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

CONTENTS

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:

14 MW Wind Power Project in Maharashtra
Version: 04
Date : 02/06/2009

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

The proposed project activity by M/s Shah Promoters & Developers is a small-scale project involving installation of 10 wind electric generators (WEGs) of individual capacities 1.25 MW (4 machines) and 1.5 MW (6 machines). The WEGs are located [1] in Suzlon wind farms in Dhule and Sangli districts of Maharashtra. The electricity generated is fed to the Maharashtra State Electricity Distribution Company Limited (MSEDCL) grid.

Other details are as follows-

WEG Location No.	Village, District	Substation	Installed Capacity	Technology
J-17	Jamade, Dhule	Jamde Substation	1.25 MW	SUZLON, S-70
J-21	Jamade, Dhule	Jamde Substation	1.25 MW	SUZLON, S-70
J-22	Jamade, Dhule	Jamde Substation	1.25 MW	SUZLON, S-70
J-23	Jamade, Dhule	Jamde Substation	1.25 MW	SUZLON, S-70
N-4	Nagaj, Sangli	Ghatnadre Substation	1.50 MW	SUZLON, S-82
N-5	Nagaj, Sangli	Ghatnadre Substation	1.50 MW	SUZLON, S-82
N-6	Nagaj, Sangli	Ghatnadre Substation	1.50 MW	SUZLON, S-82
N-7	Nagaj, Sangli	Ghatnadre Substation	1.50 MW	SUZLON, S-82
N-8	Nagaj, Sangli	Ghatnadre Substation	1.50 MW	SUZLON, S-82
N-9	Nagaj, Sangli	Ghatnadre Substation	1.50 MW	SUZLON, S-82

The net electricity exported by the project activity is of the order of 24,528MWh/year. Had this amount of electricity been produced by conventional fuel, it would lead to net emission of 21,094 tons of CO_2 per annum.

Contribution to sustainable development:

[1] Site development for a wind power project requires certain infrastructure amenities such as approach roads and grid evacuation facility. The cost of development of these facilities would put a lot of financial burden on a single promoter and hence to reduce costs, the technology supplier develops a wind farm with all basic facilities and distributes the cost of development amongst the investors, whose WTGs are located within the wind farm. In the present case the project activity falls within the wind farm developed and maintained by Suzlon Energy Limited. Individual WTGs in this wind farm belong to investors who have invested in wind energy and chosen Suzlon Energy Limited as their vendor. SPD is the owner of the WTG's and Suzlon Infrastructure Limited is the O & M contractor.

The proposed project is contributing to the sustainable development of the region[2] in following manner.

1) Social well-being

The proposed project has resulted in better living conditions for the local community. There was growth in job opportunities in the region owing to erection and operation of the wind farm. The employment of local populace has brought about improvement in living standard and subsequently has led to the development of better basic amenities such as roads and medical facilities. Thus the project has contributed to the social well being of the region.

ii) Economic well being

The project has created direct and indirect job opportunities at the time of installation and later during operation of the WEGs. The investment for the project activity has increased the economic activity of the local area. The above contributes to the economic well being and social well being of the local community. The project activity also contributes to nation's economy by reducing import of coal and other fossil fuel for electricity generation in hard currency.

iii) 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. This will lead 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.

iv) Technological well-being

The generated electricity from the project activity will be connected to the grid. The project activity will improve the supply of electricity with clean, renewable wind power while contributing to the regional/local economic development. The benefits include:

- Improved power quality
- Reactive power control
- Mitigation of transmission and distribution congestion

In view of the above, the project participants consider that the project activity will profoundly contributes to the sustainable development.

A.3. Project participants:

[2] Ministry of Environment and Forests web site: http://envfor.nic.in:80/divisions/ccd/cdm_iac.html

Name of party involved (*) (host) indicates a host party	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicates if the party involved wishes to be considered as project participants (Yes/No)
India	• Private entity - M/s Shah Promoters & Developers	No

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:

Site I - Village-Jamade, District-Dhule
Site I I - Village-Nagaj, District-Sangli

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

Site	Windmill Location No.	Addresses	Latitude	Longitude
Site – I	J-17	R. S. No. - 19, Village – Jamade, Taluka - Sakari, Dist - Dhule	20°59'24.89" N	74°18'51.52"E
	J-21	R. S. No. - 19, Village – Jamade, Taluka - Sakari, Dist – Dhule	20°59'24.89" N	74°18'51.52"E
	J-22	R. S. No. - 19, Village – Jamade, Taluka - Sakari, Dist - Dhule	20°59'24.89" N	74°18'51.52"E
	J-23	R. S. No. – 19, Village – Jamade, Taluka - Sakari, Dist - Dhule	20°59'24.89" N	74°18'51.52"E
Site – II	N-4	Survey no.-585, Village – Nagaj, Taluka - Kawathe Mahakal, Dist - Sangli	17°08' 00.00" N	74°55'59.98" E
	N-5	Survey no.- 604, Village – Nagaj, Taluka - Kawathe Mahakal, Dist - Sangli	17°08' 00.00" N	74°55'59.98" E
	N-6	Survey no.- 604, Village – Nagaj, Taluka - Kawathe Mahakal, Dist. - Sangli	17°08' 00.00" N	74°55'59.98" E
	N-7	Survey no.- 604, Village – Nagaj, Taluka - Kawathe Mahakal,Dist - Sangli	17°08' 00.00" N	74°55'59.98" E
	N-8	Survey no.- 604, Village – Nagaj, Taluka - Kawathe Mahakal, Dist - Sangli	17°08' 00.00" N	74°55'59.98" E
	N-9	Survey no.- 604, Village – Nagaj, Taluka - Kawathe Mahakal, Dist -Sangli	17°08' 00.00" N	74°55'59.98" E

Figure 1: Map of India

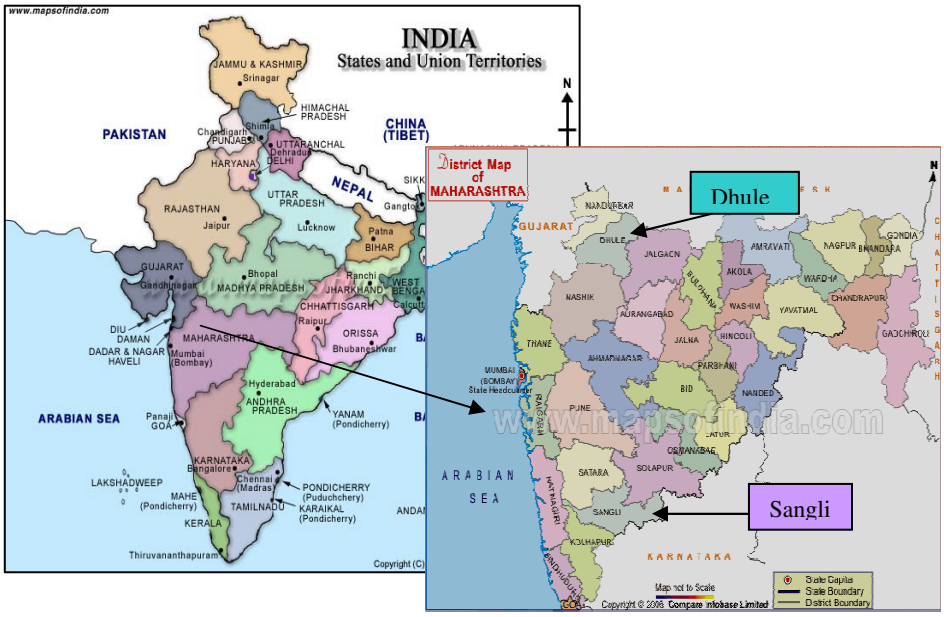


Figure 2: District Map of Maharashtra

Figure 3: Map of Dhule

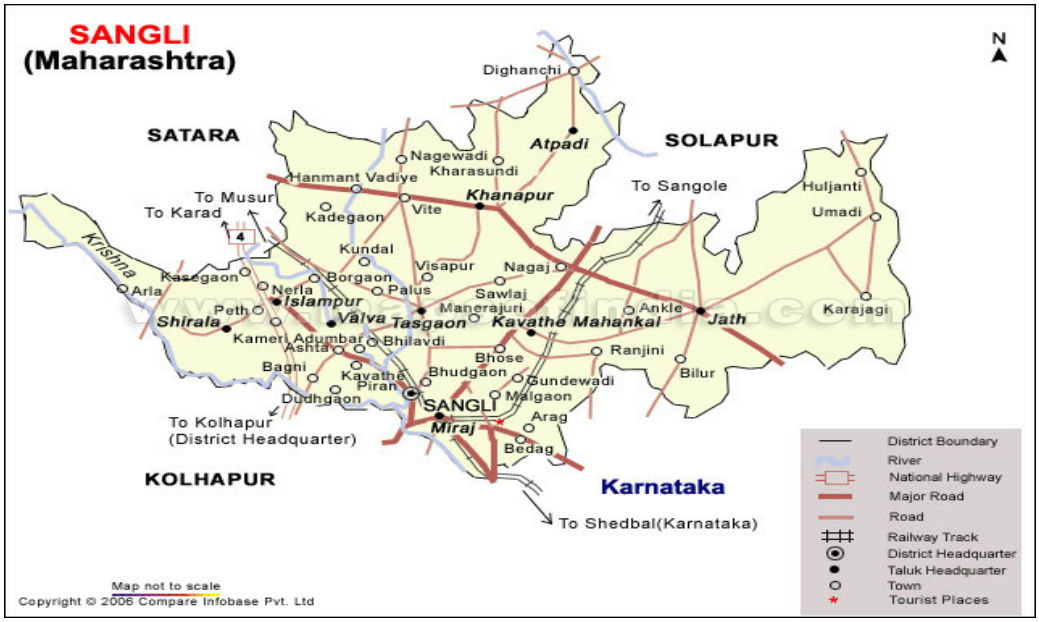


Figure 4: Map of Sangli

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

Type	:	I- Renewable energy projects
Category	:	I.D. Grid connected renewable electricity generation
Version number	:	13
Sectoral Scope	:	01

This category comprises renewable energy, including wind power, which supplies electricity to an electricity distribution system (grid). The proposed project has installed capacity of 14 MW which is lesser than the threshold limit of 15 MW for small scale project activity and the electricity is supplied to the Western Region Electricity Grid, where major part of electricity comes from conventional sources.

The proposed project activity uses indigenous technology, so there is no technology transfer in the project.

Technology

In wind energy generation, kinetic energy of wind is converted into mechanical energy and subsequently into electrical energy. Wind has considerable amount of kinetic energy when blowing at high speeds. This kinetic energy when passes through the blades of the WEG 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 important parts of windmill are:

i. Main tower
ii. Blades
iii. Nacelle
iv. Hub
v. Main shaft
vi. Gearbox, bearing and housing
vii. Brake
viii. Generator

Salient Features of Suzlon (S-70) 1250 KW WEG

Rotor diameter	69.1 m
Installed electrical output	1250 kW
Cut –in wind speed	3 m/s
Rated wind speed	12 m/s
Cut-out wind speed	20 m/s
Rotor swept area	3750 m^2
Rational speed	13.2/19.8
Rotor material	GRP

Regulation	Pitch
Generator	Asynchronous Generator, 4/6 poles
Rated output	250/1250 kW
Rotational speed	1010/1515 rpm
Operating voltage	690 v
Frequency	50 Hz
Protection	IP 56
Insulation class	H
Cooling system	Air –cooled
Gear box	3 stage gear box,1 planetary and 2 helical
Manufacturer	Winergy
Gear ratio	77.848
Nominal load	1390 kW
Type of cooling	Oil cooling system
Yaw drive system	4 active electrical yaw motors
Yaw bearing	Polyamide slide bearing
Safety system	
Aerodynamic brake	3 times independent pitch regulation
Mechanical brake	Spring powered disc brake, hydraulically released fail safe
Control unit	Microprocessor controlled, indicating actual operating conditions, UPS back up system
Design standards	GL/IEC

Salient Features of Suzlon (S-82) 1500 KW WEG

Rotor diameter	82.0 m
Installed electrical output	1500 kW
Cut –in wind speed	4 m/s
Rated wind speed	14 m/s
Cut-out wind speed	20 m/s
Rotor swept area	5281 m^2
Rational speed	16.30 RPM
Rotor material	GRP
Regulation	Pitch
Generator	Asynchronous generator,4 poles
Rated output	1500 kW
Rotational speed	1511 rpm
Operating voltage	690 v
Frequency	50 Hz
Protection	IP 54
Insulation class	H
Cooling system	Air –cooled
Gear box	3 stage gear box,1 planetary and 2 helical
Manufacturer	Winergy
Gear Ratio	95.09
Nominal load	1650 kW
Type of cooling	Oil cooling system
Yaw drive system	4 active electrical yaw motors
Yaw bearing	Polyamide slide bearing
Safety system	
Aerodynamic brake	3 times independent pitch regulation
Mechanical brake	Spring powered disc brake, hydraulically released fail safe
Control unit	Microprocessor controlled, indicating actual operating conditions, UPS back up system
Design standards	GL/IEC

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

Years	**Estimation of annual emission reductions in tonnes of CO_2 e**
2009-2010	21094
2010-2011	21094
2011-2012	21094
2012-2013	21094
2013-2014	21094
2014-2015	21094

Years	Estimation of annual emission reductions in tonnes of CO2 e
2015-2016	21094
2016-2017	21094
2017-2018	21094
2018-2019	21094
Total estimated reductions (tonnes of CO_2 e)	**210940**
Total number of crediting years	10
Annual average of the estimated reductions over the crediting period (t CO_2 e)	**21094**

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).

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

According to paragraph 2 of Appendix C to the simplified Modalities and Procedures for small-scale project activities, 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 & 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. This can be verified from UNFCCC Website http://cdm.unfccc.int/Projects/index.html. 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 : **I.D. –** Grid connected renewable electricity generation (Version 13)

Reference : Appendix B of the simplified M&P for small scale CDM project activities

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

Applicability Criteria	
This category comprises renewable energy generation units, such as photovoltaics, hydro, tidal/wave, wind, geothermal and renewable biomass, that supply electricity to and/or displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit.	The project activity encompasses **wind** power generation from 10 wind electric generators. The electricity thus generated will be evacuated to the **western regional grid** where fossil fuel fired generation contributed to 138901 MUs out of total generation of 188241 MUs during the year 2005-06[3]
If the unit added has both renewable and non-renewable components, the eligibility limit of 15 MW 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 15 MW	The project activity is within the small scale limit of **15 MW**. However there is neither a non-renewable component nor co-firing in this case.
Combined heat and power systems are not eligible under this category.	Not applicable
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 physically distinct from the existing units	The present activity is a new set up hence not applicable.
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	Not applicable.

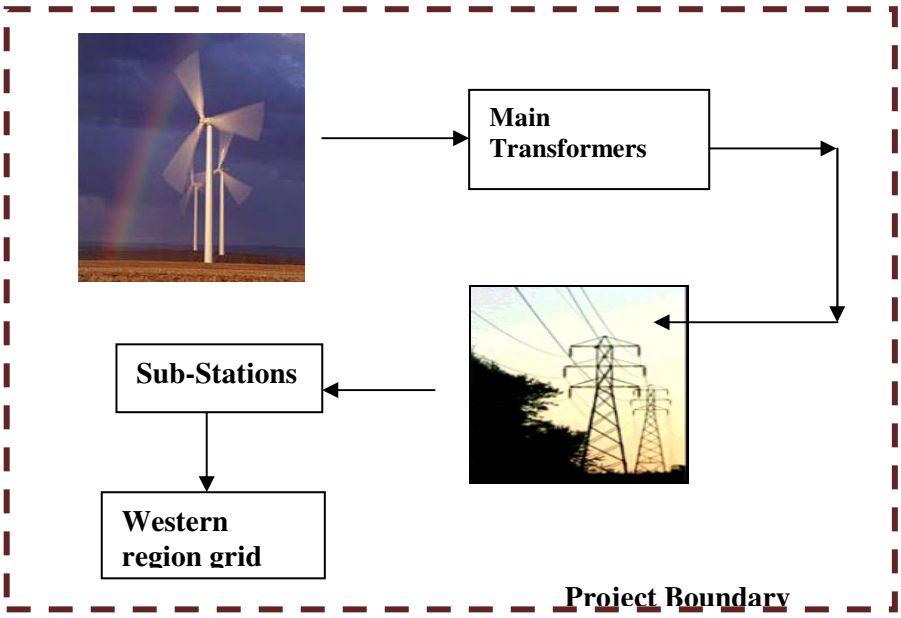
With above considerations, Type I.D. is most appropriate for the project activity.

B.3. Description of the project boundary:

As mentioned under paragraph 6 of Type I.D. of '*Annex-B of the simplified modalities and procedures for small-scale CDM project activities*', project boundary encompasses the physical, geographical site of the renewable generation source. The project boundary includes the WEGs, regional grid & substations of the project. The flow diagram showing boundary of the project is as follows-

[3] http://www.wrpc.nic.in/annualreport0506/Chapter2.pdf, Page 7.

Figure 5, Project Boundary



B.4. Description of baseline and its development:

The project activity is a wind power project that supplies electricity to state grid. Since wind is a renewable resource, the GHG emission from the project activity is zero.

The project will have a total installed capacity of 14 MW, hence this is a small-scale CDM project and the Simplified M&P for Small-Scale CDM Project Activity, Category I.D. is applicable. This category "comprises renewable energy sources, such as photovoltaic, hydro, tidal/wave, wind, geothermal and biomass, that supply electricity to an electricity distribution system that is or would have been supplied by at least one fossil fuel or non-renewable biomass fired generating unit".

Baseline methodology for projects under Type I.D has been detailed in paragraphs 7-11 (Type I.D Version -13) of the above-mentioned document. Paragraph 9 (Type I.D) applies to this project activity, which states that:

The baseline is the MWh produced by the renewable generating unit multiplied by an emission coefficient (measured in $tCO_2 eq/MWh$) 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 tCO_2 eq/ MWh*) 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.

Baseline emission reductions have been estimated using ***weighed average emission factor*** *(in tCO_2 eq/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- 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:

Seriousness of CDM consideration

The project promoters were aware of the CDM funds for wind energy projects before they had planned for the present project activity. However, their understanding on CDM was clarified further by their WEG contractor and supplier (Suzlon Energy Limited) at the time of purchase of the wind turbines. Before investing in this project, the promoters had detailed discussions on the financial viability and had decided that they would go for this project only after considering proceeds from CDM. During the same time, the promoters had also sought advice of their auditor, P.B. Shah, on the prudence in investing in a risky project as wind. The reply of the Auditor vide letter dated 06/12/2005 states clearly that the promoters can expect a reasonable return from the project if CDM revenue was considered. Acting in accordance with this advice, the promoters decided to undertake this project vide Partner's Resolution dated 03/01/2006. The purchase order was subsequently released on 20/04/2006. Inline with the "Guidance on the demonstration and assessment of prior consideration of the CDM" EB 41, continual and real actions were taken to secure the CDM funds by SPD during the implementation of the project. This is evident from the following documents:

- Letter from SPD to Mitcon Consultancy services limited, dated 09/04/2007, regarding CDM consultancy services for the proposed project activity.
- Work order for the consultancy services dated, 20/09/2007 to Mitcon Consultancy services limited.

Both these documents clearly demonstrate that continual and real actions were taken by SPD during the implementation of the project activity.

That the firm had taken parallel action to implement the project and get the project registered as CDM activity should be evident from below chronology of events.

Sr. No	*Date*	*Activity*	*Reference Document*
1	03/01/2006	Partner's Resolution	Partner's Resolution already part of PDD
2	11/04/2006	Synergy Global's proposal for purchase/trading of certified emission reduction accruing from the project activity.	Proposal dated 11/04/2006 from Synergy Global to Mr. Rajesh Shah
3	20/04/2006	Start Date: Released purchase orders & work orders for 5 MW WTG's (1.25 MW *4)	Purchase order & work order dated 20/04/2006,
4	07/07/2006	Loan sanction of Rs. 17.5 crores for the project activity	Bank of Maharashtra letter AR38/ADV/IFB/2006,
5	10/08/2006	Commissioning of 5 MW (1.25 MW*4) WTGs	Commissioning Certificate dated 22/08/2006
6	September 2006	Cable theft problem starts at Dhule Nandurbar Sites.	Suzlon PPT stating the problems associated with the cable thefts
7	04/09/2006	Signing of Power Purchase Agreement for 5MW WTGs	PPA dated 04/09/2006
8	19/12/2006	Purchase order for supply of 6 MW(1.5 MW*4) WTGs	Purchase order dated 19/12/2006
9	08/02/2007	Released purchase orders & work orders for the supply of 3 MW(1.5*2) WTGs	Purchase order dated 08/02/2007
10	28/03/2007	Meeting with CDM consultant	Letter from SPD dated 09/04/2007
11	09/04/2007	Letter from SPD to the present consultant regarding CDM consultancy	Letter dated 09/04/2007
12	26/04/2007	WTG no J 23 shut down for 48 days due to cable theft	WTG performance review by SUZLON,
13	17/05/2007	WTG no J 21 shut down for 21 days due to cable theft	WTG performance review by SUZLON
14	June 2007	Operation of both WTGs restored	WTG performance review by SUZLON
15	02/07/2007	Released PO & WO for reaming parts of the 6 MW WTG(part of which is done on 19/12/2006)	PO & WO Dated 02/07/2007,
16	20/09/2007	Released Work Order for the CDM Consultancy Service	WO dated 20/09/2007,
17	26/09/2007	Loan Sanction of Rs. 20 Crores for the project	Bank of Maharashtra letter AR38/IFB/ADV/2007-08 dated 26/09/2007
18	30/09/2007	Commissioning of Six nos. of WTGs	Commissioning Certificate dated 08/10/2007,

19	23/10/2007	Stakeholders meeting at Sangli site	MoM Stakeholders meeting,
20	08/01/2008	Stakeholders' meeting at Dhule site	MoM Stakeholders meeting,
21	18/02/2008	PIN & PDD Submission to MoEF for HCA	
22	05/03/2008	Invitation letter from MoEF to attend the HCA meeting	Letter from MoEF,
23	14/03/2008	Signing of Power Purchase Agreement for 9 MW WTG	PPA
24	17/03/2008	HCA meeting for the project	Letter from MoEF,

Based on the above chronology of events given above and Annex-6 of PDD (which reveals the enquiry made by PP to O & M contractor regarding the CDM benefits), it is evident that there was a serious consideration and clear intention to avail the benefits of CDM by SPD to make the project activity viable. The O & M contractor arranged meeting with its sister concern, which was involved in the CDM consultancy. The PP's keenness to avail of this benefit could be further established from Synergy Global's proposal dated 11/04/2006, which was issued immediately after the meeting with the Synergy Global. Synergy Global being sister concern of SEL, was the first choice of the promoters. However the terms and conditions offered were not found to be satisfactory.

The project promoters continued with the implementing the projects and applied for loan amounting to Rs. 17.50 crores from Bank of Maharashtra to part finance the project. Once there was an indication from the Bank on acceptance of the loan request, purchase order for first set of WTGs (to be installed in Dhule) was released on 20/04/2006. The first hindrance in the CDM cycle was encountered at this point. The promoters could not initiate the CDM process until they had placed the purchase orders for the entire 14 MW capacity, the reason being uncertainty of project site. Hence, the promoters had to wait for finalization of site and individual capacities of the turbines before commencing the CDM process.

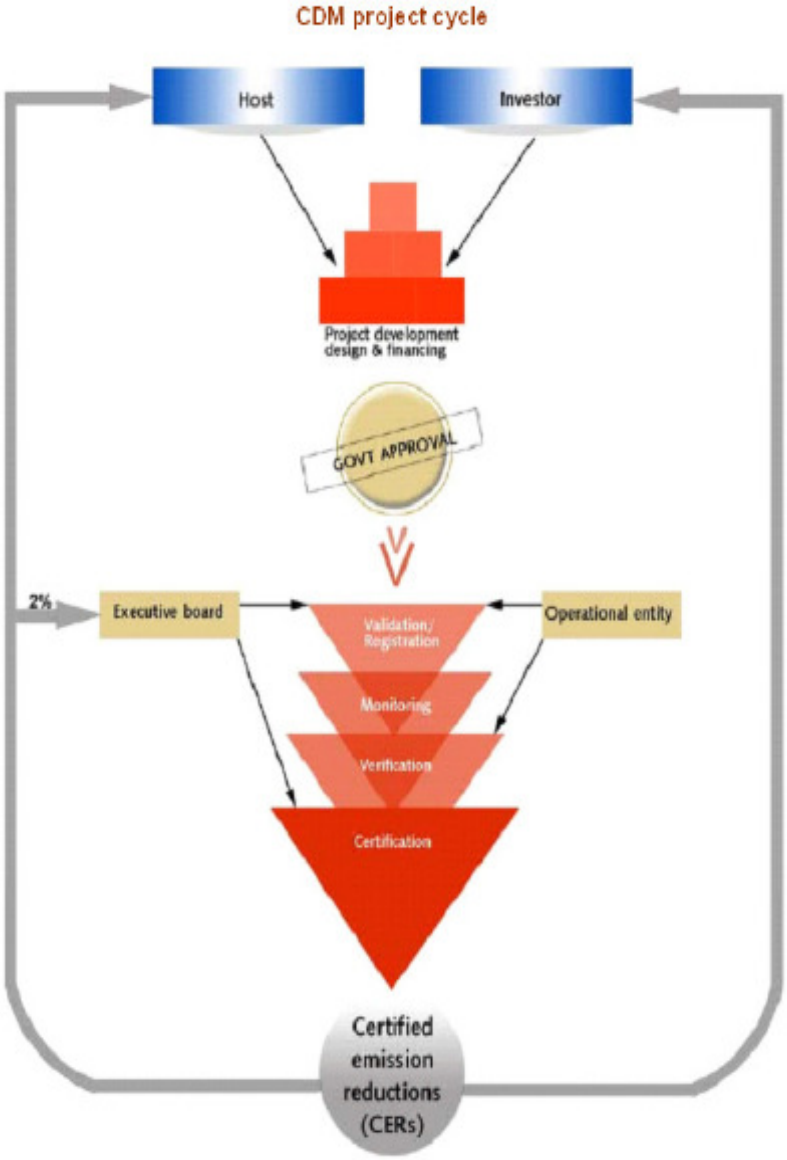
In the mean while, the first set of WTGs were commissioned in August 2006. Post commissioning, power purchase agreement for 5 MW was signed between SPD and MSEDCL on 04/09/2006. Unfortunately in September 2006, a very serious problem of cable theft surfaced in the **Dhule** – Nandurbar region (refer Suzlon's Power Point Presentation slide 14/59 which mentions that Section / Area **Jamde** among the most critically affected). This *force majeure* event caused wide scale disruption of operation on the site. As much as 56% of total installed capacity at the site was under complete or partial breakdown. In the midst of this mayhem, the promoters were skeptical about the whole project. This is evident from the PO released in parts by the SPD (refer the Purchase order for supply of 6 MW (1.5 MW*4) WTGs released on date 19/12/2006 and the Release of PO and WO for remaining parts of the 6 MW WTG on date 02/07/2007). The PP also became victim of the cable theft due to which two WTG's J21 (cable theft occurred on date 17/05/2007) and J23 (cable theft occurred on date 26/04/2007), which were already commissioned on 10/08/2006 were out of operation.

Shortly, purchase order for remaining two WTGs again of 1.5 MW on 8th February 2007 for Sangli site was released.

Once the promoters had placed Purchase orders for entire 14 MW (last PO for remaining parts of 6 MW WTG), they started approaching consultants for development of their project as a CDM activity. Finally after several rounds of negotiation, the promoters appointed the present consultant on 20th September

2007. Shortly after the release of work order to the Consultants, the remaining six WTGs were commissioned; Power Purchase Agreement was signed on 14th March 2008.

It was at this point when the promoters faced, the next impediment in the progress of their CDM project. After the release of WO to the consultant, the project could not be submitted either for Host country approval or web host the PDD for Gloabal Stakeholders Consultation, as the local stakeholders meeting could not be conducted at the Dhule site owing to local unrest[4] in the region. The stakeholder meeting was finally conducted on 08th January 2008. Since everything else was in place, the project was submitted for Host country approval. The next steps that followed were in accordance with the guidelines by Ministry of Environment & Forest (Government of India) as depicted in the following figure.



4 http://www.thehindubusinessline.com/2007/07/28/stories/2007072852360100.htm

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 07: 28 November 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.

1) Technological barrier:

With the inherent risk of infirm and intermittent generation in case of wind power projects, additional risk comes into play when the technology used for generation is also newly implemented. In this project, the 1.5MW S82 machines were just launched when the project was conceptualised. Absence of consistent track record of its performance coupled with lack of familiarity and experience with such new technologies can lead to perceptions of greater technical risk than for conventional energy sources.

Besides this, the PLF of wind power projects in Maharashtra is very low[5]. Wind power generation is subject to various factors like wind availability, grid availability, machine availability and transmissions losses, all theses factors being beyond the control of PP.

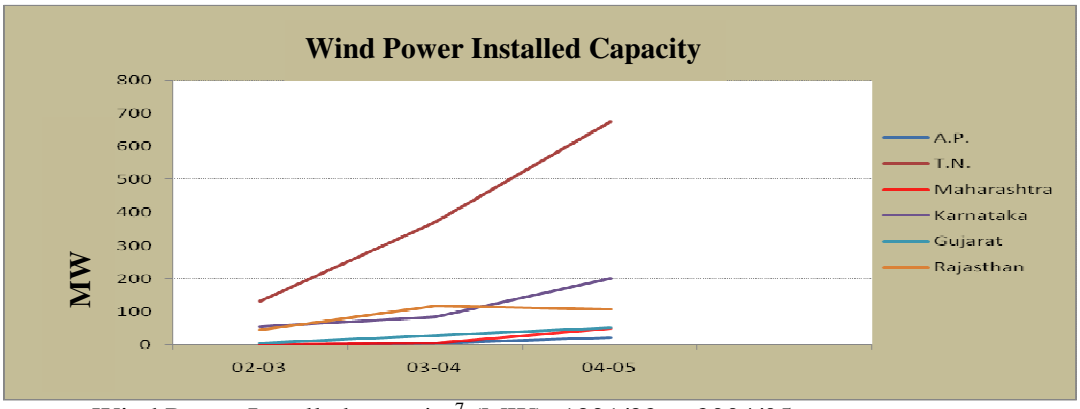
2) Barriers due to Prevailing Practices:

Energy planners and policy makers in India have generally supported conventional sources of energy for a variety of social and political reasons[6].

[5] http://www.mahaurja.com/Download/Sitewise_WindInstallationInfo.xls

[6] http://www.indiasolar.com/barriers.htm

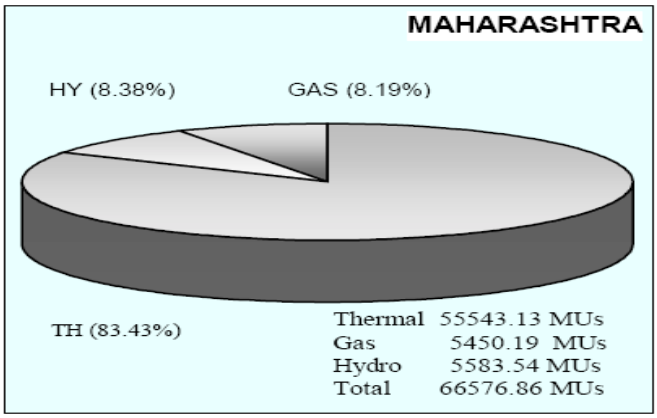
The addition in wind power capacity in India during the year 2004-05 was not very significant, barring few states. Maharashtra registered almost negligible capacity addition during this period. This is evident from the graph given below.



Wind Power Installed capacity[7] (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[8]. 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[9] MW i.e. 12.5%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.

Moreover the share of installed capacity[10] from wind power projects in Maharashtra was 3.07 % of the total installed capacity in state in the year 2004-05. The percentage of generation[11] for the same year was a paltry 0.74 %.



Energy generation in Maharashtra during the year 2004-05[12]

[7] Table 1.88; TERI Energy Data Directory and Yearbook 2005/06; Page no 219
[8] http://www.windpowerindia.com/statest.html
[9] Table 1.98; TERI Energy Data Directory and Yearbook 2004/05; Page no 201
[10] CEA General Review 2006, Table No-2.4
[11] CEA General Review 2006, Table No-3.4

Extending the argument further, of the 67078.27[13] GWh of electricity generated in Maharashtra in the year 2004-05, 60994.43[14] came from conventional sources (Fossil fuels). This makes the share of conventional sources as 91 %. Thus the entire sector is dominated by the thermal and up to a small extent, large hydro electric projects. The non conventional energy sources which are already struggling owing to higher costs involved, need good financial back up to enter this prejudiced market. As[15] rightly pointed out by Mr V. Subramanian, Secretary, Ministry of New and Renewable Energy, at the Cleantech Forum, that "renewable energy does not even get a third of support available to conventional sources". Its little wonder then that of the current installed wind power capacity of 1646 MW[16] in Maharashtra, 916 MW[17] is under various stages of CDM.

3) Other Barriers:

- ***Higher Capital Cost***

A major problem area for this sector has been high capital investment. The investment required for a wind power project is higher than most of the common renewable energy projects being implemented at present (refer to table 1 for details) as well as conventional energy projects (Table no 2). The heavy support given to convention power generation is the major cause of this disparity between wind and conventional sources[18]. Moreover the plant load factor of biomass based cogeneration plant or thermal power plant varies from 60 to 90 percent whereas for wind energy it comes to a maximum of 20-25[19] percent. This results in lower rate of return on the investment. Thus the promoters have taken considerable risk by investing in higher capital intensive and lesser reliable wind energy generation.

Table No 1[20] Capital cost of power project

Sl. No.	Source	Capital Cost (Crores of Rs/MW)	Estimated Cost of Generation Per Unit (Rs./kWh)
1.	Small* Hydro-Power	5.00-6.00	2.50-3.50
2.	Wind Power	4.00-5.00	3.00-4.00
3.	Biomass Power	4.00	3.00-4.00
4.	Bagasse Cogeneration	3.00-3.50	2.00-3.00
5.	Biomass Gasifier	2.50-3.00	3.00-4.00
6.	Solar Photovoltaic	25-30	15.00-20.00
7.	Energy from Waste	5.00-10.00	4.00-7.50

*<25 MW

[12] http://www.wrpc.nic.in/htm/anrpt0405.pdf; Page vii
[13] CEA General Review 2006, Table No-3.4
[14] CEA General Review 2006, Table No-3.4
[15] Source of the statement- http://www.livemint.com/2007/08/03181828/Renewable-energy-ministry-_seek.html?d=1
[16] MNES Annual Report 2007-08, http://mnes.nic.in/annualreport/2007_2008_English/Chapter%205/chapter%205_1.htm, Section 5.8
[17] http://cdmpipeline.org/publications/CDMpipeline.xls
[18] http://www.livemint.com/2007/08/03181828/Renewable-energy-ministry-seek.html?d=1
[19] Maharashtra Electricity Regulatory Commission recognizes PLF for wind power in Maharashtra as 20%
[20] *Source of the table no 1:* Integrated Energy Policy; Government of India (Planning Commission); Table 7.1, Page 90 http://planningcommission.nic.in/reports/genrep/rep_intengy.pdf

Table No 2 : Cost per MW

Sr. No.	Type of Power Plant	Capital Cost (INR million/MW)
1	Coal Power Plant	40
2	Lignite Power Plant	42
3	Natural Gas Power Plant	27
4	Diesel Power Plant	35
5	Present Project Activity	56.2

Table *Source: Report of the Expert committee on fuel for power generation-Page XI-CEA.*

Regulatory Barriers:

In the MERC tariff order dated 24th November 2003, the commission has noted that "In a perfect market, return on equity is determined by adjusting risk free return for risks being borne by the investors. This essentially means that the investor looks for a return on equity, which would cover the risks being borne by him. Risks can be viewed from different perspectives. An investor has several options to invest his money, with associated risk profiles. Investment in thermal power generation assets is less risky or safer, given the plant load factor and low volatility in output. Further, while volatility in fuel prices cannot be avoided, given fuel cost pass through and the availability of long-term fuel contracts such projects are less risky as compared to wind projects". Besides, the tariff structure for wind power projects is a single-part tariff structure as compared to utility scale fossil fuel and hydro projects, which have two-part tariff structure. This implies that project activity carries a higher investment risk than the utility scale fossil fuel and hydro projects, where the investment recovery is decoupled from the level of actual generation achieved by the project due to variations in off take. Thus, in case of the project activity, issues such as transmission unavailability, back-down of generation or part-load operations, which are beyond the control of the investors are likely to affect the project activity more severely.

Lack of experience in this field:

The project promoter is in the business of real estate. Entering into the field of wind power generation was an entirely new activity for them. Hence, the promoters have taken considerable risk by entering a new turf which is totally unrelated to their core business.

Investment analysis:

PP has chosen equity IRR to demonstrate the additionality of the project. Use of equity IRR to demonstrate the additionality is permitted by Additionality Tool (Ver 05.2). And the PP has chosen benchmark analysis for demonstrating that the project has a less favourable indicator than the benchmark and therefore cannot be considered financially attractive..

Additionality Tool (Ver 05.2) permits the use of "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" among others as the benchmark.. Accordingly, the PP has chosen this benchmark to demonstrate the additionality.

Suitable benchmark has been derived by the CAPM model-

Required rate of return = $R_F + \beta \times (R_m - R_f)$

Wherein return on BSE 500 index has been taken to represent *Rm*, average beta of power companies has been taken to quantify the *risk (*β) and interest rate on deposits over 1 year has been taken to represent *Rf*. The required rate of return works out to 16.95%. Normally, in CAPM, yield on Govt. Securities is taken to represent the *Rf*. Based on the yield on Govt. securities, the required return works out to 17.05%. Of the two, PP has chosen the conservative figure of 16.95% as the benchmark to demonstrate the additionality. Detailed calculations are enclosed as part of the worksheet.

Calculation and comparison of financial indicators:

All the costs and benefits accruing to the project have been considered in the calculation of the project return. The projected costs are based on the actual data and the conservative assumptions by experts.

Main assumptions:

Total Installed Capacity[21]	**MW**	**14.00**	
No of Machines	Nos.	4	6
Capacity	MW	1.25	1.50
Total Capacity	MW	5	9
Total Net Generation	**MWh**	**24528**	
Annual Generation from the project[22]	MWh	8760	15768
Plant load factor	Percent	20	
Selling rate considered	Rs./unit	3.50	
Escalation till 13th year	Rs / year	0.15	
Selling rate[23] considered from 14th year onwards.	Rs./unit	3.50	

[21] Purchase Order of the windmills

[22] Annual generation considering 20 % PLF.

[23] The tariff rate applicable for this project activity is 3.50 Rs/unit for the first year. This value will increase subsequently for the next 12 years at the rate of 0.15 Rs/unit every year. As the contract period is only for 13 years, the rate that will be applicable after 13th year is not known and has neither been specified in the power purchase agreement nor in the MERC Order dated 24th November 2003. However the State Electricity Commission has hinted at reduction in this tariff rate after the 13th year. This fact is further substantiated by MERC Order dated November 20, 2007 (Case No. 33 of 2007) on Group II projects where the tariff has been frozen at 90% of lowest

CO_2 emission per annum	T CO_2/yr	7534	13560
Rate per MT of CO_2	Euro	14	
Exchange Rate per Euro	INR	54	
Insurance & O&M[24]			
Insurance p.a.[25]	Rs. Lacs	0.71	1.40

O & M from which year applicable	Year	3	
Escalation in the O & M expenses	Percent	5.00%	
Overheads (Salaries & wages)	Rs. Lacs	12.00	12.00
Escalation in the Overheads	Percent	5.00%	

Financing			
Total Cost of Machine	Rs Lacs	2505	5371
Debt	Rs Lacs	1750.00	2000.00
Equity	Rs Lacs	755	3371
Bank Loan Interest rate	Percent	10.50%	10.50%
O & M Charges	Rs. Lacs	10.00	28.00

Based on the above assumptions the equity IRR has been worked out as per the guidance given by EB vide Annex 35 in the 39th Metting. The equity IRR works out to 13.04 %, which is much below the Benchmark of 16.95 %.The robustness of the financial analysis has been tested by carrying out sensitivity analysis for different critical factors of the project.

Sensitivity Analysis

The Guidance on the Assessment of Investment Analysis (Version 02), EB 41, annexure 45: paragraph 16:

HT Industrial Energy Tariff. Similar treatment was anticipated for this project activity as well. http://www.mercindia.org.in/pdf/Ord_20_11_2007_CNo_33_of_2007.pdf

[24] O&M Contract with Suzlon

[25] Insurance policies from The New India Assurance Company Ltd.

"*Only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation (all parameters varied need not necessarily be subjected to both negative and positive variations of the same magnitude), and the results of this variation should be presented in the PDD and be reproducible in the associated spreadsheets.*"

As per paragraph 17 of the same document:

"*As a general point of departure variations in the sensitivity analysis should at least cover a range of +10% and .10%, unless this is not deemed appropriate in the context of the specific project circumstances."*

Taking care of these two points, the sensitivity analysis works out to be:

Sensitivity Analysis					
Plant Load Factor					
Variation	*10%*	*5%*	*0*	*-5%*	*-10%*
Equity IRR	***15.69%***	***14.37%***	***13.04%***	***11.69%***	***10.32%***
Project Cost					
Variation	*10%*	*5%*	*0*	*-5%*	*-10%*
Equity IRR	***10.87%***	***11.89%***	***13.04%***	***14.34%***	***15.84%***

As per data, sourced from Maharashtra Energy Development Agency[26] (MEDA), the PLF of wind power projects in Maharashtra has hovered around 20%. Table below shows PLF values for past five years.

Plant Load Factor for Maharashtra[27]

Year	**Installed Capacity in Year (MW)**	**Cumulative Capacity (MW)**	**Generation (MUs)**	**Plant Load Factor (%)**
2000-01	117.185	192.930	140.04	8%
2001-02	206.425	399.355	332.04	9%
2002-03	0.000	399.355	672.46	19%
2003-04	7.930	407.285	705.5	20%
2004-05	48.750	456.035	742.96	19%

[26] Registered as a Society on 26 July 1985, MEDA as an organization commenced functioning from July 1986. MEDA's objective is to undertake development of renewable energy and facilitate energy conservation in the State of Maharashtra, as a state nodal agency under the umbrella of the MNRE.

[27] http://www.mahaurja.com/Download/Sitewise_WindInstallationInfo.xls

It could be seen from the above, that the average PLF of wind power projects in Maharashtra is around 19-20%. Hence a 10% increase in PLF is not realistic. However even with this increase, the IRR does not cross the benchmark value.

The project activity is clearly unattractive in absence of CDM revenues. The promoters were aware of this fact and had considered this investment only in light of carbon credits being available for this project. With the inclusion of CDM benefits in project revenue, the IRR improves from 13.04 to 16.19%.

The above paragraphs explain adequately that the proposed project activity was not a business as usual case for the project proponent. It thus satisfies the additionality conditions as required under Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities. The CDM benefits will help the project activity to cover up some of the risks.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

Baseline emission reductions have been estimated using the weighted average emission (in tCO_2 e/MWh*) of the current generation mix, using the most recent statistics available at the time of PDD.*

Maharashtra falls in Western regional grid as shown in table below. 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/MWh) 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.

Different Regional Grids of India

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

Emission Factors

Weighted Average Emission Rate (tCO_2/MWh) (including Imports)							
	2000-01	**2001-02**	**2002-03**	**2003-04**	**2004-05**	**2005-06**	**2006-07**
North	0.72	0.73	0.74	0.71	0.72	0.73	0.74

East	1.06	1.03	1.09	1.08	1.05	1.05	1.00
South	0.74	0.75	0.82	0.84	0.79	0.74	0.72
West	0.90	0.92	0.90	0.90	0.92	0.89	0.86
North-East	0.42	0.41	0.40	0.43	0.52	0.33	0.40
India	0.82	0.83	0.85	0.85	0.84	0.81	0.80

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

(Copy this table for each data and parameter)

Data / Parameter:	
Data unit:	
Description:	
Source of data used:	
Value applied:	
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

Net Generation of electricity from the Project

Western Regional Grid Emission Factor – 0.86 tCO_2 /MWh
Baseline emissions or CERs generated by the project are estimated to be:

Dhule

Capacity - 1.25MW/WEG
No. of WEGs – 4

Assumptions for Calculation of Net Electricity Generation		
Capacity Utilization Factor	Percent	20.00%
Sale of Electricity to MSEB from one WEG	MWh	2190
Sale of Electricity to MSEB from entire project	MWh/year	8760

Sangli

Capacity -1.5MW/WEG
No. of WEGs – 6

Assumptions for Calculation of Net Electricity Generation		
Capacity Utilization Factor	Percent	20.00%
Sale of Electricity to MSEB from one WEG	MWh	2628

Sale of Electricity to MSEB from entire project	MWh/year	15768

So, Net annual Generation from the Project = Generation from four no. of 1.25 MW WEGs at Dhule + Generation from six no. of 1.5 MW WEGs at Sangli

= 8760 MWh /year + 15768 MWh /year
= 24,528 MWh /year

Baseline emissions $_{(project)}$ = Grid emission factor * Net export to the grid
(tons of CO_2) (tons of CO_2/MWh) (MWh/year)

= 0.86 * 24528
= **21094 tons of CO_2**

Leakage

Since the WEGs are neither transferred from another activity nor were they existing prior to this project activity and have been transferred to another activity, hence leakage calculation is not required.

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

Year	Estimation of Project activity emissions (t CO_2 e)	Estimation of Baseline emission (t CO_2 e)	Estimation of Leakage (tCO_2 e)	Emission of overall emission reductions (tCO_2 e)
2009-2010	0	21094	0	21094
2010-2011	0	21094	0	21094
2011-2012	0	21094	0	21094
2012-2013	0	21094	0	21094
2013-2014	0	21094	0	21094
2014-2015	0	21094	0	21094
2015-2016	0	21094	0	21094
2016-2017	0	21094	0	21094
2017-2018	0	21094	0	21094
2018-2019	0	21094	0	21094
Total(tonnes CO_2e)	0	**210940**	0	**210940**

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:	EGy
Data unit:	MWh
Description:	Net Electricity export to the grid
Source of data to be used:	Joint meter reading by MSEDCL and promoter
Value of data	24,528
Description of measurement methods and procedures to be applied:	The data will be measured by metering. Every month these meter readings will be recorded by plant personnel. These records will be archived for cross-checking yearly figures.
QA/QC procedures to be applied:	The project revenue is based on the net units displaced as measured by metering system involving common bulk meter and the individual WTG controller meter. The common bulk meters constitute main meter and check meter. The accuracy of the main meter and check meter can be verified by comparing each other. Other than main meter, the project proponent has check meter so that the accuracy of main meter can be verified. The calibration of the meters will be done annually by state utility. Other than periodic calibration of the meters the reading of both meters, will be matched every month.
Any comment:	This data will be archived up-to two years after the completion of crediting period or last issuance whichever is later.

Parameter:	$EF_{Grid, y}$
Data unit:	tonnes of CO_2 eq /MWh
Description:	Weighted average grid emission factor
Source of data to be used:	The value has been provided by Central Electricity Authority
Value of data	0.86
Description of measurement methods and procedures to be applied:	The data will be taken from the latest CEA database available.
QA/QC procedures to be applied:	The value has been taken from official statistics published by Central Electricity Authority , which is a official data available in public domain.
Any comment:	This data will be archived up-to two years after the completion of crediting period or last issuance whichever is later.

B.7.2 Description of the monitoring plan:

As emission reductions from the project is determined by the number of units exported to the grid. It is mandatory to have a monitoring system in place and ensure that the project activity produces and exports the rated power at the stipulated norms. The sole objective of having monitoring system is to have a constant watch on the emission reductions.

The delivered energy will be metered by Suzlon and MSEDCL at the high voltage side of the step up transformers. Metering will be done either for two /three / more wind turbines depending on the location of wind turbines and service connection number. Metering equipments will be electronic trivector

meters*. The metering equipments will be maintained in accordance with electricity standards and will have the capability of recording daily and monthly readings. Records of joint meter reading will be maintained at site and a copy will be maintained at the head office. All the meters will be tested for accuracy every calendar year with reference to a portable standard meter. As the instruments will be calibrated and marked at regular intervals, the accuracy of measurement can be assured at all times. Necessary records of calibration will be maintained by both MSEDCL and project proponents.

The project activity essentially involves generation of electricity from wind, the employed WEGs 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.

- 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 and / or wheeling charges.
- 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 will be carried out jointly at the incoming feeder of the state power utility (MSEDCL). Machines for sale to utility are connected to the feeder.
- The joint measurement will be carried out once in a month in presence of both parties (the developer's representative and officials of the state power utility). Both parties will sign the recorded reading.
- Metering equipment - Metering is carried out through electronic **trivector meters***of accuracy class 0.2% required for the project. The main meter shall be installed and owned by MSEDCL, whereas the project participant owns the check meters. The metering equipments are maintained in accordance with electricity standards.
- The secondary monitoring, which will provide a backup (fail-safe measure) in case the primary monitoring is not carried out, would be done at the individual WEGs. Each WEG is equipped with an integrated electronic meter. These meters will be connected to the Central Monitoring Station (CMS) of the entire wind farm through a wireless Radio Frequency (RF) network (PLC). 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.

***Trivector Meter** - is a device that measures the amount of electrical energy supplied to the utility. It is called as tri-vector meter because it measures energy consumption of the three phase lines R, Y, B which are 120 phase difference from each other. It measures the consumption in terms of the active energy, reactive energy, apparent energy, power factor

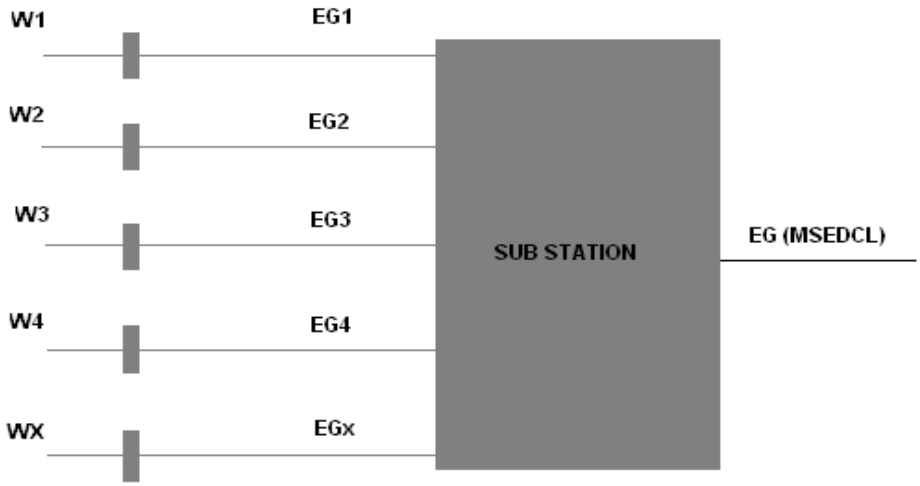
Description of calibration of WEG Controller

SCS Controller is a micro-processor based intelligent controller which has been specially designed for control of wind turbines. It uses a Woodward Multi function Relay that has three current inputs from CT and three direct voltage inputs (690 Volts). The analog values of current/voltage are converted into digital signal internally using A/D Converters at very high sampling rate. A software program reads these values and displays instantaneous parameters such as voltage, current, power factor, kVAh, kVArh and kWh. These instantaneous values are then time integrated and displayed/stored. Woodward relay does

not have a display and needs special protocol to view energy readings as this relay communicates digital signal through special communication protocol hence, it is not possible to calibrate. Moreover, turbine can not run without this relay hence it can not be removed for calibration during operation.

Description of billing calculation from net meter to individual meters

Each substation is connected to a number of 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 generated electricity is measured through a two step procedure wherein the first metering is carried out at the controller of the machine with on-board meter. The monitoring of all these wind turbines is done from a common monitoring station as a part of central monitoring system. The system consists of a state- of- the- art controlling and monitoring and well trained staff personnel of O&M contractor, Suzlon Energy Limited, are always present on site to monitor various parameters of power generation and deal with any problems related to generation, transmission or maintenance. EGn,y is the electricity generated from an individual wind turbine measured through its controller meter. The summation of total Electricity Generated from all the wind turbines of the project proponent in MWh is presented as

$$\sum_{0}^{n} EG_{n,y}$$

And the summation of total Electricity Generated from all the wind turbines at the given site and connected to the particular feeder in MWh as measured at the individual controllers is presented as

$$\sum_{0}^{m} EG_{m,y}$$

A ratio based on these two set of measured values is used for apportioning the net electricity supplied to the western regional grid by the project activity. The second metering is carried out at grid interconnection point (sub station) wherein the Joint Meter Reading (JMR) is carried out, usually in the first week of every month, in presence of the representatives of the project proponent & the state electricity utility (MSEDCL). This JMR is used for calculation of the amount of electricity supplied to

the grid against which the utility makes the payment to the project proponent. The JMR gives both the "export" ($EG_{JMR,export}$) and "import" ($EG_{JMR,import}$) of the electricity to/ from the western grid. There is a single meter which gives both the export and import values, this metered reading gives the net value of line losses and auxiliary consumption. Further, as there is a common MSEDCL joint meter for multiple project proponents, the joint meter reading (JMR) taken every month by MSEDCL personnel, reflects the cumulative monthly generation for all wind turbines connected to this MSEDCL meter. The apportioning of electricity generated from the various wind turbines is done by the EPC contractor (SEL in this case) based on the power generation from the individual wind turbines connected to this MSEDCL meter. SPD O&M personnel prepare a monthly report on generation and consumption. This report contains details of power exported/imported to/from the grid by each of the wind turbines connected. This apportioned value is then used by the project proponent to raise invoice from MSEDCL.

$EG_{,SPD}$(MSEDCL) , the electricity supplied to the grid by the project activity is calculated as follows:

$$EG_{SPD,(MSEDCL)} = \frac{\sum_{0}^{n} EG_{n,y} \; * \; EG_{MSEDCL}}{\sum_{0}^{m} EG_{m,y}}$$

Where

$EG_{SPD, MSEDCL}$	Net generation from all the WTGs included in this project activity
$\sum_{0}^{n} EG_{n,y}$	Total electricity generated by the WTGs included in this project activity at the controller.
EG_{MSEDCL}	Total net generation at MSEDCL substation feeder obtained by deducting ($EG_{JMR,import}$) from ($EG_{JMR,export}$)
$\sum_{0}^{m} EG_{m,y}$	Total generation of all the WTGs connected to the feeder at controller.

MSEDCL carries out the calibration, periodical testing, sealing and maintenance of meters in the presence of SPD representative. The frequency of meter testing is annual. All meters are tested only at the Metering Point. The meters are tested and maintained as per the Metering Code for Maharashtra. Additionally, each wind turbine is equipped with an integrated electronic meter. The electricity generated is recorded by the O & M staff of the EPC contractor on 24 hour basis.

The Accounts department of SPD receives the data from both the sources and keeps track of project activity which reduces the carbon emission reductions. The project performance is communicated to the higher management by the accounts department.

For this project, the feeder connections are as follows:
Site I : Village –Jamade, Dhule

WEG Location No.	WEG Connected on 220 KV/33KV Feeder
J-17	Jamade Sub-station
J-21	Jamade Sub-station

J-22	Jamade Sub-station
J-23	Jamade Sub-station

Site II : Village –Nagaj, Sangli

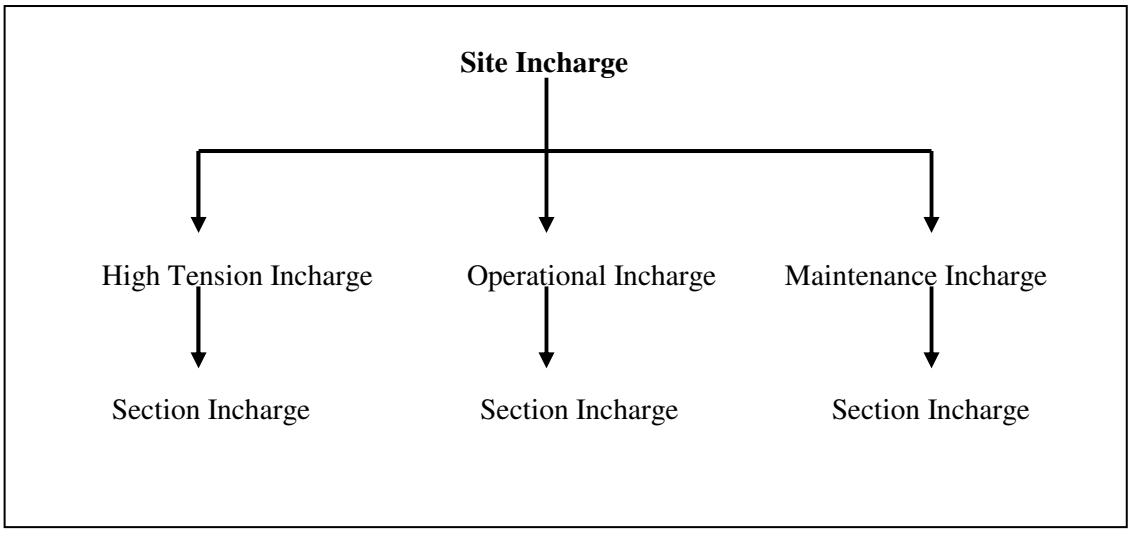
WTG Location No.	WTG Connected on 220 KV/33KV Feeder
N-4	Ghatnandre Sub-station
N-5	Ghatnandre Sub-station
N-6	Ghatnandre Sub-station
N-7	Ghatnandre Sub-station
N-8	Ghatnandre Sub-station
N-9	Ghatnandre Sub-station

Recording of generation at the joint meter (JMR) will be usually from 1st of one month to 1st or 2nd of next month.

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 is 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, training has to be provided to personnel according to their 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 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 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 WEGs can only convert wind energy into electrical energy and cannot use any other input fuel for electricity generation. As the operation of WEGs is emission free and no emissions will be produced during the lifetime of the WEGs.

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.

SPD has appointed a full time project in-charge to manage the overall project activity. The project in-charge supervises the functioning of the wind farm in close coordination with the officials & technical personnel of Suzlon.

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

Baseline Completion Date: 08/09/2008

Name of person/entity determining the baseline: M/s Shah Promoters & Developers, and their Consultant*.

*Project consultant is not project participant.

No Annex 1 party is involved

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:

20/04/ 2006 based on the first purchase order released for wind turbines.

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

20 years 0 months[28]

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

C.2.1. Renewable crediting period

Not opted.

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

Not applicable.

C.2.1.2. Length of the first crediting period:

Applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

The starting date of crediting period will be 01/02/2009 or date of registration with CDM Executive Board, whichever is later.

C.2.2.2. Length:

10 Years 0 months

[28] The life of the WTG has been certified by Manufacturers of the WTG

SECTION D. Environmental impacts

>>

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

The project activity does not fall under the purview of Environmental Impact Assessment notification 14th September, 2006 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
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 up-liftment of skilled and unskilled manpower in the region. The project provids 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

A stakeholder meeting was conducted by the project promoter M/s Shah Promoters & Developers, to discern the opinion of stakeholders on the present project activity. Various stakeholders were invited for both the sites (Dhule & Sangli).

Sr. No.	Site	Date	Time	Venue
1.	Sangli (1.5 MW X6)	23 Oct. 2007	11.30 AM	Mahadev Dongar, Village - Nagaj
2.	Dhule (1.25 MW X4)	08 Jan. 2008	11.30 AM	Phopade, Khori - Titane Village

Purpose of this meeting was to inform the interested stakeholders on the environmental and social impacts of the project activity and discuss their concerns related to the development and operation of the activity as a CDM project. The number of public groups that exist around the project area was established in order to identify the key stakeholders. Next, these groups were analysed from an institutional and social perspective. Once a comprehensive list of stakeholders was identified, they were invited to attend the public meeting to assert their opinions on the project.

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

Once the project and process was explained, including the local job creation and benefits, the local stakeholders had no objections or negative comments relating to the project. In fact they were excited about the new development in their immediate surroundings. They showed enthusiasm when proponent explained that as a result of the windmills infrastructure facilities such as roads and medical facilities will improve.

E.2. Summary of the comments received:

Once the project and process was explained, including the local job creation and benefits, the local stakeholders had no objections or negative comments relating to the project. In fact they were excited about the new development in their immediate surroundings. They showed enthusiasm when proponent explained that as a result of the windmills infrastructure facilities such as roads and medical facilities will improve.

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

There were no negative comments received therefore it was not necessary to incorporate the comments into the project design or alter the project in any way.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	M/s Shah Promoters & Developers
Street/P.O.Box:	Apte Road, Deccan Gymkhana
Building:	AST-1, Success Chambers
City:	Pune
State/Region:	Maharashtra
Postfix/ZIP:	411 004
Country:	India
Telephone:	91-20-25531777
FAX:	91-20-24275998
E-Mail:	vastushree@vsnl.net
URL:	
Represented by:	
Title:	Partner
Salutation:	Mr.
Last Name:	Shah
Middle Name:	Chandrakant
First Name:	Rajesh
Department:	Management
Mobile:	91-9822095858
Direct FAX:	91-20-24275998
Direct tel:	91-20-242275996
Personal E-Mail:	Rajeshshah28@yahoo.co.in

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

$$BE = EGy * EF_{grid,y}$$

Where EGy is the net quantity of electricity generated by the project in year y, and EF_{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.

Baseline Emission Reductions

Year	Net Generation Exported (MWh)	Baseline Emission	Project Emission (tCO_2)	Leakage (tCO_2)	Emission Reduction (tCO_2)
2009-2010	24,528	21,094	0	0	21,094
2010-2011	24,528	21,094	0	0	21,094
2011-2012	24,528	21,094	0	0	21,094
2012-2013	24,528	21,094	0	0	21,094
2013-2014	24,528	21,094	0	0	21,094
2014-2015	24,528	21,094	0	0	21,094
2015-2016	24,528	21,094	0	0	21,094
2016-2017	24,528	21,094	0	0	21,094
2017-2018	24,528	21,094	0	0	21,094
2018-2019	24,528	21,094	0	0	21,094
Total	**24,5280**	**21,0940**	0	**0**	**21,0940**
Annual Average	24,528	21,094	0	0	21,094

Annex 4

MONITORING INFORMATION

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

Data to be monitored

Internal and external audit to ensure on going 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.

Monitoring methods and procedures	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 will 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 will submit their observations to the Head- Wind Power Projects for his review and necessary action.

Procedures for maintenance of monitoring equipments:

- The Site Engineer will 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 wind turbines i.e. Suzlon, internal audits regarding GHG compliance is carried out by the suppliers.

The Suzlon Quality Management system is constantly reviewed by 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.

Annex 5

Letter of declaration that the project will remain under the limits of Small scale project activity

SHAH PROMOTERS AND DEVELOPERS
AST - 1, Success Chambers, 1232, Apte Road, Deccan Gymkhana, Pune-411 004
Ph. : 25531777, Fax : 24275998, E-mail : Vastushree@vsnl.net

"To whom it may concern"

M/s Shah Promoters & Developers formed by the founder member Shri Chandrakant Valchand Shah in the year 1986,is a registered partnership firm registered under India Partnership Act 1932.Intially the firm was engaged into the business of purchase & selling of lands & land development projects. In the year 2002,the firm started the construction of residential & commercial units namely "Hyde Park".

We have established 14 MW Wind farms in Sangli & Dhule districts of Maharashtra.

We are developing these wind power projects for CDM as per following type & category:-

Project Type : 1 –Renewable Energy Projects

Project Category : I.D.-Grid Connected Renewable Electricity Generation (Version13)

We here by confirm that the project will remain under the limits of small-scale project activity every year over the crediting period.

With best regards-

Your truly,

For M/s. Shah Promoters & Developers,

Partner

Annex 6

Evidences of CDM Consideration

SHAH PROMOTERS AND DEVELOPERS
AST - 1, Success Chambers, 1232, Apte Road, Deccan Gymkhana, Pune-411 00
Ph.: 25531777, Fax: 24275998, E-mail: Vastushree@vsnl.net

Date: 18th December 2005

TO,
M/s Suzlon Energy Ltd.
5th Floor, Godrej Millennium,
9, Koregaon Park Road,
Pune-411001.

Kind Attn: Mr. Ankit Kanchal / Mr. – Kaushik Patel

Sub: Wind Power Project

This has reference to our proposed investment in Wind Mills. Refer to our discussion, setting up wind mills for generation of power from wind

We feel that considering present economic scenario, term loan rates and risks associated with the project, it is not a feasible venture. The generation of wind turbines is subject to fluctuations due to seasonal variations in wind patterns and grid availability, such risk will continue during the project life of the Windmill. Also such risk, if covered under insurance, would lead to higher premium outflow.

You had informed that Wind Mill installations are environment friendly, the revenue is likely to be supplemented through Clean Development Mechanism (CDM) under the Kyoto Protocol. However it may take some more time for working out modalities of quantifying and availing CDM benefits/privileges as the same is still evolving.

Keeping in view all pros & cons including CDM benefits, we are pleased to inform you that we have decided to go ahead with the proposed investment in windmills.

Accordingly, we suggest a meeting to finalize the terms and conditions

With best regards

FOR, M/S SHAH PROMOTERS & DEVELOPERS

RAJESH SHAH
PARTNER

Received
K.C patel
19th Dec'05

SUZLON ENERGY LTD

5th Floor, Godrej Millennium
9, Koregaon Park Road, Pune - 411 001, India

: +91-20-40122000
: +91-20-40122100 / 40122200
: pune@suzlon.com
: www.suzlon.com

26/12/2005

To,

Shri Rajesh Shah -Partner
M/s Shah Promoters & Developers
Hyde Park, Market Yard
Pune.

Dear Sir

Sub: Wind Power Project

Thank you very much for confirming your interest in wind power project .We would like to reiterate that India has signed the Kyoto protocol and as such all Indian Projects with potential of reduction in green house gas emissions shall be eligible for additional revenue through the market mechanisms of the protocol.

Further, we strongly believe that Wind Mill Projects will qualify for the benefits under the said Protocol, though the modalities of the mechanism are likely to take some more time to take a final shape.

Once the modalities are worked out, we at Suzlon will ensure that all our Customers are provided the specialized services of the Consultants who will be hired for the purpose. Once the CDM mechanisms are finalized, Suzlon is proposing to initiate the process of project due diligence and necessary documentation for its Customers.

Thanking you and assuring best of our services,

Yours faithfully,
For, SUZLON ENERGY LTD.

for

Ankit Kanchal
Executive - Marketing.

SHAH PROMOTERS AND DEVELOPERS
AST - 1, Success Chambers, 1232, Apte Road, Deccan Gymkhana, Pune-411 004.
Ph. : 25531777, Fax : 24275998, E-mail : Vastushree@vsnl.net

EXTRACT FROM THE MINUTES OF THE MEETING OF THE PARTNERS OF M/S SHAH PROMOTERS & DEVELOPERS HELD ON 3rd January 2006 AT THE REGISTERED OFFICE OF THE FIRM AT 11:00 AM

Wind Power Project

RESOLVED THAT consent of the partners be and is hereby accorded to the setting up of 14 MW Wind Power project in the state of Maharashtra and THAT Mr. Rajesh Chandrakant Shah, partner be and is hereby authorized on behalf of the firm to sign, submit, execute such deeds, agreements undertaking and/or other documents and to do all such acts on behalf of the firm as may be necessary in the matter of setting up of the said Wind Power Project

RESOLVED FURHTER THAT benefits from CLEAN DEVELOPMENT MECHANISM to be considered for the above mentioned Wind Power Project and Mr. Rajesh Chandrakant Shah be and is hereby authorized to sign, submit and execute such deeds and documents as may be necessary to complete the process of CLEAN DEVELOPMENT MECHANISM.

CERTIFIED TRUE COPY

For SHAH PROMOTERS & DEVELOPERS

(Rajesh C. Shah)
Partner

(Sanjay C. Shah)
Partner

BANK OF MAHARASHTRA
H.O."Lokmangal", 1501, Shivajinagar, Pune-411005

Industrial Finance Branch, 1183/A, F.C.Road, Pune-411005
Email::bom941@mahabank.co.in
PH#25535056, 25538470: FAX: 25535068

AR38/ADV/IFB/2006 Date: 21st February 2006

To,
M/s Shah Promoters & Developers
AST-1, Success Chambers.
1232, Apte Road,
Deccan Gymkhana,
Pune – 411 004.

Kind Attn: Mr. Shah Rajesh C.

Ref: Your application for loan dated 14th February 2006.

Subject: Clarification regarding the financials submitted vide your application.

Dear Sir,

We thank you for interest shown by you with our bank.

We have studied the financials and the application made by you. The IRR of the project is somewhat less; also the generation will always depend upon natural factor like wind. We would like to know generation guarantee, if any is provided to you by windmill supplier.

We have studied the financials, but in this process we have come across item named 'CER Revenue' clubbed in income. We are not able to understand the nature of the income considered. Please let us know the exact nature of the revenue and is it really available for the project.

Please give the information at the earliest so that we can expedite the matter.

Thanking you,

Yours faithfully,
For Bank of Maharashtra.

औद्योगिक वित्त शाखा पुणे
BANK OF MAHARASHTRA

Senior Manager
21/2