shall be recorded monthly. The WEG shall be automatically shut-down in case of any malfunctioning of the WEG controller thereby, the probability of error in the WEG controller generation data is negligible. Thus, no calibration of WEG



controller is required. Emission reductions would not be claimed for the respective period during which any malfunctioning occurs.

- b) Sum of gross electricity generated by all WEGs owned by project proponent in project activity (Y): This shall be measured continuously by individual WEG controllers of the WEGs under the project activity and the reading shall be recorded monthly. The WEG shall be automatically shut-down in case of any malfunctioning of the WEG controller /33/ thereby, the probability of error in the WEG controller generation data is negligible. This has been verified from the WEG controller operation and maintenance procedure provided by O&M service provider /33/. Thus, no calibration of WEG controller is required. Emission reductions would not be claimed for the respective period during which any malfunctioning occurs.
- c) Total electricity exported to the grid measured at the substation (A): This shall be monitored continuously by the main meter, of accuracy class 0.2s, at the substation. The monthly meter reading recording shall be done jointly by state electricity board and project proponent representative. A check meter, of accuracy class 0.2s, shall be installed in case of failure of main meter. Both meters are in control of the state electricity board and shall be calibrated once in every year.
- d) Total electricity imported from the grid measured at the substation (B): This shall be monitored continuously by the main meter, of accuracy class 0.2s, at the substation. The monthly meter reading recording shall be done jointly by state electricity board and project proponent representative. A check meter, of accuracy class 0.2s, shall be installed in case of failure of main meter. Both meters are in control of the state electricity board and shall be calibrated once in every year.

The net electricity supplied by the project activity shall be cross-checked from the invoices raised to the state electricity board. The conservative values of net electricity exported would be considered for emission reductions.

DNV confirms that the monitoring arrangements described in the monitoring plan are feasible within the project design, and the mean of implementation of the monitoring plan is able to ensure the achievement of emission reductions.

4.7.3 Management system and quality assurance

The monitoring involves the metering of the net electricity supplied to the grid. Details of the data collection and frequency of data recording and associated formats are described in PDD and found to be adequate. The export/import electricity metering system will comprise of a set of main and check meters. The accuracy class of electricity meters for monitoring net electricity supplied is of class 0.2. The meter reading of the electricity exported to the grid will be jointly taken by the representatives of the project participant and the state utility once in a month. Data collected can be cross-checked with invoices for the sold electricity.

The project developer will establish a CDM Management Team and the details of the authorities and responsibilities have been indicated in the PDD. All paper based information will be stored by the proposed project owner.

4.8 Algorithms and/or formulae used to determine emission reductions

The calculations and formulae as addressed in the approved baseline and monitoring methodology ACM 0002, version 12.3.0 /37/, have been applied. All aspects related to the direct and indirect GHG emissions as relevant to the project activity have been addressed and are presented in a transparent manner, in line with the approved methodology.



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Baseline emission: Baseline emissions (BE_y in tCO_2) are the product of the combined margin grid emission factor ($EF_{CO_2,grid,y}$ in tCO_2/MWh) times the net electricity supplied by the project activity to the grid ($EG_{PJ,y}$ in MWh).

The combined margin emission coefficient for the NEWNE grid of India is 0.9487 tCO_2e/MWh has been fixed ex-ante for the crediting period. The data used for determining the combined margin emission factor has been sourced from Central Electricity Authority data, version 6/26/, which was the latest public data available at the time of web hosting of PDD for global stake holder comments on 14 October 2011. 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_2 baseline database /26/ 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 of all fossil-fuelled generating sources serving the system over a three year period of 2007-2008, 2008-2009 and 2009-2010. As low cost must run power plants constitutes less than 50% of the total generation in Integrated NEWNE regional grid of India in line with the guidance provided in tool to calculate emission factor for an electricity system /37/, simple OM approach has been used. BM is calculated ex ante based on 20% most recent capacity additions in the grid based on net generation as described in “Tool to calculate the emission factor for an electricity system” /38/.

The selection of the north east west and north-eastern regional (NEWNE) grid of India as the grid system boundary for the project activity is in line with the EB guidance for large countries such as India. In line with the guidance provided in the “Tool to calculate the emission factor for an electricity system”/38/, the weights for OM and BM have been taken as 75:25.

The project activity is envisaged to supply net electricity of 90 506 MWh per year, calculated based on the plant load factor of 19.46% and 19.7% for phase I and phase II respectively, as verified from the wind resource assessment report/5/ (c.f 4.2). Wind resource assessment report/5/ is the latest data source available for the estimation of electricity generation by the project activity at the time of the start of validation and thus, the same has been considered for the emission reduction calculation.

Project emission: In line with the applied methodology, no project emission is associated with the project activity.

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

Based on the calculations and results presented in the sections above the implementation of the project activity will result in an average *ex-ante* estimation of emission reduction conservatively calculated to be 85 863 tCO_2e per year for the selected crediting period.

All assumptions and data used by the project participants are listed in the PDD and/or supporting documents, including their references and sources. All documentation used by the project participants as the basis for assumptions and source of data is correctly quoted and



interpreted in the PDD. All values used in the PDD are considered reasonable in the context of the proposed CDM project activity. The baseline methodology has been applied correctly to calculate emission reductions. All estimates of the baseline 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), Government of India notification, dated 14 September 2006 /30/, wind power projects are not covered under any schedule and thus environmental impact assessment is not required for the project activity. The project is not likely to create any adverse environmental effects. The project complies with environmental regulations in India and the investors have received all the necessary clearances required for the project activity.

4.10 Comments by local stakeholders

Local stakeholder consultation meeting has been conducted on 31 March 2011 and the minutes of the local stakeholder meeting has been verified by DNV /31/. The local stakeholders include local village representative, operation and maintenance service provider and local entities. The local stakeholders were invited through advertisement in local newspaper /32/. No negative comment was received from the local stakeholders for the project activity /31/.

DNV considers the local stakeholder consultation has been carried out adequately.

4.11 Comments by Parties, stakeholders and NGOs

The PDD, version 01 dated 21 September 2011, was made publicly available on the CDM website and Parties, stakeholders and NGOs were through the CDM website (<https://cdm.unfccc.int/Projects/Validation/DB/PXQP8PHI661NOB5RNIT4DHUBFLVOXF/view.html>) invited to provide comments during a 30 days period from 14 October 2011 to 12 November 2011.

One comment was received and is given (in unedited form) in the below text box.

Comment by:

☐ Accredited NGO

☐ Party

☐ Stakeholder

Inserted on:

Subject:

Comment: How the 36% of equity contribute to 100% of project cost. Is Only 36% of project cost is contributed by equity?

How DNV has considered the comment received in its validation:

The total project activity is equity financed. The mention of equity portion of 36% was a typographical error and the PDD has been corrected to address that the total cost of project activity is INR 2770.27 million. DNV has been able to verify the total project as described in section 4.6.3 of the validation report.

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APPENDIX A

CDM VALIDATION PROTOCOL

Table 1 Mandatory requirements for Clean Development Mechanism (CDM) project activities

Requirement	Reference	Conclusion
About Parties		
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	~~CAR-1~~ 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	OK
5. In case public funding from Parties included in Annex I is used for the project activity, these Parties shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties.	Decision 17/CP.7, CDM Modalities and Procedures Appendix B, § 2	OK, no Annex Party is involved.
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
About additionality		
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	OK

Requirement	Reference	Conclusion
that would have occurred in the absence of the registered CDM project activity.		
About forecast emission reductions and environmental impacts		
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
For large-scale projects only		
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
About stakeholder involvement		
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	
Other		
15. The baseline and monitoring methodology shall be previously approved by the CDM Executive Board.	CDM Modalities and Procedures §37e	OK
16. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances.	CDM Modalities and Procedures §45c,d	OK
17. The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure.	CDM Modalities and Procedures §47	OK
18. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP.	CDM Modalities and Procedures §37f	OK

Table 2 Requirements checklist

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A General description of project activity					
A.1 Title of the project activity (VVM para 55-57)					
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/I	☒ Clearly identifiable title of the project activity ☒ Version number of the PDD is included ☒ 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	☒ Yes <i>If no, list where the PDD is not in accordance:</i>		OK
A.2 Description of the project activity (VVM para 58-64 and VVM para 135 and 136 (a) & (c) for small-scale project activities, as applicable)					
A.2.1 How was the design of the project assessed?	/1/	DR/I	<i>What type is the project?</i> ☐ Project in existing facility or utilizing existing equipment(s) ☐ Project is either a large scale project or a small scale project with emission reductions exceeding 15 000 tCO ₂ e per year. In this case, a site visit must be performed. ☐ Project is a bundled small scale project, with each project in the bundle with emission reductions not exceeding 15,000 tCO ₂ e per year. In such case the number of physical site visits may be based on sampling, if the sampling size is appropriately justified through statistical analysis.		OK

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

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				☐ The project is an individual small scale project activity with emission reductions not exceeding 15 000 tCO ₂ e per year. In this case, DOE may not conduct a physical site visit as appropriate. ☒ Greenfield project <i>How was the design of the project assessed?</i> ☒ Physical site inspection ☐ Reviewing available designs and feasibility studies <i>If a physical site inspection is not undertaken, justify why no site visit was undertaken:</i>		
A.2.2	If a greenfield project, describe the physical implementation of the project when the validation was commenced.	/1/	DR/I	The project activity is a greenfield project and the project has commenced operation during the site visit.		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 ₂ e per year), justify the sampling through a statistical analysis:	/1/	DR/I	A physical site visit has been conducted and no sampling is involved.		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/I	Yes, the project description has been adequately provided in the PDD.		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/I	The project activity is a greenfield wind power project and no alternation of the existing facility is involved in the project activity.		OK
A.2.6	Does the project design engineering reflect current good practices?	/1/	DR/I	Yes, the project activity reflects current good practice.		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
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/I	The project activity involves the installation of 25 numbers of 2.1MW wind turbine generators (WEG). No transfer of technology is involved.		OK
A.3 Participation requirements (VVM para 51-54, 125-127)						
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/I	The host country is India. India (host) ☒ Yes ☐ No ☒ Yes ☐ No ☒ Yes ☐ 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? 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	/1/	DR	The host country is India. LoA approved by DNA of India has not been provided. India(host) ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ DNA ☐ PP	~~CAR-1~~	OK
A.3.3	Have all private/public project participants been authorized	/1/	DR	LoA approved by DNA of India has not been	~~CAR-1~~	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
by an involved Party?			provided.		
A.4 Technical description of the project activity (VVM para 58-64)					
A.4.1 Is the project's location clearly defined?	/1/	DR/I	Yes, the geographical coordinates of each of the WEGs have been provided in PDD.		OK
A.5 Public funding of the project activity					
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/I	No Annex I Party is involved in the project activity. Thus, ODA is not relevant for the project activity.		OK
B Application of a baseline and monitoring methodology					
B.1 Methodology applied (VVM para 65-76 and VVM para 136 (b) for small-scale project activities, as applicable)					
B.1.1 Does the project apply an approved methodology and the correct and valid version thereof? <i>If during the course of validation the originally applied version of the methodology expires, a CAR shall be raised in Table 3 of the validation protocol. Any new requirements of the revised version of the methodology not yet validated in Table 2 of the validation protocol shall be validated in Table 3 as part of the assessment of the CAR raised.</i>	/1/	DR/I	The project activity applies ACM0002, version 12.1., which was applicable at the time of PDD webhosting. The PDD needs to be updated as per ACM0002, version 12.2.0, as available in UNFCCC website.	~~CAR 2~~	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	No specific guidance by CDM EB is applicable for the project activity.		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.2 Applicability of methodology (and tools) (VVM para 65-76) <i>Insert a row for each applicability criteria of the applied methodology (and tools)</i>					
B.2.1 How was it validated that project complies with the following applicability criteria: <i>“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” ?</i>	/1/	DR/I	The project activity is the installation and operation of a greenfield grid connected wind power generation plant.		OK
B.2.2 How was it validated that project complies with the following applicability criteria: <i>In the case of capacity additions, retrofits or replacements (except for wind, solar, wave or tidal power capacity addition projects which use Option 2: on page 11 to calculate the parameter $EG_{PJ,y}$): 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 ?</i>	/1/	DR/I	The project activity is a wind power plant, thus this applicability criteria is not applicable.		OK
B.2.3 How was it validated that project complies with the following applicability criteria: Applicability criteria related to hydro power plant?	/1/	DR	The project activity is a grid connected wind power plant. Thus, the applicability conditions specifically related to hydro power plants have not been assessed and considered irrelevant.		OK
B.2.4 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	/1/	DR/I	The project activity is a greenfield wind power project.		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	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”?					
B.2.5	Is the selected baseline on of the baseline(s) described in the methodology and this hence confirms the applicability of the methodology?	/1/	DR	Yes, the baseline has been selected as per the applied methodology.		OK
B.3 Project boundary (VVM para 78-80)						
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/I	The project boundary includes all the 25 WEGs, substation and NEWNE grid, as required by 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 ₂ equivalent for the net electricity supplied by the project activity to NEWNE grid has been identified in line with the methodology. No other GHG source is relevant to the project activity.		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/I	The project activity being a greenfield wind power plant, no other source of emission contributing for more than 1%, which is not addressed in the methodology, is foreseen.		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.4 Baseline scenario determination (VVM para 81-88, 105-107) <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/I	The baseline scenario of the project activity has been identified as the electricity delivered by the project activity that would otherwise have been generated by the other power plant connected to NEWNE grid.		OK
B.4.2 How have the other baseline scenarios been eliminated in order to determine the baseline?	/1/	DR/I	The baseline has been identified as per the methodology. No elimination of scenarios is required in line with the applied methodology.		OK
B.4.3 What is the baseline scenario?	/1/	DR/I	The baseline scenario of the project activity has been identified as the electricity delivered by the project activity that would otherwise have been generated by the other power plant connected to NEWNE grid.		OK
B.4.4 Is the determination of the baseline scenario in accordance with the guidance in the methodology?	/1/	DR/I	Yes, the baseline scenario has been identified as per the applied methodology.		OK
B.4.5 Has the baseline scenario been determined using conservative assumptions where possible?	/1/	DR/I	Baseline scenario has been identified as per the applied methodology.		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/I	Baseline scenario has been identified as per the applied methodology taking into consideration the relevant national and/or sectoral policies.		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.4.7	Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/	DR/I	Baseline scenario has been identified as per the applied methodology.		OK
B.4.8	Is the baseline determination adequately documented in the PDD? • 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. • All documentation is relevant as well as correctly quoted and interpreted. • Assumptions and data can be deemed reasonable • Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD. • The methodology has been correctly applied to identify what would occurred in the absence of the proposed CDM project activity	/1/	DR/I	Baseline scenario has been identified as per the applied methodology taking into consideration the relevant national and/or sectoral policies.		OK
B.5 Additionality determination (VVM para 94-121 and VVM para 137 for small-scale project activities, as applicable)						
B.5.1	What approach/tool does the project use to assess additionality? Is this in line with the methodology? In case of small-scale CDM project activities, is Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities applied considering also the “Non-binding best practice examples to demonstrate additionality for SSC project activities”.	/1/	DR/I	The project activity is a large scale CDM project activity and correctly applies “Tool for the demonstration and assessment of additionality”, Version 05.2, as required by the methodology.		OK
B.5.2	Have the regulatory requirements correctly been taken into account to evaluate the project activity and the alternatives?	/1/	DR/I	Yes, the baseline scenario, as stipulated by the methodology, has been identified keeping in consideration the relevant regulatory requirements.		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.5.3	Is sufficient evidence provided to support the relevance of the arguments made?	/1/	DR/I	The baseline scenario, which would have happened in absence of the project activity, has been identified as per the methodology and in line with the national regulation.		ok
B.5.4	What is the project additionality mainly based on (Investment analysis or barrier analysis)?	/1/	DR/I	The additionality of the project activity has been demonstrated through investment analysis.		OK
Prior consideration of CDM (VVM para 98-103)						
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/ /3/ /4/	DR/I	The start date of the project activity is 20 December 2010. A notification to UNFCCC and DNA has been sent by project proponent 7 March. The notification for the CDM consideration to UNFCCC was received by the UNFCCC on 16 May 2011, as verified from the website: https://cdm.unfccc.int/Projects/PriorCDM/notifications/index.html Acknowledgement from the DNA of India was received on 24 March 2011. The evidence in support has been provided to DNV. Thus, in line with the “Guideline for the demonstration and assessment of prior consideration of CDM” it has been concluded that CDM was seriously considered for the project activity. Furthermore, it has also been verified from the note for approval to the HZL management, dated 10 December 2010, that the investment was approved by the management considering the CDM revenue.		OK
B.5.6	If the starting date is after 2 August 2008 and before the global stakeholder consultation, has the DNA and UNFCCC confirmed that the project participants have informed in	/1/ /3/	DR	The start date of the project activity is 20 December 2010 and as mentioned in B.5.5, the notification for the CDM consideration has been		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
writing of the project's intention to seek CDM status?		/4/		sent to DNA and UNFCCC by the project proponent, as per the requirement.		
Continuous efforts to secure CDM status (only to be completed if starting date is before 2 August 2008)						
B.5.7	What initiatives were taken by the project participants from the starting date of the project activity to the start of validation in parallel with the physical implementation of the project activity?	/1/ /3/ /4/	DR/I	The PDD does not include the complete chronology, which includes but not limited to the date when construction works started, the date when commissioning started and the date of start-up, of event in section B.5 as per the requirement specified in "Guidelines for completing project design document and the proposed new baseline and monitoring methodologies (CDM-NM)", version 07. The chronology of events needs to be supported with related evidences.	~~CAR-3~~	OK
B.5.8	When did the construction of the project activity start?	/1/ /3/ /4/	DR/I	Refer to B.5.7	~~CAR-3~~	OK
B.5.9	When was the project commissioned?	/1/	DR/I	Refer to B.5.7	~~CAR-3~~	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	Refer to B.5.7	~~CAR-3~~	
Investment analysis (VVM para 108-114) <i>The list of questions below must be adjusted to the parameters in the investment analysis relevant to the project under validation. <u>All</u> input parameters need to be assessed.</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	Yes, the project activity generates revenue due to the generation of electricity.		OK
B.5.12	Do any of the alternatives to the project activity involve	/1/	DR	No, the baseline scenario does not require		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	investment? Is this reflected in the PDD?			investment.		
B.5.13	Is the choice of benchmark analysis, investment comparison or simple cost analysis correct?	/1/	DR	Yes, since the baseline scenario does not require investment, as per the “Guidelines for the assessment of investment analysis”, benchmark analysis has been chosen.		
B.5.14	Is the benchmark/discount rate the latest available at the time of decision?	/1/ /2/	DR/I	Cost of equity of 16.87% has been considered as the benchmark for the project activity. This is considered as applicable as the project activity is 100% equity financed. The risk free rate of 7.92% has been considered as per the weighted average yield rate of Government securities for the year 2010-2011, which is applicable to the project activity. Market premium/risk premium and beta value for power sector has been calculated from the BSC Sensex data. The following are not clear: 1) The calculation of the benchmark has not been provided. 2) The evidence of the data used for the calculation of risk premium and beta has not been provided. 3) This has not been confirmed if all the power sector listed have been considered for the beta calculation. 4) The beat values have not been unlevered to be independent of financial leverage of the individual company. 5) The conservativeness of the beta value has not been demonstrated as the lowest beta value has not been considered.	CAR-4	OK
B.5.15	What is the financial indicator? Is it on equity/project basis?	/1/	DR/I	Post tax IRR has been chosen as the financial		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	Before/after tax? Is the financial indicator in correspondence with the benchmark?	/2/		indicator. The financial indicator is in correspondence with the benchmark.		
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/ /2/	DR/I	Yes, the assumptions are appropriate.		OK
B.5.17	Does the income tax calculation take depreciation into account? Is the depreciation year in accordance with normal accounting practice in the host country?	/1/ /2/	DR/I	Yes, the income tax has been calculated by considering depreciation.		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/ /2/	DR/I	IRR has been calculated for 21 years, the lifetime of the project activity. The salvage value of 10% of the capital cost has been considered. As per the CERC guideline, salvage is 10% of the plant and machinery and 100% of the land cost. The salvage value considered in the project activity does not meet the CERC guideline.	~~CL1~~	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/ /2/	DR/I	The project activity does not have FSR/DPR.		OK
B.5.20	How was the amount of output (e.g. sales of electricity) assessed? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/ /2/	DR/I	☐ 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 ☒ The plant load factor determined by a third party contracted by the project participants (e.g. an engineering company) ☐ Other approach. <i>Provide details on how the load factor was</i>	~~CL2~~	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<i>validated::</i> The plant load factor of 19.76% for 8 WEGs and 19.46% for 17 WEGs has been verified from the wind resource assessment for the project activity by Power and Engineering Consultants. The following are to be clarified: 1) The date of the assessment needs to be clarified.		
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 paragraph 95.	/1/ /2/	DR/I	☐ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☐ 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 evidence for cost of electricity has not been provided. Power purchase agreement has not been provided.	~~CL-2~~	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 paragraph 95.	/1/ /2/	DR/I	☐ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☐ Review of feasibility reports, public announcements, contracts and annual financial reports related to the project and the project participants <i>Provide details on how the investment costs were validated:</i> The investment cost of INR 277 million has been verified during the site visit. Copies of the purchase agreements, which is the evidence for the investment cost, has not been provided.	~~CL-2~~	OK
B.5.23 How were the O&M costs assessed? Were the data available	/1/	DR/I	☐ Cross-check against third-party or publicly		

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/2/		available sources (e.g. invoices or price indices) ☐ 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&M costs were validated:</i> Evidence for the O&M cost has not been provided.		
B.5.24	Describe the assessment of the other input parameters. Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/ /2/	DR/I	☒ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☐ 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> The other input parameters, such as income tax rate, depreciation and generation based incentives have been verified from the public sources. Evidence for the insurance has not been provided.	~~CL-2~~	OK
B.5.25	Was the financial calculation spreadsheet verified and found to be correct?	/1/ /2/	DR/I	The excel sheet for the IRR calculation has been provided and found to be in accordance with the investment guideline.		OK
B.5.26	Sensitivity analysis: Have the key parameters contributing to more than 20% of the revenue/costs during operating or implementation been identified? Has possible correlation between the parameters been considered?	/1/ /2/	DR/I	The sensitivity analysis has been performed for electricity generation, tariff, project cost and O&M cost. Sensitivity analysis has been performed with 10% variation.		OK
B.5.27	Sensitivity analysis: Is the range of variations is reasonable in the project context?	/1/ /2/	DR/I	The range of +10% to -10% has been considered. The PDD does not address and justify the variation of the parameters to be limited up to 10%.	~~CAR-5~~	OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				The sensitivity analysis has not been performed for the scenario in which the project IRR shall pass the benchmark or become more favourable, as indicated in "Guidance on the assessment of investment analysis" version 5, para 20.		
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/ /2/	DR/I	The key parameters have not been varied to reach the benchmark. This analysis needs to be demonstrated.	~~CL-5~~	OK
Barrier analysis (VVM para 115-118)						
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 is not performed.		OK
Common practice analysis (VVM para 119-121)						
B.5.30	What is the geographical scope of the common practice analysis? Is this justified?	/1/	DR/I	Rajasthan has been considered as the geographical scope for the common practice analysis. This is appropriate in view of the fact that in India, each state has its regulatory commission responsible for the development of tariff order and other issues related to the electricity sector. Thus, the regulatory environment of each state of India is different and independent.		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/I	The common practice has been further analysed as per the micro/mini scale, capacity of the wind power plants, wind power plants under operation at the time of project start date and the type of investor. The PDD is not clear on the following: 1) The PDD does not justify the difference in the investment climate for micro/mini	~~CL-3~~	OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				wind power project and the project activity. 2) The range of installed capacity has been considered for 24 MW to 75MW. The PDD does not justify the adequacy of the range of capacity considered. 3) The PDD states that data has been sourced from Wind Power Directory, 2010. It is not clarified if the data is the latest data available at the time of start of validation (PDD webhosting).		
B.5.32	What is the data source(s) used for the common practice analysis?	/1/	DR/I	Justification of the data source, as mentioned in B.5.31, to be provided.	~~CL3~~	OK
B.5.33	How many similar non-CDM-projects exist in the region within the scope?	/1/	DR/I	There are no non- CDM project in the range 24MW – 75MW installed by the private investor.		OK
B.5.34	How were possible essential distinctions between the project activity and similar activities assessed?	/1/	DR/I	The issues raised in B.5.31 needs to be clarified.	~~CL3~~	OK
B.5.35	What is the conclusion of the common practice analysis?	/1/	DR/I	The issues raised in B.5.31 needs to be clarified.	~~CL3~~	OK
Conclusion						
B.5.36	What is the conclusion with regard to the additionality of the project activity?	/1/ /2/	DR	This is subjected to satisfactory conclusion of CAR 4- 5 and CL 1 – 3.	~~CL1~~ ~~CL2~~ ~~CL3~~ ~~CAR4~~ ~~CAR5~~	OK
B.6 Calculations of GHG emission reductions						
Data and parameters that are available at validation and that are not monitored (VVM para 199-203)						
B.6.1	How was the “Combined Margin CO ₂ emission factor for NEWNE grid” available at validation verified?	/1/	DR	OM and BM for the calculation of combined margin has been sourced from CEA database, version 6, latest available at the time of PDD		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				webhosting. Combined margin has been determined as 75:25 of OM: BM as per the “Tool to calculate the emission factor for an electricity system” for the wind power projects.		
Baseline emissions (VVM para 89-93)						
B.6.2	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	Yes, the baseline emission has been calculated as per the methodology. Baseline emission is the product of net electricity supplied by the project activity to the grid and the combined margin grid emission factor.		OK
B.6.3	Have conservative assumptions been used when calculating the baseline emissions?	/1/	DR	The baseline emission has been calculated as per the methodology		OK
B.6.4	Are uncertainties in the baseline emission estimates properly addressed?	/1/	DR	Baseline emission has been calculated as per the methodology		OK
Project emissions (VVM para 89-93)						
B.6.5	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR/I	No project emission is associated with the project activity as per the methodology.		OK
B.6.6	Have conservative assumptions been used when calculating the project emissions?	/1/	DR/I	No project emission is associated with the project activity as per the methodology.		OK
B.6.7	Are uncertainties in the project emission estimates properly addressed?	/1/	DR/I	No project emission is associated with the project activity as per the methodology.		OK
Leakage (VVM para 89-93)						
B.6.8	Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	No leakage is associated with the project activity. No equipment transfer is applicable.		OK
Emission Reductions (VVM para 89-93)						
B.6.9	Algorithms and/or formulae used to determine emission reductions: All assumptions and data used by the project participants	/1/	DR	The emission reduction has been calculated as per the applied methodology, ACM0002, version 12.2. The data reference has been adequately		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
are listed in the PDD and related document submitted for registration. The data are properly referenced • All documentation is correctly quoted and interpreted. • All values used can be deemed reasonable in the context of the project activity • The methodology has been correctly applied to calculate the emission reductions and this can be replicated by the data provided in the PDD and supporting files to be submitted for registration.				provided in the PDD and verified.		
B.7 Monitoring plan (VVM para 122-124)						
Data and parameters monitored						
B.7.1	Do the means of monitoring described in the plan comply with the requirements of the methodology?	/1/	DR/I	Yes, the monitoring plan is described as per the methodology.		OK
B.7.2	Does the monitoring plan contains all necessary parameters, and are they clearly described?	/1/	DR/I	Yes, the monitoring plan contains electricity export and import, as required by the methodology.		OK
B.7.3	In case parameters are measured, is the measurement equipment described? Describe each relevant parameter.	/1/	DR/I	The net electricity supplied by the project activity is calculated from electricity export and import. Electricity export and import shall be monitored by energy meter of accuracy class 0.2. The energy meters are installed at the feeder point to which WEGs are connected, where WEGs not belonging to the project activity is also connected. The electricity export/imported shall be apportioned and the amount of export and import shall be checked from the monthly JMR shall be used as the data source and shall be cross checked from the invoices raised by the project participant.		OK
B.7.4	In case parameters are measured, is the measurement accuracy addressed and deemed appropriate? Describe each	/1/	DR/I	Electricity export and import, both main and check meter, shall be monitored by electronic		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
relevant parameter.				trivector meters of accuracy class 0.2 installed at the feeder point.		
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/I	The energy meters, main and check for export and import, shall be calibrated once in a year.		OK
B.7.6	Is the monitoring frequency adequate for all monitoring parameters? Describe each parameter.	/1/	DR/I	Electricity export and import shall be monitored by energy meter of accuracy class 0.2 on continuous basis and the amount of export and import shall be checked from the monthly JMR shall be used as the data source and shall be cross checked from the invoices raised by the project participant.		OK
B.7.7	Is the recording frequency adequate for all monitoring parameters? Describe each parameter.	/1/	DR/I	The data shall be reported on monthly basis.		OK
Ability of project participants to implement monitoring plan						
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/I	The operation & maintenance arrangements provided are systematic organizational chart with respect to the role of each personnel. The same is being followed on the site		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/	DR/I	The procedures are identified for day-to-day records handling		OK
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/I	Yes the data management, quality assurance, quality control is sufficient for the accurate recording and reporting of the CERs		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	/1/	DR/I	Yes all the data will be archived & will be available for 2 years after the last crediting period		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
occurs later?						
Monitoring of sustainable development indicators/ environmental impacts						
B.7.12	Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country?	/1/	DR/I	Monitoring of sustainable development indicator is not warranted by the legislation of India.		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/I	Not applicable		OK
B.7.14	Are the sustainable development indicators in line with stated national priorities in the host country?	/1/	DR/I	Not applicable		OK
C Duration of the project activity / crediting period						
C.1.1 Start date of project activity (VVM para 99-100, 104)						
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/I	The start date of the project activity is 20 December 2010. The evidence for the same has not been provided. It has not been demonstrated with supporting evidences that the aforementioned start date is as per the CDM-EB guidance.	~~CL-4~~	OK
C.1.3	Is the stated expected operational lifetime of the project activity reasonable?	/1/	DR/I	The life time of the project activity is stated as 21 years and is considered as reasonable.		OK
C.1.4	Is the start date, the type (renewable/fixed) and the length of the crediting period clearly defined and reasonable?	/1/	DR/I	Renewal crediting period with the start date of the crediting period as 1 March 2012 has been considered.		OK
D Environmental Impacts (VVM para 131-133 and VVM para 136 (d) for small-scale project activities, as applicable))						
D.1.1	Are there any host country requirements for an	/1/	DR/I	No EIA is required for the project activity as per		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
Environmental Impact Assessment (EIA), and if yes, is an EIA approved? Does the approval contain any conditions that need monitoring? For small-scale project activities, is an assessment of the environmental impacts of the proposed CDM project activity is required by the host Party?				the national regulation of India.		
D.1.2	Does the project comply with environmental legislation in the host country?	/1/	DR/I	Yes the project complies with the legislation in the host country.		OK
D.1.3	Will the project create any adverse environmental effects?	/1/	DR/I	No adverse environmental, as compared to the established baseline scenario, is envisaged from the project activity.		OK
D.1.4	Have identified environmental impacts been addressed in the project design?	/1/	DR/I	No adverse environmental, as compared to the established baseline scenario, is envisaged from the project activity.		OK
D.1.5	Has an analysis of the environmental impacts of the project activity been sufficiently described?	/1/	DR/I	No adverse environmental, as compared to the established baseline scenario, is envisaged from the project activity.		OK
D.1.6	Are transboundary environmental impacts considered in the analysis?	/1/	DR/I	No such effect is applicable for the project activity.		OK
E Stakeholder Comments (VVM para 128-130)						
E.1.1	Have relevant stakeholders been consulted?	/1/	DR/I	Yes all the relevant stakeholders have been considered		OK
E.1.2	Have appropriate media been used to invite comments by local stakeholders?	/1/	DR/I	The PP has used both regional language newspaper and newspaper in English in order to invite comments by the local stakeholders. The same has been investigated during the site visit. Copies of the notifications in the newspapers are not submitted	CL-5	OK
E.1.3	If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder	/1/	DR/I	Stakeholder consultation is not required by the regulation of India for such project activity.		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
consultation process been carried out in accordance with such regulations/laws?						
E.1.4	Is a summary of the stakeholder comments received provided?	/1/	DR/I	It was confirmed during the site visit that the stakeholder meeting was held. Copies of minutes of meeting for the stakeholder comments are not provided.	~~CL-5~~	OK
E.1.5	Has due account been taken of any stakeholder comments received?	/1/	DR/I	There have been no negative comments with respect to the project. Other positive comments have been addressed.		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
CAR 1 LoA approved by DNA of India has not been provided.	A.3	HCA has been provided.	Letter of Approval from host Party India, dated 14 September 2012 has been provided. OK. CAR 1 is closed.
CAR 2 The PDD needs to be updated as per ACM0002, version 12.2.0, as available in UNFCCC website.	B.1.1	The PDD has been revised in accordance with version 12.3.0 of the ACM0002. Minor changes in applicability criteria have been incorporated.	The PDD has been revised as per the methodology ACM0002 version 12.3.0, as available in the UNFCCC website. OK. CAR 2 is closed.
CAR 3 The PDD does not include the complete chronology, which includes but not limited to the date when construction works started, the date when commissioning started and the date of start-up, of event in section B.5 as per the requirement specified in “Guidelines for completing project design document and the proposed new baseline and monitoring methodologies (CDM-NM)”, version 07. The chronology of events needs to be supported with related evidences.	B.5.7-B.5.10	The chronology table including the start date of construction, commissioning date etc. Has been included in section B.5 of the revised PDD.	The PDD has been revised to include the chronology of events in section.5 of the PDD as per the “Guidelines for completing project design document and the proposed new baseline and monitoring methodologies (CDM-NM)”, version 07. The supporting evidences have been provided. OK. CAR 3 is closed.
CAR 4 The following are not clear in the PDD for the benchmark calculation: 1) The calculation of the benchmark has not been provided. 2) The evidence of the data used for the calculation of risk premium and beta has not been provided. 3) This has not been confirmed if all the power sector listed have been considered for the beta calculation.	B.5.14	The following changes have been made in the PDD: 1) Benchmark calculation is explained in section B.5 and the benchmark calculation spreadsheet in enclosed. 2) The screenshots of beta values and evidence of calculation of risk premium has been provided and beta has been provided. 3) All the power sector listed companies have been considered for beta calculation. 4) The beta values have been unlevered and	The equity benchmark calculation has been provided in the excel format. The screenshots for the beta value and risk premium has been provided in the benchmark calculation excel sheet. The benchmark calculation has been revised to include all the power companies listed as the type of output is similar. The beta value has been unlevered and the average beta has been considered for the benchmark calculation.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
4) The beta values have not been unlevered to be independent of financial leverage of the individual company. The conservativeness of the beta value has not been demonstrated as the lowest beta value has not been considered.		conservative value of beta has been considered.	Based on the above mentioned revisions and data, the benchmark has been calculated to be 15.29%. The benchmark calculated in the webhosted PDD was 16.87%. The conservativeness of the selected equity benchmark has also been demonstrated by comparing the applied benchmark of 15.29% with the default equity benchmark as provided in “Guidelines on the assessment of investment analysis” version 5. As per the “Guidelines on the assessment of investment analysis”, the default equity benchmark of 11.75% for India for Group I projects is to be converted to real terms by adding the inflation rate. In line with the investment analysis guidance, average inflation of India, as projected and published by Reserve Bank of India for 10 years is 5.1% (W.P.I). Default equity benchmark for the project activity is 16.85%. Thus, this demonstrate that the equity benchmark, as calculated by CAPM method, is conservative than the default benchmark. Since, both the approaches are applicable as per the “Guidelines on the assessment of investment analysis” version 5, on the principle of conservativeness; equity benchmark of 15.29% has been selected and accepted as the benchmark for the project activity. OK. CAR 4 is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
CAR 5 The PDD does not address and justify the variation of the parameters to be limited up to 10%. The sensitivity analysis has not been performed for the scenario in which the project IRR shall pass the benchmark or become more favourable, as indicated in “Guidance on the assessment of investment analysis” version 5, para 20.	B.5.27, B.5.28	The extent of variation of key parameters which results in IRR reaching the benchmark has been included in section B.5 of the revised PDD.	The PDD and excel sheet has been revised to perform the sensitivity analysis for the scenario at which project equity IRR reaches the benchmark. OK. CAR 5 is closed.
CL1 The salvage value of 10% of the capital cost has been considered. As per the CERC guideline, salvage is 10% of the plant and machinery and 100% of the land cost. The salvage value considered in the project activity does not meet the CERC guideline.	B.5.18	The salvage value of 10% of the plant and machinery and 100% of the land cost has been considered in accordance with CERC guideline.	The IRR analysis has been adequately revised. The salvage value of 10% and 100% of the land cost has been assumed. OK. CL 1 is closed.
CL 2 The date of wind resource assessment needs to be clarified. The evidence for cost of electricity has not been provided. Power purchase agreement has not been provided. The investment cost of INR 277 million has been verified during the site visit. Copies of the purchase agreements, which is the evidence for the investment cost, has not been provided. Evidence for the O&M cost has not been provided. Evidence for the insurance has not been provided.	B.5.20, B.5.21, B.5.22, B.5.23, B.5.24	Power purchase agreement is enclosed as evidence of power purchase cost. The offer letter from Suzlon dated 04/12/2010 is enclosed as evidence of O&M cost. Further the O&M agreement with Suzlon is enclosed. The evidence of insurance cost (costs incurred for previous projects) is enclosed.	The evidence related to investment cost, electricity tariff, O&M and insurance cost have been provided. The verification of the mentioned documents confirms that the appropriate input values have been considered in the IRR analysis. The wind resource assessment is dated 2011. Since, it could not be confirmed that the wind assessment was available at the time of investment decision; plant load factor of 21% has been applied in the IRR analysis. The PLF applied has been verified from the Rajasthan Electricity Regulatory Commission’s tariff order, dated 6 August 2010/46/ and the same was available at the time of investment

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
			decision. It has been verified that the applied PLF of 21% in IRR analysis is higher than the estimated PLF of 19.46% and 19.7% for phase I and phase II respectively in wind resource assessment report/5/. Thus, based on the “Guidance on the Assessment of Investment Analysis”, version 5 /39/ and conservatively, the PLF of 21% has been considered for IRR analysis /2/. OK. CL 2 is closed.
CL 3 Common practice analysis: The PDD is not clear on the following: 1) The PDD does not justify the difference in the investment climate for micro/mini wind power project and the project activity. 2) The range of installed capacity has been considered for 24 MW to 75MW. The PDD does not justify the adequacy of the range of capacity considered. 3) The PDD states that data has been sourced from Wind Power Directory, 2010. It is not clarified if the data is the latest data available at the time of start of validation (PDD webhosting). The common practice analysis has not been performed as per the guidance on common practice by CDM EB and Additionality tool, version 6.	B.5.31	The range of data considered has been taken as +/-50%. This range has been specified in the additionality under the steps for common practice for project activities listed in paragraph 6. The data considered for the common practice analysis includes all projects commissioned up to March 2010. This is conservative, since for common practice analysis, only those projects can be compared which are under operation prior to the start of the proposed project activity (December 2010), in accordance with the Additionality Tool.	The common practice analysis has been revised as per the “Tool for the demonstration and assessment of additionality” version 6. In line with the Additionality tool, version 6, based on the fact that in India, the regulatory regime and tariff regulations are made by State Regulatory commissions of each state separately, Rajasthan has been considered as the geographical boundary for the common practice analysis. As per paragraph 6 of the Additionality tool, version 6, 50% +/- of the installed capacity of the project activity giving similar output (electricity) till the start date of the project activity has been considered. The common practice analysis has been provided in the excel format and demonstrated that Nall-Ndiff is 0 (less than 3) and factor F is 0 (less than 0.2). OK. CL 3 is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
CL 4 The evidence for the same has not been provided. It has not been demonstrated with supporting evidences that the aforementioned start date is as per the CDM-EB guidance.	C.1.3	As per the CDM glossary of terms: “The start date shall be considered to be the date on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity. This, for example, can be the date on which contracts have been signed for equipment or construction/operation services required for the project activity.” Accordingly the date of signing of purchase orders for the project activity has been considered as the start date. All purchase orders for the project activity are enclosed as documentary evidence.	The evidence for the start date of the project activity as 20 December 2010 has been provided. It has been verified from the evidences that the mentioned date is the earliest of the real action. OK. CL 4 is closed.
CL 5 Copies of the notifications in the newspapers are not submitted. Copies of minutes of meeting for the stakeholder comments are not provided.	E.1.2, E.1.4	The public notice and notification / invitation by newspaper are enclosed. The minutes of meeting for the local stakeholder consultation is enclosed.	Evidence for the notice on newspaper and minutes of the meeting for local stakeholder consultation has been provided. OK. CL 5 is closed.

Table 4 Forward action requests

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

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APPENDIX B

CURRICULA VITAE OF THE VALIDATION TEAM MEMBERS

Ms. Sharmistha Shome, DNV Bangalore, India holds a Master's Degree in Energy Systems. Her educational qualification covers the fields of sustainable development, power plant technology, renewable energy technology, performance of thermal & electrical utilities and project financing.

She has experience in validation and verification of several CDM projects/JI and other 3rd party validation/verification services. She has completed the ISO14001 EMS Lead Auditor course. Her qualification and experience in CDM demonstrate her sufficient sectoral competence in renewable energy sector.

Ms. Preeti Jolad: holds a Master Degree in Environmental Engineering, a Bachelor Degree in Civil Engineering, a Post Graduate Diploma in Environmental Law, with certifications such as Business English Certification from Cambridge University, having an overall experience of around 6 years. Prior to joining DNV, she has about six years of experience in construction industry, regulations on construction industry, air/water/noise monitoring, reporting to state & central pollution control boards, designing of water supply system & works on UK Water Industry. Her experience covers fields of Water & Waste Water infrastructure.

She is gaining experience in CDM 3rd party validation/verification services.

Her qualification & industrial experience are convening the quick and efficient learning of 3rd party validation/verification services.

Mr. Nitin Kapoor holds a Bachelor in Chemical Engineering and is also a qualified Chartered Financial Analyst (CFA). He has an overall experience of 15 years and 6 months as on date. Prior to joining DNV he had experience of 10 years and 5 months in Oil & Gas as well as manufacturing sector (food) with leading MNC's like ITC, Coca Cola and Enron Oil and Gas. During his stint in industry his responsibilities included carrying out energy audits and to identify potential areas of improvement. His experience includes analysis of specific consumptions (primarily on energy, raw materials and utilities) of processes based on historical data, carrying out material balances (heat and mass), analysis of equipment performance and identification and measurement of energy saving opportunities. He has also been responsible for the operations of the complete Crude Distillation Unit in the refinery, complete platform operations in Oil and Gas sector as well as for the utilities like steam, AHU while in Maintenance at ITC. He also has been incharge of the ETP operations in Coca Cola and ITC as well as Water and Sewage treatment plants while working offshore. He has been responsible for EMS and QMS at ITC and Coca Cola.

He has experience of 3.5 years in validation and verification of numerous CDM projects within DNV. He has received extensive training in the CDM validation and verification process. He is an appointed validator for the CDM validation and verification program of DNV and has performed validation of several CDM projects. He is also a Lead Auditor for QMS, auditor for EMS and Safety. His qualification, industrial experience and project experience in CDM demonstrate his sufficient sectoral competence in Energy Generation from renewable energy sources, energy efficiency, heat and energy demand and waste/waste water treatment. His direct work experience in Oil and Gas and food sector demonstrates his sectoral competence in these industries. His qualification as CFA demonstrates his competence in financial analysis.

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

He has experience of around 6 years in validation and verification of numerous CDM projects in DNV, both in India & abroad. He has completed national training on "Wind Energy Technology" conducted by Center for Wind Energy Technology, Ministry of New and Renewable Energy. His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in energy generation from renewable energy sources.