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

CONTENTS

Annexes

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:

10 MW Wind Power Project in Maharashtra by Deepak Fertilizers and Petrochemicals Corporation Limited
Version: 1
Date : 10/06/2008

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

The proposed project activity is a wind power project of 10 MW installed capacity in the State of Maharashtra by M/s Deepak Fertilisers and Petrochemical Corporation Ltd. (hereafter DFPCL or project participant). It consists of eight wind electricity generators (WEGs) of 1.25 MW capacity each.
The details of each of the WTGs are tabulated below:-

WTG location no and commissioning date	Installed capacity	Make	Village	District
J087- 29.09.2006	1.25	Suzlon Model S-70	Aichale	Dhule
J091- 29.09.2006	1.25	Suzlon Model S-70	Aichale	Dhule
K441-29.09.2006	1.25	Suzlon Model S-70	Dhandane	Nandurbar
K442-29.09.2006	1.25	Suzlon Model S-70	Dhandane	Nandurbar
K513-29.09.2006	1.25	Suzlon Model S-70	Wankute	Nandurbar
K514-29.09.2006	1.25	Suzlon Model S-70	Wankute	Nandurbar
K478-29.09.2006	1.25	Suzlon Model S-70	Mandal	Nandurbar
K503-29.09.2006	1.25	Suzlon Model S-70	Vavad	Nandurbar

The electricity generation from this project will contribute to GHG reductions estimated at 14676 tCO2e p.a. over its estimated life of 20 years. It will evacuate approximately 17.06 million kWh of renewable power annually to the power deficit Western Region Grid.

Purpose of the project activity:

The main purpose of the project activity is to generate electrical energy through sustainable means thus contributing to climate change mitigation efforts.

Contribution of project activity to sustainable development:

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

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

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

1. Social well-being

The proposed project activity has led to alleviation of poverty by establishing direct and indirect employment benefits accruing out of ancillary units for manufacturing towers, erection and maintenance of the WTGs and security services. The infrastructure in and around the project area has also improved due to project activity. This includes development of road network, increased accessibility to medical facilities and improvement in the quality of electricity in terms of its availability and frequency as the generated electricity is fed into a deficit grid.

2. Economic well-being

The project activity has resulted in investment in the developing region which otherwise would not have happened in the absence of the 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 and sub-urban habitants) which has provided 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.

3. Environmental well-being

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

4. Technological well-being

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

A.3 Project participants:

Name of Party involved (*) ((host) indicates a host	Private and/or public entity(ies) project participants (*) (as	Kindly indicate if the Party involved wishes to be

[1] Ministry of Environment and Forests web site: http://cdmindia.nic.in/host_approval_criteria.htm

Party)	applicable)	considered as project participant (Yes/No)
India.	• Private entity - M/s Deepak Fertilisers and Petrochemical Corporation Ltd.	No.
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party (ies) involved is required.		

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

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

A.4.1.1 Host Party (ies):

India.

A.4.1.2 Region/State/Province etc.:

Maharashtra.

A.4.1.3 City/Town/Community etc:

Dhule and Nandurbar

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

WTG Location no	Village	Taluka	District	Latitude	Longitude	Elevation
J087	Aichale	Sakri	Dhule	20º59´27.39″ N	74º18´51.94″ E	1383 ft
J091	Aichale	Sakri	Dhule	20º59´27.39″ N	74º18´51.94″ E	1383 ft
K441	Dhandane	Nandurbar	Nandurbar	21º21´57.31″ N	74º14´32.09″ E	713 ft
K442	Dhandane	Nandurbar	Nandurbar	21º21´57.31″ N	74º14´32.09″ E	713 ft
K513	Wankute	Nandurbar	Nandurbar	21º21´57.31″ N	74º14´32.09″ E	713 ft
K514	Wankute	Nandurbar	Nandurbar	21º21´57.31″ N	74º14´32.09″ E	713 ft
K478	Mandal	Nandurbar	Nandurbar	21º21´57.31″ N	74º14´32.09″ E	713 ft
K503	Vavad	Nandurbar	Nandurbar	21º21´57.31″ N	74º14´32.09″ E	713 ft

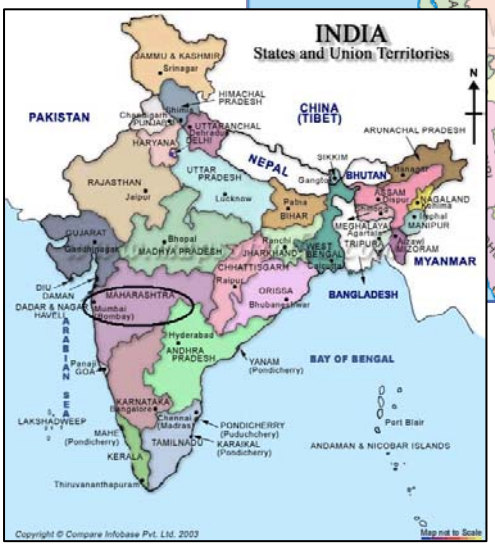


Fig: 1 Location Map of Maharashtra

Fig: 2 District Map of Maharashtra

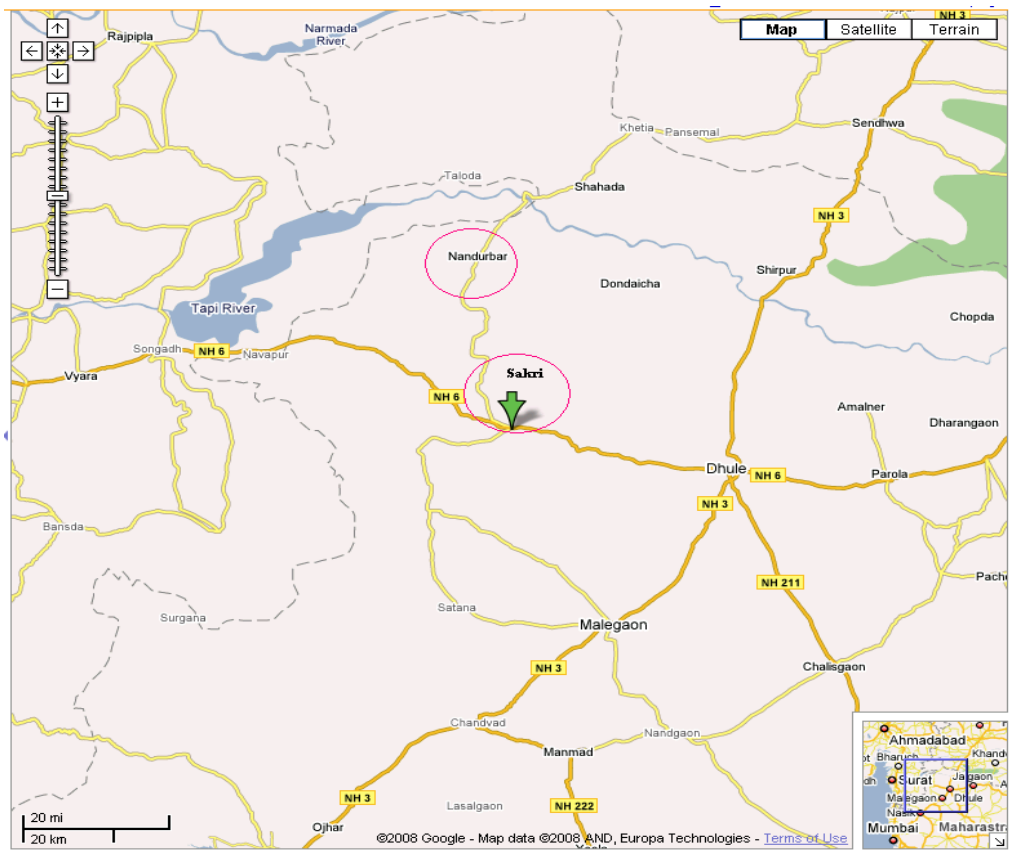


Fig: 3 Location of Project activity

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

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

- **Type : I – Renewable Energy Projects**
- **Project Category : I.D. – Grid connected renewable electricity generation** (Version 13: 14 December 2007)

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

Technology

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

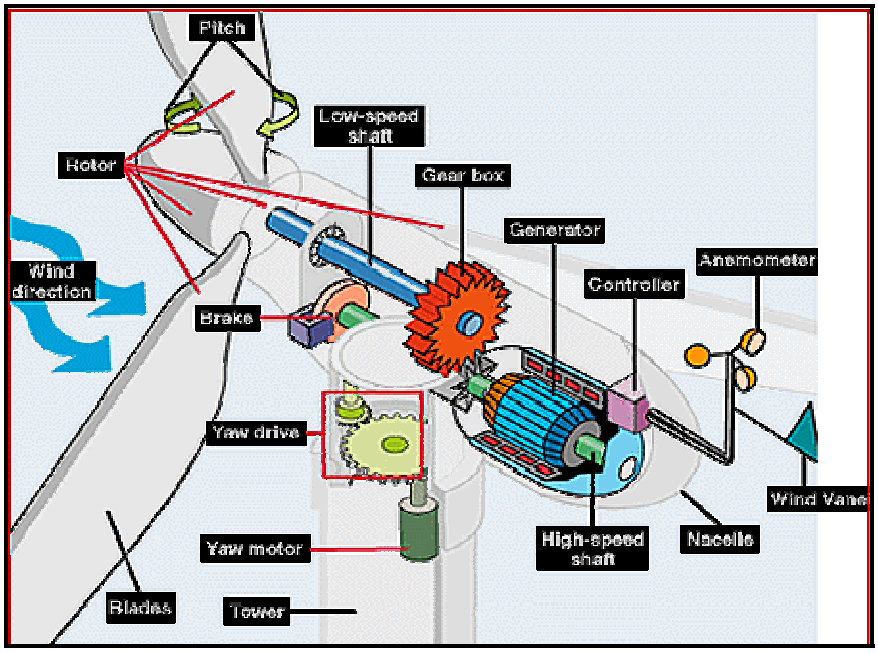


Figure 04, Major Mechanical Parts of a Wind Turbine

The technology is a clean technology since there are no GHG emissions associated with the electricity generation. The project invoves 8 nos. Suzlon make WEGs, model S-70 of individual 1.25 MW capacities. Salient features of the model S70 WEGs are -

Salient Features of 1.25 MW (S 70) WEG

Sr. No.	Particulars	Specifications
1.	Rotor diameter	69.1 m
2.	Hub height	74 m
3.	Installed electrical output	1250 kW
4.	Cut-in wind speed	3 m/s
5.	Rated wind speed	12 m/s
6.	Cut-out wind speed	20 m/s
7.	Rotor swept area	3750 m^2
8.	Rotational speed	13.2/19.8
9.	Rotor material	GRP
10.	Regulation	Pitch
11.	Generator	Asynchronous Generator, 4/6 poles
12.	Rated output	250/1250 kW
13.	Rotational speed	1010/1515 rpm
14.	Operating voltage	690 V
15.	Frequency	50 Hz
16.	Protection	IP 56
17.	Insulation class	H

18.	Cooling system	Air cooled
19.	Gear box	3-stage gearbox, 1 planetary & 2 helical
20.	Manufacturer	Winergy
21.	Gear ratio	77.848
22.	Nominal load	1390 kW
23.	Type of cooling	Oil cooling system
24.	Yaw drive system	4 active electrical yaw motors
25.	Yaw bearing	Polyamide slide bearing
26.	Safety system	
26.1.	Aerodynamic brake	3 times independent pitch regulation
26.2	Mechanical brake	Spring power disc brake, hydraulically released, fail safe. Microprocessor controlled, indicating.
27.	Control unit	Actual operating conditions, UPS back-up system
28.	Tower	Tubular
29.	Design standards	GL/IEC

The 1.25 MW S-70 windmills used in the project have been developed indigenously by Suzlon Energy Limited and no transfer of technology is involved.

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

Years	Estimation of annual emission reductions in tonnes of CO2 e
2008	17934
2009	14314
2010	14314
2011	14314
2012	14314
2013	14314
2014	14314
2015	14314
2016	14314
2017	14314
Total estimated reductions (tonnes of CO2 e)	**146760**
Total number of crediting years	**10**
Annual average of the estimated reductions over the crediting period (tCO2 e)	**14676**

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

The project has not received any public funding from Annex I countries and Official Development Assistance (ODA). The project is a unilateral project.

A.4.5 Confirmation that the small-scale project activity is not a de-bundled 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 de-bundled component of a large project activity if there is a registered small-scale activity or an application to register another small-scale activity:

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

None of the above applies to the above project and project participant has not registered or applied for registration for any other wind power project. Therefore, the proposed project is not a de-bundled component of a larger CDM 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:

Project Type : **I –** Renewable Energy Projects

Project Category : **D –** Grid connected renewable electricity generation (Version 13: 14 December 2007)

Reference : Appendix B of the simplified M&P for small-scale CDM project activities (UNFCCC, 2003b)

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

Requirements with respect to technology/measure under AMS I.D. – Grid connected renewable electricity generation (Version 13: 12 December 2007)

- 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.

- If the unit added has both renewable and non-renewable components (e.g.. a wind/diesel unit), the eligibility limit of 15MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15MW.

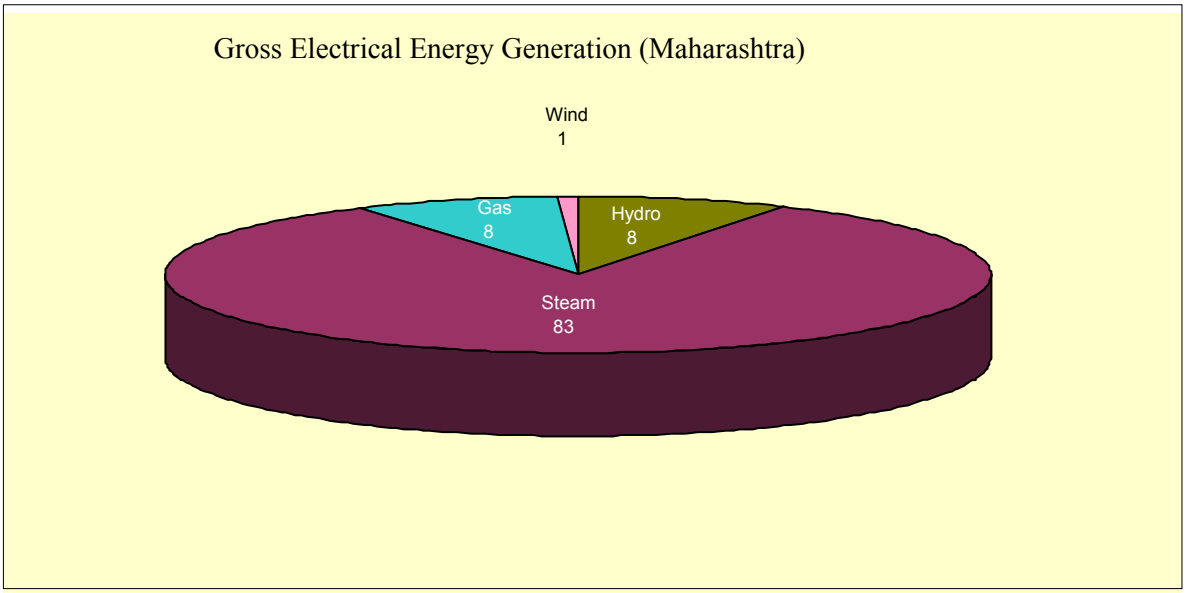
- Combined heat and power (co-generation) systems are not eligible under this category.

- In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.

- Project activities that seek to retrofit or modify an existing facility for renewable energy generation are included in this category. To qualify as a small scale project, the total output of the modified or retrofitted unit shall not exceed the limit of 15 MW.

Justification:

The installed capacity of the project is 10 MW, which is less than the limiting capacity of 15 MW and is thus eligible to use small-scale simplified methodologies. Further, the project activity supplies electricity to Western Region Electricity Grid, where major part of electricity comes from non-renewable electricity generation. Hence, the type and category of the project activity matches with I.D. as specified in Appendix B of the indicative simplified baseline and monitoring methodologies for small-scale CDM project activities.



Source: CEA General Review 2006 (Table No 3.4)

B.3 Description of the project boundary:

Project boundary specified in the Appendix B of simplified modalities and procedures is that which encompasses the physical and geographical site of the renewable generation source. This includes the wind turbine installation, pooling and MSEDCL sub-stations. The proposed project activity evacuates the power to the Western Region Grid. Therefore, all the power plants contributing electricity to the Western Region Grid are taken in the connected (project) electricity system for the purpose of baseline estimation.

The meter which is used to measure the electricity supplied to grid is at substation and is an integral part of project boundary.

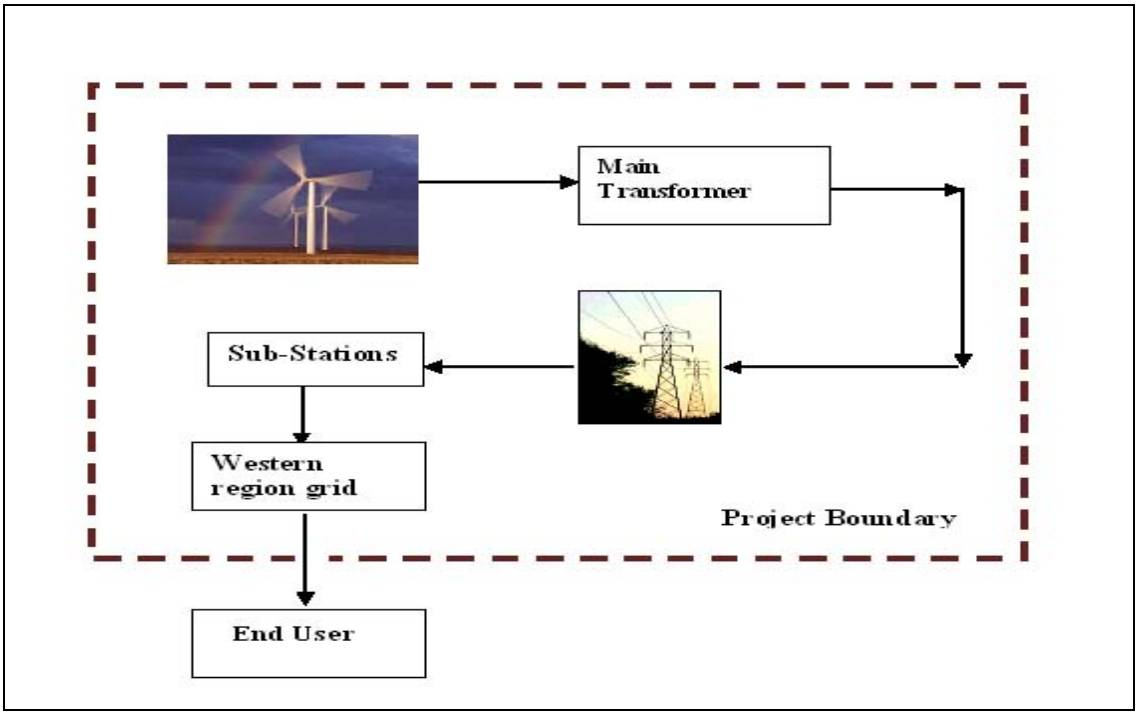


Figure 03, Project Boundary

B.4 Description of baseline and its development:

Baseline Estimation:

Baseline for projects under Type I.D has been detailed in paragraphs 7-11(Type I.D) of the above-mentioned document. Paragraph 9 (Type I.D) applies to this project activity, which states that:

The baseline for all other projects (excluding landfill gas, waste gas, waste water treatment, agro- industry projects and projects where all generators use exclusively fuel oil and/or diesel fuel) is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO_2equ/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 'Tool to calculate the emission factor for an electricity system'.

OR

b) The weighted average emissions (in kg CO2equ/kWh) of the current generation mix. (The data of the year in which project generation occurs must be used)

Baseline emission reductions have been estimated using weighted average emissions (in tCO_2 equ/MWh) for the Western Region Grid.

Following information is used for baseline determination:

Sr. No.	Key information/data used for baseline	Source of data/information
1.	Electricity generated	Monthly Meter Reading
2	Western Regional Grid	CO_2 Baseline Database for the Indian Power Sector User Guide[2]- Version 3.0 (15/12/2007) Central Electricity Authority, Government of India.

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:

Justification for additionality of the project

UNFCCC simplified modalities seek to establish additionality of the project activity as per Attachment A to Appendix B, (Version 06: 30 September 2005). It states that 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.

Project participants identified following barriers for the proposed project activity.

✓ **Barriers due to Prevailing Practices:**

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

Energy planners and policy makers in India have generally supported conventional sources of energy for a variety of social and political reasons. Coal and oil based thermal power was preferred due to its short gestation period, marginal physical displacement of people and pressure of donor agencies. This discrimination is translated even in the strategy for the energy sector in the 10th Five Year Plan[3] –

"The Tenth Plan strategy for the sector includes increasing the production of coal and electricity, accelerated exploration for hydrocarbons, equity oil abroad……."

The Plan recognizes energy generation with fossil fuels as the major thrust area and coal being the most preferred source for power generation (about 78% of domestic coal production in India is dedicated to power generation), all energy policies are biased towards its development. Planning commission is of the view that this dominance of coal in India's energy mix is most likely to continue until 2031-32[4].

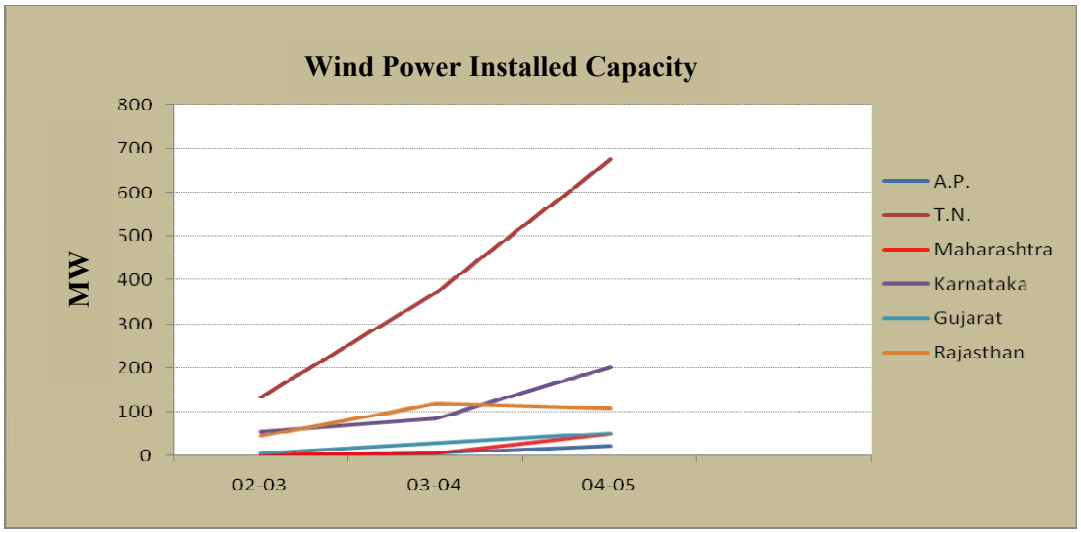
As for non conventional sources, there is an insignificant mention of plans to reduce pollution caused from operation of conventional power plants. The Integrated Energy Policy[5] (IEP), Government of India, Planning Commission states clearly in its Policy For Renewable and Non-conventional Energy Sources that "capital subsidies which only encourage investment without ensuring outcome should be phased out by the end of 10th Plan" This comes as a major blow to wind power projects as wind is the most infirm source of energy generation amongst non conventional sources. The generation suffers significantly in both low and high wind regimes. Hence the most favourable monsoon period may also become unfavourable in times of very high wind or during thunder and lightening. Thus a generation related subsidy is sure to put wind energy projects at a disadvantage amongst other renewable energy sources.

Moreover the IEP considers fuel wood plantations, bio-gas plants, wood gassifier based power plants, solar thermal, solar water heaters, solar photovoltaics, bio-diesel and ethanol as potent areas in renewable energy sources. Owing to this apathy, addition in wind power capacity in India during the year 2004-05 was not very significant, barring few states.

[3] http://planningcommission.nic.in/plans/planrel/fiveyr/10th/volume2/v2_ch7_3.pdf

[4] http://planningcommission.nic.in/reports/genrep/rep_intengy.pdf

[5] *Source:* Integrated Energy Policy; Government of India (Planning Commission) http://planningcommission.nic.in/reports/genrep/rep_intengy.pdf



Wind Power Installed capacity[6] (MW): 1991/92 to 2004/05

The technical wind power potential of the State of Maharashtra, which is in the western part of the country, is approximately 3650 MW[7]. The current practice followed by investors (investing in WEGs) is to set up wind power projects in Southern States of India because of higher generation potential (these states observe two monsoon seasons, leading to higher PLF). Owing to this fact, the total capacity exploited in the State of Maharashtra (as on March 31, 2005) was just about 456.2 MW i.e. 12.5%[8] of the technical potential, which is far behind the potential harnessed in Southern States. Hence, a wind power project in Maharashtra needs to be encouraged

✓ **Other Barrier:**

- Financial infeasibility

Though the project activity was not financially viable, the project participants took the decision to invest in it to effectively contribute towards environment protection. For establishing financial viability, an investment analysis was carried out by using Sub-step 2b - Option III i.e. 'Benchmark Analysis' of the additionality tool version 5. Equity IRR has been identified as the appropriate financial indicator.

***Determining appropriate analysis method*:**

Since the project activity generates financial benefits other than CDM related income the sub-step 2b-option I is not followed. The investment analysis is carried out by 'benchmark analysis ' as referred in additionality tool version 5 sub-step 2b – option III.

[6] Table 1.99; TERI Energy Data Directory and Yearbook 2005/06

[7] http://www.windpowerindia.com/statest.html

[8] http://www.windpowerindia.com/statstate.html

As per option III *Discount rates and **benchmarks** shall be derived from*:

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

Equity IRR is identified as the appropriate financial indicator and benchmark has been derived as per option (d).

As per Maharashtra Electricity Regulatory commission (MERC) report dated. 24/11/2003 a private sector investor participating in electricity generation is expected to earn a minimum return of 16% p.a. on the equity contribution. The project promoter has considered the same rate as the minimum return required from the project.
Following further assumptions were made for the investment analysis.

Life of project	20 yrs
Installation period	6 months
O&M Free Period	2 yrs
Annual O&M Exp 3rd to 10th yr	1.125 Mn
Annual Increase in O&M	5%
Debt Component	60%
Term Loan interest	11.5%
Income tax rate	33.67%
Depreciation on WTG	80%
Tariff Rate per unit	Rs. 3.50
Escalation per year in tariff upto 13th year	Rs. 0.15
Section 80IA of 100% exemption in profits for 10 years in first 15 years of operation considered	

The project set up by the proponent generates an Equity IRR of 12.79% only which is substantially below the benchmark rate of 16%. Hence the project activity cannot be considered as financially attractive.

Comparison of Financial Indicator:

All the reasonable costs and benefits accruing to the project have been considered in the calculation of the project return. The projected costs are based on the contracted amounts, data considered by MERC and reasonable estimations by project proponent. Variations in Units sold to MSEB for whatever reason and Rate of Interest on Term Loan are considered the significant risk factor for the project. Hence sensitivity is considered for this variable.

Probability of happening	**5%**	**10%**	**15%**	**40%**	**15%**	**10%**	**5%**
Salable units (+) up) / (-) down by	**-10.0%**	**-5.0%**	**-2.5%**	**0%**	**2.5%**	**5%**	**10.0%**
Equtiy IRR without CDM	9.42%	11.16%	11.99%	12.79%	13.58%	14.35%	15.85%
Equity IRR with CDM	11.81%	13.54%	14.37%	15.19%	15.98%	16.75%	18.25%
Interest rate	**13%**	**12.5%**	**12%**	**11.5%**	**11.0%**	**10.5%**	**10.0%**
Equtiy IRR without CDM	12.25%	12.43%	12.61%	12.79%	12.98%	13.17%	13.36%
Equity IRR with CDM	15%	14.76%	14.97%	15.19%	15.40%	15.62%	15.85%

Conclusion : Hence the returns from the project are found to be clearly less attractive than the benchmark return.

- **Regulatory Risks:**

The project promoter has entered into an agreement with Maharashtra State Electricity Distribution Company Ltd. (MSEDCL) (a sub-division of Maharashtra State Electricity Board) for the sale of electricity to them. This Agreement (Article 18 Section 18.02 CDM Benefit) stipulates "MERC shall be approached to review the tariff structure (contained in the Agreement) once the project becomes eligible for CDM benefit or similar credits and any mechanism for sharing of CDM or similar credit between the seller (in this case DFPCL) and MSEDCL. The decision of the MERC will be binding on both parties." Hence, though an Agreement has been signed, the rate at which electricity will be sold to MSEDCL may change if DFPCL obtains any benefit under CDM or they may have to share the benefit with MSEDCL. The extent of sharing of the CDM benefit has not been specified by MERC. Hence, this is a big risk undertaken by the project participant as revenue, either from the sale of electricity or from the CDM benefit may be affected depending upon the decision of MERC.

- **Security risks:**

Providing security to the wind turbines has always been a concern as these turbines are located in the remote areas. Though DFPCL have employed several security staff from the local villages in and around the site, it is not possible for the security personnel to protect the turbines against the theft of cables which is generally carried out by a mob. At project sites, there has already been a cable theft which has lead to economic loss as the WEG's were idle for few months till the cables were replaced.

To mitigate the risks mentioned in the above paragraphs and encourage the setting up of a wind power project in Maharashtra, CDM support to the project participant is required.

B.6 Emission reductions:

B.6.1 Explanation of methodological choices:

Baseline methodology for projects under Type I.D has been detailed in paragraphs 7-11 (Type I.D) of the above-mentioned document. Paragraph 9 (Type I.D) applies to this project activity, which 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 CO_2equ/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 Simple OM and the Average OM calculations must be considered.

OR

(b) The weighted average emissions (in kg CO_2equ/kWh) of the current generation mix.

Baseline emission reductions have been estimated using the weighted average emission (in kgCO_2 equ/kWh) of the current generation mix, using the most recent statistics available at the time of PDD submission. (Paragraph 9, sub point (b))

In the proposed baseline, Western Region grid is used as the reference region for estimating the current generation mix. Using the methodology available for small-scale project activities, the weighted average emissions (in tCO_2 e/GWh) of current generation mix of Western Region Grid of India is used for the calculation of baseline. The weighted average emission factor data calculated and provided by Central Electricity Authority (CEA) is used for the proposed project activity.

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

(Copy this table for each data and parameter)

Data / Parameter:	**G**
Data unit:	KWh
Description:	Guaranteed Generation
Source of data used:	Purchase order of the WTGs.
Value applied:	2800000
Justification of the choice of data or description of measurement methods and procedures actually applied :	This figure has been provide by the Supplier of the WTGs.
Any comment:	------

B.6.3 Ex-ante calculation of emission reductions:

Assumptions for calculation of Net Electricity generation

		Per WTG	Entire Project
Guaranteed Generation	MWh	2800	22400
Capacity Utilization Factor (CUF)[9]	Percent	20.00%	20.00%
Average Grid Non availability[10] (GN)	Percent	2.0%	2.0%
Average Deductions due to transmission losses (TL)[11]	Percent	5.0%	5.0%

Net electricity supplied to the grid in the first year = Guaranteed generation * (1- GN) * (1-TL)
= 22400 * (1-0.02) * (1-0.05)
= **20854 MWh**

Net electricity supplied to the grid from 2nd year onwards = Generation at 20 % CUF * (1-TL)
= (10 *365*24*0.20) * (1-0.05)
= **16644 MWh**

Baseline Emission = Net electricity supplied to grid * Weighted avg. emission factor

For first year = 20854 × 0.86 t CO_2 / MWh
= **17934.44 t CO_2 / annum**

For second year onwards = 16644× 0.86 t CO_2 / MWh
= **14313.84 t CO_2 / annum**

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

Year	**Project Emission (tonnes CO_2e /yr.)**	**Baseline Emissions (tonnes CO_2e /yr.)**	**Leakage (tonnes CO_2e / yr.)**	**Emission Reductions (tonnes CO_2e /yr.)**
2008	0	17936	0	17934
2009	0	14317	0	14314
2010	0	14317	0	14314
2011	0	14317	0	14314
2012	0	14317	0	14314
2013	0	14317	0	14314
2014	0	14317	0	14314
2015	0	14317	0	14314
2016	0	14317	0	14314
2017	0	14317	0	14314
Total (tonnes CO_2e)	**0**	**146789**	**0**	**146760**

[9] MERC Tariff Order ,Section 2.2.2.B; http://mercindia.org.in/pdf/Detail_Wind_Energy_Order.pdf

[10] Considered only for the first year

[11] MERC Tariff Orde, Section 1.6.12; http://mercindia.org.in/pdf/Detail_Wind_Energy_Order.pdf

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

B.7.1 Data and parameters monitored:

(Copy this table for each data and parameter)

Data / Parameter:	**EG_y**
Data unit:	MWh
Description:	Net Electricity supplied to the grid
Source of data to be used:	Joint meter reading and MSEDCL electricity bills
Value of data	17934- For first Year 14314- second Year onwards
Description of measurement methods and procedures to be applied:	The data can be measured accurately. The meters installed measure mentioned variables on a continuous basis. Every month these meter readings will be recorded by responsible person from State utility board in presence of representative of project promoter. These records will be archived for cross-checking yearly figures.
QA/QC procedures to be applied:	The main meter and check meter are calibrated by state utility once every year.
Any comment:	The data will be archived for entire crediting period + 2 years. The archiving will be done both on paper and electronically.

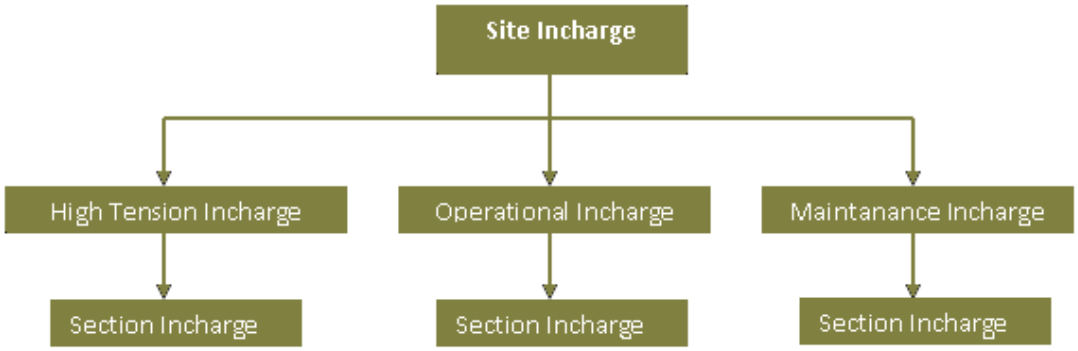
Data / Parameter:	**Grid Emission Factor**
Data unit:	t CO_2 / MWh
Description:	Weighted Average Grid Emission rate
Source of data to be used:	Central Electricity Authority – CDM - Carbon Dioxide baseline database Version 3.0
Value of data	0.86
Description of measurement methods and procedures to be applied:	The used data is from an official source.
QA/QC procedures to be applied:	The archive of data will be maintained for crediting period + 2 years. The archiving will be done both on paper and electronically.
Any comment:	This value will change every year as per the latest information available from CEA. The present value is for the year 2006-07

B.7.2 Description of the monitoring plan:

The project participant has signed an operation and maintenance agreement with the supplier of the wind turbines i.e. Suzlon. The agreement is for a period of 10 years. The performance of the turbines, safety in operation and scheduled /breakdown maintenances is responsibility of Suzlon and are organized and monitored by them. So the authority and responsibility of project management lies with the O & M contractor.

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

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



Routine Maintenance Services:

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

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

Security Services:

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

Management Services:

a) Data logging 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 utility of power generated at Wind Farm and supplied to grid from the meter/s maintained by utility for the purpose and co-ordinate to obtain necessary power credit report/ certificate.

Technical Services:

a) Visual inspection of the WEGs and all parts thereof.

b) Technical assistance including checking of various technical, safety and operational parameters of the equipment, trouble shooting and relevant technical services.

The project activity essentially involves generation of electricity from wind, the employed WEG can only convert wind energy into electrical energy and cannot use any other input fuel for electricity generation. The operation of WEGs is emission free and no emissions are produced during the lifetime of the WEG.

Although it is being anticipated that there would be no unintended emissions/leakages from this project, however, if any such condition arises, and leakage effect is found due to the project, such leakage will be accounted accordingly as mentioned in the chosen applied baseline methodology.

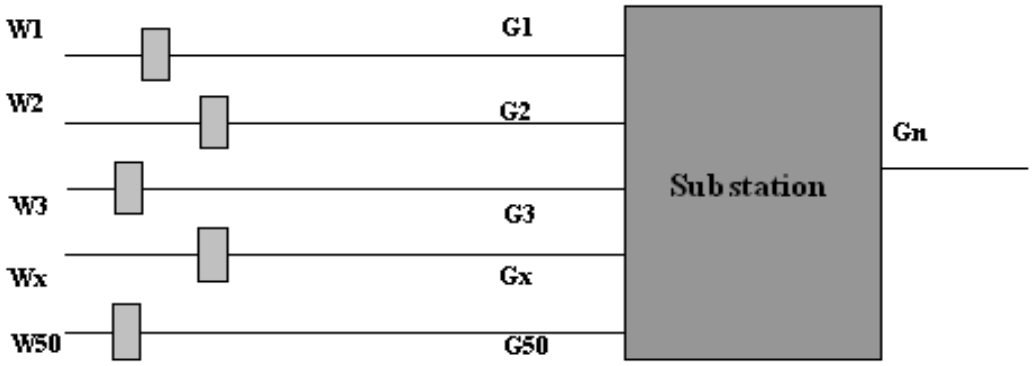
- The proposed project activity requires evacuation facilities for sale to grid and the evacuation facility is essentially maintained by the state power utility (MSEDCL).
- The electricity generation measurements are required by the utility and the investors to assess electricity sales revenue.
- The project activity has therefore envisaged two independent measurements of generated electricity from the wind turbines.
- The primary recording of the electricity fed to the state utility grid is carried out jointly at the incoming feeder of the state power utility (MSEDCL). Turbines for sale to utility are connected to the feeder.
- The joint measurement is carried out once in a month in presence of both parties (the project participant's representative and officials of the state power utility). Both parties sign the recorded reading.
- Metering equipment - Metering is carried out through electronic trivector meters of accuracy class 0.2% required for the project. The main meter has been installed and owned by MSEDCL, whereas the project participant owns the check meters. The metering equipments are maintained in accordance with electricity standards.
- Meter readings - The monthly meter readings (both main and check meters) at the project site and the receiving station are taken simultaneously and jointly by the parties on a pre-determined day of the following month. At the conclusion of each meter reading an appointed representative of the MSEDCL and the project participant's signs a document indicating the number of kWh exported to the grid.
- The secondary monitoring, which provides a backup (fail-safe measure) in case the primary monitoring is not carried out, as it is done at the individual WEGs. Each WEG is equipped with an integrated electronic meter. These meters are connected to the Central Monitoring Station (CMS) of the entire wind farm through a wireless Radio Frequency (RF) network (SCADA). The generation data of individual machine can be monitored as a real-time entity at CMS. The snapshot of generation on the last day of every calendar month is kept as a record both in electronic as well as printed (paper) form.

All the relevant data & reports for maintaining accuracy in future monitoring and reporting of GHG's emission reductions is with the project participant, which follows Quality Management System (QMS) procedure as per ISO 9001 and is ISO certified organization.

Project participant has appointed a full time project in-charge to manage the overall project activity after commissioning. The project in-charge supervises the functioning of the wind farm in close coordination with the officials & technical personnel of Suzlon Energy Limited (SEL).

Description of billing calculation from main meter to individual meters

Each substation is connected to approximately 50 wind turbines. The generation reading is collectively displayed by the substation meter. The net generation of each of the wind turbines is then calculated in the following manner:



The reading at the substation will be net generation – Gn

The sum of generation of all the wind turbines connected to a particular substation is Gg

i.e. (G1+G2+G3+Gx+…+G50) = Gg

Gg > Gn as some transmission loss takes place on the way to the substation.

Thus Gg-Gn=X

This transmission loss is distributed amongst the 50 wind turbine in proportion to their generation.

G1/Gg = Y1

Similarly G2/Gg = Y2

Thus transmission loss is calculated as

[Y1 / (Y1+Y2+Yn…….+Y50)] * X = L1

Therefore net generation from a particular wind turbine 1 is calculated as G1-L1=G

Training

Training of staff operating and maintaining the WTGs is carried out by the WTG manufacturer and supplier (Suzlon). Special emphasis is given to the training of the employees to enable them to develop their skills to meet changing WTG technology and to provide efficient and effective O&M services. There is an initial learning programme as well as continuous learning programmes for all employees. All newly-hired employees are required to attend an intensive two- to four-week, full-time training programme to familiarize them with business and operations.

Besides the usual training programs for their staff Suzlon conducts specific familiarization capsules for customers, such that they are fully aware of the capabilities of the highly sophisticated WECs of Suzlon.

The training programme focuses mainly on the management, monitoring and maintenance, and safety and reliability aspects of wind power. The objectives include:

1. Understanding the various stages and aspects in the management of Wind Power systems
2. Understanding the importance of monitoring and maintenance of Wind Power systems and hence the various tasks involved in this
3. Understanding the importance of safety and reliability aspects involved with Wind Power and the measures taken.
4. Managing generation and other data for future reference

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

Date of completion of Baseline and Monitoring methodology – 10th June, 2008

Name of person/entity determining the baseline: M/s Deepak Fertilisers and Petrochemical Corporation Ltd. and their consultant.

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:

07.06.2006 (based on purchase order issued to Suzlon)

C.1.2 Expected operational lifetime of the project activity:

20 Years 0 months

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

C.2.1 Renewable crediting period

Not opted for.

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:

Applicable

C.2.2.1 Starting date:

Date of registration with CDM EB, which is expected by 01/08/2008

C.2.2.2 Length:

10 years and 0 months.

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[12] 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. However, certain foreseen impacts due to the project activity are discussed below:

Impact on air
Wind power 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
There are no known migratory birds/endangered species in the region of project activity. Therefore no harm on the ecological environment is envisaged.

Impact due to noise

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

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. 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 benefited economically through land sales. The project activity helps the upliftment of skilled and unskilled manpower in the region. The project activity provided employment opportunities not only during the construction phase, but will also provide 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 major adverse impacts on environment during its construction or operational phase. The human-interest parameters would show positive impacts due to increased job opportunities at the facility as well as other ancillary units coming up.

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:**

Not Applicable.

SECTION E. Stakeholders' comments

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

Project participant identified local communities, farmers, and villagers, as the stakeholders with an interest in the CDM activities. The meeting was conducted on 05/06/2007 at 10:30 for both the sites i.e.Dhule & Nandurbar. Venue of the meeting was Chadvel office of Suzlon Infrastructure Limited. Project participant issued invitation letters to the respective stakeholders requesting them to attend meeting or depute representatives at respective venues:

The agenda of the meeting was as follows:

- Description of the project and its associated benefits
- Queries and responses from the participant and the stakeholders

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

E.2	Summary of the comments received:

Stakeholders had no objections from installations of WEGs. Instead they welcomed the investment as it has lead to

- Additional revenue generated through land / lease to outsiders like contractors & their employees.
- Job opportunities for day -to - day maintenance and security of WEGs
- Developments of roads

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

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

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Deepak Fertilisers and Petrochemical Corporation Ltd.
Street/P.O.Box:	Opp. Golf Course, Shastri Nagar
Building:	Yerwada
City:	Pune
State/Region:	Maharashtra
Postfix/ZIP:	411006
Country:	INDIA
Telephone:	+91-20-66458000
FAX:	+91-020-26683723
E-Mail:	dbanerjee@deepakfertilisers.com
URL:	www.dfpcl.com
Represented by:	
Title:	Sr. General Manager (Accounts, Taxation & Project Finance)
Salutation:	Mr.
Last Name:	Banerjee
Middle Name:	--
First Name:	D.
Department:	Management
Mobile:	+91-9371025431
Direct FAX:	+91-20- 26683723
Direct tel:	+91-20- 66458070
Personal E-Mail:	--

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

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

Annex 3

BASELINE INFORMATION

Baseline emissions are calculated as the kWh produced by the project activity multiplied by an emission coefficient for the Western Regional grid, calculated as the weighted average emissions (in kg CO_2equ/kWh) of the current generation mix.

$BE = EGy * CEF_{grid}$

Where EGy is the net quantity of electricity generated by the project in year y, and CEF_{grid} is the carbon emissions factor of the Western grid.

CEF_{grid} is taken from CDM database provided by CEA and it is approved by DNA i.e Ministry of Environment and Forest, India.

Annex 4

MONITORING INFORMATION

The points given below detail the monitoring plan:

- The electronic meter that is used for monitoring is the Export-Import Energy Meter and is, installed before the grid.
- It is a three phase, four wire, 50 Hz, 110 Volts, 6 Amp, Time of Day (ToD), 0.2 class Export-Import tri- vector Energy meter.
- The calibration procedure followed requires calibrating the meter once in a 12 month, by the MSEDCL. MSEDCL is State Electricity Utility Company which functions under Government of Maharashtra (GoM) as per Central Electricity Act & it is responsible for Energy Meter calibration check with their calibrated Reference Standard Meter having traceability with International Standards through Institute for Design of Electric Measuring Instruments, Sion, Mumbai (IDEMI, Govt. of India Institution). The purchaser/ wheeling agent of power performs calibration check in presence of representative of owner.
- The import and export of electricity is continuously monitored by the export/ import meter and the data is recorded on a monthly basis jointly by the participant and the electricity utility
- This meter is located at the delivery point of wind power in MSEDCL grid. This accounts for the import of electricity that is used by the project participant. Hence the net electricity generated is calculated from the joint meter reading and recorded /archived in paper/electronic.

The complete monitoring responsibility is carried out as follows:

Data monitoring	This data will be measured continuously in the Project Promoter (PP)'s energy meters (microprocessor control panel) located at individual WEGs and also in the MSEDCL energy meters located at individual WEGs. The Technicians of the CDM team will record the generation data from the PP's meters on a daily basis in log books. The reading from MSEDCL meter will be recorded every month by MSEDCL personnel in the presence of site Engineer. The invoices will be raised on the basis of Joint Meter Reading sheets. The monitoring records will be maintained at the PP's end for the entire crediting period plus two years.
QA/QC procedures	The PP's energy meter will be calibrated once every year. The monthly MSEDCL meter reading will be cross-checked with the PP's meter data by the Site Engineer. In case the deviation in MSEDCL's recorded data is beyond the allowable limits for energy meters, the PP would request MSEDCL to calibrate/rectify the meter at the earliest. For the period of error, data would be adjusted as described under "Data uncertainties and adjustments". Responsibility of calibration will be with the Site Engineer.
Reporting	The Site Engineers (SE) will review the PP's energy meter log books on a daily basis and record the data in computer. On a daily basis, a compilation of the energy data from each WEG will be uploaded in the O&M Contractor's website. This website data will be accessible by the

	Head - Wind Power Projects (WPP) at the respective project promoter's administration office. The Head – WPP will then take a print of the daily report from the website and file it. He will prepare a monthly consolidated report of the energy meter data. The monthly consolidated report will also include reading provided by MSEDCL's monthly report for cross-checking purposes.
Data archiving	Once the monthly reports are approved, it would be archived in paper at the respective administrative office by the Head-WPP. Electronic copy of monthly reports would be archived by the PP. Log books at the site would be archived by the Site Engineer.
Data uncertainties and adjustments	For this parameter, data uncertainties are likely during the following scenarios: • During error in meter • When meter is dismantled for O&M or calibration • When data is not recorded or records are lost Error in the meter will be usually identified during cross-checking the monthly energy reports. If an error is found in the MSEDCL meter, the data recorded by the PP's meter minus average transformer losses would be calculated and used for emission reduction determination for the error period. When the PP's meter is dismantled for O&M or Calibration, the reading recorded by the MSEDCL meter for that period would be noted and adjusted with the PP meter reading. When data or records are lost, the emission reductions would be calculated based on MSEDCL's monthly generation report.

Procedures for internal audit and Management review:
An internal audit of the project activity would be done on a half yearly basis by a special audit team. The audit team would comprise competitive persons. The team would audit the project for the following aspects among other things:

- Are the monitoring of CDM parameters done in line with the CDM PDD and CDM Manual
- Is the documentation of monitored CDM parameters done properly
- Are equipments calibrated and maintained as scheduled
- Is the quantity of CERs generated inline with that projected in the CDM PDD, if not, what are the reasons for deviation?
- Are necessary corrective actions being taken to address deviations?
- Check the authenticity of data monitored and recorded by random cross-checking with other sources.

The audit team would submit their observations to the Head- Wind Power Projects for his review and necessary action.

Procedures for maintenance of monitoring equipments:

- The Site Engineer would conduct a physical inspection of all the energy meters once a month
- Any maintenance requirements would be immediately attended
- The energy meters will undergo a preventive maintenance one a year

- The responsibility of maintenance will be with the Site Engineer
- Maintenance history card would be maintained for all energy meters

Internal Audit and GHG Compliance at the Suppliers End

Since the promoters have signed an O&M contract with the suppliers of the windmills i.e. Suzlon, internal audits regarding GHG compliance is carried out by the suppliers.

The Suzlon Quality Management system is constantly reviewed by both internal and external audit to ensure ongoing adherence to the highest international standards of quality control and assurance. The quality systems are certified as compliant with the requirements of ISO 9001 (2000) by Det Norske Veritas (DNV), one of the leading global registrars of Quality Management systems. GHG compliance of the project activity is associated with the ISO 9001 system and project performance reviews will be conducted and verified on a regular basis.