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:

>>
Title: Wind Power Project in Gujarat
Version: 07
Date: 13/12/2012

A.2. Description of the project activity:

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Mytrah Energy (India) Limited (formerly Caparo Energy (India) Limited[1]) is entering into the renewable energy sector with an objective to build wind power assets in India. Mytrah Energy (India) Limited is setting up 25.20 MW wind power project at in Rajkot District and Surendranagar District of Gujarat State. The project activity comprises of 12 Wind Electric Generators (WEGs) with a capacity of 2.1 MW each. The S88 model WTGs installed as project activity will be provided by Suzlon Energy Limited (SEL).

The objective of the proposed CDM project is to generate electricity from environmentally benign sources of energy in the Indian state of Gujarat in order to use renewable and clean electricity to contribute towards combating global warming. The project will lead to reduced greenhouse gas emissions as it displaces electricity from the Northern Eastern Western North-Eastern (NEWNE) grid dominated by fossil fuel based electricity generation plants.

The project activity will help to reduce the supply demand gap in the state and also helps in contributing to the sustainable development by using wind energy as the source of power generation and reduction of GHG Emissions. In the project site, there are other wind projects owned by other customers connected to the same substation. There is an apportioning procedure which is approved by the state nodal agency for apportioning the electricity to each and every customer. This apportioning becomes the basis for subsequent invoicing and ultimately Certified Emission Reduction (CER) calculation.

Purpose of the project activity:

The technology of electricity generation from renewable wind resource is environment friendly as it does not use any fossil fuel. The power (electricity) thus produced by the project activity would be transmitted to the state electricity grid, thereby displacing equivalent amount of power in the grid which is dominated by emission intensive thermal power plants. It is estimated the proposed project would approximately generate 50662.584 MWh of electricity per annum. The project activity will therefore displace an equivalent amount of electricity which would have otherwise been generated by fossil fuel dominant grid. The project proponent plans to avail CDM benefits for the project.

Pre project scenario and Baseline Scenario:

[1] http://www.mytrah.com/

In the absence of the project activity, the equivalent amount of electricity would have been generated by power plants connected to the NEWNE grid which is dominated by conventional sources of energy (fossil fuels)[2].

The project activity is a zero emissions wind based power generation project connected to NEWNE grid. The project is expected to export 50662.584 MWh to NEWNE Grid every year. Hence, the baseline for the project as per Version 12.3.0 of ACM 0002[3] is defined as "*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*" approved in EB65. The project harnesses renewable resources in the region, thereby displacing non-renewable natural resources and leading to sustainable economic development of the locality. Suzlon Energy Limited (SEL) is the WEG supplier and the operations and maintenance contractor for the project. The electricity generated from the proposed wind farm will be supplied to common local substation through local transmission lines duly metered and measured by Gujarat Urja Vikas Nigam Limited (GUVNL) on a monthly basis at the substation of the wind farm.

The project scenario thus,

- provides additional generation from a clean and renewable source of energy
- strengthens the regional grid (NEWNE grid of India)
- contributes towards conservation of non renewable fossil fuels
- helps in combating global warming

Contribution to sustainable development:

Ministry of Environment and Forests, has stipulated economic, social, environment and technological well being as the four indicators of sustainable development[4]. The project contributes to sustainable development using the following ways.

Social wellbeing:

- 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 wellbeing:

- 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 wellbeing:

[2] http://www.cea.nic.in/reports/monthly/executive_rep/aug11/8.pdf

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

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

- The project activity will generate power using zero emissions wind based power generation which helps to reduce GHG emissions and specific pollutants like SO_x, NO_x, and SPM associated with the conventional thermal power generation facilities.

Technological wellbeing:

- 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) (Private Entity)	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party(ies):

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India

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

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Gujarat

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

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Rajkot and Surendranagar district

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

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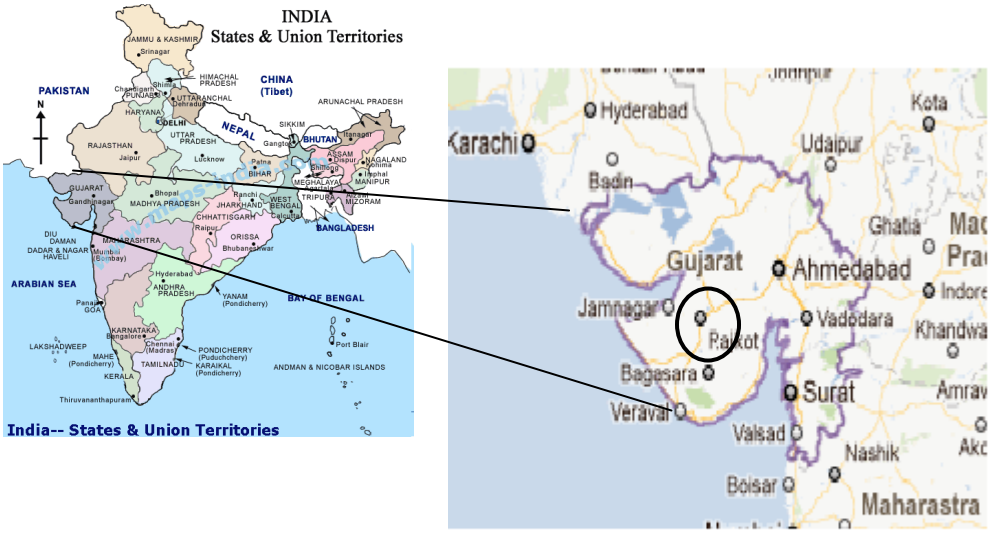
The wind power project is located in Rajkot and Surendranagar district, Gujarat, India. The geo-coordinates of the project location is as follows:
Latitude: 22°16'57"N and Longitude: 71°11'11"E

The location of WTGs is as given below:

Sr. No	Location No.	Village and Tehsil	District	Latitude	Longitude	Model	HH
1	JSD 038	Bhadla	Rajkot	22° 11' 41.9"	71° 05' 44.4"	S88	80 m
2	JSD 041	Dahisara	Rajkot	22° 11' 41.4"	71° 08' 7.5"	S88	80 m

Sr. No	Location No.	Village and Tehsil	District	Latitude	Longitude	Model	H H
3	JSD 042	Dahisara ,	Rajkot	22° 11' 31.3"	71° 08' 28.3"	S88	80 m
4	MAH013	Bhojpari	Surendranagar	22° 17' 48.5"	71° 10' 15.8"	S88	80 m
5	MAH014	Bhojpari	Surendranagar	22° 17' 1.3"	71° 10' 19.1"	S88	80 m
6	MAH015	Bhojpari	Surendranagar	22° 16' 46.2"	71° 10' 21.3"	S88	80 m
7	MAH016	Chobari	Surendranagar	22° 15' 39.8"	71° 11' 42.3"	S88	80 m
8	MAH018	Chobari	Surendranagar	22° 15' 29.2"	71° 11' 27.5"	S88	80 m
9	MAH021	Tajpar	Surendranagar	22° 14' 53.6"	71° 10' 39.8"	S88	80 m
10	MAH022	Sakhpar	Surendranagar	22° 14' 56.6"	71° 11' 13"	S88	80 m
11	MAH041	Bhojpari	Surendranagar	22° 17' 27.5"	71° 10' 9.9"	S88	80 m
12	MDW 021	Kabran	Surendranagar	22° 17' 48.0"	71° 08' 24.1"	S88	80 m

The geographical location of the project site is as shown below:



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

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As per the categorisation by UNFCCC, the project activity falls under 'Scope 1, Sectoral Scope: Energy industries (renewable/non-renewable)', since the project activity involves electricity generation from renewable wind resource by using WEGs and export to the grid. The methodology applied for the project is **ACM 0002** of **version 12.3.0.**

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

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The project activity comprises of 12 WEGs with a capacity of 2.1 MW each. The technology is indigenous and no technology transfer is taking place. The project activity is a zero emissions wind based power generation project which intent to use Wind Energy Generators (WEGs) to generate power. The technology doesn't involve any fossil fuel usage and hence there are no emissions associated with the project. The S88 model WEGs are supplied by Suzlon Energy Limited (SEL), a subsidiary of the Suzlon group, and considered to be one of the leading manufacturers of site-specific WEGs with strong R&D backup having R&D centres in Germany, Netherlands and Asia. The technical design of the WEG is advanced and is deemed to reflect current good practice. The technical parameters of the WEGs are as listed below:

MODEL[5]	S88 – 2.1MW
Operating Data	
Rated power	2.1MW
Cut-in wind speed	4 m/s
Rated wind speed	14 m/s
Cut-out wind speed	25 m/s
50 years gust wind speed	59.5 m.s
Hub height	79m (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 m^2
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%

[5]Details as per the product Boucher of S88 Suzlon model

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
Tower	
Type	Tubular Tower (4 sections)
Corrosion protection	Epoxy/ PU coated

The PLF assumed for the project is 22.95% and the same has been used for the power generation calculations.

Electricity generated in the project activity is fed to the NEWNE grid. The project activity is a zero emissions wind based power generation project connected to NEWNE grid. The project is expected to export 50662.584 MWh to NEWNE grid every year.

Pre project scenario and baseline scenario
In the absence of the project activity, equivalent amount of electricity would have been generated by power plants connected to the NEWNE grid, which is dominated by fossil fuels[6]. The same is been represented in the below table.

Region	**Total (MW)**				**Nuclear**	**Hydro**	**Renewable energy source**	**Total**
	Coal	**Gas**	**DSL**	**Total**				
Northern	24232.5	4134.76	12.99	28380.25	1620	14422.75	3509.56	47932.56
Western	33105.5	7903.81	17.48	41026.79	1840	7447.5	5937.6	56251.89
Eastern	21122.88	190	17.2	21330.08	0	3882.12	356.42	25568.62
N. Eastern	60	787	142.74	989.74	0	1116	223.6	2329.34
NEWNE grid	**78520.88**	**13015.57**	**190.41**	**91726.86**	**3460**	**26868.37**	**10027.18**	**132082.4**

Technology transfer: No technology transfer from other countries is involved in this project.

[6] http://www.cea.nic.in/reports/monthly/executive_rep/aug11/8.pdf

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

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The project uses fixed crediting period for ten years from the date of registration. The wind project is expected to reduce 482,730 tonnes of CO_2 over the crediting period of ten years. The year wise details of expected emission reductions are as given below.

Year*	Annual estimate of emission reductions (tonnes of CO_2e)
Year 1	48273
Year 2	48273
Year 3	48273
Year 4	48273
Year 5	48273
Year 6	48273
Year 7	48273
Year 8	48273
Year 9	48273
Year 10	48273
Total estimated emission reduction (tonnes CO_2e)	482730
Total number of crediting years	10 years (Fixed crediting period)
Annual Average over the crediting period of estimated reductions (tonnes of CO_2e)	**48273**

* Begins from the start date of crediting period and each year extends for 12 months.

A.4.5. Public funding of the project activity:

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There is no public funding from Annex 1 countries and there is no diversion of Official Development Assistance (ODA) available 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:

>>
Title: Consolidated baseline methodology for grid-connected electricity generation from renewable sources.
Methodology: Version 12.3.0 of ACM 0002[7].
The methodology also refers to the latest approved versions of the following tools:

- Tool to calculate the emission factor for an electricity system (Version 02.2.1, Approved in EB 63);
- Tool for the demonstration and assessment of additionality;
- Combined tool to identify the baseline scenario and demonstrate additionality;
- Tool to calculate project or leakage CO2 emissions from fossil fuel combustion

The tools used in the PDD are as follows:
"Tool to calculate emission factor for an electricity system" – Version 02.2.1, Approved in EB 63[8]
"Tool for the demonstration and assessment of additionality" – Version 6.0.0 ,Approved in EB 65[9].
"Guidance on assessment of investment analysis"- Version 5.0 approved in EB 62[10].

"Combined tool to identify the baseline scenario and demonstrate additionality" has not been used as the project activity is a Greenfield wind power project.
"Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" has not been used as the project involved in harnessing wind to generate power and there are no project emissions and leakage associated with fossil fuel combustion at the project.

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

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

S.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 wind power plant connected to NEWNE grid of India. 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	The project activity is the installation of wind power units with a total generation capacity of 25.2MW and hence the project is

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

[8] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.2.1.pdf

[9] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v6.0.0.pdf

[10] http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf

	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	applicable under these criteria.
3.	In the case of capacity additions, retrofits or replacements (except for capacity addition projects for which the electricity generation of the existing power plant(s) or unit(s) is not affected: the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity addition or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity;	This criterion is not applicable as the project activity is development of Greenfield wind power generation project.
4.	In case of hydro power plants: • At least one of the following conditions must apply: o The project activity is implemented in an existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or o The project activity is implemented in an existing single or multiple reservoirs, where the volume of any of reservoirs is increased and the power density of each reservoir, as per the definitions given in the Project Emissions section, is greater than 4 W/m2 after the implementation of the project activity; or o The project activity results in new single or multiple reservoirs and the power density of each reservoir, as per the definitions given in the Project Emissions section, is greater than 4 W/m2 after the implementation of the project activity. In case of hydro power plants using multiple reservoirs where the power density of any of the reservoirs is lower than 4 W/m 2 after the implementation of the project activity all of the following conditions must apply: • The power density calculated for the entire project activity using equation 5 is greater than 4 W/m2; • All reservoirs and hydro power plants are located at the same river and were designed together to function as an integrated project1 that collectively constitutes the generation capacity of the combined power plant; • The water flow between the multiple reservoirs is not used by any other hydropower unit which is not a part of the project activity; • The total installed capacity of the power units, which	The project activity is wind power project and hence the condition is not applicable.

	are driven using water from the reservoirs with a power density lower than 4 W/m2, is lower than 15 MW; • The total installed capacity of the power units, which are driven using water from reservoirs with a power density lower than 4 W/m2, is less than 10% of the total installed capacity of the project activity from multiple reservoirs.	
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 is less than 4 W/m^2.	The project activity does not involve fuel switch from fossil fuels to renewable energy sources. The project activity is Greenfield wind power project and does not used biomass fuels/Hydel resources for power generation. 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 version 12.3.0 of ACM 0002[11], the selection of gases to be included and excluded within the project activity is as follows.

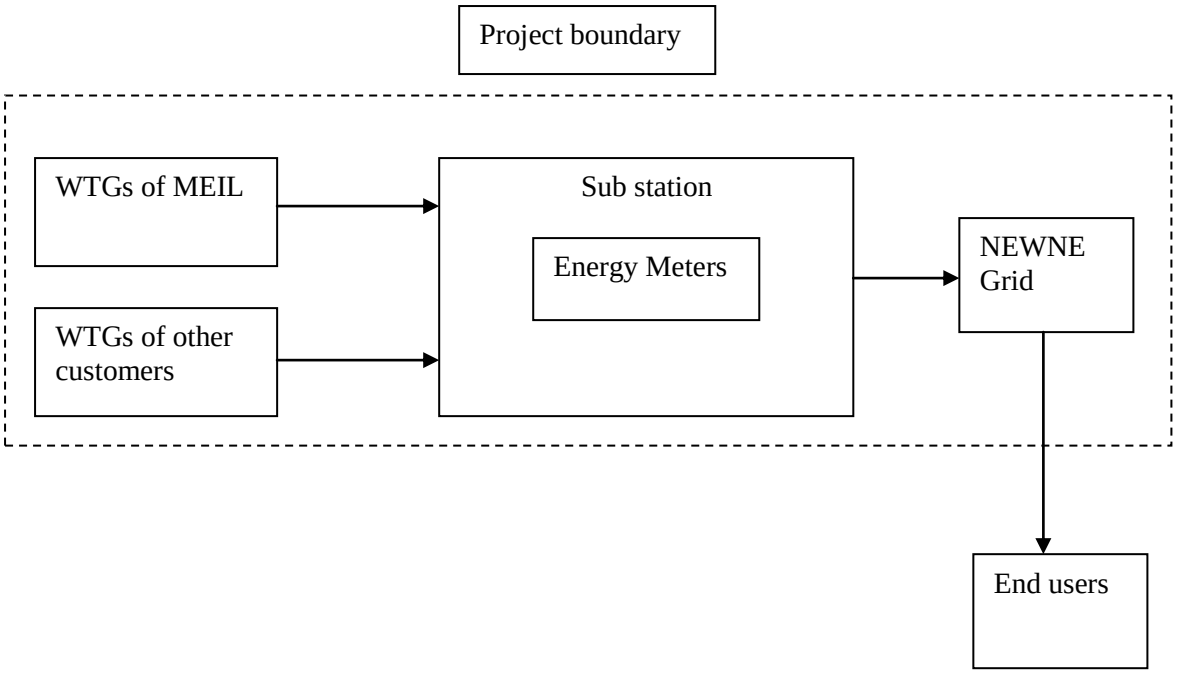
	Source	Gas	Included	Explanation
Baseline	CO2 emissions from electricity generation in fossil fuel fired power plants that is displaced due to the project activity	CO_2	Yes	Major emission source
		CH_4	No	Minor emission source
		NO_2	No	Minor emission source
Project Activity	Grid Connected wind power based electricity generation	CO_2	No	Electricity generation by using WEGs does not generate 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 12.3.0 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 is defined as follows.

In the below given diagram, the wind energy generators are connected to the substation. From the substation, the electricity is fed into the NEWNE grid. The NEWNE grid then transfers the electricity to end users. As per the methodology, the project boundary includes, the wind power project, the substation, and all other power plants connected to the NEWNE grid.

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



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 12.3.0, 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 CO_2 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 case is in compliance with all applicable legal and regulatory requirements. The Electricity Act 2003[12] says "Any generating company may establish, operate and maintain a generating station without obtaining a licence under this Act if it complies with the technical standards relating to

[12] http://powermin.gov.in/acts_notification/electricity_act2003/national_electricity_policy_plan.htm

connectivity with the grid referred to in clause (b) of section 73" and hence does not restrict the usage of any technology and fuel for electricity generation.

The baseline emissions are to be calculated as follows":

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

Where:

Parameters	Definitions	Value	Units
BE_y	Baseline emissions in year y (tCO_2/yr)	48273	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)	50662.584	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" (tCO_2/MWh)	0.9528	tCO2/MWh
$EF_{grid,OM,y}$	Operating margin CO_2 emission factor of NEWNE grid	0.9842	tCO_2/MWh
$EF_{grid,BM,y}$	Build margin CO_2 emission factor of NEWNE grid	0.8588	tCO_2/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 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:
Under this alternative, MEIL would have gone ahead with the implementation of project without CDM benefits. The project would have generated electricity from the clean technology and the same could have been exported to the grid. However the project activity is not financially viable without CDM revenue.

Alternative 2: Continuation of the current situation (No project activity)
The project is a greenfield activity. The project proponent would not have 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 and the equivalent amount of GHG would have been associated with the fossil fuel based power plant.

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:
Electricity generation from wind farm is not a legal requirement or a mandatory choice and also there is no restriction to power generation by harnessing wind power. There is no legal restriction to the choice of fuel for power generation[13].

Outcome of Step 1:
The alternative scenarios to the project activity are in compliance with the mandatory legislation and regulations taking into account the enforcement in the region.

Step 2: Investment Analysis:

To determine whether the proposed project activity is not:
a) The most economically or financially feasible; or
b) Economically or financially feasible, without the revenue from the sale of certified emission reductions (CERs).

Sub-step 2a: Determine appropriate analysis method

This project will generate financial income from sale of electricity generated from the project activity to the grid. Option-I Simple Cost Analysis will not be applicable. So, either Option-II (Investment comparison analysis) or Option-III Benchmark analysis can be applied.

The purpose of the investment analysis is to determine whether the proposed activity is economically or financially attractive or not without the revenue from sale of Certified Emission Reductions (CERs). This is done by comparing the financial returns from the project activity to that of a benchmark and if the returns of the project activity are less than the benchmark, it can be demonstrated that the project is not a financially suitable one.

[13] Electricity Act, 2003

As per Para 12 of "Guidance on the Assessment of Investment Analysis, Version 05, EB62", a benchmark approach is suited to the circumstances where the baseline does not require investment or is outside the direct control of the project developer, i.e. cases where the choice of the developer is to invest or not to invest. In the baseline there is the no project activity, in which case equivalent amount of electricity would be generated by grid electricity system through its current operational power plants and by new capacity addition (which are mostly thermal). Therefore the selection of benchmark analysis is appropriate.

In order to analyse the financial viability of the project activity, the prime financial indicator that has been used is the Equity Internal Rate of Return (equity IRR). Equity IRR is considered as appropriate financial indicator for demonstrating the additonality of the project activity since it represents the return expectation of an equity investor, the project proponent. The project proponent bares the real risk from the project's uncertainties, since loan amount has to be serviced even if the project does not perform. Thus, project proponent's assessment of the expected returns from the invested equity is crucial in the decision to implement the project.

Following the guidance on the Assessment of Investment Analysis, Version 05 and equity IRR has been chosen as the financial indicator for the project activity.

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.

Calculation of Benchmark:
The cost of equity has been calculated as per the Capital Asset Pricing Model (CAPM) method. The benchmark has been calculated as follows:
Return on Equity = Risk Free Rate + Beta*(Market Return – Risk Free Rate)
The expected return on equity has been determined using the Capital Asset Pricing Model (CAPM). The CAPM economic model is used worldwide to determine the required/expected return on equity based on potential risk of an investment. The formula of CAPM is as follows:
Return on Equity = Risk Free Rate + Beta*(Market Return – Risk Free Rate)

Calculation of Risk Free Rate:
The risk free rate is understood as the rate of return on an asset that is theoretically free of any risks, therefore the rate of interest on government bonds are considered as risk free rates.

For calculating Risk Free Rate, Month-end Yield to Maturity for twenty years of SGL Transaction in Central Government Dated Securities for Various Residual Maturities, published by Reserve Bank of

India has been considered. This was published on 12 October 2010, which was available during the project conceptualization.
The Risk Free Rate considered is 8.36[14]%.

Calculation of Market Return:
This is calculated based on Sensex close value for base year (January 1991) and data prior to decision making (September 2010) using Compound Annual Growth Rate (CAGR) formula.

The PP has done a comparison between BSE 500, BSE 100, BSE 200 and Sensex. The comparison table is as given below:

Index	BSE 500	BSE 100	BSE 200	Sensex
Market return	19.64%	16.79%	17.86%	16.58%

In order to compute a conservative benchmark, the PP has decided to use the more conservative value for Market Return ie, 16.58%.

Market return = {(Ending Value/Beginning Value)^(1/Number of Years)}-1
Ending Value = 20069.12
Beginning Value = 982.32
Number of Years = 20
Putting the above values, the Market Return = 16.58%.

Calculation of Beta:
The beta (β) for this project has been calculated taking the variance in the market (BSE 500) and variance in stocks (For a set of comparable companies engaged predominantly in the business of Power generation). PP has considered BSE 500 index as it represents larger list of companies which are present in similar sector. Considering the large number companies would minimize the bias if any due to prevailing market conditions. The following industries has been listed under power sector in BSE 500 Indices Adani Power, BF Utilities, CESC, Jaiprakash Pow, JSW Energy, KSK Energy Vent, Neyveli Lignite, NHPC, NTPC, Power Grid Corp, Reliance Infra, Reliance Power, SJVN, Tata Power, Torrent Power, BHEL, Suzlon Enrgy, Siemens Ltd, Crompton Greaves, Thermax Ltd, Lanco Infrastructure. Among these BHEL, Suzlon energy, Siemens Ltd, Crompton greaves, Therrmax limited are excluded as the core business of these companies is not power generation. As stated above the beta computation is based on five years data. Hence only those companies which are listed in the BSE 500 for over five years prior to the conceptualization date of the current project activity has been considered for further analysis. The following companies viz., Adani Power, JSW Energy, KSK Energy Ventures, NHPC, Power Grid Corp, Reliance Power, SJVN, Torrent Power which are listed after 2005 have not been included in computation of RoE (and hence WACC). Hence only Reliance Infra, Tata Power, NTPC, NLC, BF utilities, CESC, Jaiprakash Power, which are listed in BSE 500 and are listed for over five years have been considered for arriving at the benchmark.

Company	**Debt**	**Equity**	**D/E**	**Tax rate**	**Equity Beta (Levered Beta)**	**Unlevered beta**
Reliance Infra	4114.9	15152.19	0.271571	33.99%	1.69	1.43
Tata Power	5,872.01	10,623.77	0.552724		0.97	0.71
NTPC	37797	63724.1	0.593135		0.59	0.42

[14] http://www.rbi.org.in/scripts/BS_ViewBulletin.aspx?Id=11647

NLC	4,077.36	10,324.67	0.394914		1.430	1.13
BF utilities	108.82	59.58	1.826452		2.020	0.92
CESC	3,337.21	4,671.30	0.714407		1.070	0.73
Jaiprakash Power	5,608.55	3,377.81	1.66041		1.670	0.80
Average Beta					1.350	0.88

Thus the Beta Value = 0.88

Now using the formula for CAPM
Return on Equity = Risk Free Rate + Beta*(Market Return – Risk Free Rate)
= 8.36 + 0.88*(16.58 – 8.36)
= 15.59%

Hence the Benchmark Return on Equity is 15.59%

The parameters and assumptions used for Equity IRR calculations have been mentioned below. A sensitivity analysis has also been done for the equity IRR with change in certain parameters, to show the robustness of the analysis. The following table gives the assumptions made while calculating the post tax Equity IRR, along with their sources:

Assumptions:	**Values**	**Data Source**
Location - State	Gujarat	Board resolution dated 13 October 2010
Place	Mahidad	Board resolution dated 13 October 2010
No of WEGs	12	
Capacity of each WTG	2.1 MW	Quotation from Suzlon dated 02 June 2010
Project Size	25.2 MW	
Cost per WEG	114.83 INR Million	Quotation from Suzlon dated 02 June 2010
Cost of Project per MW	54.7 INR Million	Quotation from Suzlon dated 02 June 2010
Total Project Cost	**1378 INR Million**	
Means of Finance		
Debt	70	http://www.gercin.org/renewablepdf/en_1303211765.pdf
Equity	30	http://www.gercin.org/renewablepdf/en_1303211765.pdf
Opearating Parameters		
Plant Load Factor (net of Transmission charges)	22.95%	The PLF value that was available to the PP during time of decision making was sourced from the Quotation of Suzlon dated 02 June 2010. According to this quotation the PLF value is 21.48%. In order to comply with "GUIDELINES FOR THE REPORTING AND VALIDATION OF PLANT LOAD FACTORS" EB 48, Annexure 11, the PP had conducted a third party PLF Report by Parsons Brinckerhoff India Pvt. Limited on 15 July 2011. In order to be on the

		conservative side while calculating the IRR, the PP has decided to use the more conservative PLF value of 22.95% from the third party report.
Total Generation for the project at above PLF	50.66 Million kWh p.a.	Calculated
Grid Availability	100.00%	Quotation from Suzlon dated 02 June 2010
Total generation after Line Loss	50.66 Million kWh p.a.	Calculated
Life of the Wind Turbine	20 years	Technical specification by Technology supplier (S-88 Model, 2.1 MW, 50 Hz) dated 27/08/2010
O & M cost		
O & M Cost (in Lacs) from 3rd Year of operation incl Ser. Tax	24.00 INR Lacs	Quotation from Suzlon dated 02 June 2010
Annual escalation from 3rd year	5%	Quotation from Suzlon dated 02 June 2010
Financial Parameters		
Interest on Term Loan		
Rupee Loan	12.25 %	http://www.sbi.co.in/webfiles/uploads/files/1295700909703_ANALYST_PRESENTATION_Q3FY11.pdf
Moratorium	2 years	http://www.gercin.org/renewablepdf/en_1303211765.pdf
Repayment period	10 years	http://www.gercin.org/renewablepdf/en_1303211765.pdf
Tariff	INR 3.56/KWh	http://www.gercin.org/renewablepdf/en_1303211765.pdf
Tariff escalation	0%	
Depreciation Rate		
As per companies Act	15%	http://law.incometaxindia.gov.in/DitTaxmann/IncomeTaxRules/Rules2005/APPENDIXI_new.htm
Plant and machinery - SLM	5.28%	Schedule XIV of Companies Act, 1956
As per Income Tax Act		
Depreciation rate-first year	15%	http://law.incometaxindia.gov.in/DitTaxmann/IncomeTaxRules/Rules2005/APPENDIXI_new.htm
Taxation		
Corporate Tax	33.99%	http://www.kpmg.com/BB/en/IssuesAndInsights/ArticlesPublications/Documents/Corp-and-Indirect-Tax-Oct12-2010.pdf
MAT	18%	http://www.pwc.fr/assets/files/pdf/2010/03/pwc_budget/pwc_budget_2010_itanditEs.pdf
Generation Based Incentive	INR 0.5/KWh	http://www.inwea.org/others/OPERATIONAL_GUIDELINES.pdf

The PLF of 22.95% assumed in the investment analysis is determined by the third party contracted by the project proponent. This is compliance with EB 48 Annex 11. The PLF provided by the technology supplier in its quotation dated 02/06/2010 is 21.48%. The PLF provided by the GERC in its tariff order[15] No. 1 dated 30/01/2010 is 23%. The PLF provided by the technology supplier and GERC was available to the project proponent at the time of decision making. However, in order to comply with the EB 48 Annex 11, the PLF determined by third party has been used in the investment analysis. This PLF is in line with the PLF values available at the time of decision making
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.

Comparison of financial indicator and the benchmark:

The IRR for any power project is highly dependent on the Plant Load Factor (PLF) of the project. Taking into account the PLF at that location, the equity IRR for the wind power project activity was worked out.

The PLF value that was available during the decision making was sourced from Suzlon's Quotation dated 02 June 2010. According to the quotation the PLF value is 21.48%. Considering this PLF the Equity IRR comes to 5.43%. However in order to comply with the EB 48 Annex 11, the PP had conducted a third party assessment of the PLF. As per this PLF study report, the PLF value is 22.95%. Hence the PP has decided to take the more conservative of the PLF value while computing the IRR.

The equity IRR for this project activity is 7.65% which is below the benchmark of 15.59%. These financial calculations include all the relevant revenues (except CER revenues) and costs associated with the project.

Project	Equity IRR without CDM	Benchmark
MEIL	7.65%	15.59%

Therefore, with CDM revenue the equity IRR will improve and become comparable to the benchmark.
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 20 of Guidelines on the assessment of investment analysis (Version 05, EB 62):

*"*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, O&M, project cost and power tariff. The results of the sensitivity analysis are provided in the table below.

Parameters	Sensitivity	Values	Base case IRR	Benchmark

[15] http://www.gercin.org/renewablepdf/en_1303211765.pdf

PLF	10.00%	11.32%	7.65%	15.59%
	-10.00%	4.18%		
O&M	10.00%	7.15%		
	-10.00%	8.15%		
Tariff	10.00%	12.25%		
	-10.00%	3.01%		
Project Cost	10.00%	4.82%		
	-10.00%	11.44%		

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:

The common practice analysis has been carried out on the basis of GUIDELINES ON COMMON PRACTICE (Version 02.0., EB 69, and Annexure 08)[16].

As per the guidelines, the following definitions have been mentioned. The table below gives the definitions as applicable in case of this particular project:

Definitions	Applicability for this project
Applicable geographical area	India
Measure	Since this is a wind power project, it falls under "*Switch of technology with or without change of energy source including energy efficiency improvement as well as use of renewable energies (example: energy efficiency improvements, power generation based on renewable energy)*"
Output	The project generates electricity.
Different technologies	The different technologies have been identified on the basis of: Energy source/fuel (example: energy generation by different energy sources such as wind and hydro and different types of fuels such as biomass and natural gas).

As per this guideline, the following steps have been given to carry out the common practice analysis.

[16] http://cdm.unfccc.int/Reference/Guidclarif/meth/meth_guid44.pdf

Step 1: calculate applicable capacity or output range as +/-50% of the total design capacity or output of the proposed project activity

The project capacity is 25.2 MW
Thus the output range is 12.6 MW to 37.8 MW.

Step 2: identify similar projects (both CDM and non-CDM) which fulfill all of the following conditions:
(a) The projects are located in the applicable geographical area;
(b) The projects apply the same measure as the proposed project activity;
(c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;
(d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant;
(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;
(f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity

The following table demonstrates the compliance of the project with the above conditions:

The projects are located in the applicable geographical area	India is the geographical area, hence all projects located in India has been selected. Hence this criteria is satisfied.
The projects apply the same measure as the proposed project activity	The project is a Wind Energy project which is a renewable energy project. This falls under the category 2 (b) of the guideline which says: *"2 (b) Switch of technology with or without change of energy source including energy efficiency improvement as well as use of renewable energies (example: energy efficiency improvements, power generation based on renewable energy);"* Hence this criteria is satisfied.
The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity	Since the project is a wind power project, this criterion is not applicable. Hence this criteria is satisfied.
The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant	All the plants in which the projects are implemented to generate and supply electricity to the grid have been chosen. Hence this criteria is satisfied.
The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1	All the plants whose output range is between 12.6 to 37.8 MW have been selected. Hence this criterion is satisfied.
The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity,	All the projects that have been selected had started commercial operation before the PDD got webhosted (18 January 2011) Hence this criterion is satisfied.

whichever is earlier for the proposed project activity	

The Electricity Act 2003 came into force in June 2003. The project commissioned before the Electricity Act, 2003 has not been considered for common practice analysis. It should be noted that there was no uniform regulation for determination of tariff for generation & sale of power prior to the Electricity Act, 2003 and moreover, in India power sale tariff and power purchase agreements for all states are based upon the guidelines of this Act. Hence, all prospective project owners since 2003 have to include the effect of this Act (i.e., State-wise power sale tariff orders) during taking investment decision. This option was not available to project owners prior to 2003 and hence, in accordance to the approved methodological tool, projects installed after 2003 have a "similar regulatory frameworks and investment climate".

The number of projects under each fuel type within the applicable range in India is as follows:

Fuel Type	Number of project within the given range
Thermal	7[17]
Hydro	7[18]
Wind	37[19]
Solar	0[20]
Biomass	6[21]
Nuclear	0[22]
Tidal	0[23]

[17] The details regarding the thermal power plants in India have been taken from Baseline Carbon Dioxide Emission Database Version 7.0. The link for the same is as follows:
http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

[18] The details regarding the thermal power plants in India have been taken from Baseline Carbon Dioxide Emission Database Version 7.0. The link for the same is as follows:
http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

[19] The list of wind power projects have been taken from the "The Indian Windpower directory 2011", which is an official compendium of wind power projects in India.

[20] The list of solar projects has been selected from the Renewable Energy Corporation websites of each and every state in India.

[21] The list of biomass projects has been selected from the Renewable Energy Corporation website of each and every state of India. Many of the renewable energy corporation sites do not contain a proper list of biomass projects along with their installed capacities. Hence only those projects for which proper data is available have been considered. One of the projects by Birla Corporation Limited which has a capacity of 15 MW and located in Maharashtra, has not been considered since it is a captive power plant.

[22] As per Nuclear Power Corporation of India Limited website (http://www.npcil.nic.in/main/contactus_stations.aspx#rajasthan), there are no nuclear projects in India in the applicable range.

Geothermal	0[24]

[23] As per Business Line, the first commercial tidal energy project is yet to be commissioned in India by Atlantis Resources Corporation. This will only be commissioned by 2013. The link for the same is as follows: http://www.business-standard.com/india/news/india-set-to-get-asia%5Cs-first-tidal-power-plant/421859/

[24] As per research conducted by Energy Alternatives India (a market research firm specializing in the domain of energy) there are no grid connected geo thermal power project in India. The link for the same is as follows: http://www.eai.in/ref/ae/geo/geo.html

Thermal Power Plants

Sl.No	Project Proponent Name	DT_ COMM	CAPACITY MW	STATE	TYPE
1	BARAMURA	03-Aug-10	21	TRIPURA	Thermal
2	ROKHIA GT	31-Mar-06	21	TRIPURA	Thermal
3	RITHALA CCCP	04-Oct-10	35.75	DELHI	Thermal
4	RITHALA CCCP	09-Dec-10	35.75	DELHI	Thermal
5	VALUTHUR GT	01-Sep-08	33.7	TAMIL NADU	Thermal
6	KUTTALAM GT	24-Mar-04	37	TAMIL NADU	Thermal
7	VALANTHARVI GT	15-Apr-06	14.8	TAMIL NADU	Thermal

Hydro Power Plants

Sl.No	Project Proponent Name	UNIT_NO	DT_ COMM	CAPACITY MW	STATE	TYPE
1	KOPILI ST.-II	5	31-Dec-03	25	ASSAM	HYDRO
2	KHOPOLI	2	25-Mar-03	24	MAHARASHTRA	HYDRO
3	MADHIKHEDA	1	28-Aug-06	20	MADHYA PRADESH	HYDRO
4	MADHIKHEDA	2	09-Sep-06	20	MADHYA PRADESH	HYDRO
5	ALMATTI DAM	1	26-Mar-04	15	TAMIL NADU	HYDRO
6	BHAWANI KATTALAI BARRAGE	1	01-Aug-06	15	TAMIL NADU	HYDRO
7	BHAWANI KATTALAI BARRAGE	2	22-Sep-06	15	TAMIL NADU	HYDRO

Biomass Power Plants:

Sl.No	Project Proponent Name	Capacity	State
1	Ind Bharath Energies[25]	20	Maharashtra
2	RR Energy Limited[26]	15	Chattisgarh
3	KVK Bio-Energy Pvt. Ltd.[27]	15	Chattisgarh
4	Sambhav Energy Ltd.[28]	20	Rajasthan
5	Godawari Power & Ispat Ltd.	20	Chattisgarh
6	Gaps power & infrastructure pvt ltd	13	Maharashtra

[25] http://www.mahaurja.com/PDF/Biomass_Proj_StatusC.pdf

[26] http://www.credacg.org/bpg_projects_commissioned.htm

[27] http://www.credacg.org/bpg_projects_commissioned.htm

[28] http://www.rrecl.com/PDF/Commissioned.pdf

Wind Power Plants

Sl.No	**Project Proponent Name**	**Capacity**	**State**
1	Accion Wind Energy Pvt Ltd	16.5	Karnataka
2	Aryan Coal Benefication	15	Maharashtra
3	Belgaum Wind Farms Pvt. Ltd	24.8	Karnataka
4	Best & Co	25	Tamil Nadu
5	CLP Windfarm (I) Pvt Ltd	20.8	Karnataka
6	CPCL	17.6	Tamil Nadu
7	DLF Home Developers	19.5	Rajasthan
8	DLF Home Developers	33	Tamil Nadu
9	Doodanavar & Brothers	15	Karnataka
10	Enercon Wind Farms (Raj) Pvt Ltd	24	Rajasthan
11	Enercon Windfarms Sai Limited	20	Maharashtra
12	GACL	23.75	Gujarat
13	Generacion Eolica India Pvt Ltd	31.2	Karnataka
14	Green Infra Wind Farms Ltd	24	Tamil Nadu
15	Gujarat Flourochemicals Limited	23.1	Maharashtra
16	Gujarat Flourochemicals Limited	19.5	Rajasthan
17	HPCL	21.25	Rajasthan
18	Gujarat NRE Coke Limited	26.25	Gujarat
19	HZL	18.4	Karnataka
20	IOCL	21	Gujarat
21	Jaiprakash Associates	16.25	Maharashtra
22	Jindal Steel and Power Limited	24	Maharashtra
23	Kohinoor Planet Construction	24	Rajasthan
24	KPR Mill	19.8	Tamil Nadu
25	Modern Road Makers	20	Rajasthan
26	MSPL Group	30	Gujarat
27	Patnaik Minerals	35.2	Gujarat
28	Patnaik Minerals	15	Maharashtra
29	Madras Cement Limited	19.8	
30	Rajasthan Ren Energy Corp Limited	25	Rajasthan
31	Rajasthan State Mines and Minerals Limited	15	Rajasthan

32	Rajasthan State Mines and Minerals Limited	22.5	Rajasthan
33	Rajasthan State Mines and Minerals Limited	31.5	Rajasthan
34	Manganese Ore (India) Limited.	15.2	Madhya Pradesh
35	Powerica Limited	16.5	Tamil Nadu
36	Soundararaja Mills	20	Tamil Nadu
37	India Power Corporation Limited (IPCL)	24.8	Gujarat

Step 3: within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number Nall

From the list of power plants mentioned in Step 2 the list of power plants which are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation is given below:

Thermal Power Plants:

Sl.No	Project Proponent Name	DT_ COMM	CAPACITY MW	STATE	TYPE
1	BARAMURA	03-Aug-10	21	TRIPURA	Thermal
2	ROKHIA GT	31-Mar-06	21	TRIPURA	Thermal
3	RITHALA CCCP	04-Oct-10	35.75	DELHI	Thermal
4	RITHALA CCCP	09-Dec-10	35.75	DELHI	Thermal
5	VALUTHUR GT	01-Sep-08	33.7	TAMIL NADU	Thermal
6	KUTTALAM GT	24-Mar-04	37	TAMIL NADU	Thermal
7	VALANTHARVI GT	15-Apr-06	14.8	TAMIL NADU	Thermal

Hydro Power Plants

Sl.No	Project Proponent Name	UNIT_NO	DT_ COMM	CAPACITY MW	STATE	TYPE
1	KOPILI ST.-II	5	31-Dec-03	25	ASSAM	HYDRO
2	KHOPOLI	2	25-Mar-03	24	MAHARASHTRA	HYDRO
3	MADHIKHEDA	1	28-Aug-06	20	MADHYA PRADESH	HYDRO
4	MADHIKHEDA	2	09-Sep-06	20	MADHYA PRADESH	HYDRO
5	ALMATTI DAM	1	26-Mar-	15	TAMIL NADU	HYDR

			04			O
6	BHAWANI KATTALAI BARRAGE	1	01-Aug-06	15	TAMIL NADU	HYDRO
7	BHAWANI KATTALAI BARRAGE	2	22-Sep-06	15	TAMIL NADU	HYDRO

Wind Power Plants:

Sl.No	Project Proponent Name	Capacity	State
1	Best & Co	25	Tamil Nadu
2	Soundararaja Mills	20	Tamil Nadu

The list of power plants that are under CDM and their CDM reference is provided in the below table.

List of Biomass Power Plants under CDM

Sl. No	Project Proponent Name	Capacity	State	CDM Status	CDM referenece
1	Ind Bharath Energies	20	Maharashtra	Yes	http://cdm.unfccc.int/Projects/DB/TUEV-SUED1256547738.62
2	RR Energy Limited	14	Chattisgarh	Yes	http://cdm.unfccc.int/Projects/DB/SGS-UKL1158161760.22/view
3	KVK Bio-Energy Pvt. Ltd.	15	Chattisgarh	Yes	http://cdm.unfccc.int/Projects/Validation/DB/R775FQ7UVYVVD0RO16Q0BN2DT5WH67/view.html
4	Sambhav Energy Ltd.	20	Rajasthan	Yes	http://cdm.unfccc.int/Projects/Validation/DB/778HZWKTDPISOU40RB2LQC1BZMDTWM/view.html
5	Godawari Power & Ispat Ltd	20	Chattisgarh	Yes	http://cdm.unfccc.int/Projects/Validation/DB/DAB3N3UF9L4HJLAXJBW7A1V8SFICWF/view.html
6	Gaps power & infrastructure pvt ltd	13	Maharashtra	Yes	http://cdm.unfccc.int/Projects/DB/SGS-UKL1171466457.73/view

List of Wind Power Plants under CDM

Sl.No	Project Proponent Name	Capacity	State	CDM Status	Reference
1	Accion Wind Energy Pvt Ltd	16.5	Karnataka	Yes	http://cdm.unfccc.int/Projects/DB/DNV-CUK1216117082.43/view
2	Aryan Coal Benefication	15	Maharashtra	Yes	http://cdm.unfccc.int/Projects/Validation/DB/SB3OIAHMLZK0Z0KZ1J4ZLHHC8O8541/view.html
3	Belgaum Wind Farms Pvt. Ltd	24.8	Karnataka	Yes	http://cdm.unfccc.int/Projects/DB/DNV-CUK1204705646.68/view
4	CLP Windfarm (I) Pvt Ltd	20.8	Karnataka	Yes	http://cdm.unfccc.int/Projects/Validation/DB/UTY2YY69RTQ04NJW0ZRHKU5VSCZAGV/view.html
5	CPCL	17.6	Tamil Nadu	Yes	http://cdm.unfccc.int/Projects/DB/BVQI1257245548.54/view
6	DLF Home Developers	19.5	Rajasthan	Yes	http://cdm.unfccc.int/Projects/Validation/DB/34CAG54CUL49MILW9S0SKWCWU38SSX/view.html
7	DLF Home Developers	33	Tamil Nadu	Yes	http://cdm.unfccc.int/Projects/Validation/DB/34CAG54CUL49MILW9S0SKWCWU38SSX/view.html
8	Doodanavar & Brothers	15	Karnataka	Yes	http://cdm.unfccc.int/Projects/Validation/DB/41QELS82OAMKTCOUWKY4N0ZBYGHD7M/view.html
9	Enercon Wind Farms (Raj) Pvt Ltd	24	Rajasthan	Yes	Bundled wind power project with title: Bundled wind energy power projects (2003 policy) in Rajasthan: http://cdm.unfccc.int/Projects/DB/SGS-UKL1181738388.43/view
10	Enercon Windfarms Sai Limited	20	Maharashtra	Yes	http://cdm.unfccc.int/Projects/DB/DNV-CUK1279516994.31/view
11	GACL	23.75	Gujarat	Yes	http://cdm.unfccc.int/Projects/Validation/DB/PLJVAOHCZK3WX6GN4QGVAH8C3MGAYP/view.html
12	Generacion Eolica India Pvt Ltd	31.2	Karnataka	Yes	http://cdm.unfccc.int/Projects/DB/RWTUV1290591737.68/view
13	Green Infra Wind Farms Ltd	24	Tamil Nadu	Yes	http://cdm.unfccc.int/Projects/Validation/DB/M1348X23DCLTZ365Z248CT9XT4EEOS/view.html
14	Gujarat Flourochemicals Limited	23.1	Maharashtra	Yes	http://cdm.unfccc.int/Projects/DB/RWTUV1202913883.06/view

Sl.No	Project Proponent Name	Capacity	State	CDM Status	Reference
15	Gujarat Flourochemicals Limited	19.5	Rajasthan	Yes	http://cdm.unfccc.int/Projects/Validation/DB/2PRTXEX2D3L8N6SMULG87OVB1WWJPG/view.html
16	HPCL	21.25	Rajasthan	Yes	http://cdm.unfccc.int/Projects/Validation/DB/H88VQDBMZDVSK37NPUUWXHR25K08FR/view.html
17	Gujarat NRE Coke Limited	26.25	Gujarat	Yes	http://cdm.unfccc.int/Projects/Validation/DB/2WHFROEPK85ARNQ1TVKJV4WC8ATMAB/view.html
18	HZL	18.4	Karnataka	Yes	The complete capacity is under the PDD named "Wind power project by HZL in Karnataka". http://cdm.unfccc.int/Projects/DB/BVQI1208874936.63/view
19	IOCL	21	Gujarat	Yes	http://cdm.unfccc.int/Projects/DB/DNV-CUK1304071464.49/view
20	Jaiprakash Associates	16.25	Maharashtra	Yes	http://cdm.unfccc.int/Projects/DB/SGS-UKL1266513892.49/view
21	Jindal Steel and Power Limited	24	Maharashtra	Yes	http://cdm.unfccc.int/Projects/DB/DNV-CUK1331028815.56/view
22	Kohinoor Planet Construction	24	Rajasthan	Yes	http://cdm.unfccc.int/Projects/DB/BVQI1302691944.71/view
23	KPR Mill	19.8	Tamil Nadu	Yes	http://cdm.unfccc.int/Projects/DB/SIRIM1299217620.46/view
24	Modern Road Makers	20	Rajasthan	Yes	http://cdm.unfccc.int/Projects/Validation/DB/AERX8YCUI2RBEAK41JC7IF8SN67G1P/view.html
25	MSPL Group	30	Gujarat	Yes	http://cdm.unfccc.int/Projects/DB/BVQI1286434210.07/view
26	Patnaik Minerals	35.2	Gujarat	Yes	http://cdm.unfccc.int/Projects/DB/RWTUV1288029478.94/view
27	Patnaik Minerals	15	Maharashtra	Yes	http://cdm.unfccc.int/Projects/DB/RWTUV1306214743.43/view
28	Madras Cement Limited	19.8	Tamil Nadu	Yes	http://cdm.unfccc.int/Projects/Validation/DB/Q861X5CIWDLQSWCRTY3HP0MHMBDM7S/view.html
29	Rajasthan Ren Energy Corp Limited	25	Rajasthan	Yes	http://cdm.unfccc.int/Projects/Validation/DB/Y8W0UMSG3DAI1VHPT2U3Y4IF9N7S4G/view.html
30	Rajasthan State Mines and Minerals Limited	15	Rajasthan	Yes	http://cdm.unfccc.int/Projects/DB/DNV-CUK1243661243.16/view

Sl.No	Project Proponent Name	Capacity	State	CDM Status	Reference
31	Rajasthan State Mines and Minerals Limited	22.5	Rajasthan	Yes	http://cdm.unfccc.int/Projects/DB/BVQI1201770524.09/view
32	Rajasthan State Mines and Minerals Limited	31.5	Rajasthan	Yes	http://cdm.unfccc.int/Projects/Validation/DB/RNNKAHLY2ZRXKKY7KS859PZOQL3XCJ/view.html
33	Manganese Ore (India) Limited.	15.2	Madhya Pradesh	Yes	http://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1265262346.25/view
34	Powerica Limited	16.5	Tamil Nadu	Yes	http://cdm.unfccc.int/Projects/DB/LRQA%20Ltd1264590823.08/view
35	India Power Corporation Limited (IPCL)	24.8	Gujarat	Yes	http://cdm.unfccc.int/Projects/Validation/DB/K0ZTRSQUQH8WZN76AA11ZAZW16BPNH/view.html

Hence N_{all} = 16

Step 4: within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number Ndiff

Among all the power plants identified within Nall, the number of power plants that are not using wind as a technology is 14.
Hence N_{diff} = 14

Step 5: calculate factor F=1-Ndiff/Nall representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity

F = 1-(14/16)
Thus F = 0.125
As per version 02 of the GUIDELINES ON COMMON PRACTICE, The proposed project activity is a "common practice" within a sector in the applicable geographical area if the factor F is greater than 0.2 and Nall-Ndiff is greater than 3.

As per the above calculations F = 0.125 which is less than 2 and N_{all} - N_{diff} =2, which is less than 3. Thus the project is not a common practice..

Chronology of events:

S.No	Activity	Date
1	Appointment of CDM Consultant	31 March 2010
2	Quotation received for the project	02 June 2010
3	Prior consideration of CDM form sent to UNFCCC	16 August 2010
4	Board Resolution considering CDM benefits	13 October 2010
5	Placement of purchase orders (First Major Investment)	18 January 2011
6	Resubmission of Prior CDM Consideration form to UNFCCC	07 March 2011[29]
7	Local Stakeholder consultation meeting	07 May 2011

Demonstration of Prior CDM Consideration:

As per the Guidelines "On The Demonstration And Assessment Of Prior Consideration Of The CDM" /EB62/Annex13, "the project participant must inform a Host Party designated national authority (DNA) and the UNFCCC secretariat in writing of the commencement of the project activity and of their intention to seek CDM status. Such notification must be made within six months of the project activity start date". In compliance with above, PP has placed the purchase order (first major investment) on 18/01/2011 for the project activity and subsequently intimated to UNFCCC and the DNA about its intention to seek CDM status within six months of the start date of project activity (date of placing Purchase Orders). The entire chronology has been demonstrated in the above table.

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:

>>

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

$$ER_y = BE_y - PE_y$$

Where:

ER_y = Emission reductions in year y (t CO_2e)

BE_y = Baseline emissions in year y (t CO_2)

PE_y = Project emissions in year y (t CO_2e)

Baseline Emissions:

Baseline emissions include only CO_2 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

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

[29] http://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html?s=20

Where:
BE_y = Baseline emissions in year y (tCO_2)
$EG_{PJ,y}$ = 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 CO_2 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" (tCO_2/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), 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)

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 CO_2 emission factor of NEWNE grid
Source of data used:	Central Electricity Authority:CO_2 Emission Database CEA CO_2 Baseline database Version 07[30]
Value applied:	0.9842
Justification of the choice of data or description of measurement methods and procedures actually	The operating margin emission factor data has been deduced from CO_2 database. CEA CO_2 Baseline database Version 07

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

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 CO_2 emission factor of NEWNE grid
Source of data used:	Central Electricity Authority:CO_2 Emission Database CEA CO_2 Baseline database Version 07
Value applied:	0.8588
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 CO_2 database. CEA CO_2 Baseline database Version 07
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 0.8588

Data / Parameter:	$EF_{grid,CM,y}$
Data unit:	tCO_2/MWh
Description:	Combined margin CO_2 emission factor of NEWNE grid
Source of data used:	Central Electricity Authority:CO_2 Emission Database CEA CO_2 Baseline database Version 07
Value applied:	0.9528
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" based on CEA data.
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 0.9528 tCO_2e.

Annual net electricity supplied to the grid by the project activity
= generation capacity*PLF*8760/1000

= 25.2*22.95%*8760/1000
=50662.584 MWh

So the baseline emission = Emission reductions = 50662.584* 0.9528 = 48273 tCO_2e

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

>>

Year*	Estimation of project activity emissions (tonnes of CO_2)	Estimation of baseline emissions (tonnes of CO_2)	Estimation of leakage (tonnes of CO_2)	Estimation of overall emission reductions (tonnes of CO_2)
Year 1	0	48273	0	48273
Year 2	0	48273	0	48273
Year 3	0	48273	0	48273
Year 4	0	48273	0	48273
Year 5	0	48273	0	48273
Year 6	0	48273	0	48273
Year 7	0	48273	0	48273
Year 8	0	48273	0	48273
Year 9	0	48273	0	48273
Year 10	0	48273	0	48273
Total (tonnes of CO_2)	**0**	**482730**	**0**	**482730**

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
Description:	Quantity of net electricity exported to the grid during the year y.
Source of data to be used:	Certificate for share of electricity generated by Wind Farm.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	50662.584
Description of measurement methods and procedures to be applied:	**Measurement:** The machines of the project activity and machines of other project developers are connected to the Substation The common metering point comprises one main meter & check meter (jointly certified by GUVNL i.e. GETCO and the service provider i.e. Suzlon/ its representative every month) and one ABT meter (ABT meter readings are not certified jointly, although GUVNL, GEDA and GETCO consider this reading as the total energy for billing purpose and used for the

	calculation of sharing of the energy of the individual developers). Consequently, the ABT meter reading reflects the net electricity supplied by the wind farm (both export and import), including the project activity. The net electricity supplied by individual wind turbines is determined by a process of sharing the net electricity recorded at the ABT meter in proportion of the electricity generation recorded by the energy meters at the individual wind turbines. The Sharing of energy is done as per PPA by GETCO. Sharing plan for calculating net electricity exported to the grid is given in section B.7.2. Taking all of the above parameters into consideration the authorized state agency (GETCO) releases a monthly Share Certificate for the net energy exports. This certificate will be used for determining the emission reductions and also for the billing and payment of net sale of electricity from the project. **Data Type:** Calculated **Archiving Procedure:** All the data items monitored under the monitoring plan will be archived electronically and paper for 2 years after the entire crediting period or 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:	All the meters of accuracy class 0.2s are under the purview of GETCO and will be calibrated by GETCO every 3 years as per section 7.2 (iv) of the PPA .The net electricity exported can be cross checked with the sales receipts Also, the generation from each WEG in the wind farm is recorded by an energy meter installed near each machine. The energy meter provides monthly generation data from individual WEG and also records the power consumed by the individual WEG (as explained below). Thus, to cross check; the net electricity supplied to the grid by the project activity WEGs must be lesser than summation of net electricity generated by WEGs of project activity, as measured at the individual energy meter and controller (LCS) of each WEG due to the accounted transmission losses.
Any comment:	The data will be archived for two years after the end of the last crediting period or till the last issuance of CERs for the project activity, whichever is later The ABT meter readings at the substation are recorded by GETCO representative every month.These ABT meters are fully under the jurisdiction of GETCO. The readings of net electricity supplied to the grid by each customer are made

	available on the website of SLDC-Gujarat (GETCO).

Data / Parameter:	$E_{,exp}$
Data unit:	MWh/year
Description:	Electricity exported from each WEG of the project activity during the year y.
Source of data to be used:	Monthly Generation Report prepared by O&M service provider and endorsed by GEDA
Value of data	50662.584
Description of measurement methods and procedures to be applied:	Measurement: The electricity export from each WEG in the windfarm is recorded by an energy meter installed near each machine. The energy meter provides monthly electricity import data from individual WEG. Data Type: Continuous measuring and at least monthly recording 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 maintaining the records. Calibration Frequency: Energy meters will be calibrated atleast once in 3 years.
QA/QC procedures to be applied:	All the energy meters of accuracy class 0.2S are under the purview of GETCO and will be calibrated by GETCO every 3 years as per section 7.2 (iv) of the PPA .
Any comment:	-

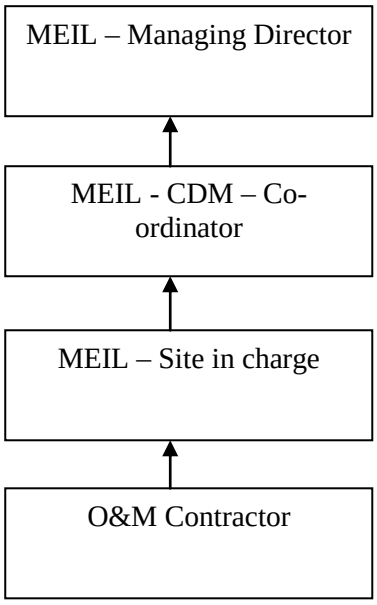
Data / Parameter:	$E_{,imp}$
Data unit:	MWh/year
Description:	Electricity imported from each WEG of the project activity during the year y.
Source of data to be used:	Monthly Generation Report prepared by O&M service provider and endorsed by GEDA. provider
Value of data	0
Description of measurement methods and procedures to be applied:	**Measurement:** Electricity imported will be measured using electricity meter installed at each WEG . Electricity imported by the project is calculated as the sum of values of electricity exported by all WEGs. **Data Type:** Continuous measuring and at least monthly recording Archiving Procedure: All the data items monitored under the monitoring plan will be archived electronically as well as on paper 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:	All the energy meters of accuracy class 0.2S are under the purview of GETCO and will be calibrated by GETCO every 3 years as per section 7.2 (iv) of the PPA .
Any comment:	The power to be imported is very low as compared to the power generated. For ex ante estimation of CER, power imported is assumed to be zero. The data will be archived for two years after the end of the last crediting period or till the last issuance of CERs for the project activity, whichever is later.-

B.7.2. Description of the monitoring plan:

>>

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



The Operation & Maintenance of the project will be done by Suzlon Energy Limited. The individual turbine electricity generation is recorded by the LCS meter (controller) at the individual wind turbine. Also, Every WEG has an individual energy meter connected to it. This meter can measure both import and export of electricity by the individual WEGs. This meter is under the purview of GETCO and will be calibrated by GETCO officials at least once in 3 years. Every month officials from Suzlon measures the electricity export and import from each WEG and issue the monthly generation report to the project proponent which is also endorsed by the GEDA..

There are 2 feeders to which all the 12 WEGs of MEIL are connected. These two feeders also contain WEGs of other customers. The two feeder meters are connected to a single Main and Check Meter at the substation. The Main meter can measure both electricity import and electricity export. Every month Joint Meter Reading is taken at the Main Meter, by GETCO officials in the presence of officials from Suzlon. There is an Availability Based tariff meter installed at the substation. The reading of ABT meter are not certified jointly although GUVNL/GEDA, SLDC consider this reading as the total energy for billing purpose.

Working model for sharing of energy (considered by GETCO)

The model evolved by the state utility (GEDA) and the generating company and the steps involved in this are as follows.

1. Each WTG will have separate metering point which will be read jointly by the representative of the company and the state utility personals (Gujarat Energy Development Agency).Both import and export of electricity by each WTG will be measured by these meters. This will be certified by both the representatives.

2. Considering the total No of WTG in the Project by various investors and the energy recorded in the each WTG meter shall be consolidated and considered as net energy generated from the Wind farm.
3. For calculating the net electricity supplied by the project to the grid the following formula may be considered for understanding.

Share of PP's Net Electricity supplied to grid = (C×Y) / (C+C1+C2+...Cn)

Where:

C = Net generation by 12 WTGs owned by Mytrah Energy (India) Limited

C+C1+C2+C3…….Cn = Total energy generated from the Wind farm from different companies including Mytrah Energy (India) Limited.

Y= The Meter reading by GETCO at the S/s metering point (ABT)

All the above calculations are in accordance with the PPA.

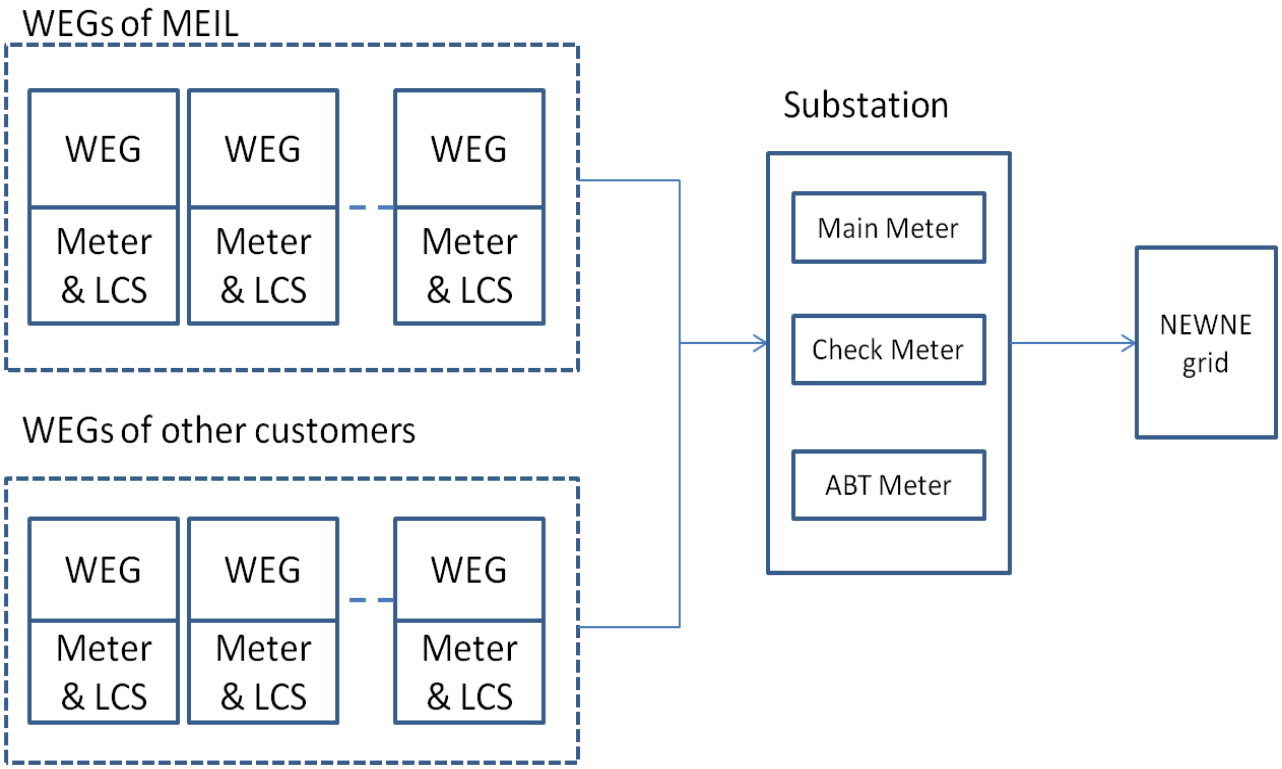
Using the above sharing approach, The SLDC-GETCO will provide the certificate of generation through their web site. This will be considered for raising invoice accordingly payment will be received from GUVNL. This Certificate of Share forms the basis of billing and also emission reduction calculation. The value of net electricity delivered can be cross checked with the monthly invoices.

In case the ABT Meter is not functioning there is a Main and Check Meter located at the substation which also calculates electricity import and export by all customers (whole wind farm). In case the meter located at the individual WEGs fail, the controller readings (LCS) of each WEG that are recorded by the Central monitoring System of Suzlon, shall be used for measuring electricity generation by individual WEGs.

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.

NOTE: The net electricity supplied to the grid by the project activity is a calculated value which is arrived by using the value of electricity generation by project WEGs, non-project WEGs at individual energy meters and the cumulative value of electricity import and export of the entire number of WEGs connected to substation (i.e. including project and non-project WEGs) as measured at the pooling substation. Since the measurement of electricity generation of non-project WEGs at energy meter is non- feasible for PP and The main meter & check meter reading at the substation and ABT meter are under the jurisdiction of GETCO only and are not shared with the individual project developers, hence, these parameter have not been included as the monitoring parameters in section B.7.1of PDD.

The monitoring arrangement, metering system under project boundary has been illustrated in schematic diagram below:



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 baseline study and monitoring methodology: 22/09/2011.
Name of the responsible person/entity: Mytrah Energy (India) Limited (Project Participant)
The details are given in Annex-1

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[31], *"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 order has been placed.

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

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

The expected operational lifetime of the project activity is 20 years.

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

The project proponent has selected the fixed crediting period for the project activity.

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:

>>
15/12/2012or the date of registration of the project with UNFCCC whichever occurs later

C.2.2.2. Length:

>>
10 years and 0 months

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 14 September 2006[32], 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:

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

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

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 occupants of the surrounding villages and the local communities, employees, contractors. Local population is considered to be a major stakeholder with respect to the project activity. Comments were received from the village people. The stakeholder meeting was organized at the project site in Bhojapara village in Surendranagar District of Gujarat State on 07th May 2011. The relevant stakeholders identified were sent personal invitation on 30 April 2011, stating the purpose, date, time and venue of the meeting. The comments were invited and recorded in questionnaire duly filled by every participating stakeholder.

Representative of the project proponent explained the purpose of the meeting and detailed all questions in the questionnaire in the local language. He further explained about the advantages of the wind energy generation and explained how the project would help in reducing demand supply gap of electricity in an environmentally friendly manner.

The villagers wished to know the impact of WEGs on the environment in the region. Further to the discussion, Representative of SEL, explained about the eco-friendly wind power 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.
In general, all stakeholders related to the project activity had a positive opinion on the project activity.

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

>>

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 (MEIL)
Street/P.O.Box:	8001,
Building:	Q-City, S.No: 109,Nanakramguda, Gachibowli
City:	Hyderabad
State/Region:	Andhra Pradesh
Postcode/ZIP:	500032
Country:	India
Telephone:	+91-40- 3376 0100
FAX:	+91-40- 3376 0101
E-Mail:	
URL:	
Represented by:	
Title:	Managing Director
Salutation:	Mr
Last name:	Kailas
Middle name:	
First name:	Vikram
Department:	
Mobile:	
Direct FAX:	+91-40- 3376 0100
Direct tel:	+91-40- 3376 0101
Personal e-mail:	Vikram.Kailas@mytrah.com

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 in Operating Margin (GWh) is shown in the below table.

Net Generation in Operating Margin (GWh)					
	2006-07	2007-08	2008-09	2009-10	2010-11
NEWNE	379,471	401,642	421,803	458,043	476,987
South	109,116	114,634	121,471	134,717	137,387
India	488,587	516,275	543,274	592,760	614,374

The Simple Operating Margin (tCO_2/MWh) (incl. Imports) is shown in the table.

Simple Operating Margin (tCO2/MWh) (incl. Imports)					
	2006-07	2007-08	2008-09	2009-10	2010-11
NEWNE	1.01	1.00	1.01	0.98	0.97
South	1.00	0.99	0.97	0.94	0.94
India	1.01	1.00	1.00	0.97	0.96

The Build Margin in tCO_2/MWh is shown in the table below

Build Margin (tCO2/MWh) (not adjusted for imports)					
	2006-07	2007-08	2008-09	2009-10	2010-11
NEWNE	0.63	0.60	0.68	0.81	0.86
South	0.70	0.71	0.82	0.76	0.73
India	0.65	0.63	0.71	0.80	0.83

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[33].

Share of Must-Run (Hydro/Nuclear) (% of Net Generation)					
	2006-07	2007-08	2008-09	2009-10	2010-11
NEWNE	18.5%	19.0%	17.4%	15.9%	17.6%
South	28.3%	27.1%	22.8%	20.6%	21.0%
India	20.9%	21.0%	18.7%	17.1%	18.4%

From the above table, the use of the Simple OM method is justified as the average share of the low cost/ must run resources in the last 5 years constitutes only 17.68%, which is 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 latest Tool to Calculate Emission Factor, the simple OM may be calculated by one of the following two options:
Option A: Based on the net electricity generation and a CO2 emission factor of each power unit 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.

[33] CEA database Version 07

As per the tool, 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).

Since the data for Option A is available, the Option A is used:

Option A - Calculation based on average efficiency and electricity generation of each plant
Under this option, the simple OM emission factor is calculated based on the net electricity generation of each power unit and an emission factor for each power unit, as follows:

Calculation Approach
The simple OM has been calculated using the formula given below:

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

Where,

EFgrid,OMsimple,y = Simple operating margin CO2 emission factor in year *y* (tCO2/MWh)
EGm,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 = All power units serving the grid in year *y* except low-cost/must-run power units
y = The relevant year as per the data vintage chosen in Step 3

Determination of $EF_{EL,m,y}$

The emission factor of each power unit m has been determined by Option A1, equation 2 of the tool as follows:

$$EF_{EL,m,y} = \frac{\sum_{i} FC_{i,m,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_{m,y}}$$

Where,
Where:
EFEL,m,y = CO2 emission factor of power unit *m* in year *y* (tCO2/MWh)
FCi,m,y = Amount of fossil fuel type *i* consumed by power unit *m* in year *y* (Mass or volume unit)
NCVi,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* (tCO2/GJ)

EGm,y = Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
m = All power units serving the grid in year *y* except low-cost/must-run power units
i = All fossil fuel types combusted in power unit *m* in year *y*
y = The relevant year as per the data vintage chosen in Step 3

Year	Net quantity of electricity generated in OM (GWh)	Net Imports (GWh)	Simple Operating Margin (tCO_2/MWh) (incl. Imports)
2008-09	421802.63	0	1.0066
2009-10	458043.08	4284.01	0.9777
2010-11	476986.72	0	0.9706
Operating Margin (OM) - 3 Year generation weighted average (tCO_2/MWh)			0.9842

Thus the simple operating margin CO2 emission factor for the recent years (2008-09, 2009-10, 2010-11) is 0.9842 tCO_2/MWh

Step 5:Calculate the build margin emission factor:

As per the latest tool to calculate emission factor, Option 1 for calculating Build Margin has been chosen. 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)
$EFEL_{,m,y}$ = CO_2 emission factor of power unit m in year y (tCO_2/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 from CEA Databse Version 07 (2010-11) available has been used and the build margin thus calculated is 0.8588 tCO_2/MWh. CEA calculates Build Margin emission factor in line with the latest "Tool to Calculate Emission Factor" hence using CEA data is justified.

Therefore $EF_{grid,BM,y}$ = 0.8588 tCO_2/MWh

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

The combined emissions factor is calculated as follows.
$EF_{grid,CM,y} = EF_{grid,OM,y} \times W_{OM} + EF_{grid,BM,y} \times W_{BM}$
Where,
$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year y (tCO_2/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 $W_{BM} = 0.25$
Hence the baseline emission factor is calculated as follows.

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

=0.9842*0.75+0.8588*0.25
=0.9528 tCO_2/MWh
Thus the resulting combined emission factor is 0.9528 tCO_2/MWh

Annex 4

The detailed monitoring plan is provided in section B.7.2

Appendix A

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 furnished to host country DNA 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=C xD)**	**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 incurre*	*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*	*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 Host Country DNA on the amount spent on social/community development activity*

	d					*to the current assessment yea*			

Appendix B

Abbreviations

CDM	Clean Development Mechanism
CER	Certified Emission Reductions
CO_2	Carbon Dioxide
GHG	Greenhouse Gas
GWh	Giga Watt hour
IPCC	Intergovernmental Panel on Climate Change
MoEF	Ministry of Environment and Forests
NGO	Non Government Organizations
PDD	Project Design Document
QA	Quality Assurance
QC	Quality Control
UNFCCC	United Nations Framework Convention on Climate Change
HH	Hub Height

Appendix B

Reference List

Sr. No	References
1.	Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) **http://cdm.unfccc.int**
2.	Website of United Nations Framework Convention on Climate Change, **http://unfccc.int**
3.	IPCC National GHG Inventories-2006

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