CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

CONTENTS

A. General description of the small scale project activity

B. Application of a baseline and monitoring methodology

C. Duration of the project activity / crediting period

D. Environmental impacts

E. Stakeholders' comments

Annexes

Annex 1: Contact information on participants in the proposed small scale project activity

Annex 2: Information regarding public funding

Annex 3: Baseline information

Annex 4: Monitoring Information

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
03	22 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

SECTION A. General description of small-scale project activity

A.1 Title of the small-scale project activity:

8.3 MW small-scale Grid Connected Wind Electricity Generation Project by Parakh Agro Industries Limited at district Dhule (Maharashtra), India

Version : 03
Date : 04th December 2007

A.2. Description of the small-scale project activity:

With an intention to invest in and promote cleaner technologies, and contribute to sustainable development, Parakh Agro Industries Limited has invested in renewable energy based power generation by establishing a Wind Electric Generators of 8.3 MW installed capacity in the villages of Brahmanvel, Ranjangaon and Chhadvel in Sakri Taluka, Dhule district, Maharashtra.

The project activity involves commissioning and operation of 2 x 1.65 MW, NEG Micon Wind Electric Generators (WEGs) and 4 x 1.25 MW, Suzlon Wind Electric Generators (WEGs). Electricity generated by this Wind Electric Generators is 16573.92 MWh/year (gross) & 15745.224 MWh/year (Net) annually and supplied to the power deficit Western Regional Grid. Annually the Green House Gas (GHG) emission reductions from this project activity, accounts for 14171 tCO2e (tonnes of carbon dioxide equivalent). The fixed crediting period is chosen to be 10 years although the operational lifetime of the project activity will be 20 years.

The primary objective of the project is to generate clean electricity with zero GHG emission at project site. The generated electricity is fed to the western regional grid. An equivalent amount of GHG emissions in the form of CO_2 released from generation of fossil fuel based thermal power in the regional grid will be replaced by the project activity.

Purpose of the project activity

The main purpose of the project activity is to generate electrical energy through sustainable means using wind resource, and to contribute to climate change mitigation efforts.

Apart from generation of renewable electricity, the project has also been conceived for the following:

- To enhance the propagation of commercialisation of wind turbines in the region
- To contribute to the sustainable development of the region, socially, environmentally and economically
- To reduce the prevalent regulatory risks for this wind park through revenues from the CDM

Contribution of project activity to sustainable development

Indian economy is highly dependent on “Coal” as fuel to generate energy and for production processes.

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

View of the project participants on the contribution of the project activity to sustainable development:

Ministry of Environment and Forests, Govt. of India has stipulated the following indicators for sustainable development in the interim approval guidelines for CDM projects:

a. **Social well being-** The proposed project activity leads to alleviation of poverty by establishing direct and indirect employment benefits accruing out of ancillary units for manufacturing lattice towers for erecting the WEGs and for maintenance during operation of the project activity. The infrastructure in and around the project area will also improve due to project activities. This includes development of road network and improvement of electricity quality, frequency and availability as the electricity is fed into a deficit grid.

b. **Economic well being -** The project activity leads to an investment of about INR 45.2886 millions to a developing region which otherwise would not have happened in the absence of project activity. The generated electricity is fed into the Western Regional 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.

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

d. **Technological well being –** The 1.65MW and 1.25MW wind turbines are the state of the art wind turbines available in India. The two turbines mentioned above are the highest capacity turbines available in India. These turbines employ the advanced technology for generation as well as for grid interaction. (write about scada if it is there for these turbines)

A.3. Project participants:

Name of Party involved (*) ((host) indicates a host party)	Private and/or public entity (ies) Project participants (*) (as applicable)	Kindly indicate if the party involved wishes to be considered as project participant (Yes/No)

Government of India (Host) (Host Country)	Parakh Agro Industries Limited, Pune	No

A.4. Technical description of the small-scale project activity:

Technology employed in the project is installation of horizontal axis windmills which converts wind energy in electrical energy. In wind energy generation, kinetic energy of the wind is converted into mechanical energy and subsequently into electrical energy. Wind turbines capture the wind's energy with two or three propeller-like blades, which are mounted on a rotor, to generate electricity. When the wind blows through the blades of the windmill, a pocket of low-pressure air forms on the downwind side of the blade. The low-pressure air pocket then pulls the blade towards it, causing the rotor to spin. The rotor turns the shaft that further spins the connected generator. The spinning of this generator produces the required electricity.

A.4.1. Location of the small-scale project activity:

A.4.1.1. Host Party (ies):

Country: India

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

State: Maharashtra, District: Dhule

A.4.1.3. City/Town/Community etc:

Taluka: Sakri, Village: Brahmanvel, Chhadvel, Ranjangaon

A.4.1.4. Details of physical location, including information allowing the unique identification of this small-scale project activity:

The details of the location are furnished below:

Table No.1: Location of the Project

Location	**District**	**Latitude N**		**Longitude E**		**Elevation**
		Deg.	**Min**	**Deg.**	**Min**	**Above mean sea level**
Dhule	Dhule	20	54	74	76	600 m

Dhule
Mean annual wind speed: 21.1 km/h at 30m height
Mean annual wind power density: 224 w/m^2 at 50m height and 186 w/m^2 at mast (25m)

Table No.2: Name of the Contractor, Village, Survey No.

S. No.	Name of EPC Contractor	Village	Location No.	Survey No.	Sr. No.
1	Suzlon Energy Limited	Ranjangaon	K 292	R.S.No. 21	64033032
2	Suzlon Energy Limited	Ranjangaon	K 293	R.S.No. 21	64031465
3	Suzlon Energy Limited	Chhadvel	K 286	R.S.No. 475	64031462
4	Suzlon Energy Limited	Chhadvel	K 291	R.S.No. 466	64032103
5	NEG Micon	Brahmanvel	BB 6	R.S.No. 178/A	504958 B 05108
6	NEG Micon	Brahmanvel	BB 4	R.S.No. 178/A	504958 B 05114

Figure 1: Location of Maharashtra in India

Figure 2: State map of Maharashtra

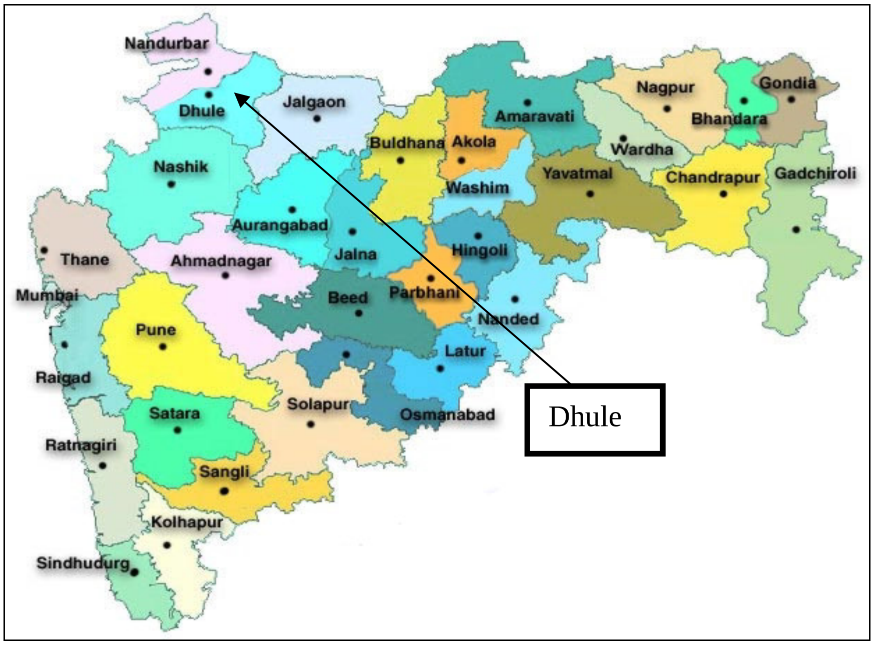
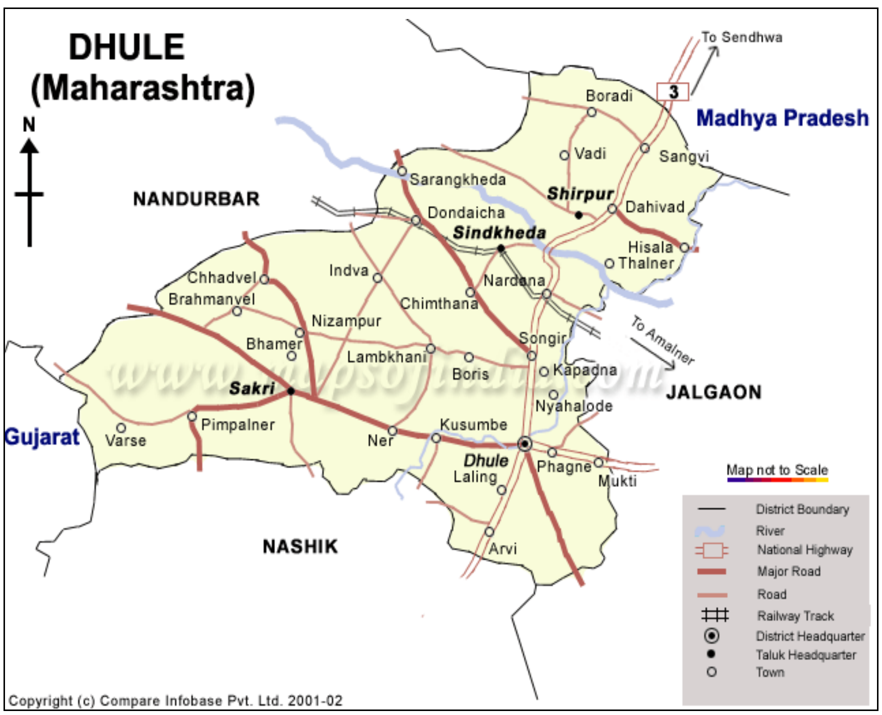


Figure 3: Map of Dhule District



A.4.2. Type and category (ies) and technology/measure of the small-scale project activity:

Type and Category

Since, the capacity of the proposed project is only 8.3 MW, which is less than the maximum qualifying capacity of 15MW, the project activity has been considered as a small scale CDM project activity and UNFCCC indicative simplified modalities and procedures

(http://cdm.unfccc.int/methodologies/SSCmethodologies-AMS-I.D-Version-12) are applied.

The project activity utilizes the wind resource for power generation and exports the generated electricity to the grid. According to small-scale CDM modalities the project activity falls under:

Sectoral Scope 1 **Energy industries (renewable / non renewable sources)**
Type – I **Renewable Energy Projects**
Category I-D **Grid connected renewable electricity generation**

Project activity with Technology details:

In wind energy generation, kinetic energy of wind is converted into mechanical energy and subsequently into electrical energy.

Wind blowing at high speeds has a considerable amount of kinetic energy. The kinetic energy in wind, is converted into mechanical energy as it passes through the blades of the wind turbines and rotates the wind blades. When the wind blades rotate, the connected generator also rotates, thereby producing electricity. The technology is a clean technology since there are no GHG emissions associated with the electricity generation.

Technology transfer

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

<u>Technical Specifications of the WEGs</u>

Table No.3: Technical specifications of the 1.25 MW Suzlon WEGs

Operating Data	
Rotor Height	64 m
Hub Height	65 m
Cut in Speed	3 m/s
Rated Speed	12 m/s
Cut out speed	25 m/s
Survival Speed	67 m/s
Rotor	
Blade	3 Blade Horizontal Axis
Swept Area	3217 m^2
Rotational Speed	13.9 to 20.8 rpm

Regulation	Pitch Regulated
Generator	
Type	Asynchronous 4 / 6 Pole
Rated Output	250 / 1250 kW
Rotational Speed	1006 / 1506 rpm
Frequency	50 Hz
Gear Box	
Type	Integrated (1 Planetary & 2 Helical)
Ratio	74.971:1
Yaw System	
Drive	4 electrically driven planetary gearbox
Bearings	Polyamide slide bearings
Braking System	
Aerodynamic Brake	3 independent systems with blade pitching
Mechanical Brake	Hydraulic fail safe disc braking system.

The salient features of 1.25 MW WEGs is as follows:

1. Higher Efficiency - Designed to achieve increased efficiency and co-efficient of power (Cp)
2. Minimum Stress and Load - Well-balanced weight distribution ensures lower static & dynamic loads
3. Shock Load-free Operation - Advanced hydrodynamic fluid coupling absorbs peak loads and vibrations
4. Intelligent Control - Next generation technologies applied by extensive operational experience maximizes yield
5. Maximum Power Factor - High-speed asynchronous generator with a multi-stage intelligent switching compensation system delivers power factor up to 0.99
6. Climatic Shield - Hermetically sheltered, advanced over-voltage and lightning protection system
7. Unique Micro-Pitching Control - Unmatched fine pitching with 0.1° resolution to extract every possible unit of power
8. Grid-friendly - Grid friendly design generates harmonics-free pure sinusoidal power
9. ISO-certified vendors confirm high quality components
10. ISO 9001:2000 for Design, Development, Manufacture and Supply of Wind Turbines
11. ISO 9001:2000 certification for Installation, Commissioning, Operation and Maintenance
12. Type certification by Germanischer Lloyd, Germany
13. Approved by the Ministry of Non-Conventional Energy Sources (MNES)

Figure 4: Technical description of technology used in Suzlon 1.25 MW WEG

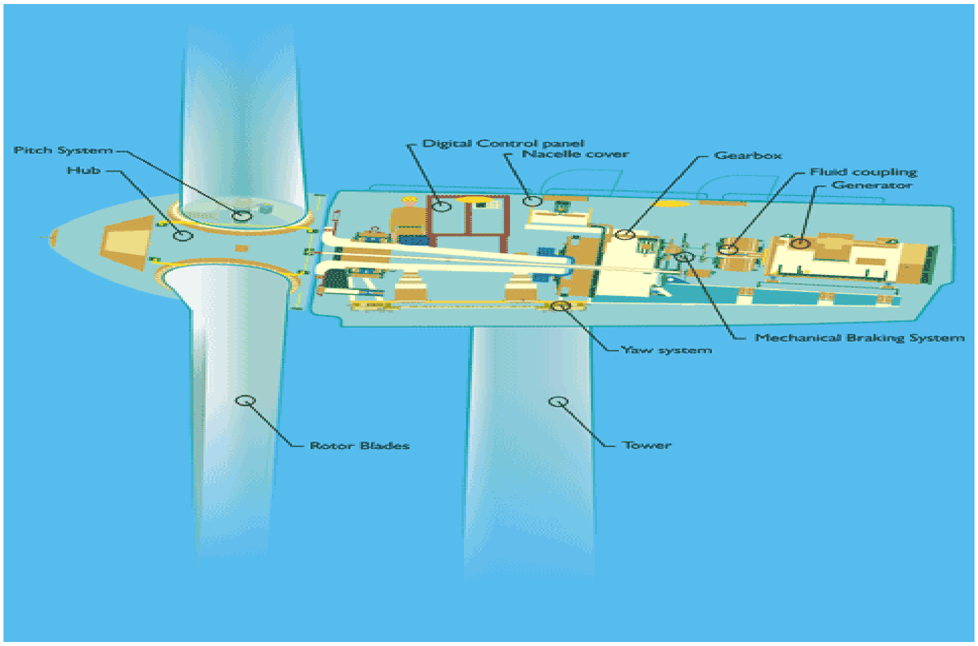
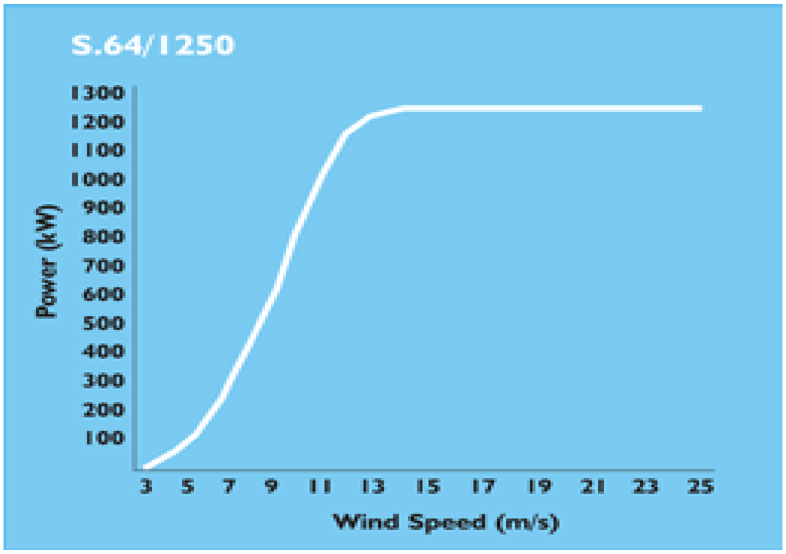


Figure 5: Power Curve for Suzlon 1.25 MW WEG



Technical Specifications of NEG MICON NM 82/1650:

Table No.4: Techniclal Specification of NEG MICON NM82/1650:

Operational Conditions

Calculated lifetime	20 years
Cut in wind speed	3.5 m/s
Cut out wind speed	20 m/s (10 min. Average)
Maximum rotational speed	14.4 rpm
Main Specification	
Rotor diameter	82 m
Number of blades	3
Power control	Active Stall ®
Rotational speed (Synchronous)	14.4 rpm
Rotor position	Upwind
Nominal power	1650 Kw
Hub height	78 m
Rotor	
Rotor Diameter	82 m
Tilt angle	5^{o}
Swept area	5281 m^2
Blade	
Material	Carbon Fibre/Epoxy /Wood
Blade length	40 m
Blade profile	FFA –W3, NACA 63.4
Air Brake	Full Blade
Hub	
Type	Spherical
Material	EN-GJS-400-18U-LT
Main Shaft	
Type	Forged shaft and flange
Material	34 CrNiMo6
Main Bearing	
Front bearing	Spherical roller bearing
Main Gearbox	
Gear Ratio	1:70.2
Mechanical Power	1800 kW
Couplings	
Gearbox/generator	Flexible
Generator	
Nominal power	1650 kW
Rotational speed (Synchronous)	1012 rpm at rated power
Insulation class	F/B
Protection class (IEC529)	IP54
Machine Frame	

Type	Casted front end
Material	EN-GJS-400-18U-LT
Yawing System	
Yaw bearing, type	Ball bearing, internal gearing
Yaw motor	6 Nos.
Yaw gear	6 pcs
Gearing ratio	1:1666
Yaw brake	Hydraulic disc brake, 6 pcs.
Mechanical Brake	
Type	Fail safe - Hydraulic release
Position	Mounted on high speed shaft
Number of calipers	1 pc.
Tower	
Type	Conical tubular
Height	75.5 m
Corrosion protection	Acc. to ISO 12944: C5 I
Control System	
Manufacture	NEGM Control systems
Type	Microprocessor based

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

The chosen crediting period is 10 years which is fixed crediting period.

Table No.5: Table of Emission Reduction:

Year*	**Annual Estimation of emission reduction in tonnes of CO_2e**
2008	14171
2009	14171
2010	14171
2011	14171
2012	14171
2013	14171
2014	14171
2015	14171
2016	14171
2017	14171
Total estimated reductions (tonnes of CO_2e)	141710
Total number of crediting years	10

Annual average over the crediting period of estimated reductions (tones of CO2 e)	14171

* In the above table year 2008 corresponds to the period 1st April 2008 to 31st March 2009. Similar interpretation will apply to remaining years.

A.4.4. public funding of the small-scale project activity:

There is no public funding involved in the project activity. The project activity has been developed on the basis of 100% in-house resources of the company.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity:

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

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

The project promoter (Parakh Agro Industries) hereby confirms that there is no registered small scale project activity registered within the previous two years with it in the same project category and technology whose project boundary is within 1km of the project boundary of the proposed small scale activity. Thus the project is not a debundled component of any other large-scale 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 small-scale project activity:

The methodology followed will be "AMS 1 D/Version 12 (Valid from 10 Aug 07 onwards) – Approved methodology for Small Scale Projects" under the sectoral scope "Grid connected renewable electricity generation" which is most appropriate for this Project and is listed as per the UNFCCC norms.

Project Type : **I –**Renewable energy project

Project category : **D –**Grid connected renewable electricity generation **(**Version 12-valid from 10 Aug 07 onwards**)**

Reference **:** Appendix B of simplified M&P for small scale project activities (UNFCCC, Recent norms)

B.2 Justification of the choice of the project category:

Justification of the choice of the project type & category:

Paragraph 1 of "Type AMS. I.D. Grid connected renewable electricity generation (Version 12: Valid from 10 Aug 07 onwards)" of appendix B of the simplified M&P for small-scale CDM project activities, states that "This category comprises renewable energy generation units, such as photovoltaics, hydro, tidal/wave, wind, geothermal and renewable biomass, that supply electricity to and/or displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit."

The proposed project consists six wind turbines, with total capacity of 8.3MW, which is less than the limit of 15 MW of maximum output capacity as specified in Annex-II "Simplified Modalities & Procedures for Small Scale CDM Project Activities" for Type (i) project activities: renewable energy project activities with a maximum output capacity equivalent to up to 15 megawatts (or an appropriate equivalent) (decision 17/CP.7, paragraph 6 (c) (i)). Thus, this project reduces anthropogenic emissions by sources and its maximum output capacity is less than 15 MW. Therefore it confirms to this category thereby qualifying as a small-scale project activity

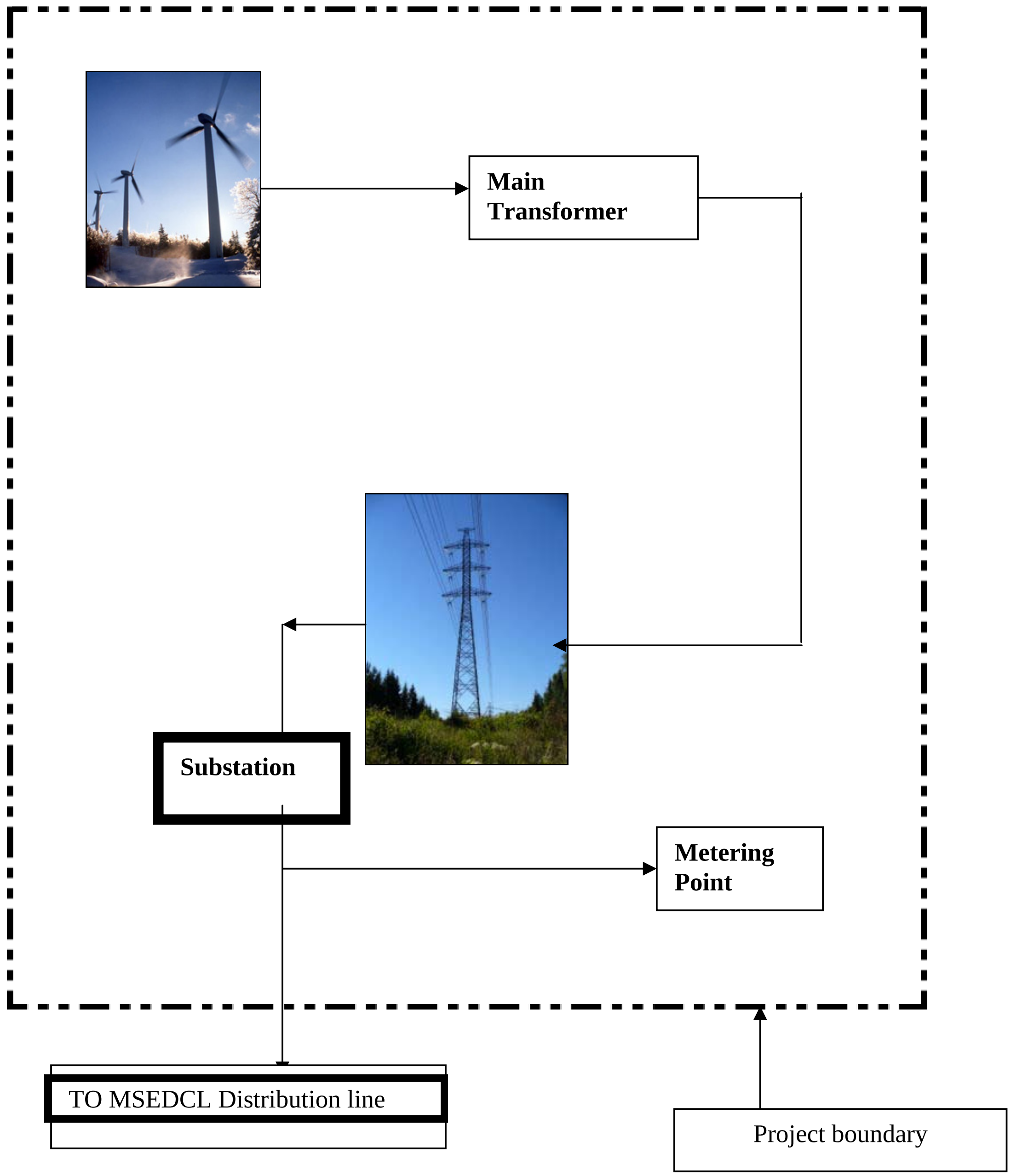
B.3. Description of the project boundary:

As per the methodology "the project boundary encompasses the physical, geographical site of the renewable generation source."

The project boundary is composed of the Wind Energy Generators and the metering equipment for each generator and substation, and the grid (Western grid) which is used to transmit the generated electricity.

Diagram of Project Boundary:

Figure No.:6 Project Boundary



B.4. Description of baseline and its development:

Baseline as per Paragraph 9 of "Type AMS. I-D Grid connected renewable electricity generation (Version 12: Valid from 10 Aug 07 onwards)" of Appendix B of the simplified M&P for small-scale CDM project activities states that:

For all other systems, the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO2e/kWh) calculated in a transparent and conservative manner as:

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the approved methodology ACM0002. Any of the four procedures to calculate the operating margin can be chosen, but the restrictions to use the Simple OM and the Average OM calculations must be considered.

OR

(b) The weighted average emissions (in kg CO2e/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

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

The project activity feeds electricity to the (MahaTransco) MSEDCL grid, which falls under western regional grid in India, the western regional grid has been selected as the reference grid for estimation of baseline.. The displaced electricity generation is the element that is likely to affect both the operating margin in the short run & the build margin in the long run; electricity baselines should reflect a combination of these effects. Therefore an ideal baseline approach is envisaged as the one that combines both Operating & Build margin as prescribed in first alternative given inparagraph 9 under category I.D of the UNFCCC M&P for small-scale projects.

In case of the project activity, a combined margin (CM) emission factor, consisting of the combination of the operating margin emission factor & build margin emission factor, calculated according to the procedures prescribed in the approved methodology ACM0002 and publicly available in the official website of CEA, has been used for arriving at the baseline. The simple operating margin emission factor (inclusive of imports) and the build margin emission factor (not adjusted for imports), both for the year 2005 to 2006(latest available on the official website of CEA) for the Western Regional Electricity Grid, as per CEA are used.

Key assumptions & rationale in Baseline Emissions:

AMS 1 D/Version 12 (Valid from 10 Aug 07 onwards) (but for baseline ACM0002/Version 06 (Valid from 19 May 06 onwards)) describes a stepwise approach to apply the methodology to the project activity. Baseline Emission factor is calculated as combined margin, consisting of a combination of operating margin (OM) and build margin (BM) factors. This methodology lists the parameters that need to be monitored for estimating the baseline, project emissions as well as leakage.

Baseline emission factor EFy is calculated as the weighted average of the Operating Margin emission factor ($EF_{OM,y}$) and the Build Margin emission factor ($EF_{BM,y}$):

$EF_y = w_{OM} \times EF_{OM,y} + w_{BM} \times EF_{BM,y}$

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

Emission factor for Operating Margin and Build Margin are taken from CEA guidelines

Thus baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO_2e/kWh) calculated.

(a) EFy

Data / Parameter:	EFy
Data unit:	tCO2/MWh
Description:	CO2 emission factor of the grid
Source of data used:	CEA website http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm
Value applied:	0.90
Justification of the choice of data or description of measurement methods and procedures actually applied:	Emission factor is used in the calculation of emission reductions.
Any comment:	Calculated as weighted sum of the OM and BM emission factors. .

(b) EF_{OM}y

Data / Parameter:	EFOMy
Data unit:	tCO2/MWh
Description:	CO2 Operating margin emission factor of the grid
Source of data used:	CEA website http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm
Value applied:	0.99
Justification of the choice of data or description of measurement methods and procedures actually	This is used in calculation of emission factor EFy

applied:	
Any comment:	Calculated as indicated in the simple OM baseline method

d) $EF_{BM}y$

Data / Parameter:	$EF_{BM}y$
Data unit:	tCO2/MWh
Description:	CO2 Build margin emission factor of the grid
Source of data used:	CEA website http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm
Value applied:	0.63
Justification of the choice of data or description of measurement methods and procedures actually applied :	- This is used in the calculation of emission factor EFy.
Any comment:	Calculated as indicated in the simple OM baseline method

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 small-scale CDM project activity:

Additionality:

Power generation scenario in Maharashtra state:

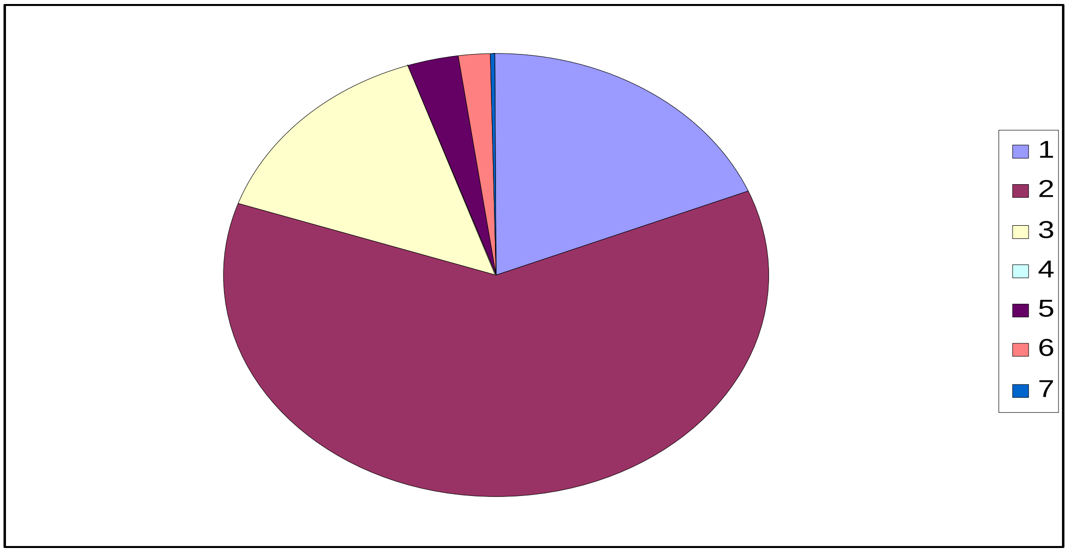
Power generation scenario in Maharashtra state is as bellow in financial year 2004-05

Table: Mode wise Breakup of Installed Capacity of Power Generation in Maharashtra

Sector	Modewise Breakup (MW)								Grand Total
	Hydro	Thermal				Wind*	Nuclear	RES	
		Steam	Gas	Diesel	Total				
	2914.17	9414	2223.9	0	11637.9	456.30	297	41.72	15347.09

(Source: Directory of Indian Wind power 2005 *Excluding RES)

Wind energy amounted only 2.97% of the total installed capacity of power generation in Maharashtra.



Hydro	Steam	Gas	Diesel	Wind*	Nuclear	RES
2914.17	9414	2223.9	0	456.3	297	41.72

Power generation scenario in Western Region:
Power generation in the western Region (WR) grid is primarily based on coal based power plants Which contribute ~77% .while wind power including other non-conventional energy contributes less than 2.5% of the total annual generation in WR grid.
(Source: http:// powermin.nic.in/Indian electricity scenario)

From state power generation scenario & WR power generation scenario. It is clearly shows that wind power generation project are not a business as usual project. Then also project proponent (PAIL) has shown there interest towards environmental sustainability by this project as power generated using wind energy dose not emit any green house gas (GHG) even through investment in wind power is not financial attractive & thus is a risk.Howevere taking in to account the economic value of CERs from project activity, proponent could mitigate risk involved & have decided to go ahead with the project. Simplified modalities & procedures for small scale CDM project activities guide to established additionality of the project activity which is as below:
Attachment A to Appendix B

1. Project participants shall provide an explanation to show that the project activity would not have occurred anyway due to at least one of the following barriers:
(a) Investment barrier: a financially more viable alternative to the project activity would have led to higher emissions;
(b) Technological barrier: a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions;
(c) Barrier due to prevailing practice: prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions;

(d) Other barriers: without the project activity, for another specific reason identified by the project participant, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher.

From the above barrier project activity gone through the following barrier:

(a) Investment barrier:

The primary business of PAIL is Agro product manufacturing & related service. The average post tax equity IRR in these sectors is substantially high and in the range of 18 – 20% p.a. Consequently, seek new investments in sectors that earn comparable lower returns. Wind energy has several inherent disadvantages such as intermittent nature, very low PLFs, all of which translate into low return on investment. Further, in the recent years the capital costs of wind turbines, generators and associated equipment have been rising on account of the rises in prices of metals, components. The post tax equity IRR of the project even after taking into account the tax benefits it provides on account of accelerated depreciation (without contribution from CER revenues) is 13.66% & 12.10% (SUZLON & NEG MICON). A comparison of this with the above returns makes it clear that the investment in the wind power project would not be made by the investors. The CER revenues (@ 10 Euro /tCO2e) enable raising the post tax equity IRR to 17.06% & 14.23 % (SUZLON & NEG MICON), which takes it closer to the expectation.

In project post tax equity IRR is considered as a investment analysis parameter & same one is calculated by considering fallowing techno-economical parameter

Table No.10: Techno Economic parameters of the Project

Techno Economic parameters for Suzlon		
Capacity of machine	1250	kW
Number of machine	4	Number
Total Investment	2502.76	Lakhs INR
Operational and Maintenance per machine +Overheads	10 (5% escalation every year)	Lakhs INR
Electricity Generation	Estimated based on the site performance	Million units
1 Euro	56	INR
Price of CER	10	Euro
Debt/ Equity ratio	2.99	
Interest rate	9	Percentage

Table No.11: Parameters of the Project:

Techno Economic parameters for NEG Micon		
Capacity of machine	1650	kW
Number of machine	2	Number

Total Investment	2026.10	Lakhs INR
Operational and Maintenance per machine +Overheads	9.50 (5% escalation every year)	Lakhs INR
Electricity Generation	Estimated based on the site performance	Million units
1 Euro	56	INR
Price of CER	10	Euro
Debt/ Equity ratio	3.35	
Interest rate	8.50	Percentage

(c) Barrier due to prevailing practice:
The following prevailing practice barriers have been identified by the project proponents that would hinder the implementation of the proposed project activity

Prevailing Practice:
The tables below clearly indicate that power sector capacity addition does not include wind energy as prevailing practice in Maharashtra. For the FY 2004-05 wind energy amounted for only **2.97%** of the total installed capacity of power generation in Maharashtra

Table: Mode wise Breakup of Installed Capacity of Power Generation in Maharashtra

Sector	Modewise Breakup (MW)								Grand Total
	Hydro	Thermal				Wind*	Nuclear	RES	
		Steam	Gas	Diesel	Total				
	2914.17	9414	2223.9	0	11637.9	456.30	297	41.72	15347.09

(Source: Directory of Indian Windpower 2005 *Excluding RES)

Less capacity utilization factor:

The capacity utilization factor of the wind farms during 2002-03 was just 14%. The low capacity factors of the wind mills adversely affect the profitability of the project.

Source: (www.dae.gov.in/pub/doc10/pg30.htm)
State Power Sector Performance Ranking:

The state of Maharashtra is not the best suitable destination for investment in power sector. According to the performance rating of the state power sectors across all states carried out by ICRA / CRISIL at the instance of the Ministry of Power (MoP), Maharashtra is placed only sixth amongst the states with wind potential. This rating is taken from the report of 2004. Though a third review of the report based primarily on the data obtained till December 2005, has been released in June 2006, when the commissioning of the project took place there was only data of 2004 available and therefore this data is considered. It is clear from the report that investment in the states of Andhra Pradesh, Karnataka, Tamilnadu and Gujarat are better options than Maharashtra. Furthermore, regarding to the latest version of the Report on State Power Sector Performance Ratings, Maharashtra still faces the following problems:

- Stagnant generation capacity in the state for last 5 years has lead to a huge demand-supply gap and load shedding through out the state. Also, there has not been any significant addition to the power generation capacity by the private sector in this period.

- MSEDCL still needs to invest substantially in improving its distribution network. The rate of failure of distribution transformers (DTR) has increased to 19 per cent in 2004-05 from 15 per cent in 2003-04.

- Tariff orders for 2004-05 and 2005-06 are yet to be issued by MERC, owing to the significant delays in filing of tariff applications by utilities. Due to delays in filing of tariff orders and average revenue realisation (ARR) high uncertainty for investors remains concerning the project activity being profitable.

- MSEB had accumulated losses of Rs 19.08 billion as on March 31, 2005.

(a) Other barriers:

Natural Disaster:

The generation of electricity from wind is, of necessity, an entirely an outdoor activity which is usually located in a remote location, beyond the control of project promoter. The wind generators and the grids are constantly subject to natural elements such as high winds and rain and a Disaster such as a severe thunderstorm and lightning can damage the generators and/or the grid. Whereas the cost of repairing the generators or grid can be recovered by insuring them, the loss in revenue due to the turbine not generating electricity when it is damaged or the grid not functioning cannot be recovered as insurance companies normally do not provide liquidated damages in their insurance cover. Even if, the insurance company agrees for liquidated damages cover, the insurance premium will be prohibitively very high.

Lack of experience in this field:

The project promoter is in the business of Textile manufacturing, Export & related products. Entering into the field of wind power generation was an entirely new activity for them, as they did not possess any knowledge or experience in this field. Hence, entering into this totally new and un-related field itself was a risky proposition for the project promoters. In order to enter into this business, the project promoter had to upgrade the knowledge and skill not only at the Management level but also for the subordinates who would look after this project.

Uncertainty in power generation:

The major risk faced by the promoters is the uncertainty in the electricity generation of electricity in a wind power project is mainly dependant on the available wind. As the electricity generation from the WTG is a function of the cube of the wind speed, even small variations in the wind speed contribute to relatively large variations in the electricity generated

Step 3: Barrier Analysis:

Herein the project proposer is required to determine whether the proposed project activity faces barriers that:

(a) Prevent the implementation of this type of proposed project activity; and
(b) Do not prevent the implementation of at least one of the alternatives through the following sub-steps:

Sub-step 3a: Identify barriers that would prevent the implementation of the type of the proposed project activity.

The following barriers have been identified by the project proponents that would hinder the implementation of the proposed project activity:

Less capacity utilization factor:

The capacity utilization factor of the wind farms during 2002-03 was just 14%. The low capacity factors of the wind mills adversely affect the profitability of the project.

Source: (www.dae.gov.in/pub/doc10/pg30.htm)

State Power Sector Performance Ranking

The state of Maharashtra is not the best suitable destination for investment in power sector. According to the performance rating of the state power sectors across all states carried out by ICRA / CRISIL at the instance of the Ministry of Power (MoP), Maharashtra is placed only sixth amongst the states with wind potential. This rating is taken from the report of 2004. Though a third review of the report based primarily on the data obtained till December 2005, has been released in June 2006, when the commissioning of the project took place there was only data of 2004 available and therefore this data is considered. It is clear from the report that investment in the states of Andhra Pradesh, Karnataka, Tamil Nadu and Gujarat are better options than Maharashtra. Based on their analysis carried out for all the states in India, the results specific to the states with available wind potential are summarized in Table
18:Table No.9: Score of the ICRA / CRISIL Report on State Power Sector

Rank	State	State Govt.	SERC	GENERATION	T&D	Financial Risk	Others	Commercial Viability	Total
Maximum score		**17.00**	**13.00**	**6.0**	**21.00**	**23.00**	**5.00**	**15.00**	**100**
1	Andhra Pradesh	8.75	10.75	4.75	11.75	14.75	2.75	3.25	56.75
2	Karnataka	9.50	9.50	5.50	7.25	13.75	3.75	2.00	51.25
3	Gujarat	9.69	2.50	3.75	9.30	15.50	3.75	6.50	50.99
4	Rajasthan	9.00	4.00	5.20	7.25	12.63	3.75	-	41.83
5	Tamil Nadu	4.75	9.00	3.00	9.50	9.63	1.75	2.00	39.63
6	**Maharashtra**	**7.25**	**4.00**	**4.00**	**4.50**	**12.25**	**1.25**	**4.50**	**37.75**
7	Kerala	4.00	0.50	2.50	13.00	10.00	3.00	1.25	34.25
8	Madhya Pradesh	6.90	3.00	2.00	6.10	4.75	-	2.00	24.75

Furthermore, the 2006 edition of the Report on State Power Sector Performance Ratings shows that Maharashtra is not the best state to invest in, even today. The report lists various problems that are being faced in the Maharashtra power sector. The report states that the problems in the power sector have led to stagnancy in the generation capacity of the state for the last 5 years. Addition to power generation by the private sector in this period has been minimal. There has also been an increase in the rate of failures in the distribution network. The issuance of tariff orders has been delayed and all these problems have resulted in the MSEDCL incurring an accumulated loss of a whopping INR 19.08 billion as on March 31 2005.

The two ICRA reports of 2004 and 2006 clearly suggest that Maharashtra, as of today as well as during the time the investor purchased the WEGs, was not the best state for investment in the power sector and the project proponent has undertaken a considerable risk while investing in this state.

The Dhabol case

In 1992 the Indian Government invited private investors - *including one well-known company ENRON* - *to contribute in building a large power plant in Maharashtra. One year later the MSEB signed a power purchase agreement with the ENRON-controlled Dabhol Power Corporation (DPC). However, in 1995 after the state elections the new government abandoned the project due to alleged corruption and high costs. Renegotiations of the project resulted in a better position for the MSEB. When the first phase of the project started its operation in 1999, Maharashtra government allies tried to cancel the project, as the power prices were too high for their estimation, moreover they stopped their payments to DPC. The conflict continued and in 2001 the board of DPC decided to authorize the management to terminate the contract any time it chooses.*This case shows the unpredictability private investors could face concerning investments in theMaharashtra power sector.

However, due to the increase in power demand in the recent years the MSEB in mid and late 2005 started negotiating with the Dhabol plant owners. In this period the MSEB was negotiating a price upward of INR 3 and likely to be between INR 4 to INR 6, for every unit of electricity supplied by the plant. These negotiations finally resulted in the MSEB agreeing to pay INR 5.70 per unit of electricity . This is much higher than the price per unit paid for wind electricity (INR 3.5 per unit).

The higher price per unit paid by MSEB for electricity from the Dabhol plant clearly indicates that the SEB is willing to pay more for the more reliable sources of electricity, further reiterating the SEB’s preference for conventional sources of power.

Both of the above issues concerning the Dabhol Plant happened prior to investments in the windmills and the investors were well aware of the risks faced while investing in the Maharashtra Power sector.

A comparative analysis of the risks involved in the proposed project vis-à-vis the risks associated with investment in a conventional fossil fuel based power plant, is discussed below

Table No.10: Comparative analysis for Wind Energy & Conventional fossil fuel

Details	**Wind Energy based**	**Conventional fossil fuel based**
Investment	8.3 MW * 5.25 crore/MW = INR 435 million	2.9 MW * 4.5 crore/MW = INR 130.5 million
	RISKS	
Payment from Utility	Risk of refusal of payment as in the Dabhol power plant in 1999.	No such risk as the MSEDCL in 2006 is willing to pay a high price for guaranteed power generation as in the case of the Dabhol Plant.
Non availability of	Availability of wind is beyond	No such risk

fuel	the control of project proponent.	
Non availability of grid	The implementation of a WEG can happen only at a particular site with wind potential, the evacuation facility at this area may be provided through a lower HT voltage grid	The implementation can happen at a better HT grid 110 kV & above, thus the grid availability would be better
Life Cycle	Lower life cycle – all wind electricity generators supplied in India carry a designed life of 20 years, thus the investor will have to create a sinking fund for re-investment at the end of project life (after salvage)	Higher life cycle – all conventional projects have higher PLF (thus low capital investment) and longer project life that allows the investor to reduce the amount of sinking fund required for the project to recreate the same facility after expiry of the useful project life.
Alternate fuels	The project is designed for wind as a fuel and no alternate fuel can be used.	The conventional projects can use alternate fuel to minimize the conventional fuel expenditure, as well as on the basis of locally available fuels.

The comparison shows that there are more risks involved while investing in wind energy as opposed to investing in conventional fossil fuel based power.

Prevailing Practice:

The tables below clearly indicate that power sector capacity addition does not include wind energy as prevailing practice in Maharashtra. For the Financial Year 2004-05 wind energy amounted for only **2.97%** of the total installed capacity of power generation in Maharashtra

Table No.11: Mode wise Breakup of Installed Capacity of Power Generation in Maharashtra

Sector	Modewise Breakup (MW)								Grand Total
		Thermal							
	Hydro	Steam	Gas	Diesel	Total	Wind*	Nuclear	RES	
	2914.17	9414	2223.9	0	11637.9	456.30	297	41.72	15347.09

(Source: Directory of Indian Windpower 2005 *Excluding RES)

Regarding the installed generation capacity sector wise, the table below shows, that private sector investment relies on thermal power projects. Only **14.4%** of private investments were made in wind power. Additionally one has to consider that the project activities purpose is sale of electricity to the grid.

Table No.12: Sector wise Installed Generation Capacity in Maharashtra

Ownership	Modewise Breakup (MW)							Grand Total
		Thermal						
Sector	Hydro	Coal	Gas	Diesel	Total	RES*	Nuclear	
State	2831.66	6425	912	0	7337	74.76	0	10243.42
Private	**447**	**1650**	**1660**	**0**	**3310**	**631.92**	**0**	**4388.92**
Central	0	1339	397.28	0	1736.33	0	852.06	2588.39
Total	**3278.66**	**9414.05**	**2969.28**	**0**	**12383.33**	**706.68**	**852.06**	**17220.73**

(Source: Infraline.com, data for March 2006 * RES includes wind energy and other renewable energy sources.

The private investment in wind electricity generation is therefore not the prevailing business practice in the state and the proposed project is hence, additional.

Due to natural Disaster:

The generation of electricity from wind is, of necessity, an entirely an outdoor activity which is usually located in a remote location, beyond the control of project promoter. The wind generators and the grids are constantly subject to natural elements such as high winds and rain and a Disaster such as a severe thunderstorm and lightning can damage the generators and/or the grid. Whereas the cost of repairing the generators or grid can be recovered by insuring them, the loss in revenue due to the turbine not generating electricity when it is damaged or the grid not functioning cannot be recovered as insurance companies normally do not provide liquidated damages in their insurance cover. Even if, the insurance company agrees for liquidated damages cover, the insurance premium will be prohibitively very high.

Due to lack of experience in this field:

Entering into the field of wind power generation was an entirely new activity for them (PAIL), as they did not possess any knowledge or experience in this field. Hence, entering into this totally new and un-related field itself was a risky proposition for the project promoters. In order to enter into this business, the project promoter had to upgrade the knowledge and skill not only at the Management level but also for the subordinates who would look after this project.

Due to uncertainty in power generation:

The major risk faced by the promoters is the uncertainty in the electricity generation of electricity in a wind power project is mainly dependant on the available wind. As the electricity generation from the WTG is a function of the cube of the wind speed, even small variations in the wind speed contribute to relatively large variations in the electricity generated.

Regulatory Risk:

Maharashtra Electricity Regulatory Commission (MERC) in exercising its power under Sec 22(i) c & 29 of the erstwhile ERC Act 1998, & also under Section 62 & 86 (i) e of the EA 2003,fixed the tariff rates of electricity when sold to the state owned utility for wind power projects that are commissioned after 1st April ,2003.This is a regulatory barrier as the rate at which electricity is to be sold to the state utility was fixed by MERC & binding on the project promoter who had no say in the matter .

Further, a negative impact was created in the whole set -up owing to defaults in payment of revenue by the state owned utility, to earlier investors in wind energy projects. While the former statement is a direct regulatory risk, the later statement is an indirect regulatory risk to the project promoter.

The project promoter has entered in the agreement with Maharashtra state electricity distribution company Ltd. (MSEDCL) for sale electricity to them. This agreement (article 18 sections 18.02 CDM Benefit) stipulates “MERC shall be approached to review the tariff structure (contained in agreement) once the project becomes eligible for CDM benefits or similar credits and any mechanism for sharing of CDM or similar credit between the seller i.e. PAIL in this case) & MSEDCL. The decision of the MERC will be binding on both parties. Hence through an agreement has been signed , the rate at which electricity is sold to MSEDCL may change if PAIL obtain any benefit under CDM or they may have to share the benefits with MSEDCL .The extent of sharing of the CDM Benefits has not been specified by MERC. Hence this is a big risk undertaken by the project promoter as revenue, either from a sale of electricity or from the CDM benefit may be affected depending upon the decision of MERC.

Despite of an agreement of payment of bills within 45 days of billing from MSEDCL, the bills are generally paid in about 90 days after billing. This also creates some problem in getting cash at stipulated time.

Sub-step 3 b: Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity):

As stated the above alternatives are specifically hindering the implementation of wind farm projects including the proposed project activity. None of these barriers are applicable to either of the two other alternatives.

Step 4: Common practice analysis

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

Provide an analysis of any other activities implemented previously or currently underway those are similar to the proposed project activity. Projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc. Other CDM project activities are not to be included in this analysis. Provide quantitative information where relevant.

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

Table No.13: state wise wind power potential in India as on 31/03/2006:

Sr. No.	**State**	**Gross Potential (MW)**	**Technical Potential (MW)**	**Installed Capacity (MW)**
1	Andhra Pradesh	8275	1920	121.1
2	Gujarat	9675	1780	337.9
3	Karnataka	6620	1180	584.3
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	2897.34
10	West Bengal	450	450	1.1
11	Other States	--	--	1.6
	Total	45195MW	13390MW	5347MW

The total installed capacity of power generation in India through all power generation (coal, gas, nuclear, hydro and others) sources is 126031.27 MW [3] whereas the installed capacity of wind power in India is 5347 MW. Thus only 4.2 % 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. Hence we can say that it is not a common practice in the region to generate electricity using wind and sell the generated output to the grid.

(Sourse: Indian Wind Power Directory 2006)

Impact of CDM:

The project registration will result in the following:

1. Reduction in Burdon of government to commission of additional new thermal power generation plant which help to reduce GHG emission.
2. Improvement in post-tax equity IRR with CER sale improves financial viability of project.
3. Reduction in overall grid transition losses, as power generated in project activity will be used locally. Government will not require transmitting the equivalent power from far of located conventional power projects indirectly which help to reduce GHG emission.
4. Reduction in GHG through the non conventional fuel based installation in the state.
5. Sustainable economic development as most of the wind sites in the state are in the remote corners & under developed areas, new installation at these locations will bring in economic development of these far flung locations.
6. New employment opportunities as the investment in wind sector in the state would also bring in direct & indirect employment benefits.

To mitigate the risks mentioned in above different points & encourage the setting up of a wind power project in Maharashtra, CDM benefit to project promoter is required.
The proposed activity thus satisfies the additionally conditions as required under attachment A & B of the simplified modalities & procedures for small scale project activities, and thus qualifies as a CDM project.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

Sources:-
1. CEA Website
2. WERB Website
3. UNFCCC Website

The project activity involves generation of electricity by the renewable energy, which is wind energy in this project. In the absence of the project activity equivalent amount of electricity would have been taken from the grid, which is predominately connected by the thermal power stations. Therefore current grid is taken as baseline scenario.

Baseline Emissions:

AMS 1 D/Version 12 (Valid from 10 Aug 07 onwards) (but for baseline ACM0002/Version 06 (Valid from 19 May 06 onwards)) describes a stepwise approach to apply the methodology to the project activity. Baseline Emission factor is calculated as combined margin, consisting of a combination of operating margin (OM) and build margin (BM) factors. This methodology lists the parameters that need to be monitored for estimating the baseline, project emissions as well as leakage.

Baseline emission factor EFy is calculated as the weighted average of the Operating Margin emission factor ($EF_{OM,y}$) and the Build Margin emission factor ($EF_{BM,y}$):

$$EF_y = w_{OM} \times EF_{OM,y} + w_{BM} \times EF_{BM,y}$$

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

Emission factor for Operating Margin and Build Margin are taken from CEA guidelines

Thus baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO_2e/kWh) calculated.

Emission Reductions (ERy):

The emission reductions from the project activity are equal to the baseline emissions minus sum of project emissions and leakage. Since the project activity generates electricity from wind, which is a zero emission source, there are no associated project emissions. As per AMS I.D, leakage need not be considered since there is no transfer of energy generating equipment from another activity or transfer of existing equipment to another activity. Therefore, project emissions and leakage from the project activity are zero and thus emission reductions from the project activity are directly equal to the baseline emissions.

ERy = EFy – (PEY + Ly), where
PEy = Project Emissions in year y (nil in this case)
Ly = Leakage in y (nil in this case)

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

(a) EFy

Data / Parameter:	EFy
Data unit:	tCO2/MWh
Description:	CO2 emission factor of the grid
Source of data used:	CEA website http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm
Value applied:	0.90
Justification of the choice of data or description of measurement methods and procedures actually applied:	Emission factor is used in the calculation of emission reductions.
Any comment:	Calculated as weighted sum of the OM and BM emission factors. .

(b) $EF_{OM}y$

Data / Parameter:	EFOMy
Data unit:	tCO2/MWh
Description:	CO2 Operating margin emission factor of the grid
Source of data	CEA website

used:	http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm
Value applied:	0.99
Justification of the choice of data or description of measurement methods and procedures actually applied:	This is used in calculation of emission factor EFy
Any comment:	Calculated as indicated in the simple OM baseline method

d) $EF_{BM}y$

Data / Parameter:	$EF_{BM}y$
Data unit:	tCO2/MWh
Description:	CO2 Build margin emission factor of the grid
Source of data used:	CEA website http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm
Value applied:	0.63
Justification of the choice of data or description of measurement methods and procedures actually applied :	- This is used in the calculation of emission factor EFy.
Any comment:	Calculated as indicated in the simple OM baseline method

B.6.3 Ex-ante calculation of emission reductions:

Sources:-
1. CEA Website
2. WERB Website
3. UNFCCC Website

The baseline methodology has followed the Type one specified under project category I D. in Appendix B of simplified modalities & procedure for small scale project activity. The project activity involves generation of electricity by the renewable energy, which is wind energy in this project. In the absence of the project activity equivalent amount of electricity would have been taken from the grid, which is predominately connected by the thermal power stations. Therefore current grid is taken as baseline scenario.

Baseline Emission:

For wind the default weight is as fallows: W_{OM} = 0.75 & W_{BM} = 0.25 (as per ACM002 Version 06)

EF_{OM} = 0.99 tCO2/Mwh
EF_{BM} = 0.63 tCO2/Mwh

The net baseline emission factor as per combined margin

$$EF_Y = 0.75*EF_{OM} + 0.25*EF_{BM}$$
$$= 0.75*0.99 + 0.25*0.63$$
$$= 0.90 \text{ tCO2/Mwh}$$

Baseline Emissions are the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO_2e/kWh) calculated

- Gross electricity generation (as committed by suzlon) : 16573920 KWh/year
- Internal losses : 5%
- Net electricity supplied to grid : 15745224 KWh/year

Baseline Emission:
= Net kWh produced by the windmills feed to grid x Baseline emission factor EFy
= 15745224 x 0.90 x 0.001
=14171 t-CO_2/ year

Where,

0.001 = Conversion factor for tCO_2/MWh to tCO2/KWh

Emission Reductions (ERy):

- **ERy = EFy – (PEY +Ly) ,**
- **ERy =**14171 **– (0 + 0)**
- **ERy =**14171 **t-CO_2/ year**

Where,

PEy = Project Emissions in year y (nil in this case)
Ly = Leakage in y (nil in this case)

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

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

It is to be noted that as the operating conditions are going to be same for the whole crediting year, the fuel consumption will be same for the next years as that of the current year. Therefore it is considered that the emissions will also be the same as per the current year for the next years.

On applying the formulae, the values are as follows:

Table No.14: Ex-ante estimation of emission reductions:

Year	Estimation of project activity emissions (tCO_2e)	Estimation of baseline emissions (tCO_2e)	Estimation of leakage (tCO_2e)	Estimation of overall emission reductions (tCO_2e)
Year 2008	0	14171	0	14171
Year 2009	0	14171	0	14171
Year 2010	0	14171	0	14171
Year 2011	0	14171	0	14171
Year 2012	0	14171	0	14171
Year 2013	0	14171	0	14171
Year 2014	0	14171	0	14171
Year 2015	0	14171	0	14171
Year 2016	0	14171	0	14171
Year 2017	0	14171	0	14171
Total (tonnes of CO2e)	**0**	**141710**	**0**	**141710**

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

Title: "Grid connected renewable electricity generation" AMS I D version 12 (10th August 2007)

Reference: Appendix B to the simplified M&P for small-scale CDM project activities The project activity meets the eligibility criteria to use simplified modalities and procedure for small scale CDM project activities as set out in paragraph 6 (c) of decision 17/CP.7 as explained in the earlier actions.

B.7.1 Data and parameters monitored:

(1) EGy (Gross):

Data / Parameter:	**EGy(Gross)**
Data unit:	MWh/year
Description:	Electricity Generated at project site

Source of data to be used:	Data Sheet maintain by PAIL
Value of data	16573.920
Description of measurement methods and procedures to be applied:	Electricity measured is used in calculation of emission reductions. - The electricity generated by the WTG is measured at the local control system (LCS reading) which can be cross verified from the Energy meter installed at the Transformer yard. - The data is measured instantaneously with Generation and recorded monthly 100% of the data is monitored - The data is archived electronically
QA/QC procedures to be applied:	As per SUZLON wind power ltd. IQMS (Integrated Quality Management System), the generation reports of the WTG are observed instantaneously and uploaded on a daily basis and the data is archived as daily, weekly, monthly and Yearly generation reports in the electronic database of the organization.
Any comment:	Electricity is supplied by the project activity to the grid.

(2) EGy (Net):

Data / Parameter:	**EGy**
Data unit:	MWh/year
Description:	Net Electricity supplied to substation by the project
Source of data to be used:	Data Sheet maintain by PAIL
Value of data	15745.224
Description of measurement methods and procedures to be applied:	Electricity measured is used in calculation of emission reductions. - The electricity generated by the WTG is measured at the local control system (LCS reading) which can be cross verified from the Energy meter installed at the Transformer yard. - The data is measured instantaneously with Generation and recorded monthly 100% of the data is monitored - The data is archived electronically
QA/QC procedures to be applied:	As per SUZLON wind power ltd. IQMS (Integrated Quality Management System), the generation reports of the WTG are observed instantaneously and uploaded on a daily basis and the data is archived as daily, weekly, monthly and Yearly generation reports in the electronic database of the organization.
Any comment:	Electricity is supplied by the project activity to the grid.

B.7.2 Description of the monitoring plan:

Parakh Agro Industries Limited has entered into Operation & Maintenance Agreement with the EPC contractor M/s Suzlon Energy Limited & NEG Micon India Private Limited for carrying out the necessary maintenance of the installations during the designed life of the project. These respective agencies will be responsible for the operation and maintenance structure that will be implemented in order to monitor emission reductions generated by the project activity is as under:

1 Routine Maintenance Services

Routine Maintenance Labour Work involves making available suitable manpower for operation and maintenance of the Equipment and covers periodic preventive maintenance, cleaning and upkeep of the Equipment including **-**

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

2 Security Services

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

3 Management Services

a) Data logging in for power generation, grid availability, machine availability.
b) Preparation and submission of monthly performance report in agreed format.
c) Taking monthly meter reading jointly with MSEDCL, of power generated at the wind farm and supplied to MSEDCL Grid from the meter/s maintained by MSEDCL for the purpose and co-ordinate to obtain necessary power credit report/ certificate.

4 Technical Services

a) Visual inspection of the WTG and all parts thereof.
b) Technical Assistance including checking of various technical, safety and operational parameters of the equipment, trouble shooting and relevant technical services.

The responsibility of registration of the project has been assigned to

Mr. Prakash. H. Parakh
Managing Director
Parakh Agro Industries Ltd.
Parakh House,
Plot No. 1, and 2. Marketyard,
Gultekdi, Pune – 411037
Ph No. + 91 20 2426 1733
Fax + 91 20 2426 3211

The Managing Director, will take care of the overall supervision of the project performance including the following:

- Performance review of the WEG installations.
- Monitoring & liaison with the state electricity utility
- Arranging for annual verification of the installations for issuance of CERs

The project activity essentially involves generation of electricity from wind, the employed WEGs convert wind energy into electrical energy and do not use any other input fuel for electricity generation. Thus no special ways and means are required to monitor leakage from the project activity.

Since the project activity does not involve any leakage and only measurement of generated electricity from wind farm installations will form the basis of annual GHG reduction by the project. The project management does not require any extensive training of personnel. The respective EPC contractors do the operation and maintenance of the installations and measurement of generated electricity is done by state electricity utility. The EPC contractors are ISO certified organizations and follow designated procedures for the assigned tasks. One of the EPC contractors (Suzlon) has also implemented SAP3 for stringent management of project.

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

The Baseline Study is as per the CEA's (Central Electricity Authority) CO2 Database, the information pertaining to the Western Region Electricity Board Grid has been used for this Project Activity.

Date of first completion – 29/08/2006 (modified 06th September 2007)

Monitoring is done as per Monitoring Plan.

Name of persons/entities determining the baseline:

Senergy Global Pvt Ltd
9th Floor, EROS Corporate Tower, Nehru Place,
New Delhi – 110 019, India.
Tel: +91-11-41805501/2/3
Fax: +91-11-41805504/46506006
E.mail: mail@senergyglobal.com
Url: www.senergyglobal.com

Senergy Global Pvt. Ltd. is not project proponent.

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:

21/03/2006 (commissioning date of the first WEG)

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

20 years

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

C.2.1. Renewable crediting period

Not Applicable

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

Not Applicable

C.2.1.2. Length of the first crediting period:

Not Applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

01/04/2008 or the date of registration

C.2.2.2. Length:

10 years 0 month

SECTION D. Environmental impacts

D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

The project activity does not fall under the purview of Environmental Impact Assessment notification of the Ministry of Environment and Forests (MoEF), Government of India (GOI) and the project activity is exempted from environmental clearances. The project activity has no significant impact on the environment.

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:

As mentioned above, wind projects in India do not require an Environmental Impact Assessment. The only document which is remotely connected is the 'No Objection Certificate', which has been approved by the State Electricity Government in the case of all the wind farms in the Project.

SECTION E. Stakeholders' comments

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

Stake holder's identification:

The project proponent has identified following stakeholders while the development of the project activity.

- Local Communities
- Local governmental representatives
- Maharashtra Energy Development Agency (MEDA)
- Maharashtra State Electricity Distribution Company Limited (MSEDCL)

Stakeholder Involvement:

The project has been executed after receiving the necessary consent of the involved state government agencies, MEDA is responsible for executing the state electricity policy as per MERC (Maharashtra Electricity Regulatory Commission) for implementation of wind electric generators, whereas the MSEDCL is responsible for entering into power purchase, wheeling & banking agreements with the individual project proponents for evacuation of electricity.

As both of these agencies are under the domain of the state government, the standard application procedure followed by meeting the stipulated requirements of the state government was carried out. The final outcome of the procedure resulted in the following licences & permissions:

- Permission to commission / implement the project

- Power Purchase Agreements between the electricity utility & project proponents and No Objection Certificate
- Commissioning & Grid Synchronization Certificates

The private land owners were consulted / approached through the village governing council (Panchayat) for transfer of land for erection and commissioning of wind turbines and price negotiations were carried out through the intermediation of the revenue officials of the state government in presence of the head of the village council.

Stakeholder Comments received:

No adverse comments were received from the government agencies / stakeholders, whereas the villagers have made some observations, which are mentioned in detailed in the following section.

E.2. Summary of the comments received:

Comments received/observation made:

No adverse comments were received from the government agencies / stakeholders, whereas the villagers have made following observations:

- They will continue to have the right of way in the wind farm except at places where security is required.
- The village was lacking basic amenities, and thus EPC contractor was request to consider some development of the villages.
- Employment, if possible should be given to the local villagers

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

All the submissions from the villagers were considered by the management and:

- The right of way was given to the villagers even after selling land to the EPC contractor.
- Employment of O & M staff up to the level of technicians and machine supervisors has been done from the local villages only.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Parakh Agro Industries Ltd.
Street/P.O.Box:	Parakh House,
Building:	Plot No. 1, and 2. Marketyard
City:	Gultekdi, Pune
State/Region:	Maharashtra
Postfix/ZIP:	411037
Country:	India
Telephone:	91 20 2426 1733
FAX:	91 20 2426 3211
E-Mail:	
URL:	
Represented by:	
Title:	Managing Director
Salutation:	Mr
Last Name:	Parakh
Middle Name:	H
First Name:	Prakash
Department:	
Mobile:	91-9881130300
Direct FAX:	
Direct tel:	
Personal E-Mail:	prakashparakh@parakhagro.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding involved in the project activity.

Annex 3

BASELINE INFORMATION

CENTRAL ELECTRICITY AUTHORITY: CO2 BASELINE DATABASE						
VERSION			**2.0**			
DATE			**21 June 2007**			
BASELINE METHODOLOGY			**ACM0002 / Ver 06**			
EMISSION FACTORS						
Weighted Average Emission Rate (tCO2/MWh) (excl. Imports)						
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	0.72	0.73	0.74	0.71	0.71	0.71
East	1.09	1.06	1.11	1.10	1.08	1.08
South	0.73	0.75	0.82	0.84	0.78	0.74
West	0.90	0.92	0.90	0.90	0.92	0.87
North-East	0.42	0.41	0.40	0.43	0.32	0.33
India	0.82	0.83	0.85	0.85	0.84	0.82
Simple Operating Margin (tCO2/MWh) (excl. Imports)						
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	0.98	0.98	1.00	0.99	0.97	0.99
East	1.22	1.22	1.20	1.23	1.20	1.16
South	1.02	1.00	1.01	1.00	1.00	1.01
West	0.98	1.01	0.98	0.99	1.01	0.99
North-East	0.73	0.71	0.74	0.74	0.71	0.70
India	1.02	1.02	1.02	1.03	1.03	1.02
Build Margin (tCO2/MWh) (excl. Imports)						
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North					0.53	0.60
East					0.90	0.97
South					0.71	0.71
West					0.77	0.63
North-East					0.15	0.15
India					0.70	0.68

Combined Margin (tCO2/MWh) (excl. Imports)						
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	0.76	0.76	0.77	0.76	0.75	0.80
East	1.06	1.06	1.05	1.07	1.05	1.06
South	0.87	0.85	0.86	0.86	0.85	0.86
West	0.87	0.89	0.88	0.88	0.89	0.81
North-East	0.44	0.43	0.44	0.44	0.43	0.42
India	0.86	0.86	0.86	0.86	0.86	0.85

Weighted Average Emission Rate (tCO2/MWh) (incl. Imports)						
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	0.72	0.73	0.74	0.71	0.72	0.72
East	1.09	1.03	1.09	1.08	1.05	1.05
South	0.74	0.75	0.82	0.84	0.78	0.74
West	0.90	0.92	0.90		0.92	0.88
North-East	0.42	0.41	0.40	0.43	0.48	0.33
India	0.82	0.83	0.85	0.85	0.84	0.81
Simple Operating Margin (tCO2/MWh) (incl. Imports)						
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	0.98	0.98	1.00	0.99	0.98	0.99
East	1.22	1.19	1.17	1.20	1.17	1.13
South	1.03	1.00	1.01	1.00	1.00	1.01
West	0.98	1.01	0.98	0.99	1.01	0.99
North-East	0.73	0.71	0.74	0.74	0.84	0.70
India	1.01	1.02	1.02	1.02	1.02	1.02
Build Margin (tCO2/MWh) (not adjusted for imports)						
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North					0.53	0.60
East					0.90	0.97
South					0.71	0.71
West					0.77	0.63
North-East					0.15	0.15
India					0.70	0.68
Combined Margin in tCO2/MWh (incl. Imports)						
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	0.76	0.76	0.77	0.76	0.75	0.80
East	1.06	1.05	1.04	1.05	1.04	1.05
South	0.87	0.85	0.86	0.86	0.85	0.86
West	0.87	0.89	0.88	0.88	0.89	0.81
North-East	0.44	0.43	0.44	0.44	0.49	0.42

India	0.85	0.86	0.86	0.86	0.86	0.85

Annex 4

MONITORING INFORMATION

As per paragraph 13 of "Type AMS. I-D Grid connected renewable electricity generation (Version 12: Valid from 10 Aug 07 onwards)", KWh generated by windmills is to be recorded.

The data monitoring will involve measurement of KWh generated by windmills The proposed project activity requires evacuation facilities for sale to grid and the evacuation facility is essentially maintained by the state electricity utility. The electricity generation measurements are required by the utility and the investors to assess electricity sales revenue and / or wheeling charges. The project activity has therefore envisaged two independent measurements of generated electricity from the wind turbines.

1. The primary recording of the electricity fed to the state utility grid will be carried out jointly at the incoming feeder of the state electricity utility. Machines for sale to utility will be connected to the feeder.
2. There are two energy meters installed at the site. One acts as a back up meter if the other one fails. Due to any unforeseen events if both the meters fail, the generation can be monitored at the controller end as explained below in point no.4.
3. The joint measurement will be carried out once in a month in presence of both parties (the developer's representative and officials of the state power utility). Both parties will sign the recorded reading.
4. The secondary monitoring, which will provide a backup (fail-safe measure) in case the primary monitoring is not carried out, would be done at the individual WEGs. Each WEG is equipped with an integrated electronic meter. These meters are connected to the Central Monitoring Station (CMS) of the entire wind farm. The generation data of individual machine can be monitored as a real-time entity at CMS. The snapshot of generation on the last day of every calendar month will be kept as a record both in electronic as well as printed (paper) form.

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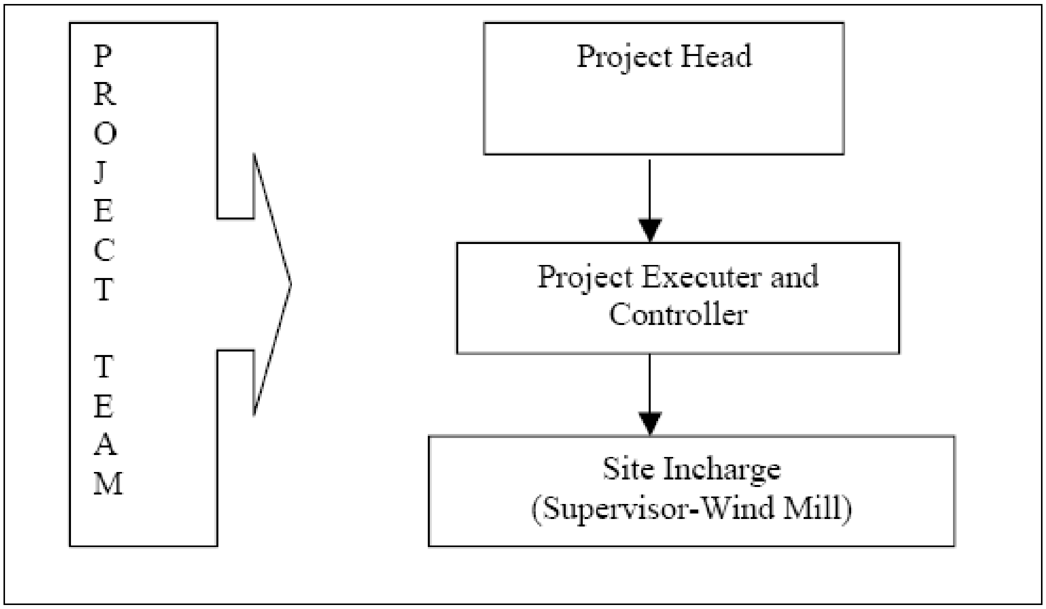
For measurement of all the parameters and maintenance of records due care has been taken and to prepare elaborated formats for data collection; methodology has been described for measurement and collection of each of the parameter; proper training is being provided to concerned personnel.

Operation and Maintenance Structure for the 8.3 MW project by Parakh Agro Industries Limited


PROJECT TEAM
Project Head
Project Executer and Controller
Site Incharge (Supervisor-Wind Mill)

NOTATIONS

Notation	Representing	Unit
%	Percentage	
ABT	Availability Based Tariff	
BM	Build Margin	tCO_2/MWh
CDM	Clean Development Mechanism	
CEA	Central Electricity Authority	
CER	Certified Emissions Reduction	
CM	Combined Margin	tCO_2/MWh
CMS	Central Monitoring Station	
CO_2	Carbon-di-oxide	
CO_2-e	CO_2 equivalent	TCO_2-e
DNA	Designated National Authority	
DOE	Designated Operational Entity	
EF_{BMY}	Build Margin emission factor	tCO_2/MWh
EF_{OMY}	Operating Margin emission factor	tCO_2/MWh
EFy	Emission Factor for the year	tCO_2/MWh
EIA	Environmental Impact Assessment	
GHG	Green House Gas	
GHG Emissions	Green House Gas Emissions	TCO_2-e/year
GOI	Government of India	
IPCC	Intergovernmental Panel on Climate Change	
ISO	Indian Standard Organization	
Kg CO_2equ/kWh	Kilogram of CO_2 equivalent per Kilo Watt Hour	
KW	Kilo Watt	
KWh	Kilo Watt hour	
M & P	Modalities and Procedures	
MERC	Maharashtra Electricity Regulatory Commission	
MPCB	Maharashtra Pollution Control Board	
MSEB	Maharashtra State Electricity Board	
MSEDCL	Maharashtra State Electricity Distribution Company Limited	
MW	Mega Watt	
No.	Number	
Nos	Numbers	
NO_x	Oxides of Nitrogen	
OM	Operating Margin	tCO_2/MWh
PAIL	Parakh Agro Industries Limited	
PDD	Project Design Document	

Notation	Representing	Unit
SEB	State Electricity Board	
SO_x	Oxides of Sulphur	
T CO_2-e	Tonnes of CO_2 equivalent	
TCO_2-e	Tonnes of CO_2 equivalent	
TCO_2-e/MWh	Tonnes of CO_2 equivalent Per Mega Watt Hour	
UNFCCC	United Nations Framework Convention on Climate Change	
w_{BM}	Default weight of Build Margin	
WEG	Wind Electric Generator	
WTG	Wind Turbine Generator	
w_{OM}	Default weight of Operating Margin	
Yr.	Year	
