CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

CONTENTS

Annexes

SECTION A. General description of project activity

A.1. Title of the project activity:

>>
Wind power project in Rajasthan
Version: 01
Date: 17/01/2012

A.2. Description of the project activity:

>>
Mytrah Energy (India) Limited (MEIL, formerly called Caparo Energy (India) Limited) is implementing a greenfield 42MW wind Power project in Jaisalmer District in the state of Rajasthan.

Purpose of the project activity:

The proposed project activity involves power generation using Wind Turbine Generator (WTG). Suzlon Energy Limited has been identified as the technology supplier for this project. The purpose of the project activity is to commission and operate 20WTGs of 2.1MW capacity each. The power generated by this project activity will be supplied to Jodhpur Vidyut Vitran Nigam Limited which is located in North East West and North East (NEWNE) electricity grid, India. The grid is currently dominated with fossil fuel based power plants[1]. The project activity will help in contributing to the sustainable development by using wind energy as the source of power generation and also meet the electricity demand which is lower than supply in the state[2].

The activity is a zero emissions wind based power generation project connected to NEWNE grid. The project is expected to export 74173 MWh to NEWNE Grid every year. As the project involves grid connected generation of greenhouse gas (GHG) free power from a renewable source the approved baseline methodology ACM0002 "*Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources*" will be used for calculating the emission reductions. The project activity thereby leads to reduction in emissions associated with grid connected power plants and enables sustainable development.

Contribution to sustainable development:

As per the guideline provided by Ministry of Environment and Forests (MoEF), economic, social, Environment and technological well being have been identified as the four indicators of sustainable development[3]. The project contributes to sustainable development using the following ways.

[1] http://www.cea.nic.in/reports/monthly/executive_rep/jun11/8.pdf

[2] http://www.cea.nic.in/reports/yearly/lgbr_report.pdf, for year 2010-11

[3] http://www.cdmindia.in/approval_process.php

Social well being:

- The project would help in generating employment opportunities during the construction and operation phases.
- The project activity will lead to development in infrastructure in the region like development of roads and also may promote business with improved power generation.
- The project proponent will contribute 2% of net revenue realised from sale of CERs towards community development initiatives.

Economic Well Being:

- The project will improve livelihood of people in the region by generating employment opportunities in the region
- The project creates business opportunities of the suppliers, financial institutions and other stakeholder who are directly or indirectly associated with the project.
- The project is a clean technology investment in the region, which would not have been taken place in the absence of the CDM benefits
- The project activity will also help to reduce the demand supply gap in the state.

Environmental Well Being:

- The project activity will generate power using zero emissions wind based power generation which helps to reduce GHG emissions and specific pollutants like SOx, NOx, and SPM associated with the conventional thermal power generation facilities.
- The project activity will indirectly helps in conserving natural resource like forest, ecosystems by using renewable wind resource to generate power.

Technological Well Being:

- The successful operation of project activity would lead to promotion of Wind based power generation and would encourage other entrepreneurs to participate in similar projects.

A.3. Project participants:

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Name of party involved	Private and/or Public entity project participants	Kindly indicate if the party involved wishes to be considered as project participant (Yes/No)
India (Host country)	Mytrah Energy (India) Limited (MEIL)	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

>>

A.4.1.1. Host Party(ies):

>>

India

A.4.1.2. Region/State/Province etc.:

>>

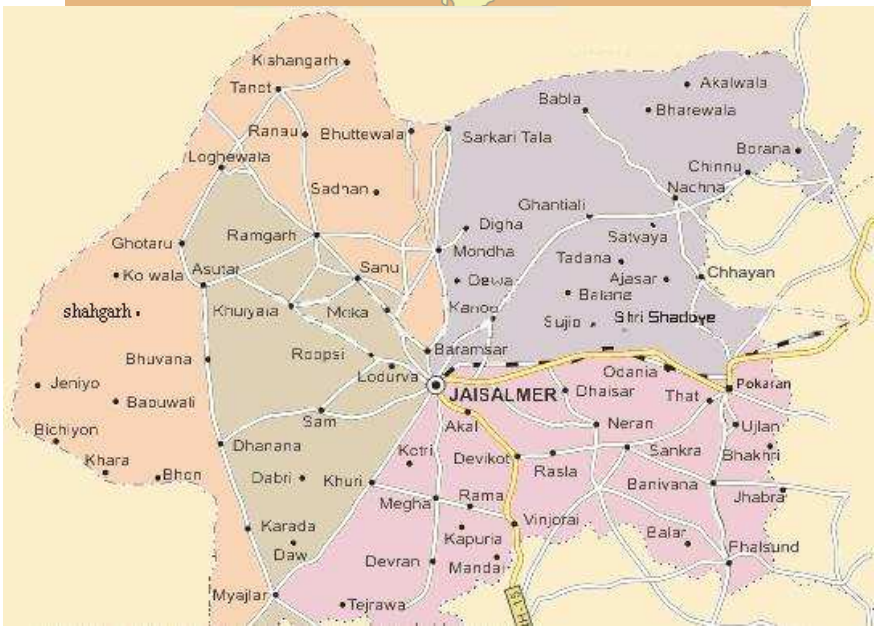
Rajasthan

A.4.1.3. City/Town/Community etc.:

Tejwa – Mokal village, Jaisalmer District.

A.4.1.4. Details of physical location, including information allowing the unique identification of this project activity (maximum one page):

The project activity is located in Tejwa – Mokal village, Jaisalmer District, Rajasthan State, India.



The locations of WTGs are as follows.

Site Locations					
Sr. No	**Loc**	**X Co-ordinate**	**Y Co-ordinate**	**Model**	**HH**
1	MK-165	665713	3012728	S88	80m
2	MK-164	666203	3012530	S88	80m
3	MK-163	666693	3012332	S88	80m
4	MK-161	667535	3011883	S88	80m
5	MK-094	667572	3008871	S88	80m
6	MK-093	668061	3008673	S88	80m
7	MK-092	668551	3008475	S88	80m
8	MK-069	668367	3007313	S88	80m
9	MK-068	667905	3007552	S88	80m
10	MK-067	667334	3007632	S88	80m
11	MK-066	666898	3007907	S88	80m
12	MK-043	665738	3007152	S88	80m
13	MK-042	666228	3006954	S88	80m
14	MK-040	667208	3006559	S88	80m
15	MK-039	667696	3006361	S88	80m
16	MK-017	668011	3005024	S88	80m
17	MK-016	667521	3005222	S88	80m
18	MK-015	667031	3005418	S88	80m
19	MK-014	666542	3005616	S88	80m
20	MK-021	670947	3003841	S88	80m

A.4.2. Category(ies) of project activity:

The project activity falls under the Category 1: Energy Industries (Renewable/Non-Renewable).
The project activity will generate power by using WTGs and will be exported to the Grid. Hence the methodology used for the project is **ACM0002** of **version 12.2.0**[4]**.**

A.4.3. Technology to be employed by the project activity:

The project activity is a greenfield project activity and does not have any project before this activity. The project activity implements 20 WTGs of Suzlon Energy Limited's 2.1MW S88 Model. The technical details are shown below.

OPERATING DATA

Rated power	2.1 MW
Cut-in wind speed	4 m/s
Rated wind speed	14 m/s
Cut-out wind speed	25 m/s

[4] http://cdm.unfccc.int/methodologies/DB/C505BVV9P8VSNNV3LTK1BP3OR24Y5L

50 years gust wind speed	59.5 m.s
Hub height	79 m (Foundation top equal to ground level)
Wind Class	IEC-IIA
Rotational Speed	15 to 17.6 rpm
ROTOR	
Pitch system	Pitch regulated, electrical
Diameter	88 m
Swept area	6082 m2
Blade material type	Epoxy bounded fibre glass
GENERATOR	
Type	Asynchronous slip ring type induction generator
Rated power	2100 kW
Rated voltage	690 / 600 V
Frequency	50 / 60 Hz
Protection	IP 54, IP23 for slip ring unit
Cooling system	Air cooled
Insulation Class	H
Slip control	Unique Flexi-Slip providing slip up to 16.67%
BRAKING SYSTEM	
Aerodynamic brake	3 independent systems with blade pitching mechanism
Mechanical brake	Hydraulic fail-safe disc brake system
GEARBOX	
Type	3 stages (One planetary & Two helical)
Ratio	1:98.8 / 1:118.1
Nominal load	2200 kW
YAW SYSTEM	
Type	Driven by 3 electrical driven planetary drives
Bearings	Polyamide slide
CERTIFICATIONS	
Design standards	GL 2003
Quality	ISO 9001:2000, ISO 9001:2008, ISO 14001:2004 & OHSAS 18001:2007
TOWER	
Type	Tubular Tower (4 sections)
Corrosion protection	Epoxy/PU coated

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

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The project uses fixed crediting period for 10 years from the date of registration. The project activity is expected to reduce 70376 tonnes of CO_2 over ten years. The year on year expected emission reduction is shown below.

Year	Annual Estimate of emission reductions in tonnes of CO2e
2013	70376
2014	70376
2015	70376
2016	70376
2017	70376
2018	70376
2019	70376
2020	70376
2021	70376
2022	70376
Total estimated emission reduction (tonnes CO_2e)	**703760**
Total number of crediting years	**10 years**
Annual Average over the crediting period of estimated reductions (tonnes of CO_2e)	**70376**

A.4.5. Public funding of the project activity:

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No Public funding or ODA has been used for this project activity

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:

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Consolidated baseline methodology for grid-connected electricity generation from renewable sources.
Methodology: ACM0002 Version 12.2.0[5]
Other tool used in the PDD is
"Tool to calculate emission factor for an electricity system" – Version 02.2, Approved in EB 61[6].
"Tool for the demonstration and assessment of additionality" – Version 6.0 Approved in EB 39[7].

B.2. Justification of the choice of the methodology and why it is applicable to the project activity:

The following steps will show the applicability of the project under this methodology.

Sl.No	Applicability criteria	Justification
1	This methodology is applicable to grid-connected renewable power generation project activities that: a) install a new power plant at a site where no renewable power plant was operated prior to the 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)	The project activity is a Greenfield plant and is connected to Rajasthan electricity grid which is part of NEWNE grid. Hence the project activity satisfies this applicability criterion.
2	The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: a) hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), b) wind power plant/unit, c) geothermal power plant/unit, d) solar power plant/unit, e) wave power plant/unit or tidal power plant/unit	The project activity is the installation of 42MW wind power plant and hence the project is applicable under these criteria.
3.	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	Not applicable as the project activity is development of Greenfield wind power generation project.

[5] http://cdm.unfccc.int/methodologies/DB/C505BVV9P8VSNNV3LTK1BP3OR24Y5L

[6] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.2.0.pdf

[7] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.1.pdf

	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;	
4.	In case of hydro power plants, one of the following conditions must apply: a) The project activity is implemented in an existing reservoir, with no change in the volume of reservoir; or b) The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the c) Project Emissions section, is greater than 4 W/m2; or d) The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m2.	The project activity is wind based power project and hence this condition is not applicable.
5.	The methodology is not applicable to the following: a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; b) Biomass fired power plants; c) Hydro power plants1 that result in new reservoirs or in the increase in existing reservoirs where the power density of the power plant is less than 4 W/m2.	The project activity does not involve fuel switch from fossil fuels, and is not a biomass or hydro based project. Hence the project activity satisfies the applicability criterion.

B.3. Description of the sources and gases included in the project boundary:

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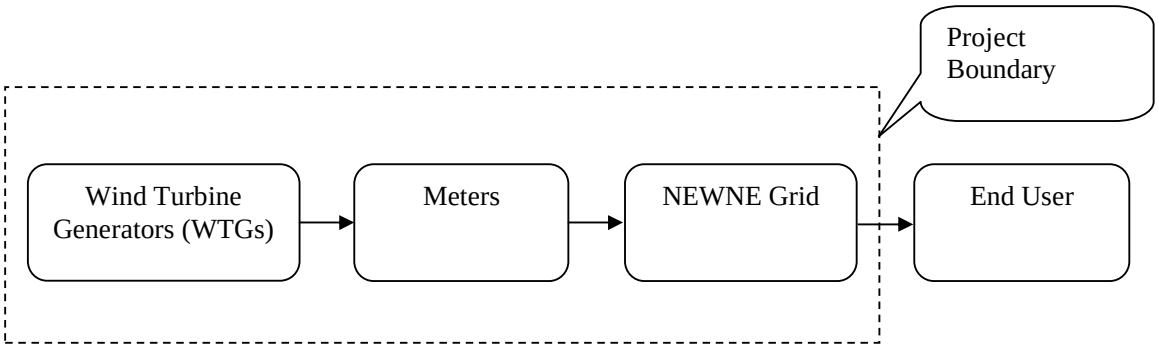
As per Table.1 of ACM0002 version 12.2.0, the selection of gases to be included and excluded within the project activity is as follows.

	Source	Gas	Included	Explanation
Baseline Activity	CO2 emissions from electricity generation in fossil fuel fired power plants that is displaced due to the project activity	CO_2	Yes	Major emission source
		CH_4	No	Minor emission source
		NO_2	No	Minor emission source
Project Activity	Grid Connected wind power based electricity generation	CO_2	No	Electricity generation by using WTGs does not incur any emissions
		CH_4	No	
		NO_2	No	

This project activity is a wind power project and hence the project emission is zero.

According to ACM0002, version 12.2.0 for the baseline emission factor, *the spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to:* the Project boundary defined as follows.



B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

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As per ACM0002 version 12.2.0, if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".

As per methodology, "*Baseline emissions include only CO2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows"*:

$$BE_y = EG_{PJ,y} * EF_{grid,CM,y}$$

Where:

BE_y	=	Baseline emissions in year y (tCO2/yr)
$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)
$EF_{grid,CM,y}$	=	Combined margin CO2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO2/MWh)

Calculation of Combined Margin Emission Factor has shown in Annex-3.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality):

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As per the decision 17/cp.7 /para 43, a CDM project activity is additional if anthropogenic emissions of GHGs by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.

Version 6.0 of "Tool for the demonstration and assessment of additionality" is used to demonstrate additionality for the project.

Step 1: Identification of alternatives to the project activity consistent with current laws and regulations.
Sub-step 1a: Define alternatives to the project activity:

Alternative 1: The proposed project activity undertaken without being registered as a CDM project activity:
In this alternative, MEIL would have gone ahead with the implementation of project without CDM benefits. The project activity could have gone ahead with generation of electricity from wind and exported to the grid. However, as shown below, the project activity is not financially viable without CDM revenue. This is a credible alternative.

Alternative 2: Continuation of the current situation (No project activity)
The project is a greenfield activity. The project proponent would not have been invested in wind power generation. In that scenario, the equivalent capacity additions in the grid would have been continued by fossil fuel based power generation mix and the equivalent amount of GHG would have been associated.

Outcome of Sub-step 1a: Alternative 1 and 2 are identified as most plausible and credible alternative to the proposed CDM project activity.

Sub-step 1b: Consistency with mandatory laws and regulations:
The above two alternatives are consistent with the mandatory laws and regulations.

Outcome of Sub-step 1b:
Generation of electricity from wind is not a legal requirement or a mandatory choice and there is no restriction to power generation by harnessing wind power. There is no legal restriction to the choice of fuel for power generation[8].

Outcome of Step 1:
The alternative scenarios to the project activity are in compliance with the mandatory legislation and regulations taking in account the enforcement in the region and EB decisions on policies of region or sector.

[8] Electricity Act, 2003

Step 2: Investment Analysis:

As per **"Tool for the demonstration and assessment of additionality",** the following steps has been used to conduct the investment analysis.

Sub-step 2a: Determine appropriate analysis method

The project activity will generate revenue by selling electricity to Jodhpur Vyapar Vitran Nigam Limited. Hence, Option-I of applying Simple Cost Analysis is not applicable. As the project is stand alone project, Option-II of applying Investment Comparison analysis is also not applicable

EB62, Version 05 of "Guidelines on the assessment of investment analysis" states that *"If the proposed baseline scenario leaves the project participant no other choice than to make an investment to supply the same (or substitute) products or services, a benchmark analysis is not appropriate and an investment comparison analysis shall be used. 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."*

Since the alternative to the project is supply of electricity from a grid, benchmark analysis (Option-III) is used to conduct investment analysis.

Sub-step 2b: Option III. Apply benchmark analysis

The baseline scenario for the project activity (as identified above) is generation of power in the GHG intensive grid. Thus, the baseline scenario does not require MEIL to make any investment. In such scenarios, as per the investment analysis guideline provided in Annex 5 of EB62, a benchmark analysis should be conducted to assess the financial additionality of the project. Thus the project proponent has conducted a benchmark analysis to ascertain the financial viability of the project.

Selection of Benchmark

As per paragraph 19 of "Guidelines on the assessment of investment analysis" (Version 05, EB 62) which states that *"If the proposed baseline scenario leaves the project participant no other choice than to make an investment to supply the same (or substitute) products or services, a benchmark analysis is not appropriate and an investment comparison analysis shall be used. 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." In addition guidance states that "in case of projects which could be developed by an entity other than the project participant the benchmark should be based on parameters that are standard in the market is suitable as the benchmark for the project activity."*

As for the project activity, Equity Internal Rate of Return has been chosen as the financial indicator and hence Return on equity (ROE) is selected as the benchmark for the project activity.

As per paragraph 15 of Guidance on investment analysis, if the benchmark is based on parameters that are standard in the market, the cost of equity should be determined either by: (a) selecting the values provided in Appendix A of the guidelines; or by (b) calculating the cost of equity using best financial practices, based on data sources which can be clearly validated by the DOE, while properly justifying all

underlying factors. The project participant has taken 11.75% as cost of equity as per the default values given in Appendix A of the guideline.

Further, as per the guidance in paragraph 7 " In situations where an investment analysis is carried out in nominal terms, project participants can convert the real term values provided in the table below to nominal values by adding the inflation rate. The inflation rate shall be obtained from the inflation forecast of the central bank of the host country for the duration of the crediting period. If this information is not available, the target inflation rate if the central bank shall be used. If the information is also not available, then the average forecasted inflation rate for the host country published by the International Monetary Fund World Economic Outlook (IMF) or the World Bank for the next five years after the start of the project activity shall be use."

The project participant has used the inflation forecast rate provided by the Reserve Bank of India (i.e. the Central bank of the host country) for the next ten years. The same has been used to adjust the default value of ROE, which is given in real terms.

Cost of equity:

$$\text{Cost of equity}_{\text{Nominal}} = (1+ \text{cost of equity}_{\text{Real}}) * (\text{Inflation rate}_{\text{Host country}}) - 1$$
$$= (1+11.75\%)*(1+5.10\%) - 1$$
$$= 17.45\%$$

This is the benchmark considered for investment analysis. Cost of equity =17.45%

The parameters and assumptions used for Equity IRR calculations have been mentioned below.

Assumptions:	
Location - State	Rajasthan
Place	Tejva-Moka
No of WEGs	20 nos
Capacity of each WTG	2.1 MW
Project Size	42 MW
Cost per WEG	114.83 INR million
Cost of Project per MW	54.68 INR million
Total Project Cost	2297 INR million
Cost per MW	54.7 INR million
Means of Finance	
Debt	**1607.6**
Equity	**689.0**
Total Project Cost	**2296.6**
Opearating Parameters	
Plant Load Factor (net of Transmission charges)	20.16%
Total Generation for the project at above PLF	74.17 million kWh p.a.
Grid Availability	100.00%
Total generation after Line Loss	74.17 million kWh p.a

Life of the Wind Turbine	20.00 years
O & M cost	
O & M Cost (in Lacs) from 3rd Year of operation incl Ser. Tx	34.65
Annual escallation from 3rd year	0.05
Insurance cost	
Insurance cost per annum for 1st Year	0.00
Insurance cost per annum from 2nd Year	6.89
Annual escalation	0.00%
Financial Parameters	
Interest on Term Loan	
Rupee Loan	11.00%
Tariff	4.22
Tariff escalation	0.00%
Depreciation Rate	
As per companies Act	
Plant and machinery - SLM	5.28%
As per Income Tax Act	
Depreciation rate- first year	15%
Taxation	
Corporate Tax	33.99%
MAT	18%

A sensitivity analysis has also been done for the equity IRR with change in certain parameters, to show the robustness of the analysis.

The input values in the financial analysis were valid at the time when the investment decision was made. The IRR has been calculated for a period of 20 years which is the expected operational lifetime of the project activity.

Sub-step 2c: Calculation and comparison of financial indicators

The Equity IRR for the project found to be 7.98% which is lower than benchmark of 17.45%. The summary of the investment is as follows

Project	IRR without CDM	IRR with CDM
MEIL	7.98%	11.91%

Sensitivity Analysis:

Sensitivity analysis has been carried out, as per the guidelines laid out by the Executive Board, on parameters that can directly affect the income of the project. As per Paragraph 17 /Page 4/GUIDELINES ON THE ASSESSMENT OF INVESTMENT ANALYSIS/EB 62/Annex 5:

"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 (all parameters varied need not necessarily be subjected to both negative and positive variations of the same magnitude), and the results of this variation should be presented in the PDD and be reproducible in the associated spreadsheets".

As per above guidelines, the parameters that have been considered for this project activity are PLF, project cost, O&M and power tariff. The results of the sensitivity analysis are provided in the table below.

Parameter	Variation in the parameter	IRR
PLF	+10%	11.46%
	-10%	4.61%
Project Cost	+10%	7.03%
	-10%	9.08%
Tariff	+10%	12.27%
	-10%	3.43%
O&M	+10%	7.66%
	-10%	8.30%

From the above table, the project activity proves to be additional at all the scenarios and hence the CDM revenue is critical to make the project financially viable.

Step 3: Barrier analysis

Barrier analysis is not considered as Step-2 proves that the project is financially non-attractive.

Step 4: Common Practise analysis

Sub-step 4a. Analyze other activities similar to the proposed project activity:

As per the approved methodological tool, common practice analysis includes:

"Projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc. Other CDM project activities (registered project activities and project activities which have been published on the UNFCCC website for global stakeholder consultation as part of the validation process) are not to be included in this analysis".

The "Directory – Indian Wind power 2011", is an official compendium of wind power projects in India. The Wind Power Directory provides installation of wind turbines by a project owner along with information on WTG capacity, total installation, location & date of commissioning. This has been

consulted to provide a list of wind project activities in Rajasthan state. For arriving at the exhaustive list of project activities, the following considerations were made to identify similar project activities occurring under similar conditions:

1. The project activity with an installation of at least 15MW

2. The wind power project set up by a single project proponent

3. The project activity located wholly in Rajasthan

The Wind Power Directory provides date of commissioning of wind projects; however, it is not possible to determine from directory whether the project activity was any one of the following:

- Total capacity of more than 15 MW is a single project activity

- Total capacity of more than 15 MW are individual small scale project activities

Hence, as a conservative measure, all project owners having installation of more than 15 MW in Rajasthan have been taken in the purview of this analysis taking above four points into account.

Following are the project owners who have wind projects in Rajasthan with a cumulative capacity of more than 15 MW installed in five years before the conceptualization of the project[9]:

Project	Location, Rajasthan	Capacity MW	Year of Commissioning	CDM
Chamber Construction Pvt Ltd	Akal	19.5	Sep-10	Yes
Friends Salt Works & Allied Industries	Tejuva	25.2	Sep-10	No
Hindusthan Petroleum Corp Ltd	Akal	25.5	Sep-10	Yes
IL& FS Energy Development	Pithodai ki Khani	38.4	Sep-10	Yes
Dhariwal Industries	Akal/Tejwa	18.6	Mar-10	No
DLF Home Developers Ltd	Osiyan	19.5	Sep-08	Yes
Enercon Wind Farms	Asloi	24	Sep-05	Yes
Enercon Windfarms Hindusthan	Bhu/Kita	60	Mar-07	Yes
Gujarat Fluorochemicals Ltd	Osiyan	30	Sep-09	Yes
Hindusthan Petroleum Corp Ltd	Soda Mada	21.25	Mar-09	Yes
IDFC	Tiwari	20	Sep-08	No
Kohinoor Planet Construction Pvt Ltd	Kitta	24	Mar-10	Yes
Modern Road Makers Pvt Ltd	Soda Mada	20	Sep-08	Yes
Rajasthan Renewable Energy Corporation	Soda Mada	15	Mar-05	Yes
Rajasthan State Mines & Mineral Ltd	Tejuva	45	Sep-06	Yes

From the above table, it is clear that 80% of the projects have for gone for CDM benefits. Hence it can be said that wind projects in the region (without CDM benefits) is not a common practice.

Step 4b: Discuss any similar options that are occurring:

From the Sub-step 4a, it is observed that similar and operational projects are not "widely observed and commonly carried out" in the region and all the projects have been undertaken considering CDM revenues.

Chronology of events:

S.No	Activity	Date
1.	Quotation received for the project	02 June 2010
2.	Board Resolution considering CDM benefits	13 October 2010
3.	Placement of purchase orders	18 January 2011
4.	Appointment of CDM Consultant	31 March 2010
5.	Prior CDM Consideration intimation sent to UNFCCC and Ministry of Environment and Forests (Host Country DNA)	11 April 2011[10]
6.	Local Stakeholder consultation meeting	30 March 2011

Demonstration of Prior CDM Consideration:

As per Version 5.0 of Glossary of CDM terms[11], *"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"*. 18/01/2011, which is the date of placement of purchase order is considered as the start date of the project activity. This is in conformance with version 04 of Guidelines on the demonstration and assessment of prior consideration of the CDM, EB62 Annex 13.

From the above investment analysis and chronology of events, it can be concluded that the project is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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According to the methodology, Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

Where:

ER_y = Emission reductions in year y (tCO2e/yr)

BE_y = Baseline emissions in year y (t CO2/yr)

PE_y = Project emissions in year y (t CO2e/yr)

Baseline Emissions:

Baseline emissions include only CO2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows

$BE_y = EG_{PJ,y} * EF_{grid,CM,y}$

[9] http://www.iges.or.jp/en/index.html

[10] Corresponds to the prior consideration which is re-sent

[11] http://cdm.unfccc.int/Reference/Guidclarif/glos_CDM.pdf

Where:

BE_y	=	Baseline emissions in year y (tCO2/yr)
$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)
$EF_{grid,CM,y}$	=	Combined margin CO2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO2/MWh)

Calculation of Combined margin emission factor has shown in Annex-3

Calculation of $EGP_{J,y}$:

If the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, then:

$$EG_{PJ,y} = EG_{facility,y}$$

where:

$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr), which is measured as the difference between the measured quantities of the grid electricity export, the import and line losses.
$EG_{facility,y}$	=	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)

Project Emissions:
The project activity involves in harnessing wind power. So the emissions from the project are zero.

Leakage Emissions:
No leakage emissions have been considered and hence the leakage emission is zero.

So the emission reductions is equal to baseline emissions $ER_y = BE_{y.}$

B.6.2. Data and parameters that are available at validation:

Data / Parameter:	$EF_{grid,OMsimple,y}$
Data unit:	tCO_2/MWh
Description:	operating margin CO2 emission factor of NEWNE grid
Source of data used:	Central Electricity Authority:CO2 Emission Database CEA CO2 Baseline database Version 06[12]
Value applied:	0.9943
Justification of the choice of data or description of	The operating margin emission factor data has been deduced from CO2 Database.

[12] http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

measurement methods and procedures actually applied :	
Any comment:	The operating margin emission factor is a 3-year generation-weighted average data, based on the most recent data available on CEA database at the time of submission of the CDM-PDD to the DOE for validation

Data / Parameter:	$EF_{grid,BM,y}$
Data unit:	tCO_2/MWh
Description:	Build margin CO2 emission factor of NEWNE grid
Source of data used:	Central Electricity Authority:CO2 Emission Database CEA CO2 Baseline database Version 06
Value applied:	0.8123
Justification of the choice of data or description of measurement methods and procedures actually applied :	The Build margin emission factor data has been deduced from CO2 Database.
Any comment:	The build Margin would be calculated ex ante and fixed during the crediting period. For ex ante calculation the most recent data available has been used and the build margin thus calculated is 0.8123

Data / Parameter:	$EF_{grid,CM,y}$
Data unit:	tCO_2/MWh
Description:	Combined margin CO2 emission factor of NEWNE grid
Source of data used:	Central Electricity Authority:CO2 Emission Database CEA CO2 Baseline database Version 06
Value applied:	0.9488
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated as per the procedures in “Tool to calculate the emission factor for an electricity system” with data deduced from CEA
Any comment:	The Combined Margin would be calculated ex ante and fixed during the crediting period.

B.6.3. Ex-ante calculation of emission reductions:

>>

According to the methodology, Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

As the project activity is wind power project, project emissions are zero and the resulting emission reduction is as follows.

$$ER_y = BE_y$$

Baseline emission factor (Combined Margin) is found to be 0.9488 tCO_2e.

Annual net electricity supplied to the grid by the project activity
= Generation * PLF * 8760/1000
= 42 * 20.16% * 8760/1000
= 74173MWh

So the baseline emission = Emission reductions = 74173 * 0.9488 = 70376 tCO_2e

B.6.4 Summary of the ex-ante estimation of emission reductions:

>>

Year	Estimation of baseline emissions (tonnes of CO_2)	Estimation of project activity emissions (tonnes of CO_2)	Estimation of leakage (tonnes of CO_2)	Estimation of overall emission reductions (tonnes of CO_2)
2013	70376	0	0	70376
2014	70376	0	0	70376
2015	70376	0	0	70376
2016	70376	0	0	70376
2017	70376	0	0	70376
2018	70376	0	0	70376
2019	70376	0	0	70376
2020	70376	0	0	70376
2021	70376	0	0	70376
2022	70376	0	0	70376
Total (tonnes of CO_2)	**703760**	**0**	**0**	**703760**

B.7. Application of the monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

Data / Parameter:	$EG_{PJ,y}$
Data unit:	MWh/year
Description:	Quantity of Net Electricity exported to the grid during the year y.
Source of data to be used:	Monthly Joint Meter Readings recorded by the representatives of JVVNL and the project proponent.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	74173
Description of measurement methods and procedures to be	Measurement: Net quantity of electricity exported by the project is calculated as the net of sum of export from individual meters, sum of import from individual meters and line losses.

applied:	Data Type: Calculated Archiving Procedure: All the data items monitored under the monitoring plan will be archived for entire crediting period or till the last issuance of CERs for this project activity whichever occurs later. Responsibility: Project Manager of MEIL will be responsible for maintain the records. Calibration Frequency: Energy meters will be calibrated atleast once in 3 years.
QA/QC procedures to be applied:	Electricity supplied can be recorded in the energy meter of 0.2% accuracy class installed by JVVNL and the meters will be calibrated by the representatives of JVVNL atleast once in 3 years. Net electricity supplied to the grid by the project activity will be cross checked with invoices submitted to JVVNL.
Any comment:	-

B.7.2. Description of the monitoring plan:

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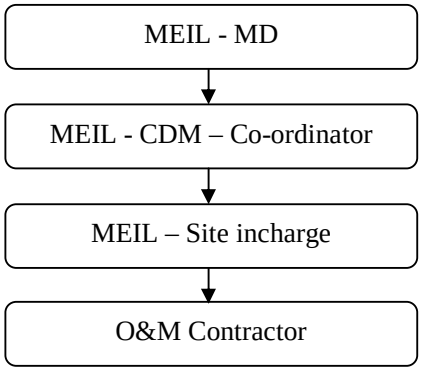
The organisational structure of this CDM project activity is as follows.



The project proponent has entered into agreement with the WTG- Supplier – Suzlon Energy Limited for the operation and maintenance of WTGs. The WTG supplier has dedicated and technically well equipped O&M team for day to day Operation and maintenance of each WTG. O&M contractor will provide a monthly report, which includes wind data, generation data, major breakdown events and machine availability. Project Manager is responsible for recording of monthly Joint Meter Readings of export and import. Monthly power export and import data will be sent regularly to CDM coordinator of MEIL.

B.8. Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies):

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Date of completion of the application of baseline study and monitoring methodology: 21/09/2011.

Name of the responsible entity: Mytrah Energy (India) Limited

The responsible entity is same as participant mentioned in Annex I to this document.

SECTION C. Duration of the project activity / crediting period

C.1. Duration of the project activity:

C.1.1. Starting date of the project activity:

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As per Glossary of CDM terms[13], *"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"*. Complying with the above norms the start date considered for the project activity is 18/01/2011 i.e., the date on which purchase orders has been placed with Suzlon Energy Limited.

C.1.2. Expected operational lifetime of the project activity:

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The project activity is expected to be operational for 20 years.

C.2. Choice of the crediting period and related information:

C.2.1. Renewable crediting period:

C.2.1.1. Starting date of the first crediting period:

>>

Not applicable

C.2.1.2. Length of the first crediting period:

>>

Not applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>

01/04/2013 or Date of commissioning of the project or Date of registration of the project, whichever is later

C.2.2.2. Length:

>>

10 years, 0 months

[13] http://cdm.unfccc.int/Reference/Guidclarif/glos_CDM.pdf

SECTION D. Environmental impacts

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D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

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As per the prevailing Ministry of Environment and Forest laws, (the Schedule 1 of Ministry of Environment and Forests (Government of India) notification dated September 14, 2006), 38 activities are required to undertake environmental impact assessment studies. Environmental Impact Assessment study is not required for wind mill project as there is no negative environmental impact due to the project activity and wind energy is one of the cleanest sources of energy.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

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The project activity is a renewable energy project. There will be no negative impact result out of the project.

SECTION E. Stakeholders' comments

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E.1. Brief description how comments by local stakeholders have been invited and compiled:

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The stakeholders identified for the project were: the usual occupants of the villages around and the local communities, NGOs, governmental agencies, employees, contractors. Local population is considered to be a major stakeholder with respect to the project activity. Comments were received from the village people. News paper advertisement was placed in newspaper on 16/03/2011. The stakeholder meeting was organised at the project site on 31/03/2011.

The meeting started with the welcome address by the representative of MEIL. He further explained about the wind project taken up by the company.

Representative of the project proponent explained the purpose of the meeting and detailed each questions in the questionnaire. He further explained about the advantages of the wind energy generation and explained how the project would help in reducing demand supply gap in environment friendly manner.

The villagers wished to know the impact of WTGs on the environment in the region. Further to the discussion, Representative of Suzlon Energy Limited, explained its a eco-friendly technology which will have no harmful effect on the environment. Finally the comments were received from the stakeholder, which has been briefed in section E-2.

E.2. Summary of the comments received:

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According to the feedback received from the stakeholders, due to the erection of wind farms the socio-economic situation in the area and the village people's living standard has been improved. It has not only provided employment but also significantly contributed to the infrastructure development likes roads.

E.3. Report on how due account was taken of any comments received:

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All comments were positive. No negative comments were received from stakeholders.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Mytrah Energy (India) Limited
Street/P.O.Box:	8001
Building:	Q-City, S.No: 109, Nanakramguda, Gachibowli
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E-Mail:	
URL:	
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Salutation:	Mr
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Department:	
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Direct FAX:	+91 40 4396 0000
Direct tel:	+91-40- 43960001
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Annex 2
INFORMATION REGARDING PUBLIC FUNDING

No public funding is available for the project.

Annex 3
BASELINE INFORMATION

The Central Electricity Authority (CEA) under the Ministry of Power, Government of India, has estimated the Build Margin and the Simple Operating Margin for the NEWNE grid, the details of which are presented below:

The Net Generation (GWh) is shown in the below table.

	2007-08	**2008-09**	**2009-10**
NEWNE	496,119	510,693	544,915

The Simple Operating Margin (tCO2/MWh) (incl. Imports) is shown in the table.

	2007-08	**2008-09**	**2009-10**
NEWNE	1.00	1.01	0.98

The Build Margin in tCO2/MWh (incl. Imports) is shown in the table below

	2007-08	**2008-09**	**2009-10**
NEWNE	0.60	0.68	0.81

Calculation of the Baseline Emission Factor

Step 1: Identify relevant electricity systems:

The Indian electricity system is divided into two regional grids, viz. (1) Northern, Eastern, Western, North-Eastern and (2) Southern grid. Each grid covers several states. As the regional grids are interconnected, there is inter-state and inter-regional exchange.

Power generation and supply within the regional grid is managed by Regional Load Dispatch Centre (RLDC). The Regional Power Committees (RPCs) provide a common platform for discussion and solution to the regional problems relating to the grid. Each state in a regional grid meets its demand with its own generation facilities and also with allocation from power plants owned by the Central Sector such as NTPC and NHPC etc. Specific quotas are allocated to each state from the Central Sector power plants.

Depending on the demand and generation, there are electricity exports and imports between states in the regional grid. The regional grid thus represents the largest electricity grid where power plants can be dispatched without significant constraints and thus, represents the "project electricity system" for the project activity. As the project activity is connected to the NEWNE regional electricity grid, the NEWNE grid is the "project electricity system".

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)
As the above step is optional, Only grid power plants have been included in the calculation of the operating margin and build margin emission factor.

Step 3: Select a method to determine the operating margin (OM).
$EF_{grid,OM,y}$ will be calculated based on one of the four following methods:

(a) Simple OM, or

(b) Simple adjusted OM, or
(c) Dispatch Data Analysis OM, or
(d) Average OM.
Any of the four methods can be used, however, 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 below table shows the share of low cost/must run resource in the generation profile of two grids in India for the last five years.

	2005-06	**2006-07**	**2007-08**	**2008-09**	**2009-10**
NEWNE	18.0%	18.5%	19.0%	17.4%	15.9%
South	27.0%	28.3%	27.1%	22.8%	20.6%
India	20.1%	20.9%	21.0%	18.7%	17.1%

From the above table, the use of the Simple OM method is justified as the share of the low cost/ must run resources constitute less than 50% of the total grid generation. The Ex ante option has been chosen where in a three year generation weighted average based on the most recent data would be calculated and the same would be fixed for the crediting period.

Step 4: Calculate the operating margin emission factor according to the selected method.
According to the, the Simple OM emission factor, the simple OM emission factor is calculated based on the electricity generation of each power unit and an emission factor for each power unit, as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_i \left(FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}\right)}{EG_y}$$

Where:
$EF_{grid,OMsimple,y}$ = Simple operating margin CO2 emission factor in year y (tCO_2/MWh)
$FC_{i,y}$ = Amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)
$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type i in year y (GJ/mass or volume unit)
$EFCO2_{i,y}$ = CO2 emission factor of fossil fuel type i in year y (tCO_2/GJ)
EG_y = Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units, in year y (MWh)
i = All fossil fuel types combusted in power sources in the project electricity system in year y
y = The three-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD

Thus the simple operating margin CO2 emission factor for the recent years (2007-08, 2008-09, 2009-10) is 0.9943 tCO2/MWh

Step 5: Identify the group of power units to be included in the build margin (BM)

For the calculation of the build margin, the sample group of power unit m must consist of either:

1. The set of five power units that have been built most recently, or

2. The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

Option 2 has been used for calculating the build margin. The data pertaining to the units thus identified are detailed in the Version 6.0 of the Baseline Carbon Dioxide Emissions database of the CEA[14].

With regards to data vintage, the project participant wishes to use Option 1 viz., for the crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation

Step 6:Calculate the build margin emission factor:

The build margin emission is the generation weighted average emission factor (tCO2/MWh) of all power units m during the year y for which power generation data is available and will be calculated as follows.

$$EF_{grid,BM,y} = \frac{\sum_{m} EG_{m,y} \times EF_{EL,m,y}}{\sum_{m} EG_{m,y}}$$

Where

$EF_{grid,BM,y}$ = Build margin CO2 emission factor in year y (tCO2/MWh)
$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EFEL_{,m,y}$ = CO2 emission factor of power unit m in year y (tCO2/MWh)
m = Power units included in the build margin
y = Most recent historical year for which power generation data is available
The build Margin would be calculated ex ante during the crediting period.

For ex ante calculation the most recent data (2009-10) available has been used and the build margin thus calculated is 0.8123

Therefore $EF_{grid,BM,y}$ = 0.8123 tCO2/MWh

Step 7: Calculate the combined margin (CM) emissions factor.

The combined emissions factor is calculated as follows.
$EF_{grid,CM,y}$ = $EFgrid_{,OM,y}$ x W_{OM} + $EF_{grid,BM,y}$ x W_{BM}
Where,
$EF_{grid,BM,y}$ = Build margin CO2 emission factor in year y (tCO2/MWh)
$EF_{grid,OM,y}$ = Operating margin CO2 emission factor in year y (tCO2/MWh)
W_{OM} = Weighting of operating margin emissions factor (%)
W_{BM} = Weighting of build margin emissions factor (%)

For wind and solar powered projects the defaults weights are as follows: W_{OM} = 0.75 and W_{BM} = 0.25

[14] http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

Hence the baseline emission factor is calculated as follows.

$EF_{grid,CM,} = EF_{grid,OM,} \times W_{OM} + EF_{grid,BM,} \times W_{BM}$

=0.9943*0.75+0.8123*0.25
=0.9488 tCO2/MWh

Thus the resulting combined emission factor is 0.9488 tCO2/MWh

Annex 4

MONITORING INFORMATION

The Operation & Maintenance of the project will be done by Suzlon Energy Limited. As per the monitoring plan, the electricity exported to the grid through the project activity and the electricity imported from the JVVNL grid will be monitored. The metering system shall comprise of a main and check meter at each WTG that measure export and import of electricity. The energy meters will be sealed in the presence of the representatives of the power producer and the state electricity board. The O&M personnel will be responsible for recording the generation data from each WTG on daily basis at the site. This is done through a Central Monitoring System (CMS) available at the project site. Monthly readings of energy meters are recorded by the officials from JVVNL - in the presence of representatives from the project proponent.

Export and Import readings recorded at main meter are considered for billing purpose and estimation of emission reductions. In case of failure of main meter, readings of check meter are used. A bulk meter consisting of main meter and check meter are installed at the nearby substation to measure total quantity of electricity exported and imported for the project activity. The difference between the sum of individual meters reading and the bulk meter reading will be the basis for the calculation of line loss. Net quantity of electricity exported by the project is calculated as the net of sum of export from individual meters, sum of import from individual meters and line losses. These readings are further used for billing purposes and the same will be used for the calculation of the emission reductions.

The energy meter will be tested and calibrated atleast once in three years. The testing and calibration of the meter will be jointly conducted by authorised representatives of MEIL and JVVNL and the results and correction so arrived at mutually will be applicable and binding on both the parties. During the test calibration, if there are errors beyond permissible limit, the bills shall be revised for the previous three months or for the exact period if known and agreed upon by both the parties, by applying correction as determined by the meter testing wing of the state transmission utility / distribution licensee to the consumption registered by the meters with lesser error.

All the data items monitored under the monitoring plan will be kept for 2 years after the end of crediting period or till the last issuance of CERs for this project activity whichever occurs later.

Monitoring plan for 2% CER revenues:
The project proponent will contribute 2% of net revenue realised from sale of CERs towards sustainable development initiatives. The details of such expenditure made would be included in the monitoring report for the period following the transaction and the format is as follows:

Action Plan for expenditure incurred through 2% of CER revenues									
Financial Year (A)	**Activity (B)**	**Issued CERs (C)**	**CER Price (D)**	**Total CDM Amount (E=CxD)**	**Expenditure in Current year (F)**	**Expenditure Carried forward (G)**	**Net Expenditure for Current Year (H = F+G)**	**Expenditure as % of CDM amount for current year (I = H/E)**	**Reference Documentation (J)**
Indicates the year for which the assessment is being provided	*Provides details of the social/ community activities on which the expenditure has been incurred*	*Quantity of CERs issued for the assessment year*	*CER price at which the transaction has happened*	*Total amount CDM amount received*	*Expenditure made on the social/ community development activity in the current assessment year*	*Additional expenditure incurred on capital goods in the previous assessment years being carried forward to the current assessment yea*	*Net Expenditure on social/ community development activity for the current year*	*Indicates the % of the total CDM amount spent on social/community development activity*	*Indicates the documentation to be provided to the DOE during the verification to evidence the amount spent on social/community development activity*

- - - -