Project design document form for small-scale CDM project activities

(Version 05.0)

PROJECT DESIGN DOCUMENT (PDD)	
Title of the project activity	"Wind Power Project in Rajasthan, India by M/s Devki Builders Pvt. Ltd."
Version number of the PDD	4
Completion date of the PDD	18/11/2011
Project participant(s)	M/s Devki Builders Pvt. Ltd.
Host Party	India
Sectoral scope and selected methodology(ies), and where applicable, selected standardized baseline(s)	Sectoral scope : 01 Methodology: AMS I.D – Grid connected renewable electricity generation – (Version 17)
Estimated amount of annual average GHG emission reductions	10,240 tCO_2

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The project activity consists of four Wind Turbine Generators (WTGs) of 1.5 MW capacities at Bastwa Mataji village, Jodhpur district, Rajasthan set up by M/s Devki Builders Pvt. Ltd. (hereafter DBPL or project participant). The project is a CDM project activity.

The project has been commissioned on 30/09/2009. The power generated is being exported to Jaipur Vidyut Vitaran Nigam Limited (hereafter JVVNL).

Purpose of the project activity:

The main purpose of the project activity is to generate electricity using wind energy. The power thus generated would be supplied to the state electricity grid and replace the power generated by fossil fuel intensive thermal power plants thus mitigating GHG emissions.

The electricity generation from the project activity will contribute to GHG reductions estimated at 102,400 tCO_2e over a period of 10 years, although the project life is envisaged as 20 years. The project activity can evacuate approximately 11,101 MWh of renewable power annually to the power deficit NEWNE grid.

Contribution of project activity to sustainable development:

Indian economy is highly dependent on "Coal" as fuel to generate energy and for production processes. Thermal power plants are the major consumers of coal in India and yet the basic electricity needs of a large section of population are not being met.

This results in excessive demands for electricity and places immense stress on the environment. Changing coal consumption patterns will require a multi-pronged strategy focusing on demand, reducing wastage of energy and the optimum use of Renewable Energy (RE) sources.

Government of India has stipulated following indicators for sustainable development in the interim approval guidelines[1] for CDM projects.

1. Social well-being

   The proposed project activity leads to alleviation of poverty by establishing direct and indirect employment benefits occurring out for manufacturing towers, for erecting the WEGs and for maintenance during operation of the project activity. The infrastructure in and around the project area will also improve due to project activity. This includes development of road network and improvement of the quality of electricity in terms of its availability and frequency as the generated electricity is fed into a deficit grid.

2. Economic well-being

   The project activity leads to an investment of about INR 3,445 lacs to a developing region which otherwise would not have happened in the absence of the project activity. The generated electricity is fed into the NEWNE grid through local grid, thereby improving the grid frequency and availability of electricity to the local consumers (villagers and sub-urban habitants) thereby resulting in greater local employment, ultimately leading to overall development. The project activity also leads to diversification of the national energy supply, which is dominated by conventional fuel based generating units.

[1] Ministry of Environment and Forests web site: http://envfor.nic.in:80/divisions/ccd/cdm_iac.html

3. Environmental well-being

The project utilizes wind energy for generating electricity which otherwise would have been generated through alternate fuels (most likely - fossil fuel) based power plants, thereby contributing to the reduction in specific emissions (emissions of pollutant/unit of energy generated) including GHG emissions. As wind power projects produce no end products in the form of solid waste (ash etc.), they address the problem of solid waste disposal encountered by most other sources of power. Being a renewable source, using wind energy to generate electricity contributes to resource conservation. Thus the project causes no negative impact on the surrounding environment contributing to environmental well-being.

4. Technological well-being

The project activity leads to the promotion of WEGs into the region, demonstrating the success of wind turbines, which feed the generated power into the nearest sub-station, thus increasing energy availability and improving quality of power under the service area of the substation. Hence, the project leads to technological well-being.

A.2. Location of project activity

A.2.1. Host Party

India

A.2.2. Region/State/Province etc.

Rajasthan

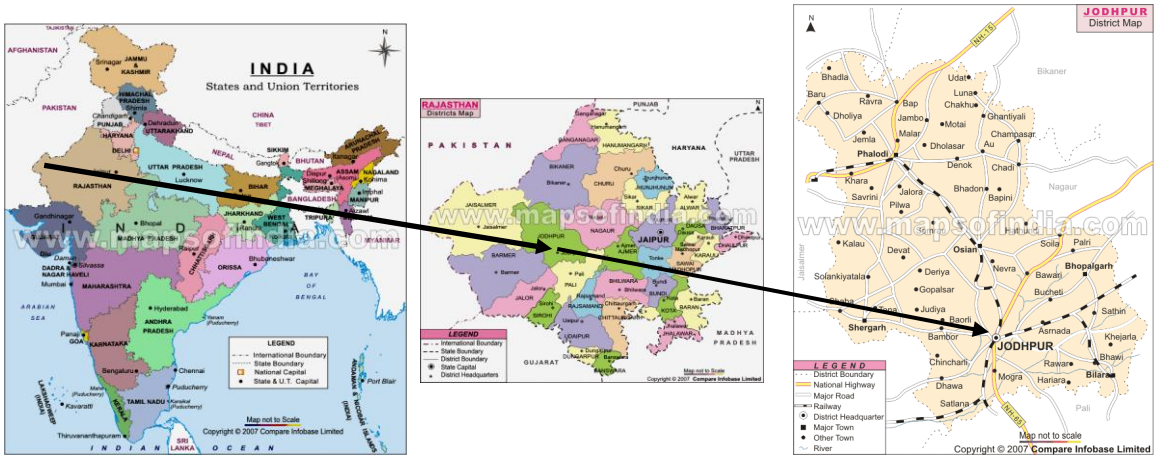
A.2.3. City/Town/Community etc.

Village : Bastwa Mataji
Taluka : Dharampur
District : Jodhpur
State : Rajasthan

A.2.4. Physical/Geographical location

Capacity	1.5 MW	1.5 MW	1.5 MW	1.5 MW
Model	S-82	S-82	S-82	S-82
Unique identification No.	RKBNL6	RKB083	RKB088	RKB089
Survey No.	RKB	RKB	RKB	RKB
Village	Kui Inda	Bastwa Mataji	Bastwa Mataji	Bastwa Mataji
Taluka	Shergarh	Shergarh	Shergarh	Shergarh
District	Jodhpur	Jodhpur	Jodhpur	Jodhpur
State	Rajasthan	Rajasthan	Rajasthan	Rajasthan
Commissioning Date	30/09/2009	30/09/2009	30/09/2009	30/09/2009
Lattitude	N26 27 38.5	N26 30 18.0	N26 31 23.7	N26 31 35.0
Longitude	E72 29 21.4	E72 33 53.2	E72 34 11.8	E72 34 05.4

- **Geographical Location**:



A.3. Technologies and/or measures

As defied under Appendix B[2] of the simplified modalities and procedures for small-scale CDM project activities, the project activity proposes to apply following project types and categories:

Type : I – Renewable Energy Projects
Category : I.D – Grid connected renewable electricity generation (Version 17)

In wind energy generation, kinetic energy of wind is converted into mechanical energy and subsequently into electrical energy. Wind has considerable amount of kinetic energy when blowing at high speeds. This kinetic energy when it passes through the blades of the wind turbines, it is converted into mechanical energy and rotates the wind blades. When the wind blades rotate, the connected generator also rotates, thereby produce electricity.

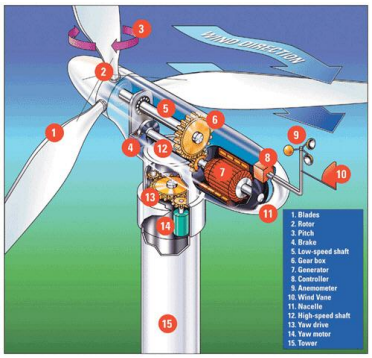


Figure 02, Major Mechanical Parts of a Wind Turbine

The technology used in this project is safe, sound and a clean technology, since no green house gas (GHG) emissions associated with the electricity generation. The project installs 4 no. (S-82) Suzlon make WEG of 1.5 MW capacity. Salient features of S-82 WEG are as follows

Table-1: Salient Features of 1.5 MW (S-82) WEG

Sr. No.	Particulars	Specifications
1.	Rotor diameter	82 m
2.	Hub height	78 m

[2] http://cdm.unfccc.int/Projects/pac/ssclistmeth.pdf

3.	Installed electrical output	1500 kW
4.	Cut-in wind speed	4.0 m/s
5.	Rated wind speed	12.0 m/s
6.	Cut-out wind speed	20 m/s
7.	Rotor swept area	5281 m^2
8.	Rotational speed	16.3 rpm
9.	Rotor material	GRP
10.	Power regulation	Independent electrochemical pitch
11.	Generator	Asynchronous Generator, 4 pole with slip ring
14.	Operating voltage	690 V
15.	Frequency	50 Hz
16.	Enclosure class	IP 54
17.	Insulation class	H
18.	Slip control	Unique Macro slip providing slip up to 16.7 %
19.	Gear box	3-stage gearbox, 1 planetary & 2 helical
20.	Gear ratio	1:95.09
21.	Nominal load	1650 kW
22.	Type of cooling	Oil cooling system, Forced lubrication
23.	Yaw drive system	Active electrical yaw motors
24.	Yaw bearing	Polyamide slide bearing
25.	Aerodynamic brake	3 independent system with blade pitching
26.	Mechanical brake	Hydraulic disc brake
27.	Design standards	GL special class

This wind project will help to decrease the dependence on fossil fuels for power generation and thus lower air pollution due to SOx/ NOx emissions. The project has also lead to infrastructural development in the areas around the WEGs.

A.4. Parties and project participants

Party involved (host) indicates host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (host).	• Private entity - M/s Devki Builders Pvt. Ltd.	No

The contact details of the entity have been provided in Annex-1

A.5. Public funding of project activity

No Official Development Assistance (ODA) involved.

A.6. Debundling for project activity

According to paragraph 2 of Appendix C to the Simplified Modalities and Procedures for Small-Scale CDM project activities (FCCC/CP/2002/7/Add.3), a small-scale project is considered a de-bundled component of a large project activity if there is a registered small-scale activity or an application to register another small-scale activity:

- *With the same project participants*
- *In the same project category and technology*
- *Registered within the previous two years; and*
- *Whose project boundary is within 1 km of the project boundary of the proposed small scale activity at the closest point*

The proposed project is DBPL's first wind power project. With reference to points of de-bundling, none of the aforementioned conditions are applicable to the project activity and therefore, the project activity is not considered as a component of large project activity and is a small scale CDM project activity.

Therefore, the proposed project is not a de-bundled component of a larger CDM project activity.

SECTION B. Application of selected approved baseline and monitoring methodology and standardized baseline

B.1. Reference of methodology and standardized baseline

Project has applied approved methodology available for small-scale CDM project at UNFCCC under Appendix B of the simplified modalities and procedures for small-scale CDM project activities.

Title : AMS I.D – Grid connected renewable electricity generation – (Version 17)
Reference:
http://cdm.unfccc.int/filestorage/V/9/L/V9LRSXKP24Q7YT6HZDUBO3C0ING8AJ.1/EB61_repan17_Revision_AMS-I.D_ver17.pdf?t=bGZ8bHowc2ZofDD_zFkbK39cstg65YGRWUQK
Tool : Tool to calculate the emission factor for an electricity system, Version 2.0 (EB 50, Annex 14)

B.2. Project activity eligibility

The project is a renewable energy project generating electricity (Type ID) – the monitoring methodology and baseline are selected here as suggested in the document 'Simplified Modalities and Procedures for Small-Scale CDM project activities'

As defined under Appendix B[3] of the simplified modalities and procedures for small-scale CDM project activities, the project activity proposes to apply following project types and categories:

- **Sectoral Scope** : 01
- **Type** : I – Renewable Energy Projects
- **Project Category** : I.D. – Grid connected renewable electricity generation
- **Reference[4]** : AMS I.D, Version 17

Requirements with respect to technology/measure under AMS I.D. – Grid connected renewable electricity generation.

Sr No	Category	Justification
1	*This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass, (a) Supplying electricity to a national or a regional grid. or (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as*	The project activity is renewable electricity generation from wind Project activity which will supply electricity to the Integrated NEWNE grid.

[3] http://cdm.unfccc.int/methodologies/SSCmethodologies

[4] http://cdm.unfccc.int/filestorage/V/9/L/V9LRSXKP24Q7YT6HZDUBO3C0ING8AJ.1/EB61_repan17_Revision_AMS-I.D_ver17.pdf?t=bGZ8bHowc2ZofDD_zFkbK39cstg65YGRWUQK

Sr No	Category	Justification
	wheeling.	
2	*This methodology is applicable to project activities that (a) install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) involve a capacity addition ;(c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s)*	*This project activity include installation of a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant);*
3	*Hydro power plant with reservoirs that satisfy at least one of the following conditions eligible to apply this methodology:* *The project activity is implemented in an existing reservoirs with no change in the volume of reservoir;* *The project activity is implemented in an existing reservoir is increased and the power density of the project activity, as per definitions given in the project emission section, is greater than 4W/m2* *The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4W/m2.*	This is not applicable to the project activity, as the project activity is not a hydro power plant.
4	*If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.*	Not applicable, As this project activity is 6 MW (1.5 MWX 4 Nos.) (< 15 MW) wind power (renewable energy) project and does not have any non-renewable component.
5	*Combined heat and power (co-generation) systems are not eligible under this category.*	Project activity is not a co-generation project.
6	*In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.*	Not applicable, this is a newly installed wind energy generation project and not capacity enhancement project.
7	*In the case of retrofit or replacement, to qualify as a small scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.*	Not applicable, No retrofits and/or *replacement* are involved in this project activity.

The project activity is a small scale activity as the capacity is 6 MW (1.5 MWX 4 No.) which is less than 15 MW ceiling capacity for the project to be considered under small scale activity as per the simplified modalities and procedures of the UNFCCC and the capacity of project activity will remain same for the entire crediting period. This category comprises renewable energy, including wind power, which supplies electricity to an electricity distribution system (grid) where the major part of electricity comes from non-renewable electricity generation. Project activity utilizes wind for power generation and exports the generated electricity to the grid hence, Type I.D is justified.

B.3. Project boundary

As specified in the para 9 of applicable methodology AMS I.D (Version 17), “The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system11 that the CDM project power plant is connected to”. For the project activity, the project boundary starts from generation of electricity to the point of electricity supply to the grid interconnection point. The entire electricity generated from the project is being exported to the NEWNE grid. Thus project boundary covers WTG, transformer, sub-station and grid. However, for the purpose of calculation of baseline emission, local electricity grid has also been included in the boundary.

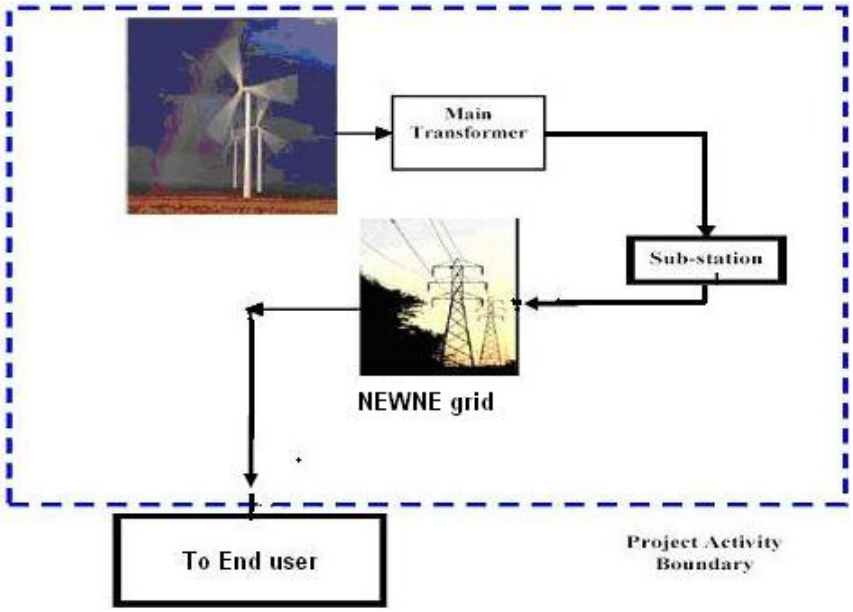


Figure 03, Project Boundary

B.4. Establishment and description of baseline scenario

As per Para 10 of methodology AMS I.D. (Version 17, EB 61) The baseline scenario is that the electricity delivered to the grid by the project activity that otherwise would have been otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid.

For the present project activity as per para 11 of methodology AMS I.D. baseline emissions are the product of electrical energy $EG_{BL,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor.

The emission factor can be calculated in a transparent and conservative manner as follows:

a) A Combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the “Tool to calculate the emission factor for an electricity system”.

OR

b) The weighted average emissions (in t CO_2/MWh) of the current generation mix. The data of the year in which project generation occurs must be used.

The key parameters and data sources are furnished below:

Key Parameter	Value	Data Source	Website
$EF_{grid,CM,y}$ (Ex-ante and will not change throughout the	Baseline emission factor for the NEWNE grid - 0.9225 tCO_2/ MWh.	CEA published baseline emission factor for NEWNE region grid (CM).	www.cea.nic.in

Key Parameter	Value	Data Source	Website
crediting period)			
$EG_{BL,y}$	Net electricity supplied by project activity to the grid.	From Plant and State Electricity Board Records.	------

The emission factor, calculated based on the data published by CEA[5] for the latest year.

B.5. Demonstration of additionality

UNFCCC simplified modalities seek to establish additionality of the project activity as per Attachment A to Appendix B, which listed various barriers, out of which, at least one barrier shall be identified due to which the project would not have occurred any way. Project participants identified Investment barrier for the proposed project activity. The additionality of this proposed wind power project is in accordance with Attachment A to Appendix B.

Investment Barrier:

Return from the project activity in absence of CDM, is not adequate to justify the investment. This is substantiated by the investment analysis carried out for the project activity:

Investment Analysis:

The investment analysis for this project activity is done as per the Methodological Tool –*"Tool for the demonstration and assessment of additionality", (Version- 06.0.0, Annex- 21, EB- 65).*

As per this tool, it is to be determined that the project activity is not:

1. The most economically or financially attractive; or
2. Economically or financially feasible, without the revenue from the sale of certified emission reductions.

Applying sub-steps:

Determine appropriate analysis method

(1) Determine whether to apply simple cost analysis, investment comparison analysis or benchmark analysis (Sub-step 2b). If the CDM project activity and the alternatives identified in Step 1 generate no financial or economic benefits other than CDM related income, then apply the simple cost analysis (Option I). Otherwise, use the investment comparison analysis (Option II) or the benchmark analysis (Option III).

The project activity is selling the generated electricity to RVPNL & is getting revenue from RVPNL other than CDM benefits. Further, as per paragraph 15, if the alternative to the project activity is the supply of electricity from a grid this is not to be considered an investment and a benchmark approach is considered appropriate. Hence, project promoter has considered Benchmark analysis to prove the additionality of the project.

Option III. Apply benchmark analysis

As per good accounting procedure benchmark analysis has been done and Additionality Tool (Version 06.0.0) has been referred. The tool requires the PP to identify the financial indicator, such as IRR, NPV, cost benefit ratio, or unit cost of service (e.g. levelized cost of electricity production in

[5] http://cea.nic.in/reports/planning/cdm_CO2/cdm_CO2.htm

$/kWh or levelized cost of delivered heat in $/GJ) most suitable for the project type and decision-making context. The project developer has chosen Project IRR to demonstrate the additionality of the project. Additionality Tool (Version 06.0.0) permits the use of Project IRR, for demonstrating the additionality using benchmark analysis. The tool permits the use of either project IRR or equity IRR. Since the project developer is demonstrating the financial unattractiveness of the project and that the project is financed by both Debt and Equity, Project IRR has been considered suitable benchmark.

Benchmark

As per Paragraph 30 of sub-step 2 (b) of Additionality Tool 06.0.0, discount rates or benchmark shall be derived from:

(a) Government bond rates, increased by a suitable risk premium to reflect private investment and/or the project type, as substantiated by an independent (financial) expert or documented by official publicly available financial data;
(b) Estimates of the cost of financing and required return on capital (e.g. commercial lending rates and guarantees required for the country and the type of project activity concerned), based on bankers views and private equity investors/funds required return on comparable projects;
(c) A company internal benchmark (weighted average capital cost of the company) [only in the particular case referred to above in paragraph 5 of additionality tool version 06.0.0] The project developers shall demonstrate that this benchmark has been consistently used in the past i.e. that project activities under similar conditions developed by the same company used the same benchmark;
(d) Government/official approved benchmark where such benchmarks are used for investment decisions;
(e) Any other indicators, if the project promoters can demonstrate that the above Options are not applicable and their indicator is appropriately justified.

PP has considered the point (b) to derive the benchmark by using various sources of information relating to items.

As per “Tool for the demonstration and assessment of additionality”, version 06.0.0, when applying Option III, the financial/economic analysis shall be based on parameters that are standard in the market, considering the specific characteristics of the project type, but not linked to the subjective profitability expectation or risk profile of a particular project developer.

As per para 12 of EB-62, annex 5, guidance of the assessment of investment analysis version 05, Local commercial lending rate or Weighted Average Cost of Capital (WACC) is appropriate benchmark for a Project IRR, hence PP has selected Local Commercial Lending rate as Benchmark of the project.

Local commercial lending rate (i.e. Benchmark Prime Lending Rate declared by Reserve Bank of India) for five major banks, as on decision making period i.e. July 2009, was in the range of 11% to 12%[6]. Average BPLR of 11.50% is considered as benchmark for the project.

Calculation and comparison of financial indicators (only applicable to Options II and III):

The financial indicator – Project IRR -is computed for a period of 20 years, corresponding to the lifetime a wind power project. The PP was considering installation of 5 WTG but due to land related problems PP has installed only 4 WTG’s. Here PP has prove the additionality on offer letter basis i.e. 5 machines, which is as per para 6 of the guidance on investment analysis.

Key assumptions for calculation of IRR are summarized below:

[6] http://rbidocs.rbi.org.in/rdocs/Wss/PDFs/4T_310709.pdf

Particulars	Unit	Basis	Value
Capacity Utilisation Factor (CUF)	%	Rajasthan Electricity Regulatory Commission order September 2006 and PLF submitted to Bank for Appraisal (Can be referred from letter issued by Bank)	22.00%
Losses (Step-up and Transmission losses)	%	Rajasthan Electricity Regulatory Commission order September 2006	4.00%
Annual Generation from project	Lacs	calculated	138.76
Deration in 6th, 10th, 14th and 18th year	%	Rajasthan Electricity Regulatory Commission order September 2006	1.25%
Tariff Rate	INR/kWh	Rajasthan Electricity Regulatory Commission order July 2009	4.28
Rate per MT of CO_2	Euro	Company Assumption	18.00
Exchange Rate	INR	http://www.gocurrency.com/v2/historic-exchange-rates.php?ccode2=EUR&ccode=INR&frMonth=10&frDay=19&frYear=2009	68.13
Grid Emission factor	tCO_2/MWh	CEA data source	0.9225
Co2 Emission Per Year	MT	calculated	12,800
O & M	In Lacs	Proposal from Suzlon	80.00
Escalation in O & M Exp.	%	Proposal from Suzlon	5.00%
O & M Free For	Years	Proposal from Suzlon	1.0
Administration Cost	In Lacs	Internal Assessment (CA Certificate is attached for reference)	10.0
Escalation in Admin. Cost	In Lacs	Internal Assessment (CA Certificate is attached for reference)	5%
Insurance	In Lacs	Sheet no. 31 under Risk code 70 , Rate code 05 of http://www.tac.org.in/ziptariffs/aiftzip.zip	6.75
Cost of WTG	In Lacs	Proposal from Suzlon	4,500
Term Loan	In Lacs	Proposal from Suzlon	3,150
Promoters Contribution	In Lacs	Difference of total project cost and term loan	1,350
Rate of Interest	in %	Loan sanction letter from bank	10.50%
Moratorium Period	Year		1
Repayment Period (including moratorium period)	Years	Loan sanction letter from bank	7
Installment Type			quarterly
Income Tax	%	Section 143, Income Tax Act 1961	33.99%
MAT		Section 117, Income Tax Act 1961	17.00%
Project IRR		calculated	8.75%
Project IRR with Carbon Sale		calculated	11.70%

The IRR for the project activity comes to 8.75% which is lower than the benchmark rate of 11.50%.

The foregoing data proves that the project was not financially attractive and the project is additional. However, the robustness of this conclusion was tested by subjecting critical parameters to reasonable variation as required under para 20 of Annex 5 of EB 62. The results of the sensitivity analysis are given below:

Sensitivity analysis

The Guidance on the Assessment of Investment Analysis (Version 05), paragraph 20, states that only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation.

As per paragraph 21 of the same document:

"*As a general point of departure variations in the sensitivity analysis should at least cover a range of +10% and -10%, unless this is not deemed appropriate in the context of the specific project circumstances."*

The different parameters that affect the viability of a wind power project are mentioned below:

Parameters	Comments
Electricity Generation	*This is the most important and critical parameter for any Power Project & hence viability of the project will be affected by any fluctuation in this parameter. Sensitivity analysis has therefore been carried out for it.*
Project Cost	*Sensitivity analysis has also been carried for this parameter and effect of 10% variation is estimated.*
O & M Cost	*This does not add to 20% of either total project cost or total project revenues even then the sensitivity has been carried out for this parameter.*
Tariff Rate (Income from sale of electricity)	*As the tariff structure for the Rajasthan is fixed for a period of 20 years, sensitivity is not carried out for this parameter.*
Debt – Equity Ratio	*As it is difficult to define the debt equity ratio at decision making stage Sensitivity has been carried out for this parameter also.*

- The result of sensitivity analysis of project is as follows:

Electricity Generation varied by	-10%	-5%	Base IRR	5%	10%
Project IRR	6.99	7.88	8.75	9.57	10.32
Project Cost Varied by	-10%	-5%		5%	10%
Project IRR	10.04	9.38	8.75	8.14	7.58
Debt portion varied to	80%	75%	70%	65%	60%
Project IRR	8.90	8.84	8.75	8.65	8.58
O & M cost Varied by	-10%	-5%		5%	10%
Project IRR	9.02	8.88	8.75	8.62	8.46

It can be seen from the above that with a 10% increase in generation for 20 consecutive years and decrease in cost of project by 10% and change in debt equity ratio up to 80% and 60% and decrease in O & M cost by 10%, the IRR of the project is not crossing the benchmark selected for the project.

From above table, it is clear that the project activity is unattractive in the absence of CDM revenue. The promoter was aware of this fact and had considered this investment only in light of carbon credits benefit being available for this project.

The above paragraphs explain adequately that the proposed project activity was not a business as usual case for the project proponent. The inclusion of CDM income will help the project activity to cross the benchmark selected for the project. The project IRR with CDM Income comes to 11.70%, which is more than the benchmark selected for the project.

Hence, the project activity is additional.

Demonstration of CDM Consideration:

DBPL has intimated to UNFCCC and NCDMA, regarding installation of 6 MW (1.5 MW X 4 Nos) wind power project in Rajasthan. The intimation was submitted on 19/12/2009, within six months of start date i.e. 12/08/2009 as per EB 41 and Prior CDM consideration form was submitted as per EB 62 Annex 13. Hence, requirement of prior CDM consideration is met.

Implementation timeline of CDM project activity

Based on the letter from Suzlon project proponent decided to proceed further in wind power project. The timeline of the activities are given below.

Sr. No.	Activity	Date
1.	Suzlon proposal for 5 WTGs (1.5 MW X 5 Nos.)	15/07/2009
2.	Board Resolution (1.5 MW X 5 Nos.)	25/07/2009
3.	Purchase Order released to Suzlon (1.5 MW X 5 Nos.)	31/07/2009
4.	Board Resolution for change in capacity (1.5 MW X 4 Nos.)	10/08/2009
5.	Revised Purchase Order release to Suzlon (1.5 MW X 4 Nos.)	12/08/2009
6.	DBPL appointed MITCON as a CDM consultant	02/09/2009
7.	Date of Commissioning (1.5 MW X 4 Nos.)	30/09/2009
8.	Stakeholder meeting	29/10/2009
9.	Prior CDM intimation form submitted to UNFCCC and NCDMA, MoEF, India	19/12/2009
10.	Proposal from validator	18/03/2010
11.	Webhosting of PDD	29/06/2010

M/s Devki Builders Pvt. Ltd had placed purchase order on 12/08/2009 which is after 02 August 2008. The project participant has already been intimated to a Host Party DNA and the UNFCCC secretariat in writing of the commencement of the project activity and of their intention to seek CDM status dated on 19/12/2009 which is within six months of the project activity start date.

B.6. Emission reductions

B.6.1. Explanation of methodological choices

Emission reductions:

Emission reductions are calculated as follows:

$ER_y = BE_y - PE_y - LE_y$

The project proponent wishes to use the $EF_{grid, CM, y}$ calculated Ex-ante, and has fixed the same for the entire crediting period.

Baseline methodology for projects under Type I. Category ID has been detailed in paragraphs 10-19 (AMS I. D). Paragraph 11 of AMS I.D. applies to this project activity, which states that:

The baseline emissions are the product of electrical energy baseline $EG_{BL,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor.

The emission factor can be calculated in a transparent and conservative manner as follows:

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the 'Tool to calculate the emission factor for an electricity system'

OR

(b) The weighted average emissions (in t CO_2/MWh) of the current generation mix.

The data of the year in which project generation occurs must be used

Calculations must be based on data from an official source (where available) and made publicly available.

In the above scenario PP has choice to either use Ex-ante emission factor which remains constant over the crediting period as per option (a) or use Ex-post emission factor which changes every year during crediting period as per option (b). Hence, PP decided to calculate & use the Ex-ante emission factor as per option (a).

The baseline emission (BE_y) is calculated as follows:

$$BE_y = EG_{BL,y} * EF_{CO_2,grid,y}$$

Where

BE_y	:	Baseline Emissions in year y (t CO_2)
$EG_{BL,y}$	:	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh).
$EF_{CO2,grid,y}$	:	CO2 emission factor of the grid in year y (t CO_2/MWh).

$EF_{CO2,grid, y}$ is determined as follows:

The weighted average of the Operating Margin emission factor ($EF_{grid, OM, y}$) and the Build Margin emission factor ($EF_{grid, BM, y}$)

$EF_{grid, CM, y} = EF_{grid, OM, y} * w_{OM} + EF_{grid, BM, y} * w_{BM}$

For wind and solar projects, the default weights are as follows: $W_{OM} = 0.75$ and $W_{BM} = 0.25$ (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods;

$EF_{grid, CM, y} = EF_{grid, OM, y} * 0.75 + EF_{grid, BM, y} * 0.25$

Where,

$EF_{grid, OM, y}$	= Operating Margin CO_2emission factor in year y (tCO_2/MWh)
$EF_{grid, BM, y}$	= Build Margin CO_2emission factor in year y (tCO_2/MWh)
w_{OM}	= Weighting of operating margin emissions factor (%)

w_{BM} = Weighting of build margin emissions factor (%)

The Combined Margin (CM) baseline emission factor ($EF_{grid, CM, y}$) is calculated by using 'Tool to calculate the emission factor for an electricity system' version 2.0, EB 50, Annex 14 as follows:
$EG_{BL,y}$ will be calculated based on the import and export at the metering point as mentioned in B.7.1

Step 1. Identify the relevant electricity system

As per the "Tool to calculate emission factor for an electricity system", if the DNA of the host country has Published a delineation of the project electricity system and connected electricity systems, these delineations should be used.

CEA has published a delineation of the electricity system. The Indian electricity system is divided into two grids, the Integrated Northern, Eastern, Western, and North-Eastern regional grids (NEWNE) and the Southern Grid.

NEWNE Grid				Southern Grid
Northern	**Eastern**	**Western**	**North-Eastern**	**Southern**
Chandigarh	Bihar	Chhattisgarh	Arunachal Pradesh	Andhra Pradesh
Delhi	Jharkhand	Gujarat	Assam	Karnataka
Haryana	Orissa	Daman & Diu	Manipur	Kerala
Himachal Pradesh	West Bengal	Dadar & Nagar Haveli	Meghalaya	Tamil Nadu
Jammu & Kashmir	Sikkim	Madhya Pradesh	Mizoram	Pondicherry
Punjab	Andaman-Nicobar	Maharashtra	Nagaland	Lakshadweep
Rajasthan		Goa	Tripura	
Uttar Pradesh				
Uttarakhand				

Since the present project activity belongs to Rajasthan State, it falls under NEWNE grid of India

The relevant electricity system for the project activity is identified as follows;

The project electricity system includes the spatial extent from WEG location, transformer & transmission lines at WEG end. The generated electricity can be dispatched without significant transmission constraints as per the O & M agreement, transmission line (Grid availability) is operated at least 95% of its rated capacity for at least 95% of hours during the year (Machine availability).

The connected electricity system includes the transmission & distribution lines (evacuation facility) at substation & onwards where generated electricity is fed in to the Rajasthan state grid that is NEWNE grid.

As per the CEA database above project electricity system and the connected electricity system does not result in clear grid boundary. Hence the NEWNE grid which might be affected, directly or indirectly, by a CDM project activity is considered for as a relevant electricity system for the project activity.

The electricity of the project is physically connected through transmission & distribution lines of the respective state utility grid which comes under geographic scope of Northern grid of Indian power sector.

The Build margin emission factor is determining by considering the respective regional grid transmission capacity.

The Operating margin emission factor (Simple OM) is calculated as the generation weighted average of CO_2 emissions per unit net electricity generation (t CO_2/MWh) of all generating power plants serving the system, not including low – cost/ must run power plant/units.(please refer below step 3 for detail calculation).

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)

Project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

Option I: Only grid power plants are included in the calculation.
Option II: Both grid power plants and off-grid power plants are included in the calculation.

PP has chosen the option I to calculate the operating margin and build margin emission factor.

Step 3. Select a method to determine the operating margin (OM)

The calculation of the operating margin emission factor ($EF_{grid, OM, y}$) is based on one of the following methods:

(a) Simple operating margin;
(b) Simple adjusted operating margin;
(c) Dispatch data analysis operating margin;
(d) Average operating margin.

The simple OM method (option a) can only be used if low- cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.

The low cost/ must run resources constitute less than 50% of the total grid generation in the average of the five most recent years. (refer table below)

Share of Must-Run (% of Net Generation)[7]

Regional Grid	2003-04	2004-05	2005-06*	2006-07	2007-08	Average of last 5 years.
North	28.1%	26.8%				
East	10.3%	10.5%				
West	9.1%	8.8%				
North-East	41.9%	55.5%				
NEW NE grid Average	22.35%	25.40%	18.0%	18.5%	19.0%	**20.65 %**
South grid Average	**16.2%**	**21.6%**	**27.0%**	**28.3%**	**27.1%**	**24.04 %**
India	17.1%	18.0%	20.1%	20.9%	21%	**19.42**

*As per the CEA'S latest baseline CO_2 baseline database for Indian Power sector User Guide version 05, page no. 04 Table 2 *Geographical scope of the two electricity grids.*

The above table clearly shows that the percentage of total grid generation by low-cost/must-run plants (on the basis of average of five most recent years) for the Northern grid is only 20.65 %

[7] http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm baseline CO2 emission database version 05

which is much lesser than 50% of the total generation. Thus, Simple OM method can be used for calculating the emission factor.

Step 4. Calculate the operating margin emission factor according to the selected method

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units.

The simple OM may be calculated:

Option A: Based on data on fuel consumption and net electricity generation of each power plant / unit (Option A), or

Option A: Based on the net electricity generation and a CO_2 emission factor, of each power or
Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

Option B can only be used if:
(a) The necessary data for Option A is not available; and
(b) Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and
(c) Off-grid power plants are not included in the calculation (i.e., if Option I has been chosen in Step 2).
As the all three conditions for using above option B are applicable for the project, PP has chosen the option B for calculating the simple OM. The Central Electricity Authority (CEA) has calculated and published the simple operating margin emission factor, latest version is used for the simple operating margin emission factor.

Ex ante option: If the ex ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-SSC-PDD to the DOE for validation.

Hence, the published simple operating margin value for the full generation-weighted average for the most recent 3 years i.e. 2006-07, 2007-08 and 2008-09 for which data are available at the time of PDD submission is considered for calculating the ex-ante simple operation margin emission factor.

$EF_{grid, OM, y}$ Calculation approach

The $EF_{grid, OM, y}$ for Northern region	tCO_2/MWh
For the year 2006-2007	1.008
For the year 2007-2008	1.000
For the year 2008-2009	1.007
Average $EF_{grid, OM, y}$	**1.005**

Step 5. Calculate the build margin (BM) emission factor

The build margin emission factor of all the power units in the respective regional grid during the most recent year for which power generation data is available was calculated in line with the requirement under "Tool to calculate the emission factor for an electricity system" version 2.0, EB 50, Annex 14 & by published by the CEA CO_2 Baseline Database, the BM value for the year 2008-09 was considered for calculating the emission factor for an electricity system:

$EF_{grid, BM, y}$ = 0.675 tCO_2e/MWh

Step 6. Calculate the combined margin (CM) emissions factor

$EF_{grid, CM, y}$ is determined as follows:

The weighted average of the Operating Margin emission factor ($EF_{grid, OM, y}$) and the Build Margin emission factor ($EF_{grid, BM, y}$):

$$EF_{grid, CM, y} = EF_{grid, OM, y} * w_{OM} + EF_{grid, BM, y} * w_{BM}$$

For wind and solar projects, the default weights are as follows: w_{OM} = 0.75 and w_{BM} = 0.25 (owing to their intermittent and non-dispatchable nature).

$$EF_{grid, CM, y} = EF_{grid, OM, y} \times 0.75 + EF_{grid, BM, y} \times 0.25$$

$$= 1.005 \times 0.75 + 0.675 \times 0.25$$
$$= 0.9225 \text{ t } CO_2/MWh$$

Thus, the CM emissions factor ($EF_{grid, CM, y}$) for the project has been calculated to be:

$EF_{grid, CM, y}$ = 0.9225 t CO_2/MWh

Baseline Emission Factor: 0.9225 t CO_2/MWh

The project proponent wishes to use the Baseline Emission Factor calculated Ex-ante and has fixed the same for the entire crediting period.

Project emissions:

As per the paragraph no. 20 of AMS I. D version 17, for most renewable energy project activities, PE_y = 0.

Leakage:

According to paragraph 22, of AMS I.D, version 17, the leakage is considered if the energy generating equipment is transferred from another activity.

As the project activity does not involve any such type of transfer of equipment no leakage is considered. i.e. LE_y = 0.

B.6.2. Data and parameters fixed ex ante

Data / Parameter	EF grid, CM, y
Unit	t CO2 / MWh
Description	Grid Emission Factor
Source of data	Calculated
Value(s) applied	0.9225[8]
Choice of data or Measurement methods and procedures	Central Electricity Authority (India) is a government body and data published is in line with the methodological requirement.
Purpose of data	
Additional comment	Value is fixed for crediting period i.e. 10 years.

[8] http://cea.nic.in/reports/planning/cdm_CO2/cdm_CO2.htm

Data / Parameter	EF grid OM, y
Unit	t CO2 / MWh
Description	Operating Margin
Source of data	CEA – CDM - Carbon Dioxide baseline database Version 5
Value(s) applied	1.005
Choice of data or Measurement methods and procedures	Central Electricity Authority (India) is a government body and data published is in line with the methodological requirement.
Purpose of data	
Additional comment	Value is fixed for crediting period i.e. 10 years.

Data / Parameter	EF grid BM, y
Unit	t CO2 / MWh
Description	Build Margin
Source of data	CEA – CDM - Carbon Dioxide baseline database Version 5
Value(s) applied	0.675
Choice of data or Measurement methods and procedures	Central Electricity Authority (India) is a government body and data published is in line with the methodological requirement.
Purpose of data	
Additional comment	Value is fixed for crediting period i.e. 10 years.

B.6.3. Ex ante calculation of emission reductions

The baseline emissions are the product of electrical energy baseline $EG_{BL,y}$ expressed in kWh of electricity produced by the renewable generating unit multiplied by an emission factor.

$$BE_y = EG_{BL,y} * EF_{CO_2,grid,y}$$

Where

BE_y : Baseline Emissions in year y (t CO_2)
$EG_{BL,y}$: Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh).
$EF_{CO2,grid,y}$: CO_2 emission factor of the grid in year y (t CO_2/MWh).

Present Project activity is situated in Rajasthan. The grid emission factor for Rajasthan (which comes under NEWNE grid) is 0.9225 t CO_2 / MWh.

Generation from the WEGs is

State	**Rajasthan**
No of turbines	4
Capacity, kW	1500
Net annual generation from the project, MWh	11,101
Plant Load Factor (%)	22.0
Grid	NEWNE
Grid emission factor, tCO_2/ MWh	0.9225
Baseline emission, tCO_2/ yr.	10,240

Therefore total baseline emission = 10,240 tCO_2/ yr

Emission Reduction:

The emission reduction ER_y by the project activity during a given year y is the difference between the baseline emissions through substitution of electricity generation with fossil fuels (BE_y) and project emissions (PE_y)

$$\mathbf{ER_y = BE_y - PE_y - LE_y}$$

Where:
ER_y = Emission reductions in year *y* (t CO_2/y)
BE_y = Baseline Emissions in year *y* (t CO_2/y)
PE_y = Project emissions in year *y* (t CO_2/y)
LE_y = Leakage emissions in year *y* (t CO_2/y)

Project Emission (PE_y)

Being a wind energy project, the project activity does not lead to any form of emission; hence project emission has not been considered in this case.
Hence, PE_y= 0

Leakage (LE_y)
As per AMS ID para 22 If the energy generating equipment is transferred from another activity, leakage is to be considered. In this project no equipment transfer is involved and hence, no leakage is considered for this project.

Hence, LE_Y=0

As there is no project emissions & leakage from the proposed project activity, the baseline emissions will be equal to the emission reduction from the Project.

$ER_y = BE_y$ = 10,240 tCO_2/yr.

B.6.4. Summary of ex ante estimates of emission reductions

The Crediting Period of a CDM project is the period for which the CDM Project can generate Certified Emission Reductions (CERs.)

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
2012-13	10,240	0	0	10,240
2013-14	10,240	0	0	10,240
2014-15	10,240	0	0	10,240
2015-16	10,240	0	0	10,240
2016-17	10,240	0	0	10,240
2017-18	10,240	0	0	10,240
2018-19	10,240	0	0	10,240
2019-20	10,240	0	0	10,240
2020-21	10,240	0	0	10,240
2021-22	10,240	0	0	10,240
Total	102,400	0	0	102,400
Total number of crediting years	10			

Annual average over the crediting period	10,240	0	0	10,240

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data / Parameter	$EG_{BL,y}$
Unit	kWh
Description	Net Electricity supplied by project activity to the grid
Source of data	Monthly credit report/ Share of electricity generation by state electricity utility.
Value(s) applied	11,101,000
Measurement methods and procedures	Data Type: calculated based on measured parameter. Detail calculation approach is incorporated in section B. 7.2 of PDD. Frequency: Calculated on monthly basis. Archiving Policy: Paper & Electronic Responsibility: State electricity utility is responsible for the proportioning of electricity and provides the net electricity generation report to each WTG owner who supplies electricity to grid through common metering system at state utility substation.
Monitoring frequency	
QA/QC procedures	The meters are of high accuracy class (0.2s). The meters are monitored continuously by Suzlon personnel. These are sealed by State Electricity Board officials to avoid malfunctioning with meter readings. The officials frequently check the meters for tempering and malfunctioning with the meters. The meters are checked as per IEC- 60687 standards. Check meter is placed to verify main meter readings. It can be used as a source of reading in case of main meter failure. Meters are calibrated annually by State Electricity Board officials in the presence of Suzlon representative.
Purpose of data	
Additional comment	The archive of data will be maintained for crediting period + 2 years.

Data / Parameter	$\sum_{0}^{n} EG_{n,y}$
Unit	kWh
Description	The summation of total Electricity Generated (kWh) at the controller from the project activity connected to single common feeder at a substation on a particular site.
Source of data	Log sheet records in Suzlon database at CMS.
Value(s) applied	----
Measurement methods and procedures	$EG_{n,y}$ is the sum of electricity generated at controller from project activity continuously measured by controller connected to CMS through SCADA network. State electricity utility used this figure to calculate net electricity generation by the project activity. This will be continuously measured and summarized monthly.
Monitoring frequency	
QA/QC procedures	The controller end generation of each WTG is continuously recorded & monitored at CMS. The controller end generation & other sensitive parameter monitoring followed can be cross verified at CMS database.
Purpose of data	

Additional comment	Data will be archived during the whole crediting period + 2 years

Data / Parameter	$\sum_{0}^{m} EG_{m,y}$
Unit	kWh
Description	The summation of total Electricity Generated at the controller from all the WTGs including project activity connected to single feeder at a particular site.
Source of data	Log sheet records in Suzlon database at CMS.
Value(s) applied	-----
Measurement methods and procedures	$EG_{m,y}$ is the sum of electricity generated from all wind turbine (including project activity) continuously measured by controller connected to CMS through SCADA network. State electricity utility used this figure & sum for all WTGs (including project activity) connected to single common feeder. This will be continuously measured and summarized monthly.
Monitoring frequency	
QA/QC procedures	---
Purpose of data	
Additional comment	Data will be archived during the whole crediting period + 2 years

Data / Parameter	$EG_{JMR,export}$
Unit	kWh
Description	Total electricity export by all WTGs (including project activity) connected to single common feeder measured at the respective substation feeder meter.
Source of data	Joint meter reading sheet/ Energy breakup sheet monitored by state electricity utility through respective feeder meter at substation.
Value(s) applied	--
Measurement methods and procedures	The value of total electricity export from the all WTGs connected to the single common feeder is monitored through main meter & check meter at the substation. Monitoring: tri vector meter will be used for monitoring Data Type: measured parameter. Recording Frequency: measured hourly and recorded monthly Archiving Policy: Paper & Electronic
Monitoring frequency	
QA/QC procedures	Other than main meter, there is check meter to verify the accuracy of main meter. The calibration of the meters will be done by state utility as per the schedule mentioned in PPA. Other than periodic calibration of the meters the reading of both meters, will be matched every month.
Purpose of data	
Additional comment	Data will be archived during the whole crediting period + 2 years

Data / Parameter	$EG_{JMR,import}$
Unit	kWh
Description	Total electricity import by all WTGs (including project activity) connected to single common feeder measured at the respective substation feeder meter.

Source of data	Joint meter reading sheet/ Energy breakup sheet monitored by state electricity utility through respective feeder meter at substation.
Value(s) applied	-----
Measurement methods and procedures	The value of total electricity import from the all WTGs connected to the single common feeder is monitored through main meter & check meter at the substation. Monitoring: tri vector meter will be used for monitoring Data Type: measured parameter. Recording Frequency: measured hourly and recorded monthly Archiving Policy: Paper & Electronic
Monitoring frequency	
QA/QC procedures	Other than main meter, there is check meter to verify the accuracy of main meter. The calibration of the meters will be done by state utility as per the schedule mentioned in PPA. Other than periodic calibration of the meters the reading of both meters, will be matched every month.
Purpose of data	
Additional comment	Data will be archived during the whole crediting period + 2 years

B.7.2. Sampling plan

The section is left blank intentionally.

B.7.3. Other elements of monitoring plan

The methodology AMS – I.D. Version 17 titled "Grid connected renewable energy generation" requires monitoring of the following parameters:

For the project activity, to establish creditable emission reduction, it has to record the actual electricity supplied to the grid (i.e. the net electricity - $EG_{BL,y}$), which would displace equivalent units of electricity at the operating and build margin of the grid. Since the simple OM emission factor is calculated based on a 3 year average, based on the most recent statistics available at the time of PDD preparation, its updation based on post monitoring is not required.

For BM calculation, option 1 ('Tool to calculate the emission factor for an electricity system (Version 2.0, EB 50, Annex 14) has been chosen, which is calculated ex ante based on the most recent information, hence its monitoring is also not required. Thus, under the monitoring protocol for the said project, it is required to monitor and record only the net electricity supplied to the grid i.e $EG_{BL,y}$.

- The proposed project activity requires evacuation facilities for sale to grid and the evacuation facility is essentially maintained by the state power utility (State Electricity Board).

- The electricity generation measurements are required by the utility and the investors to assess electricity sales revenue.

- The project activity has therefore envisaged two independent measurements of generated electricity from the wind turbines.

- The primary recording of the electricity fed to the state utility grid will be carried out jointly at the incoming feeder of the state power utility (State Electricity Board). Turbines for sale to utility will be connected to the feeder.

- The joint measurement will be carried out once in a month in presence of both parties (the developer's representative and officials of the state power utility). Both parties will sign the recorded reading.

- Metering equipment - Metering is carried out through electronic trivector meters of accuracy class 0.2% required for the project. The main meter and check meter shall be installed and owned by State Electricity Board. The metering equipments are maintained in accordance with electricity standards

- Meter readings - The monthly meter readings (both main and check meters) at the project site and the receiving station shall be taken simultaneously and jointly by the parties on the particular day of the following month. At the conclusion of each meter reading an appointed representative of the State Electricity Board and the company signs a document indicating the number of kWh exported to the grid.

- The secondary monitoring, which will provide a backup (fail-safe measure) in case the primary monitoring is not carried out, would be done at the individual WEGs. Each WEG is equipped with an integrated electronic meter. These meters are connected to the Central Monitoring Station (CMS) of the entire wind farm through a wireless Radio Frequency (RF) network (SCADA). The generation data of individual machine can be monitored as a real-time entity at CMS.

- All the relevant data & reports for maintaining accuracy in future monitoring and reporting of GHGs emission reductions will be with the SUZLON on behalf of project participant, which follows Quality Management System (QMS) procedure as per ISO 9001 and is ISO certified organization. The ISO certificate is available for verification by DOE.

- The project participant signed an operation and maintenance agreement with the supplier of the wind turbines i.e. SUZLON. The agreement is for a period of 4 years. The performance of the turbines, safety in operation and scheduled /breakdown maintenances is responsibility of SUZLON and are organized and monitored by them. So the authority and responsibility of project management lies with the O & M contractor.

- ISO 9001:2000 standard has been adopted by SUZLON, who is responsible for monitoring, and O & M of the project. Training is an essential part of the ISO system. To comply with the ISO standard the training has to be provided to personnel according to their responsibility with in organization.

Operation and maintenance of wind farms

1. Operation and maintenance service team
   - Round the clock 365 days a year – operations management
   - Preventive maintenance of installed base of WEGs across India
   - Breakdown maintenance of installed base of WEGs across India
   - Execution of major & minor design changes in WEGs

2. Special task service team provide various services to sites
   - Relocations
   - Blade replacement at site
   - Major breakdown

3. HT operation & maintenance service team
   - Substation
   - HT lines – internal external

4. Facility service team
   - SCADA service

- E-repair (Electronic components such as PCB)

5. Other service team
   - Customer support services – generation reporting
   - Liasioning with State Electricity Boards & Nodal agencies

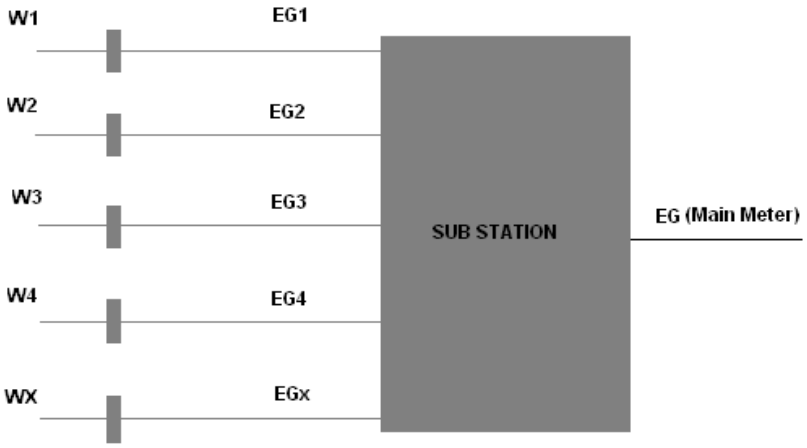
The organizational hierarchy of SUZLON for O& M management is as follows –

Designation	Responsibilities
Project Head	▪ Overall performance monitoring ▪ Project execution
Project Executer and Controller	▪ Operation ▪ Verification of data ▪ Site visit to check authenticity of data and take corrective action, wherever necessary ▪ Storage of data
Site Main Controller	▪ Operation, monitoring and verification of data ▪ Data recording ▪ Storage of data
Operation and Maintenance Contractor	▪ Operation and maintenance ▪ Data recording ▪ Storage of data

Apportioning Procedure:

Description of net electricity generation for individual WEG calculation/ proportioning procedure

Each substation is connected to a number of wind turbines. The generation reading is collectively displayed by the substation meter. The net generation of each of the wind turbines is then calculated in the following manner:



The generated electricity is measured through a two step procedure wherein the first metering is carried out at the controller of the machine with on-board meter. The monitoring of all these wind turbines is done from a common monitoring station as a part of central monitoring system (CMS). The electricity generated from this site is fed to metering arrangement number 58 (Location Nos. RKB 83 + RKB 88 + RKB 89) and metering arrangement number 57 (RKB NL 06) through 33 KV line at 33 KV feeder in 220 KV Ketu Kalan GSS of Suzlon which is further connected to 220 KV GSS, Tinwari, Dist. Jodhpur. The apportioning of the electricity at Tinwari GSS, Jodhpur, Rajasthan is done as per the following method at the wind farm.

Total numbers of wind turbines are connected to a substation through 33 KV different feeders at Ketu Kalan GSS and which is evacuated further to SEB GSS at Tinwari GSS. The generation reading is collectively displayed by the Main Billing meter at Tinwari, Jodhpur substation. Back up meters are also installed at all 33KV feeders as well as Ketu Kalan GSS for energy auditing purpose.

The net generation of each of the wind turbine is then calculated considering parameters reading of kWh export (Generation) and kWh import (Consumption).

Credit subdivision report is prepared based on the import and export of the electricity at the Tinwari substation. Calculations in credit subdivision report for this site are considered as follows.

1. Export multiplication factor is calculated based on the total export of EB main billing meter reading (net electricity supplied to the grid) divided by panel reading of entire wind farm (gross generation by all the WEGs at CMS) as

Export Multiplication Factor = (Export of EB main billing meter reading / panel reading of entire wind farm)

2. Import multiplication factor is calculated based on the total import of EB main billing meter reading (electricity imported from grid) divided by panel reading of entire wind farm (gross generation by all the WEGs at CMS) as

Import Multiplication Factor= (Import of EB meter reading / panel reading of entire wind farm)

Based on the multiplication factor and customer panel generation reading export and import units are calculated as follows

3. Export units = Export Multiplication Factor X Customer Panel Generation

4. Import units = Import Multiplication Factor X Customer Panel Generation

Ultimately net export units (net electricity supplied to the grid) by the specific customer (project participant) is calculated as

5. Net export units ($EG_{BL,y}$) = Export Units – Import Units

The responsibility of annual calibration, periodical testing, sealing and maintenance of meters is with the respective state utilities. This is done in the presence of representatives of the promoter. The frequency of meter testing is annual or as decided by the state utility time to time. All meters are tested only at the Metering Point. Additionally, each wind turbine is equipped with an integrated electronic meter. The electricity generated is recorded by the O & M staff of the WTG supplier on 24 hour basis.

Routine Maintenance Services:

Routine maintenance labour work involves making available suitable manpower for operation and maintenance of the equipment and covers periodic preventive maintenance, cleaning and upkeep of the equipment including –

a) Tower Torquing
b) Blade Cleaning
c) Nacelle Torquing and Cleaning
d) Transformer Oil Filtration
e) Control Panel & LT Panel Maintenance
f) Site and Transformer Yard Maintenance

Security Services:

a) This service includes watch and ward and security of the wind farm and the equipment.

Management Services:

Technical Services:

a) Visual inspection of the WEGs and all parts thereof.
b) Technical assistance including checking of various technical, safety and operational parameters of the equipment, trouble shooting and relevant technical services.
c) Maintenance is done every quarter and annually and a checklist is maintained manually for the same.

Note: As SUZLON is an ISO 9001:2000 certified company, training their employees for day to day recording and handling and maintenance is an integral part of their Quality Management System procedure.

B.7.4. Date of completion of application of methodology and standardized baseline and contact information of responsible persons/ entities

Date of completion of Baseline and Monitoring methodology – 08/12/2009.

Name of person/entity responsible for the application of the baseline and monitoring methodology to the project activity.:

M/s Devki Builders Pvt. Ltd. is project participant and responsible for the application of the baseline and monitoring methodology to the project activity, please refer Annex I of this document for contact details.

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

12/08/2009 (based on purchase order issued to Suzlon for 4 WTGs)

C.1.2. Expected operational lifetime of project activity

20 Years and 0 Months

C.2. Crediting period of project activity

C.2.1. Type of crediting period

Fixed crediting period

C.2.2. Start date of crediting period

23/04/2012 or date of registration with CDM EB whichever is later

C.2.3. Length of crediting period

10 years and 0 months.

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

As per EIA Notification of Ministry of Environment & Forests (MoEF), Government of India (GoI) dated 27/01/1994, amended on 14/09/2006 following project category requires prior environmental clearance.

1. Mining, extraction of natural resources and power generation (for a specified production capacity)
2. Primary Processing
3. Materials Production
4. Materials Processing
5. Manufacturing/Fabrication
6. Service Sectors
7. Physical Infrastructure including Environmental Services
8. Building /Construction projects/Area Development projects and Townships

The present project activity does not fall under any of the above mentioned category, thus project activity does not fall under the purview of Environmental Impact Assessment notification [9] 14/09/2006 of the Ministry of Environment and Forests (MoEF), Government of India (GOI) and exempted from environmental clearances.

The net impact under environmental pollution category would be positive as all necessary abatement measures would be adopted and periodically monitored. The project activity does not have any major adverse impacts on environment during its construction or operational phase. The human-interest parameters would show positive impacts due to increased job opportunities at the facility as well as other ancillary units coming up. Even host country doesn't force EIA study for such project activity.

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

Project participant identified local communities, employee of Suzlon and villagers, as the stakeholders having direct or indirect concern with this project. The meeting was conducted on 29/10/2009 at Village- Ratan ka Bas, Taluka Shergarh, Dist. - Jodhpur. Though the official location for the project activity falls under Bastwa Mataji, Nearest village from the site is Ratan Ka Bas (RKB). Hence, the site is known as RKB and numbers to the WEGs are given as RKB (Number). Being nearest village Ratan Ka Bas was selected for stakeholder consultation process. Accordingly, Project participant has issued a public notice on 20/10/2009 in local news paper "Dainik Bhaskar" to invite respective stakeholders requesting them to attend meeting or depute representatives at respective venues:

The agenda of the meeting was fixed as follows:

- Welcome
- Description of the project

[9] http://envfor.nic.in/legis/eia/so1533.pdf

- Queries and responses from the participant and the stakeholders.
- Vote of thanks

The stake holder's view was that, project participant in its own small way is contributing positively to local economy & development.

E.2. Summary of comments received

Stakeholders had no objections from installation of WEG instead they have appreciated wind power projects. The project helps them to generate additional revenue through lease to outsiders like contractors & their employees. They got the job opportunities for day -to - day maintenance and security of WEGs. They don't find any adverse impact on local environment due to wind turbines.

E.3. Report on consideration of comments received

The stakeholders have given positive feedback and thus no measures are required to be taken.

SECTION F. Approval and authorization

Appendix 1. Contact information of project participants and responsible persons/ entities

Project participant and/or responsible person/ entity	☒ Project participant ☒ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	M/s Devki Builders Pvt. Ltd.
Street/P.O. Box	545, Pancharatna, Opera House, Mumbai-400 004
Building	--
City	Mumbai
State/Region	Maharashtra
Postcode	110044
Country	India
Telephone	+ 91-22-2363 3499
Fax	+ 91- 22-2368 1215
E-mail	premgroup@hotmail.com
Website	
Contact person	
Title	Director
Salutation	Mr.
Last name	Agarwal
Middle name	
First name	Surendra
Department	--
Mobile	+91-9820075574
Direct fax	--
Direct tel.	--
Personal e-mail	surendra@premier-diamonds.com

Appendix 2. Affirmation regarding public funding

The project has not received any public funding and Official Development Assistance (ODA).

Appendix 3. Applicability of methodology and standardized baseline

Applicability of selected methodology is explained in section B.

Appendix 4. Further background information on ex ante calculation of emission reductions

Grid emission factor: The grid emission factor is calculated by using database published by Central Electricity Authority, Government of India. The values of simple operation margin (OM) & build margin (BM) are directly referred from the following database.

Central Electricity Authority Database, version 05

CENTRAL ELECTRICITY AUTHORITY: CO2 BASELINE DATABASE			
VERSION		5.0	
DATE		Nov-09	
BASELINE METHODOLOGY		ACM0002 / Ver 10	
EMISSION FACTORS			
Simple Operating Margin (tCO2/MWh) (incl. Imports)			
	2006-07	**2007-08**	**2008-09**
NEWNE	1.020	1.008	1.000
South	1.006	0.999	0.991
India	1.017	1.006	0.998
Build Margin (tCO2/MWh) (not adjusted for Imports)			
	2006-07	**2007-08**	**2008-09**
NEWNE	0.673	0.631	0.598
South	0.707	0.701	0.713
India	0.681	0.648	0.625

Appendix 5. Further background information on monitoring plan

- The monitoring information is explain under section B.7

Appendix 6. Summary of post registration changes

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Document information

Version	*Date*	*Description*
05.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the project design document form for small-scale CDM project activities (these instructions supersede the "Guidelines for completing the project design document form for small-scale CDM project activities" (Version 01.1)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from *F-CDM-SSC-PDD* to *CDM-PDD-SSC-FORM*; • Editorial improvement.
04.1	11 April 2012	Editorial revision to change history box by adding EB meeting and annex numbers in the Date column.
04.0	13 March 2012	EB 66, Annex 9 Revision required to ensure consistency with the “Guidelines for completing the project design document form for small-scale CDM project activities”
03.0	15 December 2006	EB 28, Annex 34 • The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.
02.0	08 July 2005	EB 20, Annex 14 • The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
01.0	21 January 2003	EB 07, Annex 05 Initial adoption.

Decision Class: Regulatory
Document Type: Form
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Keywords: project design document, SSC project activities