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:

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1.25 MW wind energy project, Sangli District, Maharashtra, India

Version : 01
Date : 01/08/2007

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

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The proposed wind based power generation is a small scale project activity with an installed capacity of 1.25 MW in the Sangli District of Maharashtra, India. The project involves setting up of 1.25 MW state-of-the-art Wind Electric Generator (WEG) developed by Suzlon Energy Limited.

The electricity generation from the WEG will contribute annually to GHG reductions estimated at 2,299 tCO_2eq. (tonnes of carbon dioxide equivalent). Although the project life is envisaged as 20 years, it is proposed that the project activity needs to mitigate the risks involved in renewable energy technology for the first 10 years. The project activity will evacuate approximately 2.8 GWh 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 using wind power resources, to strengthen the western grid through sale of the generated electricity to Maharashtra State Electricity Distribution Company Limited (MSEDCL) and to contribute to global 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
- To reduce the prevalent regulatory risks for this wind park through revenues from the CDM

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 Rs. 64.73 millions to a developing region which would not have happened in the absence of the project activity. The generated electricity is fed into the western regional grid through the local grid, thereby improving grid frequency. 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 end products in the form of solid waste (ash etc.), they address the problem of solid waste disposal encountered by most other sources of power. Being a renewable resource, using wind energy to generate electricity contributes to resource conservation. Thus the project causes no negative impact on the surrounding environment contributing to environmental well-being.

d. Technological well being

The project activity leads to the promotion of 1.25 MW Wind Electric Generators (WEGs) into the region, demonstrating the success of wind turbines, which feed the generated power into the nearest sub-station, thus increasing energy availability, reducing line losses and improving quality of power under the service area of the substation. Hence the project leads to technological well being.

A.3. Project participants:

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Table A.1: **Project Participant**

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 Country)	Chhotabhai Jethabhai Patel & Co.	No

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

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

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A.4.1.1. Host Party(ies):

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India

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

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State: Maharashtra

A.4.1.3. City/Town/Community etc:

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District : Sangli
Taluk : Kawthe Mahakal
Village : Jarandi

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

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The project activity is located in the Sangli District of the Maharashtra state. The districts are well connected by railways and highways. The villages are interconnected by both metalled and un-metalled roads. The latitude of the place is 16^0 51'N and the longitude is $74^0$34'E. The machines can be well identified with the respective turbine numbers.

Table A.2: Location of the project activity

Taluk	Village	Turbine Number	Installed Capacity (MW)	Commissioning Date	Land Survey Number
Kawthe Mahakal	Jarandi	G-61	1.25	31/12/2005	643/P

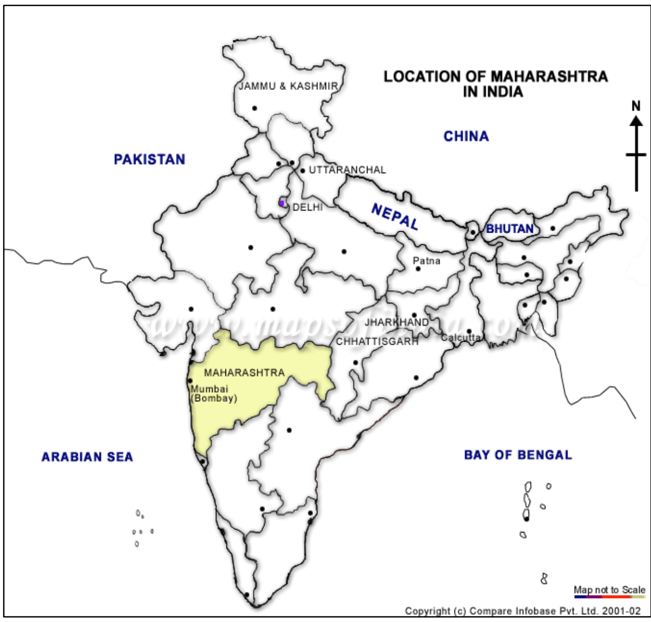

Figure A.1: Location of Maharashtra in India **Figure A.2: District Map of Maharashtra**

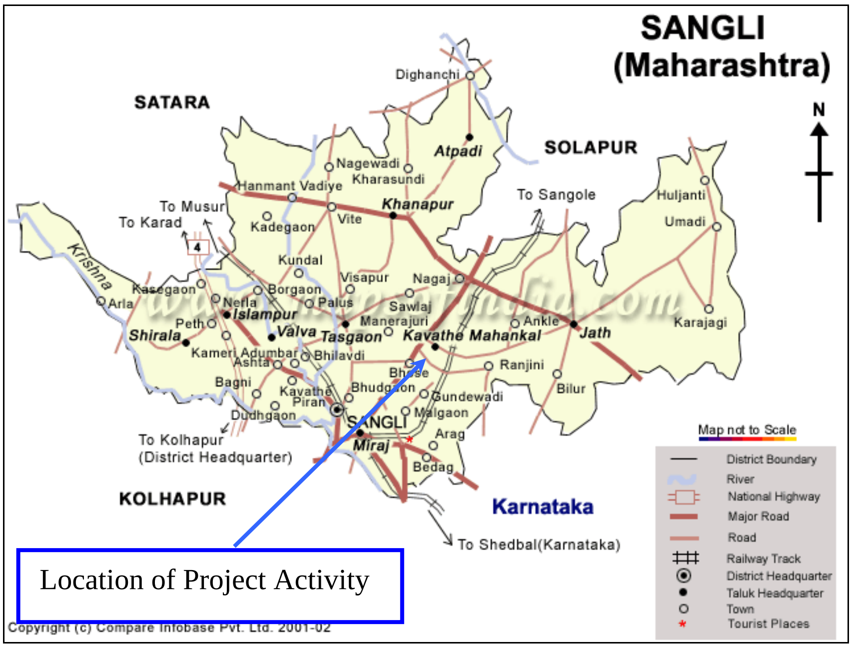

Figure A.3: Sangli District Map

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

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Type and Category

Since the capacity of the proposed CDM project is only 1.25 MW, which is less than the maximum qualifying capacity of 15 MW, the project activity has been considered as a small scale CDM project activity and UNFCCC indicative simplified modalities and procedures can be applied. The project activity utilizes the wind potential for power generation and uses this electricity for captive purposes. 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	: D - Grid connected renewable electricity generation

Technology

In wind energy generation, kinetic energy of wind is converted into mechanical energy and subsequently into electrical energy. Wind blowing at high speeds, has considerable amount of kinetic energy. When this kinetic energy passes through the blades of the wind turbines, it is converted into mechanical energy and rotates the wind blades. When the wind blades rotate, the connected generator also rotates, thereby producing electricity. The technology is a clean technology since there are no GHG emissions associated with the electricity generation. The project installs 1 WEG of Suzlon make, having capacity of 1.25 MW

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 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).

The technical specifications of the 1.25 MW WEG are as follows:

Operating Data:

1. Rotor Diameter : 69.1 m
2. Hub Height : 74 m
3. Cut in Speed : 3 m/s
4. Rated Speed : 12 m/s
5. Cut out Speed : 20 m/s
6. Survival Speed : 67 m/s

Rotor:

1. Blade : 3 Blade Horizontal Axis
2. Swept Area : 3750 m^2
3. Rotational Speed : 13.2 to 19.8 rpm
4. Regulation : Pitch Regulated

Generator:

1. Type : Asynchronous 4 / 6 Poles
2. Rated Output : 250 / 1250 kW
3. Rotational Speed : 1010 / 1515 rpm
4. Frequency : 50 Hz

Gear Box:

1. Type : Integrated (1 Planetary & 2 Helical)
2. Ratio : 77.848:1

Yaw System:

1. Drive : 4 electrically driven planetary gearbox
2. Bearings : Polyamide slide bearing

Braking System:

1. Aerodynamic Brake : 3 times independent pitch regulation.
2. Mechanical Brake : Spring power disc brake, hydraulically released, fail safe
3. Control unit : Microprocessor controlled, indicating actual operating conditions, UPS back-up system

Tower: Tubular

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

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

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Table A.3: Estimated amount of emission reduction

S. No.	Year / Period	Annual Emission Reduction ($tCO_2eq.$)
1	01/11/2007 - 31/10/2008	2,299
2	01/11/2008 - 31/10/2009	2,299
3	01/11/2009 - 31/10/2010	2,299
4	01/11/2010 - 31/10/2011	2,299
5	01/11/2011 - 31/10/2012	2,299
6	01/11/2012 - 31/10/2013	2,299
7	01/11/2013 - 31/10/2014	2,299
8	01/11/2014 - 31/10/2015	2,299
9	01/11/2015 - 31/10/2016	2,299
10	01/11/2016 - 31/10/2017	2,299
Total emission reductions ($tCO_2eq.$)		**22,990**
Total number of crediting years		**10**
Annual average over the crediting period of estimated reductions ($tCO_2eq.$)		**2,299**

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

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There is no public funding involved in this project activity.

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

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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 1 km of the project boundary of the proposed small scale activity

The project promoters hereby confirm that there is no registered small scale project activity, registered within the previous two years with them in the same project category and technology whose project boundary is within 1 km 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:

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Project Type	: I - Renewable energy project
Project Category	: D - Grid connected renewable electricity generation
Version	: 12
Date	: 27th July 2007
Reference	: http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html

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

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The project category is renewable electricity generation for a grid system, which is also fed by both fossil fuel fired generating plants (using fossil fuels such as coal, natural gas, diesel, naphtha etc.) and non-fossil fuel based generating plants (such as hydro, nuclear, biomass and wind). Hence, the applicable baseline, as per Clause 29 of Appendix B, indicative simplified baseline and monitoring methodologies is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in $kgCO_2/kWh$) calculated in a transparent and conservative manner.

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.

B.3. Description of the project boundary:

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The project boundary is defined as the notional margin around a project within which the project's impact (in terms of GHG reduction) will be assessed. As per the Appendix B of simplified modalities & procedures for small-scale CDM project activities, the project boundary is "The project boundary encompasses the physical, geographical site of the renewable generation source."

The project boundary is thus composed of the wind energy generators, the metering equipment for each generator and substation, and the grid which is used to transmit the generated electricity. The project is supplying the generated electricity to the western region grid, thus the western grid, which includes all the power plants connected physically to this system, has been chosen as the grid system for the baseline calculation.

Grid System of the proposed project activity:

There are three choices available for choosing the grid system for the project activity, viz. national grid, regional grid or state grid. In India, electricity is a concurrent subject between the State and the Central Governments. The perspective planning, monitoring of implementation of power projects is the responsibility of Ministry of Power, Government of India. At the state level the state utilities or State Electricity Boards (SEBs) are responsible for generation, transmission, and distribution of power. With power sector reforms there have been unbundling and privatisation of this sector in many states. Many of the state utilities are engaged in power generation also. In addition, there are different central / public sector organizations involved in generation like National Thermal Power Corporation (NTPC), National Hydro Power Corporation (NHPC), etc. in transmission e.g. Power Grid Corporation of India Ltd. (PGCIL) and in financing e.g. Power Finance Corporation Ltd. (PFC).

There are five regional grids: Northern, Western, Southern, Eastern and North-Eastern. Different states are connected to one of the five regional grids as shown in the table below-

Table B.1: States connected to different regional grids

Regional grid	Northern	Western	Southern	Eastern	North Eastern
States	Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab, Rajasthan, Uttar Pradesh, Uttaranchal, Delhi, Chandigarh	Gujarat, Madhya Pradesh, Maharashtra, Goa, Chattisgarh	Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, Puducherry	Bihar, Orissa, West Bengal, Jharkhand, Sikkim	Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura

The management of generation and supply of power within the state and regional grid is undertaken by the state load dispatch centres (SLDC) and regional load dispatch centres (RLDC). Different states within the regional grids meet the demand from their own generation facilities plus generation by power plants owned by the central sector i.e. NTPC and NHPC etc. Specific quota is allocated to different states from the Central sector power plants. Depending on the demand and generation there are exports and imports of power within different states in the regional grid. Thus there is an exchange of power among states in the regional grid. Similarly there exists imports and export of power between regional grids.

The Western Region grid managed by Western Region Electricity Board (WREB) constitutes five states (viz. Maharashtra, Madhya Pradesh, Chhattisgarh, Gujarat and Goa) and two Union territories (Daman & Diu and Dadar & Nagar Haveli). These states under the regional grid have their own power generating stations as well as centrally shared power-generating stations. While the power generated by own generating stations is fully owned and consumed through the respective state's grid systems, the power generated by central generating stations is shared by more than one state depending on their allocated share. WREB facilitates the share of power generated by the central generating stations. Presently the share from central generating stations is a small portion of their own generation.

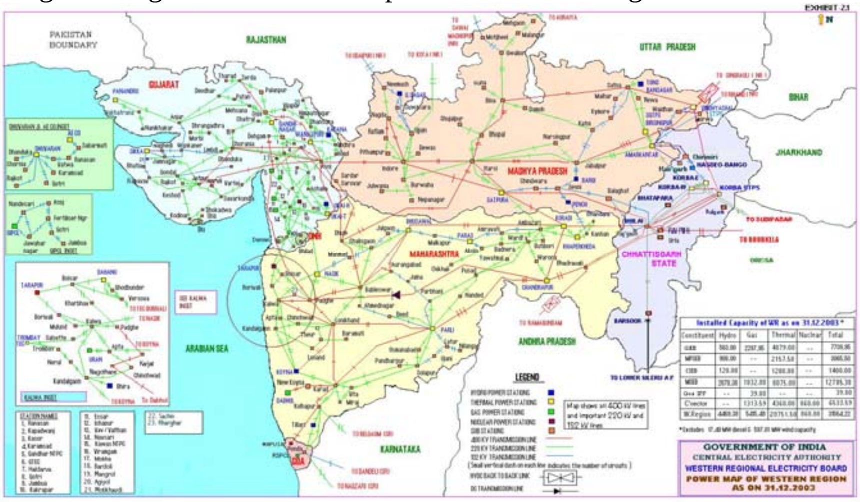

Figure A.4: Western Region Grid

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

B.4. Description of baseline and its development:

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According to the paragraph 9 of AMS I.D, the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in $kgCO_2eq./kWh$) 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 $kgCO_2eq./kWh$) 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 developers have calculated the emission factor for both the cases that is as the combined margin consisting of weighted average of the operating margin and build margin. The weightage for the operating margin and the build margin[1] is 75% and 25% respectively. The emission factor is also calculated for the weighted average emission rate for the current generation mix. Among these two values the conservative value is considered.

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:

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Referring to Attachment A to Appendix B document of "Indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories", project participants are required to provide a qualitative explanation to show that the project activity would not have occurred anyway, **at least one** of the listed elements should be identified in concrete terms to show that the activity is either beyond the regulatory and policy requirement or improves compliance to the requirement by removing barrier(s); The guidance provided herein has been used to establish project additionality. The barriers that were considered are listed below:

a) Investment barrier
b) Technological barrier
c) Barrier due to prevailing practice
d) Other barriers

Project proponents had to face various barriers to innovate and implement the project activity that would prevent the installation of the technology. The following section addresses barriers faced by project proponents to implement the project activity.

Barrier due to the prevailing practice:

The wind energy has not been exploited widely in India. It is only during the last couple of years that a commercial exploitation of wind energy started in a big way. Wind energy has been the most

[1] As per the ACM0002 version 06, 19th May 2006

unpredictable of all the other common sources of generating energy i.e. coal, diesel etc. Further wind turbines generation plant has the lowest load factor of all other sources. In the concerned cases it is in between 18% to 21%.

The total installed electricity generating capacity[2] in Maharashtra, Western Region and India, as on 31st December 2005 is given in the table below:

Table B.2: Total Installed capacity of electricity generation.

As on 31.12.2005 (in MW)						
	Hydro	**Thermal**	**Nuclear**	**Wind**	**Other RE**	**Total**
Maharashtra	3,170.67	11,643.33	582.06	456.30	248.8	16,101.16
Western Region	6,476.33	26,006.70	1,300.00	738.68	346.03	34,867.74
India	32,135.05	82,064.44	3,310.00	3,594.75	6,158.32	123,667.81

From the above table it can be seen that the total installed electricity generating capacity in Maharashtra, as on 31.12.2005 was 16,101.16 MW. This includes 72.31 % thermal (11,643.33 MW), 19.69 % hydro (3,170.67 MW), 3.62 % nuclear (582.06 MW), 2.83 % wind based generation (456.30 MW) and 1.55 % other renewable energy (248.8 MW). Coal based thermal power generation has been the mainstay of electricity generation in the state. It clearly shows that the share of electricity generation from wind is very low in the region and the current practice being followed in the state is preferential generation of electricity from fossil fuel based power plants.

State Grid Penetration

Available information on grid penetration for wind power projects in Indian States indicate that Tamilnadu is by far the leader having achieved over 17 % penetration, whereas the penetration level of wind farms in Maharashtra is merely 2.83 % which clearly demonstrates that wind power generation is not a common practice.

Table B.3: Grid Penetration by wind energy in different states

State	**Grid Penetration**
Andhra Pradesh	1.08 %
Gujarat	2.59 %
Karnataka	5.29 %
Maharashtra	2.83 %
Rajasthan	3.69 %
Tamilnadu	17.17 %
West Bengal	0.02 %
Kerala	0.06 %

[2] Annual Report 2005-06, Ministry of Power.

The gross wind potential[3] of the state of Maharashtra, which is in the western part of the country, is 3,650 MW whereas technical wind power potential is approximately 3,040 MW. The current practice followed by investors (investing in WTGs) is to execute wind electricity projects in southern states of India because of higher generation potential (these states observe two monsoon seasons, leading to a higher PLF). Owing to this fact, the total capacity exploited in the state of Maharashtra (as on 31st December 2005) was just about 15 % 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.

The western regional grid, which is the baseline for the present project consists of a major industrial belt of the country. Being the hub of most of the commercial operations, the demand for power in this region is indeed very high. According to the western regional profile, published by the Ministry of Power, Maharashtra for the period April 2006 to March 2007, recorded a second highest shortage of 26.63 % while Gujarat scored the highest shortage at 29 %. In the view of the above, the power sector is planning to invest greatly in power generating stations in the western region. Owing to the relatively low cost of electricity and higher PLF, the power sector is looking at fossil fuel generated power plants to meet this shortage. In the future also, the Government of Maharashtra plans to meet this shortage through investing largely into fossil fuel based power plants. The speech of the Honourable Chief Minister[4] Mr. Vilasrao Deshmukh at the Conference of Chief Minister on Power sector, May 28, 2007 clearly etches out the government's plans to invest into fossil fuel power plants.

Apart from this, the central government has envisaged capacity addition of 100,000 MW[5] by 2012 to meet its mission of power for which five Ultra Mega Power Projects (UMPP) of capacity 4,000 MW each are being brought up. The projects were awarded on International competitive bidding (ICB) basis. Out of them, two have been awarded to private parties. Owing to the principle of large scale economies, these projects have managed to quote very low prices (lowest bid for Rs. 1.19) as compared to other sources of energy. Incidentally, four of these five UMPP's would be located in the western region and Maharashtra would be drawing heavily from these generating stations. Below is the table from the same report, which states the demand stated and the tentative allocation of power from these projects to the respective states.

Table B.4: Quantum of demand as projected by various states from UMPP

S. No	State	Sasan (Madhya Pradesh)	Mundra (Gujarat)	Akaltara (Chhattisgarh)	Ratnagiri (Maharashtra)	Coastal Site (Karnataka)
1	Delhi	600	750	-	-	-
2	Uttar Pradesh	1000	500	1000	-	-
3	Uttaranchal	200	-	-	-	-
4	Punjab	1000	1000	-	-	-
5	Rajasthan	500	750	750	500	300
6	Haryana	850	700	700	-	-

[3] Indian Wind Turbine Manufacturers Association.

http://www.indianwindpower.com/potential.html

[4] http://www.maharashtra.gov.in/english/chiefminister/POWERSPEECH-%20New%20Delhi-%2028%20May%202007.pdf

[5] Ministry of Power, India

http://powermin.nic.in/whats_new/pdf/development_of_project.pdf

7	Madhya Pradesh	1500	-	1000	500	-
8	Chhattisgarh	500	-	1500	500	-
9	Gujarat	1600	-	-	-	-
10	Maharashtra	1500	1000	2000	1000	-
11	Karnataka	-	-	500	1500	-
12	Tamilnadu	-	500	-	1000	-
13	Kerala	-	-	-	-	200
14	A.P	-	-	-	-	-
	Total	**6150**	**6050**	**6300**	**4000**	**4000**

Table B.5: Tentative power allocation from the proposed five UMPP

S. No	State	Sasan (Madhya Pradesh)	Mundra (Gujarat)	Akaltara (Chhatisgarh)	Ratnagiri (Maharashtra)	Coastal Site (Karnataka)
1	Delhi	500	-	-	-	-
2	Uttar Pradesh	500	300	-	-	-
3	Uttaranchal	100	-	-	-	-
4	Punjab	600	500	-	-	-
5	Rajasthan	400	400	-	500	300
6	Haryana	450	400	-	-	-
7	Madhya Pradesh	1200	-	-	500	-
8	Chhattisgarh	250	-	-	500	-
9	Gujarat	1600		-	-	-
10	Maharashtra	800	-	2000	1000	-
11	Karnataka	-	-	500	1500	-
12	Tamilnadu	-	-	-	1000	-
13	Kerala	-	-	-	-	200
14	Andhra Pradesh	-	-	-	-	-
	Total	**4000**	**4000**	**-**	**4000**	**4000**

With market forces favouring fossil fuel based conventional power plants in the future and government's full fledged support to these projects (Refer: Paragraph 3 of Development of Ultra Mega Power Projects, Ministry of Power) the western region in the coming years is soon going to become highly carbon intensive. Thus, clearly, the prevailing practice in the state and the region is that of investing into conventional fossil fuel based power plants.

Regulatory Risk:
A healthy regulatory environment is a pre-requisite for the development of wind power in the country, due to the inbuilt disadvantages of this source. Following are few of the issues which question the feasibility of wind power projects in the existing scenario.

i) Barrier due to CDM benefit sharing

The project promoter has entered into power purchase agreement (PPA) with Maharashtra State Electricity Distribution Company Ltd. (MSEDCL) for the sale of electricity. This Agreement (Article 18, Section 18.02 CDM Benefit) stipulates the following:

> *"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 PPL) and MSEDCL. The decision of the MERC will be binding on both parties."*

Though an Agreement has been signed, the rate at which electricity will be sold to MSEDCL may change if the project is benefited 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. Benefit sharing of this sort decreases the net expected revenues to the project and thus affects the returns. Moreover, no fixed proportion of the CDM sharing has been mentioned, thus causing huge uncertainty in the returns to the project. In such a case, a healthy benefit from CDM will ensure that any legible proportion of benefit sharing stated by the MERC does not affect the returns to the project greatly. Hence, this is a big risk undertaken by the project promoter as his revenue, either from the sale of electricity or from the CDM benefit may be affected depending upon the decision of MERC.

The following is an excerpt from the MERC order in the matter of application filed by the (i) Maharashtra State Electricity Board [MSEB], (ii) Shri Pratap G Hogade, (iii) Renewable Energy Developers Association of Maharashtra [REDAM], and (iv) Indian Wind Energy Association [INWEA] for procurement of wind energy & wheeling for third party-sale and/ or self-use, 2002, which discusses the regulatory commission's policy to introduce the concept of CDM benefit sharing.

> *"The Commission understands that several renewable energy projects may be eligible for the benefits available through the "Clean Development Mechanism" under Kyoto Protocol. While these benefits are not available to a large number of projects which are on the verge of commercial viability, they can be availed of in future. Since the consumer is supporting the renewable energy projects by way of higher tariffs, it is essential that any such credits secured by a project should be shared on an equitable basis by the developer with the utility and its consumers. The Commission shall review the tariff structure for RE Projects that become eligible for CDM or similar credits, and devise a system, which will enable sharing of benefits between the consumers and the project developers at that stage."*

The extract also mentions that once the project has been registered as a CDM project the tariff for the project would be reviewed. Thus, uncertainty also lies in the tariff which would be applicable to the entire project.

Though the investors are eligible for the entire CDM benefits for investing into clean technology yet they would be entitled to only a small portion of it because of the policy of sharing with the utility. Moreover, the financial returns to the project initially conceived would also change if and when the commission revises the tariff applicable. Thus a great deal of uncertainty exists even after the investors become entitled to CDM benefits. The importance of the CDM benefits to the project is reflected from the fact that the investors still want to go for apply for CDM benefits.

ii) Barrier due to short term PPA

The power purchase agreement signed between project participants and the utility will last only for 13 years from the date of commercial operation. Beyond this period, the tariff rate applicable is highly likely to change. Keeping in mind the following issues, decrease in the tariff rates would not be surprising:

- Unhealthy financial status of the utilities
- Introduction of Availability Based Tariff
- Competitive Bidding

Thus, for the rest of the seven years of operation of the project, great deal of uncertainty will exist among the present investors. Moreover, past record related to group 2 projects (projects commissioned between 27th December 1999 and 1st April 2003) do not portray a very encouraging picture. The group 2 projects which had a PPA of ten years are facing great trouble as their agreement has neither been renewed nor extended. Thus, the project proponents are incurring huge losses for the same. In a situation like this, wind power projects are definitely not the most preferable investment strategy. However, the proponents of this project have still gone ahead to invest in a green energy to contribute to the process of sustainable development.

Other barriers

i) Grid related problems

Wind generated electricity do not form part of the base load to the grid. The infrequent nature of wind power is the main reason behind it. In case of low demand or the requirement of maintaining the grid stability, wind power is often disconnected from the grid. This leads to loss of the generated electricity and thus loss to the revenue earned by the investors. There are various other grid related problems which face wind power for example poor grid availability, grid outages etc. For instance, on the 25th February, 2007, a major grid disturbance occurred where in the 400 kV and 220 kV lines in western Maharashtra tripped. Below is an extract from the press release of the incident (Source: http://www.wrldc.com/):

> *"Preliminary reports indicate that a fault occurred around Phadge, Nagothane, Bableshwar area of Maharashtra causing multiple line trippings. These trippings led to islanding of Gujarat, Western Maharashtra and Mumbai system and loss of generation of around 4000 MW in Western grid including Tarapur nuclear station."*

Such incidences cause loss of the generated electricity. Although the loss is applicable to all sources, it is more crucial for a renewable energy sources as these are not as competitive and efficient on other grounds like technology, cost of electricity etc.

ii) Institutional barrier

The choice of the location of the windmills was driven by the meteorological condition. Evacuation of power from the windmill site to the nearest grid substation also was a major problem for setting up this project. Installation of system for transmitting power from the windmill site to grid substation required a significant investment which is not viable for this type of small scale project. Project proponent had to approach and agree to the terms of the supplier for the placing the evacuation system who were already existing there and working on some other projects.

The project proponent being in the Bidi manufacturing did not have any expertise in the renewable energy business. The technology was new to them. They did not have the infrastructure or organizational capacity to manage, operate and maintain the wind mills. They also did not have skilled manpower to operate the machines. The available manpower was trained to work in Bidi industry and did not have the capacity to absorb the new technology of wind mill operation and linking up with grid supply. Under this situation the alternative was to invest the money in the own business and not replace the grid power which came mainly from fossil fuel based plants. Instead, the project proponent has taken up this risk and tried to overcome the barrier by incurring a recurring expenditure by appointing the supplier itself to operate and maintain the project activity.

iii) Barriers relating to economics of wind power project

As already mentioned, wind energy generation, because of its intermittent nature, low Capacity Utilisation Factor (CUF) and a regulatory regime that provides for single part tariff, carries relatively high risks as compared to thermal and hydro power generation. The economics of wind power project, as they are based on single part tariff structure without any deemed generation benefits, depend on their ability to be able to generate at estimated levels without being backed down. This is unlike fossil fired or hydro power projects where two part tariff structure is available which mitigates the investment risks from dispatch (actual generation).

The project activity therefore is subject to a very high degree of uncertainty on account of the unpredictable and varying wind pattern in Maharashtra and the ensuing low capacity utilization factors. The associated risk is further compounded because of the fact that the project activity uses higher capacity (1.25 MW) S70 class machines whose capital cost is significantly higher than other wind turbine types. Therefore achieving a high CUF is critical to the project's viability. The risk associated with the project activity is substantially higher than conventional power generation activities and also other wind power projects. These risks have actually materialized in case of the project activity as evident from the fact that the actual CUF achieved by the project activity since inception is less than 19%.

The barriers outlined above have the potential to render the present project unviable. In a scenario like this, risk mitigating mechanisms like CDM revenues can help the project to a great deal.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>>

Approach

Existing actual or historical emissions, as applicable – is used for this project activity.

Baseline Scenario

For the project activities that do not modify or retrofit an existing electricity facility, the baseline scenario is the following:

Electricity delivered to the grid by the project would have otherwise been generated by the operation of grid connected power plants and by addition of new generation sources. The baseline emission factor (EF_y) is calculated in transparent and conservative manner as combined margin (CM), consisting of the combination of Operating Margin (OM) and Build Margin (BM) and the weighted average emission rate. Calculation of this emission factor is based on data from an official source and is made publicly available.

Details of Baseline data:

The data for the weighted average emission factor, Operating margin emission factor and Build Margin emission factor are made publicly available in the CEA website:

'The CO_2 Baseline Database for the Indian Power Sector'

Central Electricity Authority (CEA), Ministry of Power, Govt. of India.

Version: 2.0
Dated : 21st June 2007
This database is prepared as per ACM0002, Version 6.
(Reference: http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm)

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

>>

a) EFy

Data / Parameter:	**EFy**
Data unit:	tCO_2/GWh
Description:	CO_2 emission factor of the grid.
Source of data used:	Calculated as conservative value between the combined margin and the weighted average emission rate.
Value applied:	882.8648
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:	It is the conservative value between the combined margin and the weighted average emission rate.

b) $EF_{OM,y}$

Data / Parameter:	**$EF_{OM,y}$**
Data unit:	tCO_2/GWh
Description:	CO_2 Operating margin emission factor of the grid.
Source of data used:	CEA: 'The CO_2 Baseline Database for the Indian Power Sector' Version 2.0, 21st June 2007
Value applied:	998.5460
Justification of the choice of data or description of measurement methods and procedures actually applied :	– This is used in calculation of emission factor EFy. – The emission factor is calculated ex-ante at the time of PDD submission.
Any comment:	Calculated as indicated in ACM0002.

c) $EF_{BM,y}$

Data / Parameter:	**$EF_{BM,y}$**
Data unit:	tCO_2/GWh
Description:	CO_2 Build margin emission factor of the grid.
Source of data used:	CEA: 'The CO_2 Baseline Database for the Indian Power Sector' Version 2.0, 21st June 2007
Value applied:	630.00

Justification of the choice of data or description of measurement methods and procedures actually applied :	– This is used in calculation of emission factor EFy. – The emission factor is calculated ex-ante at the time of PDD submission.
Any comment:	Calculated as indicated in ACM0002.

c) $EF_{WAER,y}$

Data / Parameter:	**$EF_{WAER,y}$**
Data unit:	tCO_2/GWh
Description:	Weighted average emission rate
Source of data used:	CEA: 'The CO_2 Baseline Database for the Indian Power Sector' Version 2.0, 21^{st} June 2007
Value applied:	882.8648
Justification of the choice of data or description of measurement methods and procedures actually applied :	– This is used in the calculation of the emission factor EFy. – The data of the year in which project generation occurs must be used.
Any comment:	Weighted average emission rate for the current generation mix.

B.6.3 Ex-ante calculation of emission reductions:

>>

The baseline emission factor is calculated using the combined margin approach and the weightage average emission rate. The baseline emission factor is taken as the conservative value among the combined margin and the weightage average emission. The calculation is shown in the following steps:

A) Calculation of the Combined Margin:

Step 1: Calculation of Operating Margin Emission Factor

The operating margin emission factor has been calculated using a 3 year data vintage:

Table B.6: Simple Operating Margin (tCO_2/MWh) (Including Imports)

	2000-01	**2001-02**	**2002-03**	**2003-04**	**2004-05**	**2005-06**
North	0.9768	0.9778	0.9996	0.9871	0.9758	0.9946
East	1.2198	1.1874	1.1703	1.1959	1.1745	1.1255
South	1.0292	1.0001	1.0065	1.0041	0.9999	1.0073
West	**0.9784**	**1.0094**	**0.9830**	**0.9903**	**1.0120**	**0.9934**
North-East	0.7335	0.7101	0.7418	0.7366	0.8402	0.6994
India	1.0132	1.0202	1.0170	1.0217	1.0234	1.0189

The operating margin emission factor has been calculated using a 3 year data vintage:

The $EF_{OM,Y}$ is estimated to be:

For the year 2003-2004 the $EF_{OM,Y}$ is 990.3 tCO_2/GWh

For the year 2004-2005 the $EF_{OM,Y}$ is 1012.0 tCO_2/GWh

For the year 2005-2006 the $EF_{OM,Y}$ is 1007.3 tCO_2/GWh
Thus the final $EF_{OM,Y}$ based on three years average is estimated to be **998.546 tCO_2/GWh**.

Step 2: Calculation of the Build Margin Emission Factor
The build margin has to be calculated by constituting a sample group m from either the 5 most recently built power plants or the power plant capacity additions in the electricity system that comprise 20% of the system generation (that have been built most recently). The sample group that comprises larger annual generation from either of these has to be chosen. It is observed that the generation from the sample group that comprises 20% of the system generation has larger generation than the 5 most recently built plants. So the Build Margin is calculated from the sample group comprising the most recently additions to the grid that comprise 20% of the system generation.

Table B.7: Build Margin (tCO_2/MWh) (Not adjusted for Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North					0.5336	0.6005
East					0.9043	0.9672
South					0.7089	0.7113
West					**0.7700**	**0.6300**
North-East					0.1456	0.1489
India					0.6953	0.6841

The $EF_{BM,Y}$ is estimated as **630.0 tCO_2/GWh** (with sample group m constituting most recent capacity additions to the grid comprising 20% of the system generation).

Step 3: Calculation of Combined Margin

The combined margin is calculated as the weighted average of the Operating Margin emission factor ($EF_{OM,Y}$) and the Build Margin emission factor ($EF_{BM,Y}$):

$$\mathbf{EF_{CM,y} = w_{OM}\ EF_{OM,Y} + w_{BM}\ .EF_{BM,yss}}$$

For wind and solar projects, the default weights are w_{OM} and w_{BM}, are 75% and 25% respectively[6] (owing to their intermittent and non dispatch able nature), and $EF_{OM,y}$ and $EF_{BM,Y}$ are calculated as described in Steps 1 and 2 above and are expressed in tCO_2/MWh.

Combined margin Emission factor: **906.4129tCO_2/GWh**

B) Calculation of the Weight Average Emission Rate:

The weightage average emission rate of the current generation mix is given as:

Table B.8: Weighted Average Emission Rate (tCO_2/MWh) (Including Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	0.7237	0.7265	0.7401	0.7098	0.7203	0.7240
East	1.0876	1.0320	1.0852	1.0758	1.0534	1.0473

[6] As stated in the ACM0002 version 6.

South	0.7446	0.7478	0.8235	0.8417	0.7843	0.7355
West	**0.8984**	**0.9242**	**0.9026**	**0.9009**	**0.9234**	**0.8829**
North-East	0.4239	0.4140	0.4020	0.4281	0.4799	0.3309
India	0.8191	0.8284	0.8520	0.8479	0.8397	0.8145

From the above table the weightage average emission rate for the current generation mix is given as the 882.9 tCO_2/GWh.

C) Calculation of Baseline Emission Factor EF_y

The baseline emission factor EF_y is taken as the conservative value among the Combined Margin and Weighted average emission rate. From the above calculation we can see that the weightage average emission rate is on the conservative side. So the baseline emission factor for the project is given as

Baseline Emission factor EFy = **882.9 tCO_2/GWh**

D) Calculation of Baseline Emissions (BEy)

Baseline emissions due to displacement of grid electricity are the product of the baseline emission factor (EFy) calculated in step C, times the electricity supplied by the project activity to the grid (EGy), over the crediting period.

BEy = EGy. EFy

Baseline Emissions = **2,299 tCO_2eq. per annum.**

Step 5: Calculation of Emission Reductions (ERy)

The emission reductions by the project activity during a given year y is the difference between Baseline emissions (BEy), project emissions (PEy) and emissions due to leakage (Ly).

ERy = BEy – PEy – Ly

- Project Emissions by sources of GHGs due to the project activity within the project boundary are zero since wind power is a GHG emission free source of energy.
- Leakage is not applicable as the renewable energy technology used is not equipment transferred from another activity. Therefore, as per the simplified procedures for SSC project activities, no leakage calculation is required.

Total project activity emissions, including leakage are zero for the project activity.

Therefore, net anthropogenic emission reductions due to the proposed project are equal to the baseline emissions on a yearly basis. The annual emissions reductions are equal to **2,299 tCO_2**.

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

>>

Table B.9: Estimation of Emission Reduction

Year	Estimation of Baseline Emissions (tCO_2eq.)	Estimation of Project Emissions (tCO_2eq.)	Estimation of Leakage (tCO_2eq.)	Estimation of Emission Reductions (tCO_2eq.)

01/11/2007 - 31/10/2008	2,298.98	0	0	2,299
01/11/2008 - 31/10/2009	2,298.98	0	0	2,299
01/11/2009 - 31/10/2010	2,298.98	0	0	2,299
01/11/2010 - 31/10/2011	2,298.98	0	0	2,299
01/11/2011 - 31/10/2012	2,298.98	0	0	2,299
01/11/2012 - 31/10/2013	2,298.98	0	0	2,299
01/11/2013 - 31/10/2014	2,298.98	0	0	2,299
01/11/2014 - 31/10/2015	2,298.98	0	0	2,299
01/11/2015 - 31/10/2016	2,298.98	0	0	2,299
01/11/2016 - 31/10/2017	2,298.98	0	0	2,299
Total emission reductions over crediting period (tCO_2eq.)				**22,990**

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

B.7.1 Data and parameters monitored:

>>

a) EGy

Data / Parameter:	**EG_y**
Data unit:	GWh
Description:	Electricity exported to the grid by the project.
Source of data to be used:	JMR sheets / Measurement records of the EPC Contractor.
Value of data	2.8 GWh
Description of measurement methods and procedures to be applied:	– The electricity is measured with the help of electronic meters at the wind farm substation both by the operator and the grid representative. – The data is measured hourly and recorded monthly. – 100% of the data is monitored. – The data will be archived electronically.
QA/QC procedures to be applied:	This data will be directly used for calculation of emission reductions. Sales record to the grid and the other records are used to cross check this data and hence ensure consistency.
Any comment:	Electricity is delivered from the project activity to the grid. The generated amounts can be double checked by receipt of sales.

b) EFy

Data / Parameter:	**EF_y**
Data unit:	tCO_2/GWh
Description:	Emission factor of the existing generation mix
Source of data to be used:	CEA: 'The CO_2 Baseline Database for the Indian Power Sector' Version 2.0, 21st June 2007
Value of data	The baseline emission factor would be furnished every year and data of the year in which project generation occurs will be used.

Description of measurement methods and procedures to be applied:	The data will be taken from the CEA database and this data is made publicly available.
QA/QC procedures to be applied:	The CO_2 Baseline Database is taken from Central Electricity Authority (CEA), Ministry of Power, Govt. of India hence it is authenticated and reliable.
Any comment:	Used to calculate emission reductions every year

B.7.2 Description of the monitoring plan:

>>

The investors have entered into Operation & Maintenance Agreement with the EPC contractor M/s. Suzlon Energy Limited for carrying out the necessary maintenance of the installations during the designed life of the project. The O & M is furnished in Annexure 4. The agency will be responsible for the operation and maintenance activities that will be implemented in order to monitor emission reductions generated by the project activity and are described 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 & 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 SEB, of power generated at each wind farm and supplied to SEB grid from the meter/s maintained by SEB 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.

Leakage

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.

Metering Equipment
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. Thus no special ways and means are required to monitor leakage from the project activity.

1. The proposed CDM project activity requires evacuation facilities for sale to grid and the evacuation facility is essentially maintained by the state utility MDEDCL, which also requires electricity generation measurements.
2. The project activity has therefore envisaged two independent measurements of generated electricity from the wind turbines.
3. The primary recording of the electricity fed to the state utility grid will be carried out jointly at the incoming feeder of the state power utility, MSEDCL. The metering is carried out at the sub station via a common meter for a group of windmills that is inclusive of the WEGs not a part of this proposed CDM project activity. However, metering of the sole WEG is observed at two distinct levels:

   3.a.: At the first level, the generation from the sole WEG is recorded by an energy meter installed near the machine. This is a combination of a main and a check meter. This meter provides monthly generation data and the records are maintained on paper and electronically for reference. The meters installed at the feeder of the state power utility are calibrated periodically. The joint measurement will be carried out once in a month.

   3.b.: 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 WEG. WEG is equipped with an integrated electronic meter. This meter is connected to the Central Monitoring Station (CMS) of the wind farm maintained by Suzlon Energy Limited. 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.

4. JMRs are taken at the feeder level by the local electricity utility. The JMR readings can be further broken in to the individual turbine generation with the help of generation data from the central monitoring station of the WTGs. Therefore, for monitoring of the project activity, data shall be gathered from both the sources and the most conservative values shall be taken for calculating emission reductions arising from each WTG.

5. The investors have entered into Operation & Maintenance Agreement with the EPC contractors M/s. Suzlon Infrastructure Services Limited (SISL), (then, Suzlon Wind Farm Services Limited) for carrying out the necessary maintenance of the installations during the designed life of the project. SISL will be responsible for collecting the necessary data in order to monitor emission reductions generated by the project activity.

6. SISL will 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.

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: 30/07/2007

Contact Organisation:

Senergy Global Private Limited
9th Floor, Eros Corporate Tower, Nehru Place,
New Delhi – 110 019
India.
Tel. : +91- 11- 4180 5501
Fax : +91- 11- 4180 5504
E.mail : mail@senergyglobal.com
Url : **www.senergyglobal.com**

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:

>>
31/12/2005

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

>>
20 years 0 month.

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

>>
Fixed crediting period is chosen.

C.2.1. Renewable crediting period

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

>>
Not Applicable.

C.2.1.2. Length of the first crediting period:

>>
Not Applicable.

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
1/11/2007

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:

>>
According to Indian regulation, the implementation of the wind park does not require an Environmental Impact Assessment (EIA) study. As per the prevailing regulations of the Host Party i.e. India represented by the Ministry of Environment and Forests (MoEF), Govt. of India and also the line ministry for environmental issues in India, Environmental Impact Assessment (EIA) studies need not to be conducted for the projects which comes under the list whose investment is less than Rs. 1000 millions[7, 8] Since the Wind parks are not included in this list and also the total cost of the project is only Rs 64.73 millions, the project activity doesn't call for EIA study.

Also, in the redefined EIA notification i.e. S.O. 1533[9], dated 14th September 2006, Ministry of Environment & Forests (MoEF), Govt. of India, the wind projects are not included in the list of projects that has to get Prior Environmental Clearance (EC) either from State or Central Govt. authorities and hence no EIA study was conducted.

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:

>>
Since the project is a electricity generation through a clean and renewable source of energy i.e. wind, the project doesn't creates negative impact on the environment. Hence, no EIA conducted and thereby no reports or documents available.

SECTION E. Stakeholders' comments

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

>>
The local stakeholders identified for the project activity were as follow;

- Maharashtra State Electricity Distribution Company limited, MSEDCL
- Maharashtra Energy Development Agency (MEDA)
- The local people of village Jarandi.

The land used for implementation of the Wind farm belongs to the villagers and has been procured by the EPC contractor "Suzlon Energy Limited" for development of WEG wind farm purposes, thus local

[7] S.O. 60 (E), Environment Impact Assessment Notification, Ministry of Environment and Forests, Govt. of India dated 27th January 1994.

[8] Amendments made on 13th June 2002 vide S.O. 632 (E), Ministry of Environment and Forests, Govt. of India.

[9] Page No: 10, S. O. 1533, Ministry of Environment & Forests (MoEF), Govt. of India, http://envfor.nic.in/legis/eia/so1533.pdf

stakeholders was approached right at the inception of the project. The concerned land has been sold to Chhotabhai Jethabhai Patel & Co.

The villagers were apprised about the proposed use of land and their consent was taken for the same. The villagers entered into commercial agreement with the EPC contractor for selling out their land for the wind farm activity, and proper documentary evidence (sale agreements) for transfer of land to the EPC contractors are available for validation.

E.2. Summary of the comments received:

>>

The clearances and approvals have been received from each of the administrative institutions by the project proponent. The no objection certificates from the village Panchayat have been taken.

The villagers have made following submissions for consideration:

- 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 contractors were requested 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:

>>

The submissions from the villagers were considered by the concerned management and

- The right of way was given to the villagers even after selling land to the EPC contractors.
- 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:	M/s. Chhotabhai Jethabhai Patel & Co.
Street/P.O.Box:	Motapore
Building:	C. J. House
City:	Nadiad
State/Region:	Gujarat
Postfix/ZIP:	387 001
Country:	India
Telephone:	+91- 268 - 2562 633 / 634
Fax:	+91- 268 - 2562 637
E.mail:	ceejaygroup@yahoo.co.in
URL:	
Represented by:	
Title:	General Manager (Finance)
Salutation:	Mr.
Last Name:	Shah
Middle Name:	
First Name:	D. T.
Department:	
Mobile:	
Direct Fax:	+91- 268 – 2562 637
Direct Tel:	+91- 268 – 2562 633 / 634
Personal E-Mail:	ceejaygroup@yahoo.co.in

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding involved in the project activity and the project participants hereby confirm that there is no diversion of overseas development assistance.

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	0.7237	0.7265	0.7379	0.7095	0.7134	0.7137
East	1.0876	1.0573	1.1128	1.1035	1.0768	1.0756
South	0.7347	0.7451	0.8231	0.8417	0.7837	0.7353
West	0.8988	0.9247	0.9034	0.9020	0.9242	0.8746
North-East	0.4239	0.4140	0.4020	0.4281	0.3180	0.3309
India	0.8216	0.8309	0.8546	0.8507	0.8423	0.8170

Weighted Average Emission Rate (tCO2/MWh) (incl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	0.7237	0.7265	0.7401	0.7098	0.7203	0.7240
East	1.0876	1.0320	1.0852	1.0758	1.0534	1.0473
South	0.7446	0.7478	0.8235	0.8417	0.7843	0.7355
West	0.8984	0.9242	0.9026	0.9009	0.9234	0.8829
North-East	0.4239	0.4140	0.4020	0.4281	0.4799	0.3309
India	0.8191	0.8284	0.8520	0.8479	0.8397	0.8145

Simple Operating Margin (tCO2/MWh) (excl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	0.9768	0.9778	0.9988	0.9870	0.9745	0.9933
East	1.2198	1.2210	1.2025	1.2303	1.2037	1.1585
South	1.0219	1.0001	1.0071	1.0041	0.9997	1.0073
West	0.9791	1.0102	0.9845	0.9922	1.0132	0.9936
North-East	0.7335	0.7101	0.7418	0.7366	0.7143	0.6994
India	1.0169	1.0239	1.0207	1.0259	1.0274	1.0228

Simple Operating Margin (tCO2/MWh) (incl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	0.9768	0.9778	0.9996	0.9871	0.9758	0.9946
East	1.2198	1.1874	1.1703	1.1959	1.1745	1.1255
South	1.0292	1.0001	1.0065	1.0041	0.9999	1.0073
West	0.9784	1.0094	0.9830	0.9903	1.0120	0.9934
North-East	0.7335	0.7101	0.7418	0.7366	0.8402	0.6994
India	1.0132	1.0202	1.0170	1.0217	1.0234	1.0189

Build Margin (tCO2/MWh) (excl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06

Build Margin (tCO2/MWh) (not adjusted for imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06

North	0.5336	0.6005
East	0.9043	0.9672
South	0.7089	0.7113
West	0.7700	0.6300
North-East	0.1456	0.1489
India	0.6953	0.6841

North	0.5336	0.6005
East	0.9043	0.9672
South	0.7089	0.7113
West	0.7700	0.6300
North-East	0.1456	0.1489
India	0.6953	0.6841

Combined Margin (tCO2/MWh) (excl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	0.7552	0.7557	0.7662	0.7603	0.7540	0.7969
East	1.0620	1.0626	1.0534	1.0673	1.0540	1.0628
South	0.8654	0.8545	0.8580	0.8565	0.8543	0.8593
West	0.8746	0.8901	0.8773	0.8811	0.8916	0.8118
North-East	0.4395	0.4278	0.4437	0.4411	0.4299	0.4242
India	0.8561	0.8596	0.8580	0.8606	0.8614	0.8534

Combined Margin in tCO2/MWh (incl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	0.7552	0.7557	0.7666	0.7603	0.7547	0.7976
East	1.0620	1.0458	1.0373	1.0501	1.0394	1.0463
South	0.8690	0.8545	0.8577	0.8565	0.8544	0.8593
West	0.8742	0.8897	0.8765	0.8802	0.8910	0.8117
North-East	0.4395	0.4278	0.4437	0.4411	0.4929	0.4242
India	0.8543	0.8578	0.8562	0.8585	0.8594	0.8515

GENERATION DATA

Gross Generation Total (GWh)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	144,292	151,185	155,385	165,735	168,438	179,751
East	58,936	64,048	66,257	75,374	85,776	93,902
South	129,035	131,902	136,916	138,517	144,086	147,355
West	162,329	165,805	177,399	172,682	183,955	188,606
North-East	5,319	5,332	5,808	5,867	7,883	7,778
India	499,911	518,272	541,764	558,175	590,138	617,392

Net Generation Total (GWh)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	135,230	141,415	144,743	155,043	157,291	168,206
East	53,350	58,097	59,841	68,428	77,968	86,014

EMISSION DATA

Absolute Emissions Total (tCO2)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	97,866,565	102,743,113	106,808,582	109,996,544	112,212,597	120,056,079
East	58,026,488	61,427,499	66,593,200	75,512,010	83,956,860	92,517,515
South	89,019,263	92,112,060	105,187,726	108,049,156	105,539,862	101,712,149
West	135,192,153	141,597,621	148,557,341	144,127,175	157,781,065	153,933,199
North-East	2,202,108	2,158,348	2,280,049	2,462,796	2,468,463	2,532,819
India	382,306,576	400,038,640	429,426,898	440,147,681	461,958,846	470,751,761

Absolute Emissions OM (tCO2)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	97,866,565	102,743,113	106,808,582	109,996,544	112,212,597	120,056,079
East	58,026,488	61,427,499	66,593,200	75,512,010	83,956,860	92,517,515

South	121,158	123,630	127,789	128,373	134,676	138,329
West	150,412	153,125	164,448	159,780	170,726	176,003
North-East	5,195	5,213	5,671	5,752	7,762	7,655
India	465,345	481,479	502,492	517,376	548,423	576,206

South	89,019,263	92,112,060	105,187,726	108,049,156	105,539,862	101,712,149
West	135,192,153	141,597,621	148,557,341	144,127,175	157,781,065	153,933,199
North-East	2,202,108	2,158,348	2,280,049	2,462,796	2,468,463	2,532,819
India	382,306,576	400,038,640	429,426,898	440,147,681	461,958,846	470,751,761

Share of Must-Run (Hydro/Nuclear) (% of Net Generation)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	25.9%	25.7%	26.1%	28.1%	26.8%	28.1%
East	10.8%	13.4%	7.5%	10.3%	10.5%	7.2%
South	28.1%	25.5%	18.3%	16.2%	21.6%	27.0%
West	8.2%	8.5%	8.2%	9.1%	8.8%	12.0%
North-East	42.2%	41.7%	45.8%	41.9%	55.5%	52.7%
India	19.2%	18.9%	16.3%	17.1%	18.0%	20.1%

Absolute Emissions BM (tCO2)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North					17,108,583	20,622,114
East					14,303,611	16,990,438
South					19,839,024	20,029,713
West					27,148,870	22,318,133
North-East					299,121	266,981
India					78,699,210	80,227,378

Net Generation in Operating Margin (GWh)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	100,189	105,076	106,942	111,450	115,151	120,869
East	47,570	50,308	55,377	61,378	69,746	79,863
South	87,114	92,103	104,449	107,603	105,568	100,978
West	138,071	140,173	150,889	145,264	155,731	154,918
North-East	3,002	3,039	3,074	3,343	3,456	3,621
India	375,947	390,700	420,730	429,040	449,653	460,249

20% of Net Generation (GWh)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	27,046	28,283	28,949	31,009	31,458	33,641
East	10,670	11,619	11,968	13,686	15,594	17,203
South	24,232	24,726	25,558	25,675	26,935	27,666
West	30,082	30,625	32,890	31,956	34,145	35,201
North-East	1,039	1,043	1,134	1,150	1,552	1,531
India	93,069	96,296	100,498	103,475	109,685	115,241

Net Generation in Build Margin (GWh)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06

IMPORT DATA

Net Imports (GWh) - Net exporting grids are set to zero

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	0	0	0	0	3,616	5,748
East	489	555	357	1,689	0	0
South	1,162	1,357	518	0	0	0
West	321	0	797	962	285	11,982
North-East	0	0	0	0	2,099	0

Share of Net Imports (% of Net Generation)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06

North	32,064	34,340
East	15,818	17,567
South	27,987	28,158
West	35,257	35,425
North-East	2,055	1,793
India	113,181	117,283

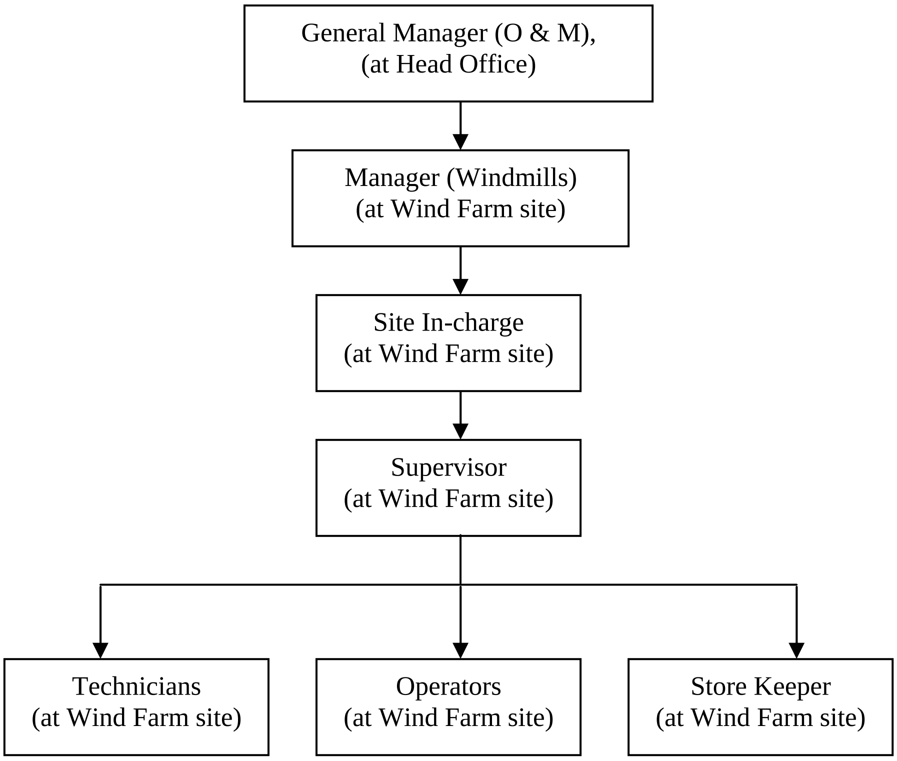
North	0.0%	0.0%	0.0%	0.0%	2.3%	3.4%
East	0.9%	1.0%	0.6%	2.5%	0.0%	0.0%
South	1.0%	1.1%	0.4%	0.0%	0.0%	0.0%
West	0.2%	0.0%	0.5%	0.6%	0.2%	6.8%
North-East	0.0%	0.0%	0.0%	0.0%	27.0%	0%

Annex 4

MONITORING INFORMATION

The investors have entered into Operation & Maintenance Agreement with the EPC contractor M/s. Suzlon Energy Limited for carrying out the necessary maintenance of the installations during the designed life of the project. The O & M is furnished in the flow chart below. The agency will be responsible for the operation and maintenance activities that will be implemented in order to monitor emission reductions generated by the project activity and are described as under:

The organization structure for the Operation and Maintenance of the windmills is depicted below:-



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 -

g) Tower Torquing
h) Blade Cleaning
i) Nacelle Torquing and Cleaning
j) Transformer Oil Filtration
k) Control Panel & LT Panel Maintenance
l) 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

d) Data logging in for power generation, grid availability, machine availability.
e) Preparation and submission of monthly performance report in agreed format.
f) Taking monthly meter reading jointly with SEB, of power generated at each Wind Farm and supplied to SEB Grid from the meter/s maintained by SEB for the purpose and co-ordinate to obtain necessary power credit report/ certificate.

4 Technical Services

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

Leakage

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.

Metering Equipment

The details about the metering equipment and procedures are mentioned in section B.7.2 of the PDD.

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