



Voluntary Carbon Standard Project Description Template

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Version 2

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Table of Abbreviations

Abbreviation	Expanded Form
BE	Baseline Emissions
BIL	Banaspani Iron Limited
BM	Build Margin
BSE	Bombay Stock Exchange
CAPM	Capital Asset Pricing Model
CDM	Clean Development Mechanism
CM	Combined Margin
DOE	Designated Operational Entity
EB	Executive Board
EF	Emission Factor
EIA	Environmental Impact Assessment
ER	Emission Reduction

VCS Project Description Template

GEDA	Gujarat Energy Development Agency
GERC	Gujarat Electricity Regulatory Commission
GETCO	Gujarat Electricity Transmission Corporation
GHG	Green House Gases
Govt.	Government
GUVNL	Gujarat Urja Vikas Nigam Limited
IRR	Internal Rate of Return
MoEF	Ministry of Environment and Forests
NEWNE	Northern, Western, Eastern and North-Eastern Grid
NHPC	National Hydro Power Corporation
NTPC	National Thermal Power Corporation
O&M	Operations and Maintenance
OM	Operating Margin
P&M	Plant and Machinery
PE	Project Emissions
PLF	Plant Load Factor
PMPL	Patnaik Minerals Private Limited
PPA	Power Purchase Agreement
RLDC	Regional Load Dispatch Centre
RPC	Regional Power Committee
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Voluntary Carbon Standard
VCU	Voluntary Carbon Units
WEG	Wind Electric Generator

1 Description of Project:

1.1 Project title

Wind power project by Patnaik Minerals Pvt. Ltd

1.2 Type/Category of the project

The project activity falls under the following types/categories of the Clean Development Mechanism under the Kyoto Protocol:

- "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"

Reference: Approved consolidated baseline methodology ACM0002/Version 09

Scope Number 1

Sectoral Scope - Energy Industries (renewable/non-renewable sources).

The specified project is not a part of a grouped project

1.3 Estimated amount of emission reductions over the crediting period including project size:

S.No.	Years	Emission Reductions, (Tonnes of CO ₂)
1	2007	64,864
2	2008	64,864
3	2009	64,864
4	2010	64,864
5	2011	64,864
6	2012	64,864
7	2013	64,864
8	2014	64,864
9	2015	64,864
10	2016	64,864
Total		648,640

The total emission reductions over the entire ten year crediting period are 648,640 tCO₂.

The project size is 35.2 MW consisting of 44 Wind Electric Generators (WEGs) of individual capacity 800 kW. The average annual emission reductions are in between 5,000 and 1,000,000 tCO₂e per year. Hence, according to

Para 5.1 of the "Voluntary Carbon Standard: Program Guidelines" the project activity falls in the second category i.e. "Projects".

1.4 A brief description of the project:

Description of the project

Patnaik Minerals Pvt. Ltd. (PMPL) is the flagship company of R N Patnaik group. The main line of activities are mining of Iron & Manganese Ore. Starting as a Proprietorship Firm, over the last 44 years (since 1961) it has evolved to be the most reputed mining company in Joda - Barbil region (Dist. Keonjhar, Orissa), which is considered as the hub of Iron Ore mining in India.

The project activity envisages implementation of a 35.2 MW wind power project consisting of 44 Wind Electric Generators (WEGs) of individual capacity 800 kW at Samana Site in Gujarat, India. Out of the 44 WEGs, 38 WEGs are owned by PMPL and Banspani Iron Limited (BIL) owns 6 WEGs. PMPL holds 49.9% shareholding in BIL and is the promoter of the same. In view of PMPL having more knowledge and a better understanding of wind power projects, BIL has opted to entrust the responsibility of negotiating, monitoring and executing the said project activity to PMPL.

The project activity is in line with the sustainable development priorities of the country. The electricity generated from the wind farm will be exported to the regional electricity grid and sold to the state electricity utility, thereby marginally contributing to reducing the energy demand supply gap in the state of Gujarat.

Technology

Enercon India Limited has supplied the wind energy technology to PMPL. WEG is ingeniously devised to convert kinetic energy from "air in motion" directly into electricity without using conventional sources like coal, oil or natural gas for power generation. The project activity implements gearless Enercon E-48 WEGs with synchronous generator, pitch regulation, low cut-in speed and aerodynamic braking system. The specification for the WEGs is provided below.

Emission Reductions from anthropogenic sources

The wind power generated from the project activity will be displacing the electricity generated from fossil fuel fired power stations feeding into regional grid and will be replacing the usage of diesel generators for meeting

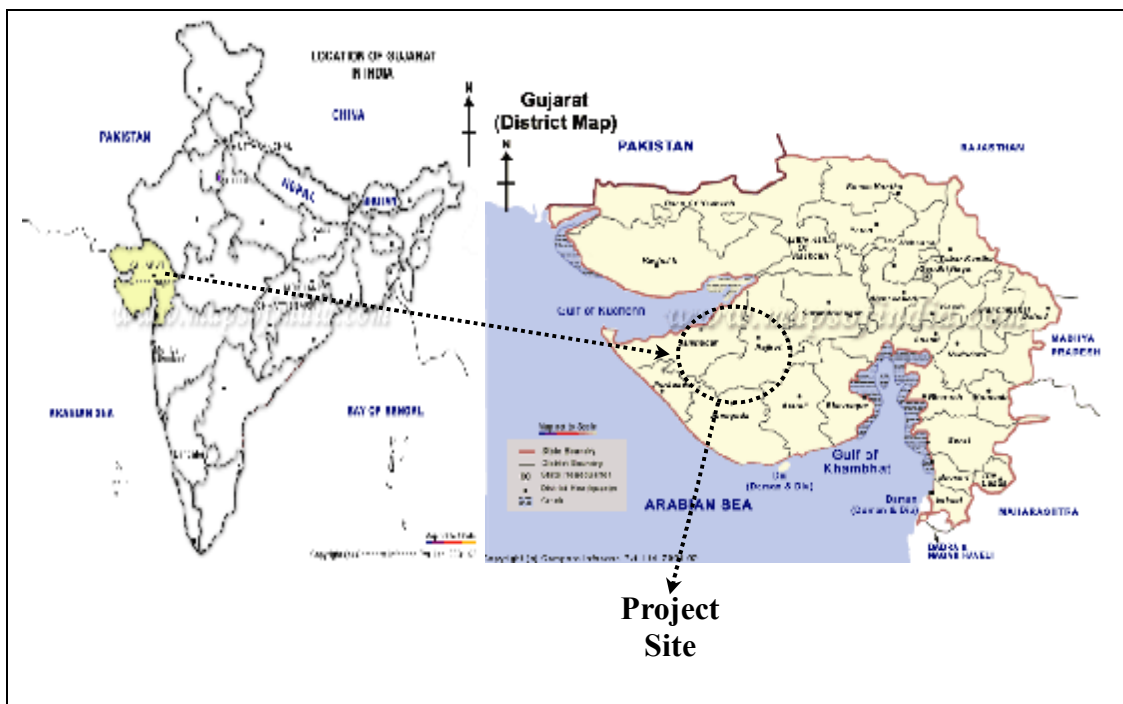
the power demand during shortage periods. Since wind power is Green House Gas (GHG) emissions free, the power generated will prevent the anthropogenic green house gas (GHG) emissions generated by the fossil fuel based thermal power stations comprising coal, diesel, furnace oil and gas. The estimation of GHG reductions by this project is limited to carbon dioxide (CO₂) only.

1.5 Project location including geographic and physical information allowing the unique identification and delineation of the specific extent of the project:

The project activity is located in the Kalavad taluka of Jamnagar district and Upleta taluka of Rajkot District in Gujarat. The nearest airport and railway station is at Jamnagar city, which is located at a distance of approximately 60 kms from the project activity site. The location of each individual WEG being installed as part of the project activity is listed below:

Serial No.	Location No.	Latitude	Longitude
1	81	22°05'54"	70°16'22"
2	82	22°05'48"	70°16'24"
3	83	22°05'41"	70°16'26"
4	84	22°05'35"	70°16'29"
5	85	22°05'28"	70°16'34"
6	86	22°05'20"	70°16'27"
7	87	22°05'15"	70°16'29"
8	88	22°05'09"	70°16'31"
9	89	22°05'03"	70°16'32"
10	90	22°04'56"	70°16'31"
11	91	22°04'58"	70°16'11"
12	92	22°05'05"	70°16'11"
13	93	22°05'11"	70°16'11"
14	94	22°05'18"	70°16'05"
15	96	22°05'31"	70°16'04"
16	97	22°05'38"	70°16'03"
17	98	22°05'44"	70°16'03"
18	99	22°05'38"	70°15'29"
19	100	22°05'32"	70°15'31"
20	101	22°05'26"	70°15'31"
21	102	22°05'19"	70°15'34"
22	103	22°05'12"	70°15'33"
23	104	22°05'05"	70°15'37"
24	105	22°04'33"	70°16'05"
25	106	22°04'26"	70°16'09"
26	107	22°04'20"	70°16'13"

27	108	22°04'13"	70°16'15"
28	109	22°04'05"	70°16'18"
29	110	22°03'59"	70°16'21"
30	111	22°03'34"	70°16'03"
31	112	22°03'28"	70°16'06"
32	113	22°03'21"	70°16'10"
33	114	22°03'16"	70°16'13"
34	501	21°57'46"	70°16'16"
35	502	21°57'53"	70°16'16"
36	503	21°57'60"	70°16'11"
37	504	21°58'03"	70°16'02"
38	507	21°58'26"	70°15'43"
39	508	21°58'31"	70°15'41"
40	510	21°58'46"	70°15'59"
41	511	21°58'50"	70°15'59"
42	512	21°58'55"	70°16'00"
43	513	21°59'01"	70°16'03"
44	514	21°59'05"	70°16'04"



1.6 Duration of the project activity/crediting period:

Project Start date:

21/03/2007 (Date of commissioning of the first WEG in the project)

Commissioning of the project:

21st March 2007

Credit Period start date:

21st March 2007

VCS Crediting Period:

The project claims credits for a ten year crediting period which may be renewed upto two times.

The emission reductions will be claimed until the date of registration under CDM with the UNFCCC.

1.7 Conditions prior to project initiation:

The project is a green-field renewable energy wind project which supplies power to the NEWNE Grid. In the absence of the project activity the electricity delivered to the grid would have been generated by the operation of grid-connected power plants which are dominated by fossil fuel based power stations.

1.8 A description of how the project will achieve GHG emission reductions and/or removal enhancements:

The proposed project activity is an initiative by PMPL to export renewable electricity produced by Wind Electric Generator (WEG) to the power deficit NEWNE region grid in order to decrease power shortage, diversify the grid and reduce greenhouse gas emissions.

In the absence of the project activity, electricity would be generated in the NEWNE grid from fossil-fuel fired power stations that are fossil fuel intensive (during power surplus time) and from the usage of diesel generators for meeting the power demand during shortage periods.

Wind power is Green House Gas (GHG) emissions free. Hence, the power generated from the project activity will prevent the anthropogenic green house gas GHG emissions that would have been generated by the fossil fuel based thermal power stations comprising coal, diesel, furnace oil and gas. The estimation of GHG reductions by this project is limited to carbon dioxide (CO₂) only.

1.9 Project technologies, products, services and the expected level of activity:

Wind turbines produce electricity by using the natural power of wind to drive a generator. Wind has considerable amount of kinetic energy when blowing at high speeds. When this kinetic energy passes over the blades of the wind turbines, it is converted into mechanical energy and rotates the wind blades. When the wind blades rotate, the connected generator also rotates, thereby producing electricity. The Project activity envisages installation of 44 WEGs of E-48 Enercon make (800 kW WEGs). The WEGs generate 3-phase power at 400V, which is stepped up to 33 KV. The project can operate in the frequency range of 46–54 Hz and in the voltage range of 400 V $\pm$ 20%.

The project activity would prevent the anthropogenic green house gas (GHG) emissions that would have been generated by the fossil fuel based thermal power stations comprising coal, diesel, furnace oil and gas that would have been generated in the absence of the project activity.

E-48 TECHNICAL DATA

Rated capacity	: 800 kW
Rotor diameter	: 48 m
Hub height	: 56 m

Rotor with Pitch Control

Type	: Upwind rotor with active pitch control
Direction of rotation	: Clockwise
Number of blades	: 3
Swept area	: 1810 m ²
Blade material	: Fibreglass (reinforced epoxy) with integral lightning protection
Rotor speed	: Variable, 16-31.5 rpm
Tip speed	: 41 - 78 m/s
Pitch control mechanism	: Continuous variable pitching

Generator	: Synchronous - Type This is a multi-pole variable speed generator. Due to this and Power electronics the Gear Box, which steps up the speed to meet the speed of Induction Generator, is eliminated resulting in reduced transmission losses, and elimination of wear and tear of the Gear Box and oil leakage associated with it.
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Hub	: Casted Steel
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Bearings : Tapered roller bearings
Grid Feeding : AC-DC-AC through Converter Invertor
Braking System : 3 independent Aero Brakes with
power back up supply.
Yaw Control : Active through adjustment gears,
friction damping
Cut-in Wind Speed : 3 m/s
Rated Wind Speed : 12 m/s
Tower : Steel Tubular, 56 m height

The technology employed in the project activity is environmentally safe and sound.

1.10 Compliance with relevant local laws and regulations related to the project:

The project activity is in compliance with all applicable legal and regulatory requirements. The implementation of project activity is a voluntary initiative and it is not a mandatory or a legal requirement. For power generation, the Electricity Act 2003¹ does not restrict or empower any authority to restrict the fuel choice, the applicable environmental regulations do not restrict the use of wind energy and there is no legal requirement governing the choice of a particular technology.

1.11 Identification of risks that may substantially affect the project's GHG emission reductions or removal enhancements:

The project activity comprises of a wind power project utilizing well established technology. The project is under successful operation and significant risk affecting the GHG reduction potential of the project activity is not anticipated.

1.12 Demonstration to confirm that the project was not implemented to create GHG emissions primarily for the purpose of its subsequent removal or destruction.

The proposed project activity is an initiative by PMPL to export renewable electricity produced by Wind Electric Generator (WEG) to the power deficit grid in order to decrease power shortage, diversify the grid and reduce greenhouse gas emissions.

¹ <http://www.ippai.org/theElectricityAct2003.pdf>

Thus, it is evident that project proponent has initiated this project with an aim to supply electricity to the grid, and not for creating GHG emissions primarily for the purpose of its subsequent removal.

1.13 Demonstration that the project has not created another form of environmental credit (for example renewable energy certificates).

The project has not created any other form of environmental credit.

1.14 Project rejected under other GHG programs (if applicable):

The project has not been rejected under any other GHG programs.

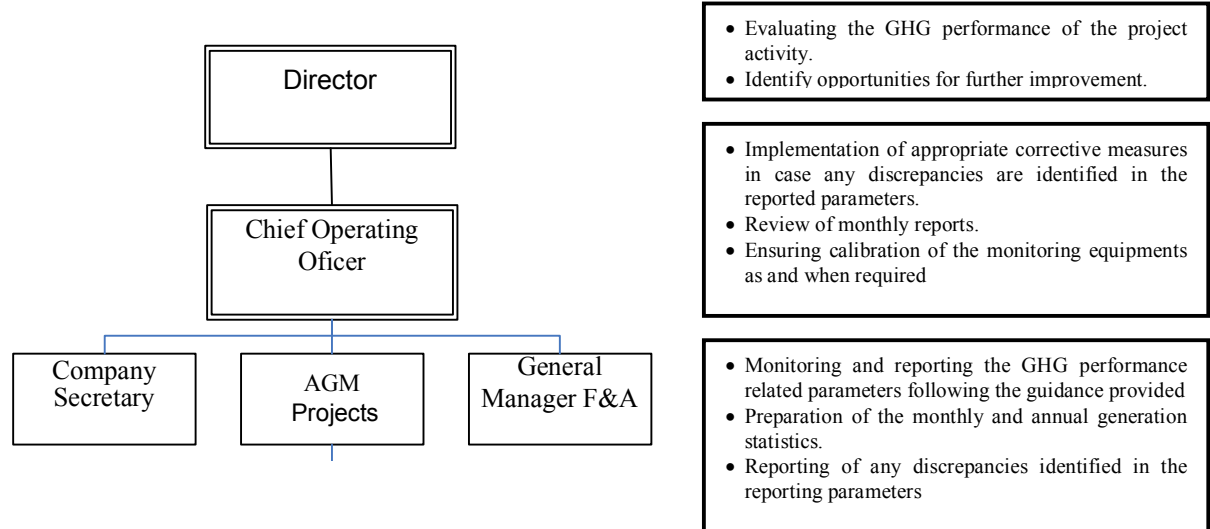
1.15 Project proponents roles and responsibilities, including contact information of the project proponent, other project participants:

To ensure trouble free operations and efficient generations through all the wind turbines, PMPL, the project proponent, has entered into a comprehensive Operation and Maintenance agreement with the manufactures of the turbines for a period of 10 years. The contractor EIL, under the O&M contract with PMPL would be responsible for the operation and maintenance of the project activity for the entire crediting period.

The authority and responsibility of project management, monitoring, measurement and reporting is with PMPL. PMPL has formulated a Project Team to ensure proper and continuous monitoring of the performance of turbines and generation of power. The same has been outlined as follows:

Team Structure

Responsibilities



The O&M personnel are qualified engineers and are trained at the WEG manufacturing facility of Enercon India Limited at Daman for operating and ensuring best performance of the WEGs.

Contact Information

Mr Sanjit Panda
 Patnaik Minerals Private Limited
 Joda Building, Street P.O. Boneikala
 Keonjhar, Orissa
 Postfix-758038, India

Telephone: +91-6767 - 273699
 Fax: +91-6767 - 272066
 E-mail: panda.sanjit@rediffmail.com

1.16 Any information relevant for the eligibility of the project and quantification of emission reductions or removal enhancements, including legislative, technical, economic, sectoral, social, environmental, geographic, site-specific and temporal information.):

Social well being

- The proposed project activity leads to alleviation of poverty in the region by establishing direct and indirect benefits through employment generation and improved economic activities by strengthening of the local grid of the state electricity utility.
- The infrastructure in and around the project area has also improved due to project activity. This

includes development of road network and improvement of electricity quality, frequency and availability as the electricity is fed into a deficit grid.

Economic well-being

- The generated electricity is fed into the NEWNE grid through local grid, thereby improving the grid frequency and availability of electricity to the local consumers (villagers & sub-urban habitants) which will provide new opportunities for industries and economic activities to be setup in the area, thereby resulting in greater local employment, ultimately leading to overall development.
- The project activity also leads to diversification of the national energy supply, which is dominated by conventional fuel based generating units.

Environmental well being

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

Technological well being

- The project activity is utilising the latest technology which is comparable with best practices in the renewable wind based energy sector anywhere in the world. The project also leads to the promotion of Wind Electric Generators (WEGs) in the region demonstrating the success of wind based renewable energy generation. Hence the project leads to technological well being.

1.17 List of commercially sensitive information (if applicable):

No commercially sensitive information has been used.

2 VCS Methodology:

2.1 Title and reference of the VCS methodology applied to the project activity and explanation of methodology choices:

The VCS methodology applied to the project activity is:

Title: “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”

Reference: Approved consolidated baseline methodology ACM0002/Version 09, Sectoral Scope: 1, EB 45

Tools referred in the methodology:

Title: Tool to calculate the emission factor for an electricity system

Reference: Version 01.1, EB 35

Title: Tool for the demonstration and assessment of additionality

Reference: Version 05.2, EB 39

The project primarily displaces power from the NEWNE grid. Hence, the baseline calculation is carried out as per approved large scale CDM methodology ACM0002 and the emission factor as per “Tool to calculate emission factor for an electricity system”.

2.2 Justification of the choice of the methodology and why it is applicable to the project activity:

Justification of the choice of methodology:

The methodology is applicable to grid-connected renewable power generation project activities that involve electricity capacity additions. The project activity is Grid-connected renewable power generation and meets the applicability conditions of the chosen methodology as follows:

Conditions in the methodology	Applicability
<i>The project activity is the installation or modification/retrofit of a power plant/unit of one of</i>	<i>The proposed project activity is a renewable electricity generation project utilising energy</i>

the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit.	from wind to generate electricity. Thus, it meets the first applicability condition.
The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available;	The project activity exports the generated electricity to the western region grid through Gujarat Urja Vikas Nigam Limited (GUVNL). The geographic and system boundaries of the NEWNE grid can be clearly defined and information on the characteristics of the grid is available and being documented in the VCS PD. Thus, this applicability condition is also satisfied.
Applies to grid connected electricity generation from landfill gas to the extent that it is combined with the approved "Consolidated baseline methodology for landfill gas project activities" (ACM0001)	This condition is not required to be satisfied by the proposed project activity as it is a wind power project and is not grid connected electricity generation from landfill gas capture.
5 years of historical data (or 3 years in the case of non hydro project activities) have to be available for those project activities where modification/retrofit measures are implemented in an existing power plant	This is a Greenfield project involving implementation of new wind farm at Samana. Hence it does not require availability of historical data.
This methodology is not applicable to project activities that involve switching from fossil fuels to renewable energy at the site of the project activity, since in this case	Since this is a Greenfield project activity, no fuel switch from fossil fuels to renewable energy at the project site is involved. Hence this applicability condition is also

<i>the baseline may be the continued use of fossil fuels at the site;</i>	satisfied.
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This baseline methodology has been used in conjunction with the monitoring methodology in the approved methodology ACM0002 ("Consolidated baseline methodology for grid-connected electricity generation from renewable sources").

2.3 Identifying GHG sources, sinks and reservoirs for the baseline scenario and for the project:

ACM0002 Version 09 specifies that the project boundary will be:

The **spatial extent** of the project boundary includes the project site and all power plants connected physically to the electricity system that the project power plant is connected to.

The project would be feeding the electricity in the NEWNE grid (Northern, Eastern, Western and North-Eastern grid). The proposed project would have marginal impact on all the generation facilities in the NEWNE grid. Thus, all the power generation facilities connected to this grid form the project boundary for the purpose of baseline estimation.

The wind farm (project activity) has a distinctive physical demarcated boundary.

The greenhouse gases and emission sources included in or excluded from the project boundary are shown in Table below:

	Source	Gas	Included?	Justification / Explanation
Baseline	CO ₂ emissions from electricity generation	CO ₂	Yes	Main emission source
		CH ₄	No	Minor emission source.

	in fossil fuel fired power plants that is displaced due to the project activity.	N ₂ O	No	Minor emission source.
Project Activity	For geothermal power plants, fugitive emissions of CH ₄ and CO ₂ from non-condensable gases contained in geothermal steam.	CO ₂	No	The project activity is a wind power project and not a geothermal project. Thus these emission sources are not applicable to the proposed project.
		CH ₄	No	
		N ₂ O	No	
	For geothermal power plants, CO ₂ emissions from combustion of fossil fuels required to operate the geothermal power plant.	CO ₂	No	The project activity is a wind power project and not a geothermal project. Thus these emission sources are not applicable to the proposed project.
		CH ₄	No	
		N ₂ O	No	
	For hydro power plants, emissions of CH ₄ from the reservoir.	CO ₂	No	The project activity is a wind power project and not a hydro power project. Thus these emission sources are not applicable to the proposed project.
	For all renewable	CO ₂	No	There is no source of backup power

	energy plants, CO ₂ emissions from backup power generation.	CH ₄	No	generation at the project site.
		N ₂ O	No	

2.4 Description of how the baseline scenario is identified and description of the identified baseline scenario:

As per the approved consolidated methodology ACM0002, version 09, since the project activity involves the installation of a new grid-connected wind power plant, 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” Version 01.1.

The project activity uses the “Baseline Methodology Procedure” as described in the applied methodology.

Identification of the baseline scenario

As per the methodology, if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is 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” Version 01.1.

Since the project activity is the installation of a new grid-connected wind power plant hence the baseline scenario is the same as described above. In the following section Combined Margin for the grid has been calculated as per “Tool to calculate the emission factor for an electricity system” Version 01.1.

Identify the relevant electric power system

For the purpose of determining the electricity emission factors, a **project electricity system** is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity (e.g. the renewable power plant

location or the consumers where electricity is being saved) and that can be dispatched without significant transmission constraints.

The Indian power system is divided into two independent regional grids, namely NEWNE grid and Southern grid. Each grid covers several states. 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 their demand with their 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. There are also electricity transfers between regional grids, and small exchanges in the form of cross-border imports and exports (e.g. from Bhutan). Recently, the Indian regional grids have started to work in synchronous mode, i.e. at same frequency.

Table 1: States and Union Territories connected to different regional grids

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

The NEWNE grid constitutes several states. These states under the regional grid have their own power generating stations as well as centrally shared power-generating stations. While the power generated by own generating

stations is fully owned and consumed through the respective state's grid systems, the power generated by central generating stations is shared by more than one state depending on their allocated share. Presently the share from central generating stations is a small portion of their own generation.

Since the project would be supplying electricity to the NEWNE regional grid, it is preferable to take the regional grid as project boundary than the state boundary. It also minimizes the effect of inter state power transactions, which are dynamic and vary widely. Considering free flow of electricity among the member states and the union territory, the entire NEWNE grid is considered as a single entity for estimation of baseline.

Step 2. Select an operating margin (OM) method

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

- (a) Simple OM, or
- (b) Simple adjusted OM, or
- (c) Dispatch data analysis OM, or
- (d) Average OM.

As per the "Tool to calculate the emission factor for an electricity system" Version 01.1, any of the four methods can be used. For the proposed project activity, simple OM method has been chosen to calculate the operating margin emission factor ($EF_{grid, OM, y}$). 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 low-cost/must-run resources are defined as power plants with low marginal generation costs or power plants that are dispatched independently of the daily or seasonal load of the grid. They typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation.

Table: Share of Low Cost / Must-Run (% of Net Generation)

	2005-06	2006-07	2007-08
NEWNE	18.0%	18.5%	19.0%
South	20.1%	20.9%	21.0%
India	20.1%	20.9%	21.0%

Ref: CO₂ Baseline Database for the Indian Power Sector – CEA, Version 04.

Percentage of total grid generation by low cost/must run plants (on the basis of average of three most recent years) = 20.66 %

The calculation above shows that the generation from low-cost/must-run resources constitutes less than 50% of total grid generation, hence usage of the **Simple OM method** in the project case is justified.

The Simple OM emission factor can be calculated using either of the two following data vintages for years(s) y:

- Ex ante option: A 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period,

or

- Ex post option: The year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required to calculate the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year (y-1) may be used. If the data is usually only available 18 months after the end of year y, the emission factor of the year proceeding the previous year (y-2) may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting periods.

The project proponents choose the *Ex ante* option for estimating the simple OM emission factor wherein as described above a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period will be undertaken.

Step 3. Calculate the operating margin emission factor according to the selected method

The simple OM method has been selected as justified above. The simple OM emission factor is calculated as the generation-weighted average CO₂ emissions per unit net

electricity generation (tCO₂/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units.

It may be calculated:

- Based on data on fuel consumption and net electricity generation of each power plant / unit (Option A), or
- Based on data on net electricity generation, the average efficiency of each power unit and the fuel type(s) used in each power unit (Option B), or
- Based on data on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system (option C)

Option A should be preferred and must be used if fuel consumption data is available for each power plant / unit. In other cases, option B or option C can be used. For the purpose of calculating the simple OM, Option C should only be used if the necessary data for option A and option B is not available and can only be used if only nuclear and renewable power generation are considered as low-cost / must-run power sources and if the quantity of electricity supplied to the grid by these sources is known.

In India, the Central Electricity Authority (CEA) has estimated the baseline emission factor for the power sector. This data has also been endorsed by the DNA and is the most authentic information available in the public domain. In calculation of the Simple OM emission factor, they have used **option B** i.e. it is based on data on net electricity generation, the average efficiency of each power unit and the fuel type(s) used in each power unit. The details of same can be found on CEA website at <http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>.

Since Option B has been used, the simple OM emission factor is calculated as follows:

$$EF_{\text{grid,OMsimple,y}} = \frac{\sum_m EG_{m,y} \cdot EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

Where:

$EF_{grid, OMsimple, y}$ = Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)

$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year y (Mwh)

$EF_{EF, m, y}$ = CO_2 emission factor of power unit m in year y (tCO_2 / Mwh)

m = All power units serving the grid in year y except low-cost/must – run power units

y = Either the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex-ante option) or the applicable year during monitoring (ex-post option) following the guidance on data vintage in Step 2

The emission factor of each power unit m should be determined as follows:

Option B1. If for a power unit m data on fuel consumption and electricity generation is available, the emission factor ($EF_{EL,m,y}$) should be determined as follows:

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

Where:

$EF_{EL,m,y}$ = CO_2 emission factor of power unit m in year y (tCO_2/MWh)

$FC_{i,m,y}$ = Amount of fossil fuel type i consumed by power unit m in year y (Mass or volume unit)

$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)

$EF_{CO2,I,y}$ = CO_2 emission factor of fossil fuel type i in year y (tCO_2/GJ)

$EG_{m,y}$ = 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 = Either the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option) or the applicable year during

monitoring (ex post option), following the guidance on data vintage in step 2

Step 4. Identify the cohort of power units to be included in the build margin

The sample group of power units m used to calculate the build margin consists of either:

- a) The set of five power units that have been built most recently, or
- b) The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

Project participants should use the set of power units that comprises the larger annual generation.

Since in India, the installed capacity and corresponding annual generation from power plants is quite high, the sample group containing set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently comprise the sample group with the larger annual generation. Thus the sample group m consisting of option (b) is used for the estimation of build margin.

In terms of vintage of data, project participants can choose between one of the following two options:

Option 1: For the first crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2: For the first crediting period, the build margin emission factor shall be updated annually, ex-post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for

which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex-ante, as described in option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

The project proponent wishes to choose option 1.

Step 5. Calculate the build margin emission factor

The build margin emissions factor is the generation-weighted average emission factor (tCO₂/MWh) of all power units m during the most recent year y for which power generation data is available, calculated as follows:

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

Where:

$EF_{\text{grid, BM}, y}$ = 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)
 $EF_{\text{EL}, m, y}$ = CO₂ emission factor of power unit m in year y (tCO₂ / Mwh)
 m = Power units included in the build margin
 y = Most recent historical year for which power generation data is available

Calculations for the Build Margin emission factor $EF_{\text{grid, BM}, y}$ is based on the most recent information available on the plants already built for sample group m at the time of PDD submission. The sample group m consists of the power plant capacity additions in the electricity system that comprise 20 % of the system generation and that have been built most recently.

Step 6. Calculate the combined margin emissions factor

The combined margin emissions factor is calculated as follows:

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

Where:

- $EF_{grid,BM,y}$ = Build margin CO₂ emission factor in year y
(tCO₂/MWh)
- $EF_{grid,OM,y}$ = Operating margin CO₂ emission factor in year y
(tCO₂/MWh)
- w_{OM} = Weighting of operating margin emissions
factor (%)
- w_{BM} = Weighting of build margin emissions factor
(%)

The following default values should be used for w_{OM} and w_{BM} :

- Wind and solar power generation project activities:
 $w_{OM} = 0.75$ and $w_{BM} = 0.25$ (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods.
- All other projects: $w_{OM} = 0.5$ and $w_{BM} = 0.5$ for the first crediting period, and $w_{OM} = 0.25$ and $w_{BM} = 0.75$ for the second and third crediting period, unless otherwise specified in the approved methodology which refers to this tool.

As mentioned before, the CEA has calculated the baseline emission factors for various regional grids in India according to the formulas specified above. As this is the most authentic information available in the public domain. The baseline emission factor used in the calculation of baseline emissions for the proposed project activity is being referred from the same for transparency and conservativeness².

Project activity emissions

According to the chosen baseline methodology ACM0002 Version 09, for wind energy based renewable energy project activities, $PE_y = 0$.

Leakage

According to ACM0002 Version 09, the main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction, fuel handling (extraction, processing, and transport), and land inundation (for hydroelectric projects). Project participants do not need to consider these emission sources as leakage in applying this methodology. Project activities using ACM0002 shall not claim any credit for

²

<http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>

the project on account of reducing these emissions below the level of the baseline scenario. Thus the leakage emissions are nil.

2.5 Description of how the emissions of GHG by source in baseline scenario are reduced below those that would have occurred in the absence of the project activity (assessment and demonstration of additionality):

The additionality of the project activity has been assessed using the “Project Test -1” of VCS 2007.1 which includes:

Step 1: Regulatory Surplus

The project shall not be mandated by any enforced law, statute or other regulatory framework.

The project activity is not mandated by any state or national laws. The project proponent was not bound by any legislative mandate to implement the project activity.

Step 2: Implementation Barriers

The project shall face one (or more) distinct barrier(s) compared with barriers faced by alternative projects.

- *Investment Barrier – Project faces capital or investment return constraints that can be overcome by the additional revenues associated with the generation of VCUs.*
- *Technological Barriers – Project faces technology-related barriers to its implementation.*
- *Institutional barriers – Project faces financial, organizational, cultural or social barriers that the VCU revenue stream can help overcome.*

Investment Barrier

PMPL has adopted the benchmark analysis to assess the financial attractiveness of the project activity. This method determines the attractiveness of the project activity for the investors, as well as provides a measure of the viability of the investment to generate revenues during its operation, as compared with other avenues and investment options. Hence, the Benchmark analysis method is to be employed for analysis of the said project.

Benchmark analysis

The Project proponent has opted to analyse the additionality of the project using the benchmark analysis. ‘Internal Rate of Return’ is one of the most widely accepted financial indicators used by banks,

financial institutions and project developers for making investment decisions. The project proponents have hence identified IRR (Internal Rate of Return) as the most appropriate financial indicator for the project and carried out an investment analysis of the project activity.

According to the “Tool for demonstration and assessment of Additionality”, the financial indicator can be based either on (1) project IRR or (2) equity IRR. There is no general preference between the approaches (1) or (2). The benchmark chosen for analysis shall be fully consistent with the choice of approach. The returns from the investment in the project activity for PMPL and BIL have been estimated separately using the project IRR³ and compared it with the benchmark which has been determined in accordance with para 6(a) sub step 2b of the Additionality tool i.e. Government bond rates increased by a suitable risk premium to reflect private investment and / or project type.

The benchmark has been calculated using the Capital Asset Pricing Model (CAPM). As per CAPM, the required return on investment is the return of a risk-free security (government bond rates) plus beta times the difference between the market return and the risk-free return. The weighted average yield of Government of India Securities has been taken to represent the risk free return. Well diversified Stock market index has been used to represent the market return.

CAPM can provide the required rate of return that a project needs to yield, taking into account the volatility (risk) of the stock relative to the market (Beta). This required return is estimated as follows:

$$R_i = R_f + \beta (R_m - R_f)$$

where:

R_i = Rate of return

R_f = Risk-free rate of return;

β = Beta or systematic risk coefficient reflecting the volatility (risk) of the stock relative to the market;

R_m = Expected market returns;

$R_m - R_f$ = Market risk premium;

³ Based on Post-tax financial Internal Rates of Return of the project over the operational lifetime of the project (20 years)

Risk free rate:

The date of investment decision of the proposed project activity is 3rd March, 2006. At the time of start of the project the data available for the weighted average yield of Government of India Securities was that of the year 2005-06, which was 7.34% (source: Table – 7.5, Reserve Bank of India Annual Report 2008.web-link: <http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/86531.pdf>).

The β in the CAPM equation helps to account for the systematic risk by quantifying the sensitivity of the stocks of the companies representing a particular project type/sector with the market returns. Thus, it incorporates the risk of a specific sector in the calculation of the benchmark. The Beta value taken for this analysis is based on the beta values of the listed power companies engaged in similar business as the project activity at the time of investment decision estimated by regressing weekly returns on stock against local index, using 3 years of data. The equity beta values have been taken from Bloomberg⁴.

Company Name	Equity Beta (Levered)
Tata Power Co Ltd	1.272
Neyveli Lignite Corporation	1.527
CESC Limited	1.402
Gujarat Inds Power Co Ltd	1.297
Reliance Energy	0.91
NTPC Limited	0.926
BF Utilities Ltd	1.362

BF Utilities was the only one company identified with mainstream wind power business, listed on the Indian bourses and actively traded with a historic beta value of 1.362. Hence, the portfolio of the companies considered for the study was widened to include the companies with significant investment in the power sector including in renewable and non renewable energy.

Conventional power plants supply firm power, operate on higher Plant Load Factor (PLF) and are not subject to the vagaries of nature as wind power plants. Wind power

⁴ Screenshots from Bloomberg terminal are submitted

projects on the other hand operate at much lower PLF and have much higher capital costs. Thus, from the perspective of a private investor, investments in thermal power plants are a safer option.

Thus, the use of the beta value for companies involved in renewable as well as non-renewable power projects is conservative, the same has been considered appropriate for the analysis.

Accordingly, the equity betas for the power sector companies considered provide an estimated beta for the power sector. In order to eliminate the company specific gearing associated with these betas, these equity betas have been adjusted for debt and tax⁵ to provide unlevered asset betas. The asset beta is obtained using the following formula:

$$\text{Modigliani - Miller Formula: } b_{\text{asset}} = b_{\text{equity}} / (1 + (1 - t) * (D/E))$$

The resulting asset beta values obtained are as follows:

Company Name	Asset Beta
Tata Power Co Ltd	0.84
Neyveli Lignite Corporation	1.36
CESC Limited	0.61
Gujarat Inds Power Co Ltd	0.56
Reliance Energy	0.58
NTPC Limited	0.69
BF Utilities Ltd	0.81

From the above, to be most conservative, minimum beta value of 0.56 observed for Gujarat Inds Power Co. Ltd. has been used to estimate the benchmark.

R_m – R_f (Market Risk Premium)

The market risk premium is the return that an investor expects over and above the risk free return available in the market. The market return has been estimated from the inception of the well diversified BSE-500 index till the project investment decision using historical approach. This represents the historical differential return of the market and the risk-free rate. The most common method of calculating this is the difference between historical return of the stock market index and the risk free rate. The differential can be calculated as arithmetic or

⁵ Pertinent data has been taken from Annual Reports for each company

geometric average. The geometric average⁶ usually is a more accurate representation of the risk premium, accordingly the market risk premium has been calculated as the historical geometric mean return on the stocks (using the BSE-5007 Index) minus the return on government securities. This would give the incremental returns over and above the risk free rate.

Market Risk Premium

$$= 19.17\% - 7.34\%$$

$$= 11.83\%$$

Rate of return on equity represented by govt. bond rates increased by market risk premium

$$R_i = R_f + \beta (R_m - R_f)$$

$$= 7.34\% + 0.56 \times 11.83\%$$

$$= 13.94\%$$

Hence the benchmark for the project activity is calculated as 13.94%.

Comparison of benchmark with Rate of Return for project:

The IRR for the proposed project activity with and without CDM revenues was computed for a period of 20 years, corresponding to the lifetime of the wind farm separately for PMPL and BIL based on the following assumptions⁸:

Table: Parameters of PMPL for Financial Calculations

Parameters	Unit	Value	Source
Time Period for IRR computed	Yrs.	20	Equal to lifetime of

⁶ The compounded return is computed by taking the value of the investment at the start of the period (Value₀) and the value at the end (Value_N), and then computing the following:

$$\text{Geometric Average} = \left(\frac{\text{Value}_N}{\text{Value}_0} \right)^{1/N} - 1$$

⁷ <http://www.bseindia.com/histdata/hindices.asp>.

⁸ The investment analysis includes various benefits available to the project activity from the national and sectoral policies for promoting renewable energy generation in India existing before 2001. i.e. the project results in the following tax benefits;

- accelerated depreciation u/s 32 of the Income Tax Act, 1961; and
- tax holiday for 10 out of first 15 years u/s 80IA of the Income Tax Act subject to Minimum Alternative Tax (MAT) u/s 115JB of the Income Tax Act.

Accelerated depreciation was introduced with effect from April 1, 1987 and Section 80IA benefit with effect from April 1, 2000.

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			the project
Total Capacity of wind-farm	MW	30.40	Purchase Order
Number of WEGs	Nos.	38	Purchase Order
Plant Load Factor Projected by Technology Supplier	%	24.97%	Calculated from Purchase Order
Expected Annual Generation	kWh Per WEG	1750000	Purchase Order
Line losses and losses on account of grid and machine availability	%	7.00	Line losses assumed based on actual historical data shared by technology suppliers. Grid availability has been conservatively assumed as 95% based on historical data
Depreciation (P&M)	% per Annum	80.00	As per Income Tax Act, 1961
Depreciation (Other P&M)	% per Annum	15.00	As per Income Tax Act, 1961
Depreciation (Civil Works)	% per Annum	10.00	As per Income Tax Act, 1961
Depreciation (Under Companies act)	% per Annum	5.28	As per Companies Act
Income Tax Rate	% per Annum	33.66	As per Income Tax Act, 1961
Cost per WEG	Rs. In Lakhs	386.80	Purchase Order
GUVNL Tariff Rate per kWh	Rs. Per KWH	3.37	GERC Order, PPA
Annual Operation and Maintenance, Security expenses	Rs. In Lakhs/WEG	4.50	O&M agreement
Administrative & Employee Expense	Rs. In Lakhs per annum	3.45	Conservative value based on salaries and wages of employees
Insurance for each WEG	Rs. In Lakhs per annum	0.53	Insurance policy
Total Project Cost	Rs. In Lakhs	14,698.40	Purchase Order

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Equity	Rs. In Lakhs	4,281.76	Calculated (Total cost - debt)
Debt	Rs. In Lakhs	10,416.64	As per actual loan drawl

Table: Parameters of BIL for Financial Calculations

Parameters	Unit	Value	Source
Time Period for IRR computed	Yrs.	20	Equal to lifetime of the project
Total Capacity of wind-farm	MW	4.8	Purchase Order
Number of WEGs	Nos.	6	Purchase Order
Plant Load Factor Projected by Technology Supplier	%	24.97%	Calculated from Purchase Order
Expected Annual Generation	kWh Per WEG	1750000	Purchase Order
Line losses and losses on account of grid and machine availability	%	7.00	Line losses assumed based on actual historical data shared by technology suppliers. Grid availability has been conservatively assumed as 95% based on historical data
Depreciation (P&M)	% per Annum	80.00	As per Income Tax Act, 1961
Depreciation (Other P&M)	% per Annum	15.00	As per Income Tax Act, 1961
Depreciation (Civil Works)	% per Annum	10.00	As per Income Tax Act, 1961
Depreciation (Under Companies act)	% per Annum	5.28	As per Companies Act
Income Tax Rate	% per Annum	33.66	As per Income Tax Act, 1961
Cost per WEG	Rs. In Lakhs	385.60	Purchase Order
GUVNL Tariff Rate per kWh	Rs. Per KWH	3.37	GERC Order, PPA
Annual Operation and	Rs. In	4.50	O&M agreement

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Maintenance, Security expenses	Lakhs/WEG		
Administrative & Employee Expense	Rs. In Lakhs per annum	0.54	Conservative value based on salaries and wages of employees
Insurance for each WEG	Rs. In Lakhs per annum	0.53	Insurance policy
Total Project Cost	Rs. In Lakhs	2,313.60	Purchase Order
Equity	Rs. In Lakhs	904.85	Calculated (Total cost - debt)
Debt	Rs. In Lakhs	1408.75	As per actual loan drawl

The financial internal rate of return without CDM revenues for PMPL and BIL are 11.15 % and 11.24% respectively, which are both much lower than the benchmark for the project activity. Therefore it is clear that the incentive through sale of the emission reductions would improve the returns from the project activity. Hence, it can be justifiably concluded that CDM revenue that the project activity would obtain through sale of the emission reductions, is very crucial to sustain the operations of the project activity.

Sensitivity analysis

The sensitivity of returns from the project activity has been evaluated for variations in the following parameters:

1. Generation
2. Capital Cost
3. O&M Cost

Parameter	Generation Variation	IRR		Comments
		PMPL	BIL	
Net Generation from wind farm	-10%	9.36	9.41	PLF may increase or decrease due to change in wind patterns. However

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	Base	11.15	11.24	considering the prevailing wind patterns and operating conditions, it is very unlikely that the generation will increase considerably.
	+10%	12.79	12.91	

Parameter	Capital Cost Variation	IRR		Comments
		PMPL	BIL	
Capital Cost of the wind farm	-10%	13.32	13.51	The capital cost is based on purchase orders and therefore there can be no variation in the same. Though the variation is not a realistic scenario as per the EB's guidance the sensitivity of +/- 10% has been analysed.
	Base	11.15	11.24	
	+10%	9.37	9.39	

Parameter	O&M Cost Variation	IRR		Comments
		PMPL	BIL	
O&M Cost for the wind farm	-10%	11.39	11.49	The O&M cost incurred by PMPL during project construction and operation stages was subjected to sensitivity analysis.
	Base	11.15	11.24	
	+10%	10.90	10.98	

The purpose of the sensitivity analysis is to demonstrate that the conclusions arrived at above are robust to reasonable variations in the critical assumptions such as generation, capital cost and O&M cost.

The results of the sensitivity analysis conducted confirm that the returns from the project do not exceed the required benchmark even with variations in project parameters.

Hence, it can be justifiably concluded that the project is not a financially attractive option and CDM revenue that the project activity would obtain through sale of the emission reductions, is very crucial to sustain the operations of the project activity.

Step 3: Common practice analysis

Analysis of other activities similar to the proposed project activity:

The following table indicates the state wise wind power potential in India vis-à-vis the total capacity installed as on 31/03/2006:

Table 7: State wise wind power Potential and installed capacity⁹:

Sl. No.	State	Gross Potential (MW) (a)	Technical Potential (MW) (b)	Installed Capacity (MW) (c)
1.	Andhra Pradesh	8275	1920	121.1
2.	Gujarat	9675	1780	338.1
3.	Karnataka	6620	1180	584.6
4.	Kerala	875	605	2.0
5.	Madhya Pradesh	5500	845	40.25
6.	Maharashtra	3650	3040	1001.15
7.	Orissa	1700	780	2
8.	Rajasthan	5400	910	358.06
9.	Tamilnadu	3050	1880	2892.5
10.	West Bengal	450	450	1.1
11.	Other States	-	-	1.6
	Total	45195 MW	13390	5340.6 MW

- As on 31/03/2006, the total installed capacity of power generation in India through all power

⁹ <http://www.windpowerindia.com/stateest.html>

generation (coal, gas, nuclear, hydro and others) sources is 121392.3 MW¹⁰ whereas the installed capacity of wind power in India is 5340 MW¹¹. Thus only 4.4 % of the total installed capacity in India is through wind generation sources. Given that the gross potential for wind power in India is 45195 MW, the exploitation of the technology is very low.

- The state of Gujarat has the highest gross potential for wind power generation among all other states; however the installed capacity in the state is much lesser than states such as Tamil Nadu, Maharashtra and Karnataka. Out of 9675 MW gross potential for power generation from wind in Gujarat, only 338.1 MW of wind power has been installed till 31st March 2006, which is just 3.5 % of the gross potential of wind power in the state.
- In the year 2005-06, the total power generated from all sources of power generation in Gujarat was 45070.44 Million Units whereas the power generated from wind power projects was only 1613.04 Million Units¹² constituting only 3.6 % of the total power generated.

Analysis of similar options that are occurring:

Wind projects of similar scale

According to Tool for demonstration and assessment of additionality (Version 5.2), similar project activities are those that “rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing etc”.

The project activity under consideration is a large scale project activity with an installed capacity of 35.2 MW. Similar project activity have thus been defined as any large scale project activity with size above 15MW and set up by a single project proponent within a particular time frame in the state of Gujarat for the sale of power to the grid.

¹⁰ Indian Wind Power Directory 2006

¹¹ <http://www.windpowerindia.com/statstate.html>

¹² Indian Wind Power Directory 2006

The projects excluded from the definition of a similar scale project and which have applied for additional funds from carbon due to various risks is provided below:

1. Captive wind power projects - A captive wind project is different from the project selling its generated output in the following ways:
 - a. A captive project is essentially implemented to meet the power requirements of an industry. Thus, there is a definite need for power which has to be secured from some sources. For meeting this requirement, the investor is likely to try and secure the cheapest and most attractive source of power. The investment will be justified only if the cost of generation through captive installation is lesser than the HT tariff offered by the grid to draw power. The baseline scenario will be different for such an investor and the risk undertaken by a captive investor will be different from an investor selling power to the grid.
2. Small scale wind power project activities bundled together from a large scale CDM project have not been considered for the analysis as the scale of these projects and the investment climate is not comparable to the project activity under consideration.
3. CDM Project activities i.e. Projects which are under the CDM pipeline have to be excluded as per the guidance provided by the "Tool for demonstration and assessment of additionality".
4. Project activities implemented post the start date of the project activity i.e. post 30th October 2006, since for common practice analysis as per the guidance, only those projects can be compared which are operational prior to the start of the proposed project activity by PMPL. Adopting a conservative approach, the analysis of similar projects has covered the period up to 31st December 2006.

The wind projects of similar scale commissioned in state of Gujarat at the time of investment in the project activity and beyond up to i.e. as on 31st December 2006 (post the start date of PMPL's wind project) were analysed from the list of projects commissioned and under operation in Gujarat available in the Indian wind Power Directory 2006, CDM Pipeline and data from WEG suppliers. Further the data on private wind farm owners in India with an aggregate capacity of 15 MW and above in India as

on 31st March 2007¹³ was also analysed for large scale private investment in Gujarat for comparison to PMPL's project activity.

Following projects were excluded from the common practice analysis due to the reasons stated alongside:

Investor name	Size in Gujarat (MW)	Distinction/Reason for exclusion
Gujarat NRE Coke	1.25+ 26.25 = 27.5	1. The project activity has also considered CDM and is currently in the CDM pipeline: ✓ Part of 22.3 MW Bundled grid connected Wind Power based electricity generation project in Gujarat http://cdm.unfccc.int/Projects/Validation/DB/Ow17ZTWQUdGVXQGE059WCBOC9C6LIR/view.html ✓ 26.25 MW wind electricity generation project of Gujarat NRE Coke Limited at Jamnagar and Kachchh http://cdm.unfccc.int/Projects/Validation/DB/2WHFROEPK85ARNQ1TVKJV4WC8ATMAB/view.html Since the project activity is under CDM, it has been excluded from common practice analysis.
Gujarat Guardian Ltd.	31.6	a. The Project activity is considering carbon finance and has already received carbon benefits through the Voluntary VER route: http://www.carbonneutral.com/cnregistry/uploaded/Jamnagar%20Wind%20Power%20Projects%20PDDs.pdf 23.2 MW capacity is included under the webhosted VER PDD validated under the Voluntary Carbon standard. After deducting the project size of 23.2 MW from the total installed capacity of project proponent in Gujarat, only 8.4 MW capacity project is left which is less than 15 MW and hence cannot be compared to PMPL's project. b. Further, the project is different from the wind power project by PMPL since it is a captive installation utilizing the generated output from its project for self utilization at its industry premises which is evident from the VER PDD above. c. Furthermore, the project activity has

¹³ <http://www.windpowerindia.com/statpriv.html>

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		already applied for CDM benefits. <u>Due to above reasons, the project is different and it has been excluded from common practice analysis.</u>														
Indian Petrochemicals Co. Ltd	15.315	The project was commissioned phase-wise and got completed in March 1997, the regulatory environment then prevailing and the policies pursued were different from those existing at the time of the start of proposed project activity by PMPL. <table><tr><th>Capacity (MW)</th><th>Date of Commissioning</th></tr><tr><td>2.25</td><td>Sep-96</td></tr><tr><td>5.625</td><td>Mar-96</td></tr><tr><td>2.7</td><td>Mar-97</td></tr><tr><td>2.8</td><td>Mar-96</td></tr><tr><td>0.54</td><td>Mar-96</td></tr><tr><td>1.4</td><td>Mar-97</td></tr></table> The differences in regulatory environment are as below: For IPCL Project – The project was installed under the Incentive scheme for wind power generation 1993 which was applicable for the period from January 1993 – September 2001. The salient features of the scheme are: ✓ Purchase of electricity at INR 1.75 /kWh (US\$ 0.039 /kWh) with wheeling charges of 2% of the energy generated by windmills and provision of banking for a period of 6 months. Electricity duty and demand cut to the extent of 30% of installed capacity of wind farm has been exempted along with 50% sales tax incentives. Additionally the generator was exempted from the electricity duty over the generated electricity. [Source: (a) Para (v)-(ix), pp. 2-3, Incentive Scheme for Wind Power Generation 1993, Govt. Resolution No. EDA-1092- M (I)-8(1)-E, dated 27.1.1993. (b) Para 6, page 4, Sales-tax incentive scheme for Wind Power Generation, 1993, Govt. Resolution No. EDA-1092-M (I)-8(2)-E, dated 27.1.1993] For PMPL Project – The project has been installed under the Gujarat Electricity Regulatory Commission order dated 11th August 2006 – In the matter of Determination of price for procurement of	Capacity (MW)	Date of Commissioning	2.25	Sep-96	5.625	Mar-96	2.7	Mar-97	2.8	Mar-96	0.54	Mar-96	1.4	Mar-97
Capacity (MW)	Date of Commissioning															
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2.8	Mar-96															
0.54	Mar-96															
1.4	Mar-97															

VCS Project Description Template

		power by the Distribution Licensees in Gujarat from Wind Energy Projects. The salient features of the order are: ✓ Purchase of electricity at INR 3.37/kWh (US \$ 0.075 /kWh) fixed for entire project lifetime of 20 years. The wheeling charges are kept constant at 4% in accordance with the previous policy including the banking period of 6 months. A brief description of the different regulatory environment is also provided on the following web-link: http://www.geda.org.in/wind/wind_power.htm Additionally, the project is a captive project as identified from the following web-link: http://sebidifar.nic.in/documents/IPCL/ar032002.pdf Page 21 of the document which clearly mentions that the electricity generated from the turbines is wheeled and utilized for internal consumption. <u>Thus this project has been excluded from the common practice analysis.</u>
Ratnamani Metals and tubes Limited	17.5	The project activity has been implemented in phases. The first phase of around 5 MW has been included under two bundled CDM project activities - 1. 22.3 MW Bundled grid connected Wind Power based electricity generation project in Gujarat and 2. 13.7 MW Bundled Grid-connected wind electricity generation in Jamnagar & Kachchh, Gujarat. 1. http://cdm.unfccc.int/UserManagement/FileStorage/X6RZB5RJQDTY6C6PF4A38DSNXH2FL4 2. http://cdm.unfccc.int/Projects/Validation/DB/HAZNBLU455HVN7QGA4I3R7T5JWWLT/view.html Post these bundled projects the second phase consisting of 13.25 MW has been proposed as a separate CDM project activity implemented post January 2007 - 13.25 MW Wind Power Generation by RMTL, in Kutch, Gujarat. http://cdm.unfccc.int/Projects/Validation/DB/FQOM561A0WJL6VAG2NT568TNPCLZCG/view.html <u>Thus, since the project activity is under CDM, it has been excluded from common practice analysis.</u>
SREI	24.8	The project has been implemented in March 2007

Infrastruc ture		and was not under operation at the start of the PMPL project activity. Furthermore, the Annual Reports of the company for the year 2006-07 and 2007-08 specifically bear a mention of availing CDM benefits for its renewable energy projects. http://www.srei.com/srei_pdf/sreiannual/2006-07.pdf http://www.srei.com/srei_pdf/sreiannual/2007-08.pdf Thus since the project was not under operation at the time of start of the PMPL project activity, it has been excluded from common practice analysis.
MSPL Ltd.	30	The Project is under CDM as part of the project activity - "30 MW wind power project at Surajbari, Gujarat in India" - http://cdm.unfccc.int/Projects/Validation/DB/L590GCJY0XLZUC0W8MMB84A2T4NKNX/view.html Further, according to the PDD the purchase orders for the project were placed on 19th December 2006 and hence the project was not under operation at the start of the PMPL project activity. Since the project activity is under CDM, it has been excluded from common practice analysis.

Thus, after exclusion of the above project activities, as stipulated by the guidance for conducting common practice analysis, **it was found that all projects of similar scale project activities under operation in the state of Gujarat at the time of start of the proposed project activity by PMPL were seeking additional carbon funds to mitigate various risks with the respective projects.**

From the above discussions it is clear that the project activity is additional and requires CDM revenues.

3 Monitoring:

3.1 Title and reference of the VCS methodology (which includes the monitoring requirements) applied to the project activity and explanation of methodology choices:

The monitoring methodology applied to the project activity is:

Title: “Consolidated monitoring methodology for grid-connected electricity generation from renewable sources”

Reference: Approved consolidated monitoring methodology ACM0002/Version 09, Sectoral Scope: 1, EB 45

3.2 Monitoring, including estimation, modelling, measurement or calculation approaches:

The monitoring plan is being devised as per approved consolidated monitoring methodology ACM0002 Version 09 - **“Consolidated monitoring methodology for grid-connected electricity generation from renewable sources”**.

The methodology requires monitoring of the following parameters:

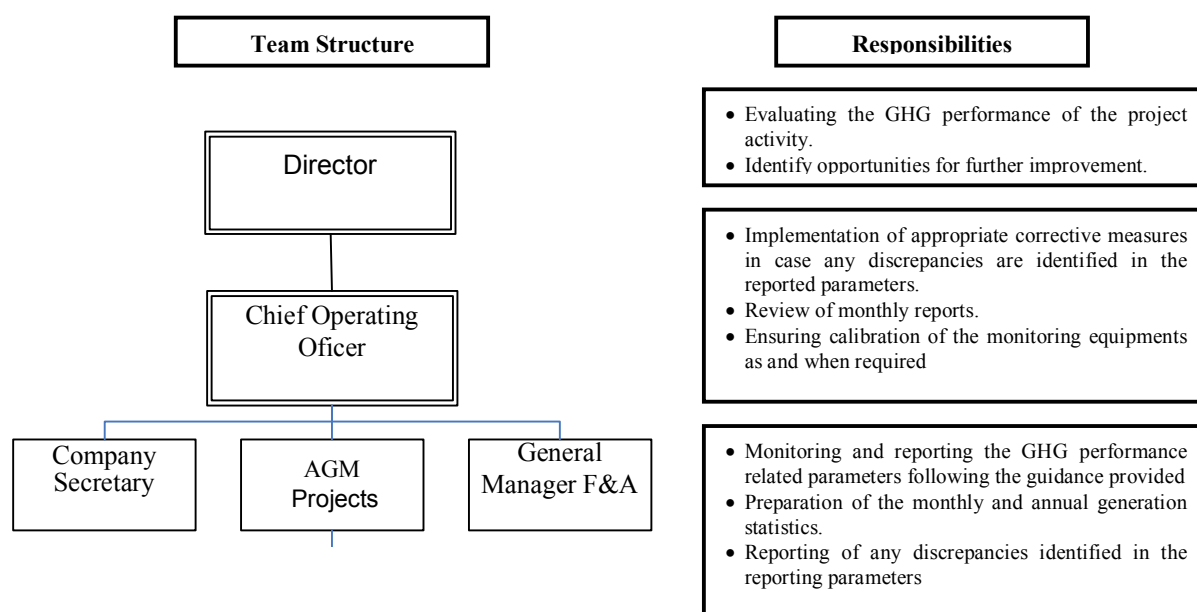
- Electricity generation from the proposed project activity;
- Data needed to recalculate the operating margin emission factor, if needed, based on the choice of the method to determine the operating margin (OM), consistent with “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” (ACM0002);
- Data needed to recalculate the build margin emission factor, if needed, consistent with “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”(ACM0002);

For the project activity to establish its creditable emission reduction, it has to record the actual electricity generation, which would displace equivalent units of electricity at the operating and build margin of the grid. Since the simple OM emission factor is calculated based on a 3 year generation-weighted average, based on the most recent statistics available at the time of PD preparation, its updating based on ex post monitoring is not required. For BM calculation, option 1 (refer ACM 0002) has been chosen, which is calculated ex ante based on the most recent information, hence its monitoring is also not required. Hence, under the monitoring protocol for the project it is required to: Monitor and record the electricity generated and exported by the wind farm to the regional grid.

To ensure trouble free operations and efficient generations through all the wind turbines, PMPL has entered into a comprehensive Operation and Maintenance agreement with the manufactures of the turbines for a **period of 10 years**. The contractor Enercon India Limited

(EIL), under the O&M contract with PMPL would be responsible for the operation and maintenance of the project activity for the entire crediting period.

The authority and responsibility of project management, as well as registration, monitoring, measurement and reporting lies with PMPL. PMPL has formulated a Project Team to ensure proper and continuous monitoring of the performance of turbines and generation of power. The same has been outlined as follows:



The O&M personnel are qualified engineers and are trained at the WEG manufacturing facility of Enercon India Limited at Daman for operating and ensuring best performance of the WEGs.

The general conditions set out for metering, recording, meter readings, meter inspections, Test & Checking and communication shall be as per the PPA (power purchase agreement) with GUVNL.

Reading of meters:

As the WEGs are owned by more than one investor at the site, the ABT compliant meter at the pooling sub-station will be installed by GETCO on 33/220 KV side. A tri vector meter shall be installed in the metering yard. At the end of the month, GEDA will give in respect of PMPL, a statement of active energy injection and reactive energy drawal of their WEGs. This statement will be the final measurement of the energy supplied to the GUVNL/DISCOM by the company for the preceding month for the purpose of payment.

The WEGs of a single customer (PMPL in this case) at a particular site are connected to a metering yard which in turn connects to a feeder that ultimately leads to the main GETCO meter at the substation maintained by Enercon India Limited. Data monitoring takes place at the metering yard. The electricity metered at the GETCO meter is proportionally divided among the customers connected to the meter on the basis of the pro-rata readings taken at the metering yard. The emission reduction calculations are done on the basis of the GETCO Main meter reading (net electricity exported to the grid) after deducting imports from the grid as mentioned in the share certificate issued by GEDA on monthly basis.

The emission reduction calculations will be done on the basis of net electricity supplied to the grid as stated in the share certificate. The joint meter readings will serve as the most authentic data source for the same.

3.3 Data and parameters monitored / Selecting relevant GHG sources, sinks and reservoirs for monitoring or estimating GHG emissions and removals:

Data / Parameter:	EG _y
Data unit:	MWh/yr
Description:	Net Electricity supplied to GUVNL facility
Source of data to be used:	Monthly Joint Meter Reading Sheets
Value of data applied for the purpose of calculating expected emission reductions	71610.0 MWh/yr
Description of measurement methods and procedures to be applied:	The WEGs of a single customer (PMPL & BIL in this case) in a particular location are connected to a metering yard which in turn connects to a feeder that ultimately leads to the bulk main GETCO meter of accuracy class 0.2s, at the substation maintained by Enercon India Limited. Net electricity generated by PMPL wind farm will be monitored and reported by GEDA in its share certificate on the basis of the metering done at the bulk main meter connected to the incoming feeder of GETCO and the meters installed at the metering yard. Data monitoring for electricity

	exported and electricity imported takes place at the metering yard and GETCO meter at the substation. The electricity metered at the GETCO meter is proportionally divided among the customers connected to the meter on the basis of the pro-rata readings taken at the metering yard. There are three meters at the GETCO sub-station each of accuracy class 0.2s and one dedicated meter for PMPL at each metering yard of accuracy class ranging between 0.2s/0.5s. The emission reduction calculations are done on the basis of the net electricity supplied as mentioned in the share certificate issued by GEDA on monthly basis.
QA/QC procedures to be applied:	Regular calibration of the GETCO meters will be undertaken yearly and faulty meters will be duly replaced immediately.
Any comment:	The data will be archived for 2 years beyond the crediting period.

3.4 Description of the monitoring plan

The WEGs of a single customer (PMPL & BIL in this case) in a particular location are connected to a metering yard which in turn connects to a feeder that ultimately leads to the bulk main GETCO meter of accuracy class 0.2s, at the substation maintained by Enercon India Limited.

Net electricity generated by PMPL wind farm will be monitored and reported by GEDA in its share certificate on the basis of the metering done at the bulk main meter connected to the incoming feeder of GETCO and the meters installed at the metering yard.

Data monitoring for electricity exported and electricity imported takes place at the metering yard and GETCO meter at the substation. The electricity metered at the GETCO meter is proportionally divided among the customers connected to the meter on the basis of the pro-rata readings taken at the metering yard.

There are three meters at the GETCO sub-station each of accuracy class 0.2s and one dedicated meter for PMPL at

each metering yard of accuracy class ranging between 0.2s/0.5s.

The emission reduction calculations are done on the basis of the net electricity supplied as mentioned in the share certificate issued by GEDA on monthly basis.

4 GHG Emission Reductions:

4.1 Explanation of methodological choice:

Emission Reductions

The project activity mainly reduces carbon dioxide through substitution of grid electricity generation with fossil fuel fired power plants by renewable electricity. The emission reduction ER_y by the project activity during a given year y is the difference between baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage (L_y), as follows:

$$ER_y = BE_y - PE_y - L_y$$

(Ref: Equation 12 of ACM002 Version 09)

The baseline emissions (BE_y in tCO_2) are the product of the baseline emissions factor (EF_y in tCO_2/MWh) times the electricity supplied by the project activity to the grid (EG_y in MWh).

$$BE_y = EF_y * EG_y$$

(Ref: Equation 8 of ACM002 Version 09)

4.2 Quantifying GHG emissions and/or removals for the baseline scenario:

S.No.	Year	Emission In Baseline (Tonnes of CO ₂)
1	2007	64,864
2	2008	64,864
3	2009	64,864
4	2010	64,864
5	2011	64,864
6	2012	64,864
7	2013	64,864
8	2014	64,864
9	2015	64,864
10	2016	64,864
TOTAL		648,640

4.3 Quantifying GHG emissions and/or removals for the project:

S.No.	Year	Leakage Emissions (Tonnes of CO ₂)	Project Emissions (Tonnes of CO ₂)
1	2007	0	0
2	2008	0	0
3	2009	0	0
4	2010	0	0
5	2011	0	0
6	2012	0	0
7	2013	0	0
8	2014	0	0
9	2015	0	0
10	2016	0	0
TOTAL		0	0

4.4 Quantifying GHG emission reductions and removal enhancements for the GHG project:

S.No.	Year	Baseline Emissions (Tonnes of CO ₂)	Project Emissions (Tonnes of CO ₂)	Emission Reductions (Tonnes of CO ₂)
1	2007	64,864	0	64,864
2	2008	64,864	0	64,864
3	2009	64,864	0	64,864
4	2010	64,864	0	64,864
5	2011	64,864	0	64,864
6	2012	64,864	0	64,864
7	2013	64,864	0	64,864
8	2014	64,864	0	64,864
9	2015	64,864	0	64,864
10	2016	64,864	0	64,864
TOTAL		648,640	0	648,640

5 Environmental Impact:

According to Indian regulation, the implementation of the wind park does not require an environmental impact assessment. The Ministry of Environment and Forests (MoEF), Government of India notification dated September 14, 2006 regarding the requirement of Environment Impact

Assessment (EIA) studies ¹⁴ states that any project developer in India needs to file an application to the Ministry of Environment and Forests (including a public hearing and an EIA) in case the proposed industry or project is listed in a predefined list. Wind parks are not included in this list and thus an EIA is not required. The project activity has no significant impact on the environment. However, certain foreseen impacts due to the project activity are discussed below:

During construction:

Impact on air

Movement of construction material during construction will have some impact on the air. As the transportation is not substantial for the project activity, the impacts will be negligible.

Impact on water

Not much water discharge takes place during construction. However, proper sanitary arrangements were provided by project proponents.

Impact on Land use

The land on which the project activity takes place is barren and largely infertile. Prior to the project activity, most of the land in Jamnagar district had no beneficial use. The project proponents had bought the land for a worthwhile application and obtained necessary approvals for installation of windmills. No dislocation of people is involved in the course of the project activity.

Impact due to noise

Personal protective equipments were provided to workers involved in the construction activity to mitigate the effects of noise pollution, but they have no impact on ambient noise level.

Taking into consideration the project life cycle, the magnitude of the impacts during the construction phase is negligible and exists for a temporary period of time till the end of construction phase. Therefore, it would not effect the environment considerably. The impacts on the environment due to construction activities of wind turbines are negligible

¹⁴ As per the Environment Protection Rule, 1986 (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii) MINISTRY OF ENVIRONMENT AND FORESTS) <http://envfor.nic.in/legis/eia/sol533.pdf>

Operation and Maintenance Phase

Enercon maintains highest level of safety standards with its operations. Systematic and scientific maintenance of all equipments has been undertaken to ensure the best safety standards.

Impact on air

Wind energy plants are known to contribute to zero atmospheric pollution as no fuel combustion is involved during any stage of the operation.

Impact on water

There is absolutely no effluent discharge during operation of wind turbine generators.

Impact on ecology

No harm on the ecological environment is envisaged.

Impact due to noise

Noise is generated due to the movement of rotor blades. Noise is very much below the regulatory norms. It has no direct effect on the population, as the area is less populated and noise generated will be attenuated by ambient conditions. The considering the overall impact of the project in reducing GHG's, creation of employment etc., makes this effect negligible.

Socio-Economic Impacts

There is no inconvenience to the local community due to the transmission lines. The locals have directly benefited economically through land sales. The project activity will generate opportunities for skilled and unskilled manpower in the region. The project will be providing employment opportunities not only during the construction phase, but also during its operational lifetime. The project activity improves employment rate and livelihood of local populace in the vicinity of the project. Moreover, the project generates eco-friendly, GHG free power, which contributes to sustainable development of the region.

Conclusion:

The net impact under environmental pollution category would be positive as all necessary abatement measures would be adopted and periodically monitored. The project activity does not have any substantial adverse impacts on environment during its construction or operational phase. The human interest parameters would show positive impacts

due to increased job opportunities at the facility as well as other ancillary units coming up subsequent to the implementation of this project.

6 Stakeholders comments:

PMPL wind farm project is located at the Samana site, district Jamnagar in the state of Gujarat. The stakeholders are defined as the public, including individuals, groups or communities, affected, or likely to be affected, by the proposed CDM project activity. The local stakeholders identified for the proposed project activity are as follows:

1. Local villagers and representatives of village governing body
2. Ministry of new and renewable energy sources
3. Gujarat Energy Development Agency
4. Supplier of WEG
5. Operation and Maintenance staff of Enercon India Limited
6. Representatives of Non governmental organisation
7. Gujarat Urja Vikas Nigam Limited
8. Ministry of Environment and Forests

Local villagers and representatives of village governing body including NGOs

The varied sections of the local population, village panchayat / NGO & local elected body of representatives administering the local area are a true representative of the local population in a democracy like India. Hence, their consents / permissions to set the project are necessary. PMPL had organised a stakeholder consultation meeting with them to inform them on the environmental and social impacts of the project activity and discuss their concerns regarding the project activity.

Ministry of new and renewable energy sources

The government of India, through Ministry of new and renewable energy sources, has been promoting energy conservation, demand side management and renewable energy projects including wind, small hydro and hydro / bio-mass power. PMPL's effort in implementing the wind power project is in line with the goals and targets of the said Ministry and hence supported by them.

Gujarat Energy Development Agency (GEDA)

GEDA is the principal agency in Gujarat responsible for development of renewable energy sources in the state. PMPL has obtained permission from GEDA for setting up the

wind power project. GEDA is also responsible for transfer of wind farm from Enercon to PMPL and at a later stage will be providing the commissioning certificate when all the WEGs are commissioned.

Supplier of WEGs

Enercon India Ltd. is the supplier of WEGs and is also responsible for the operation and maintenance of the PMPL project activity.

Gujarat Urja Vikas Nigam Limited (GUVNL)

PMPL has signed a power purchase agreement with GUVNL for selling the units generated from the project activity at a price fixed by the GUVNL/DISCOM according to the power purchase agreement.

Designated National Authority - Ministry of Environment & Forest (MoEF), Government of India

The Ministry of Environment & Forests is the Designated National Authority in India. The government of India, through Ministry of Environment and Forests (MoEF), is encouraging project participants to take up such Climate Change initiatives. PMPL has submitted the Project Concept Note and Project Design Document to the MoEF for Host Country Approval.

Summary of the comments received:

The project activity is environmentally benign and there are no perceived negative impacts on the environment (Indeed the project activity has many positive impacts on environment).

In order to understand and address reservations towards the said project activity that the local inhabitants of the region may have, a CDM Stakeholder Meeting was organized on 24th August, 2007 at the Hotel Vishal in Jamnagar. The meeting was presided over by Mr. M Mahakud, GM (F&A), Patnaik Minerals Private Limited along with Mr. B Behra, AGM (P & A), Mr Sanjit Panda, AGM (Projects) and Mr. Himanshoo Vaishnav, Head (Land Development), Enercon India Limited.

The stakeholders present in the meeting were village representatives along with other villagers belonging to villages in and around the wind farm project activity and also Representatives of Enercon and PMPL.

Mr. B Behra welcomed the gathering and introduced the company and its initiative to the stakeholders present. He further briefed the gathering about the environmental hazards faced by the society in the present scenario and

highlighted the importance of CDM and clean energy. He also explained how wind energy can be instrumental in promoting clean and pollution free environment. He invited Mr. Sanjit Panda to describe the project activity and discuss the benefits of implementing wind farm project. Mr. Sanjit Panda further stressed on the need for climate change mitigation and presented the global warming scenario across the world for better understanding of the need for the proposed CDM project activity. He then delivered the vote of thanks and appreciated the villagers for their active participation.

Mr. Anand Solanki of Enercon India Limited offered the Gujarati translation of the speeches made by Mr. Sanjit Panda for better understanding.

A number of queries were raised and are duly noted below:

- I. Are there any labour requirements for the project that can provide employment to the local inhabitants?
- II. The movement of heavy vehicles for transport of equipment are damaging village roads. What sort of remedial measure is being planned to address this?
- III. What will be done with respect to improving Education and health needs of the nearby villages?
- IV. Is there any possibility of the water table of the region being affected by the installation of the wind farm for the project?
- V. Is there any possibility of the water table of the region being affected by the installation of the wind farm for the project?
- VI. Do the temperature conditions in the areas around the wind farm increase?
- VII. Can the WEGs cause changes in the precipitation pattern, and hence arability of the region?

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

The stakeholders understood the project activity being undertaken by PMPL and were appreciative of the initiative. However, they did express certain reservations and clarifications that were duly addressed by the representatives of PMPL and Enercon present. A summary of these comments and the clarifications on the same are presented below:

Queries raised by Participants	Clarifications by PMPL/EIL
Are there any labour requirements for the project that can provide employment	The construction and installation of the wind farm shall create demand for

to the local inhabitants?	manpower, and it will be ensured the local villagers are given preference in these. Even during operation of WEGs there will be requirements for manpower for maintenance and security, where the villagers will again be given priority.
The movement of heavy vehicles for transport of equipment are damaging village roads. What sort of remedial measure is being planned to address this?	Enercon shall endeavour to repair any damage to the roads caused by the project and also maintain them after the implementation of the project activity.
What will be done with respect to improving Education and health needs of the nearby villages?	Social development is a continuous process and further steps would be taken up in this direction once the project is commissioned.
Is there any possibility of the water table of the region being affected by the installation of the wind farm for the project?	There is no chance of any adverse affects on the ground water table as a result of the project activity for two reasons: a. The civil excavation work undertaken during installation does not extend beyond a depth of 6 meters, which is too shallow to affect the water table. b. Generation of power from wind, as is done using WEGs, does not involve any water and hence can't disturb the water table.
Do the temperature conditions in the areas around the wind farm increase?	There is no thermal radiation or emission radiation resulting from the operations of the wind farm that may increase temperatures.
Can the WEGs cause changes in the precipitation pattern, and hence arability of the region?	No, there are no impacts on rainfall in the region, nor shall it damage the fertility or arability of the surrounding regions.

7 Schedule:

Starting date of the project activity:

21.03.2007

Date of commissioning of first WEG in the project activity

Expected operational lifetime of the project activity:

20 years, 0 months

Commissioning of the project: 21.03.2007

Termination of project: not applicable

Start date of crediting period: 21.03.2007

Monitoring Period: 10 year crediting period (renewed at most two times)

8 Ownership:

8.1 Proof of Title:

The ownership details of the PMPL project may be referred from the Host Country Approval Obtained under CDM for the project activity.

8.2 Projects that reduce GHG emissions from activities that participate in an emissions trading program (if applicable):

The project is also pursuing the CDM route for claim of carbon credits through the above project. Emission reductions will not be claimed under both programs for the same time period to avoid double counting.
