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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SSL Wind Power Project
Version no. 07
Date: 03/06/2010

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

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The project activity being presented here is a grid-connected renewable electricity generation project, being developed by Suma Shilp Limited (SSL), with the intention of utilizing the energy of wind to generate electricity that shall be supplied to the grid completely without causing any emissions of Green House Gases (GHGs) as there is no usage of fossil fuels that emit GHGs on combustion; instead, the energy of wind is utilized in rotating wind turbines that generate electricity, providing a cleaner alternative to generating power than the use of fossil fuels.

The project activity helps displace an equivalent quantity of electricity which is generated using fossil fuels in the regional grid. This leads to abatement of GHG emissions, that would have otherwise been emitted from the fossil fuel dominated power plants in the region, which is a business as usual scenario.

The project activity consisted of twelve Wind Turbine Generators (WTGs), each of a capacity of 1.25 MW, being installed in the Sakri taluka of the state of Maharashtra, and power generated by these WTGs is being exported to the NEWNE Grid.

The project contributes to India's sustainable development in the following ways[1]:

Economic well-being

The project activity helps to reduce the states dependency on fossil fuels, to some extent, while also helping to reduce the existing electricity supply gap marginally. The project activity shall help to increase employment opportunities for local people, leading to an improved village level economy. Moreover, due to this project activity investment in infrastructure facilities such as roads and electrical transmission will be attracted.

Technical well being

[1] Refer to the National CDM Authority of India site for the indicators of sustainable development that need to be met http://www.cdmindia.in/approval_process.php

The project exhibits India's technical prowess with regards to wind energy turbine manufacturing, as the WTGs used have been manufactured by an Indian company, Suzlon. The technology employed here is environmentally safe and sound, as no emissions arise from the implementation of the activity. Moreover, using a renewable energy source to generate electricity ensures that there is no pollution that may affect the surrounding environment.

Social well-being

The project activity will aid in enhancing local employment in the vicinity, which is a backward rural area. Due to increase in the income and availability of employment opportunities, there will be an improvement in the level of education and the overall socio-economic standards of the area.

Environmental well-being

Sustainable development through generation of eco-friendly power using the energy of the wind helps to conserve natural resources including land, forests, minerals, water and ecosystems. It also helps in reducing GHG emissions compared to a business-as-usual scenario, reducing other pollutants (SOx, NOx, PM etc.,), leading to avoidance of air and water pollution

A.3. Project participants:

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Name of the Party Involved	Private and/or Public Entity(ies) Public Participants	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (host)	Suma Shilp Limited	No

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

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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Sakri taluka, Dhule district, Maharashtra state

A.4.1.3. City/Town/Community etc:

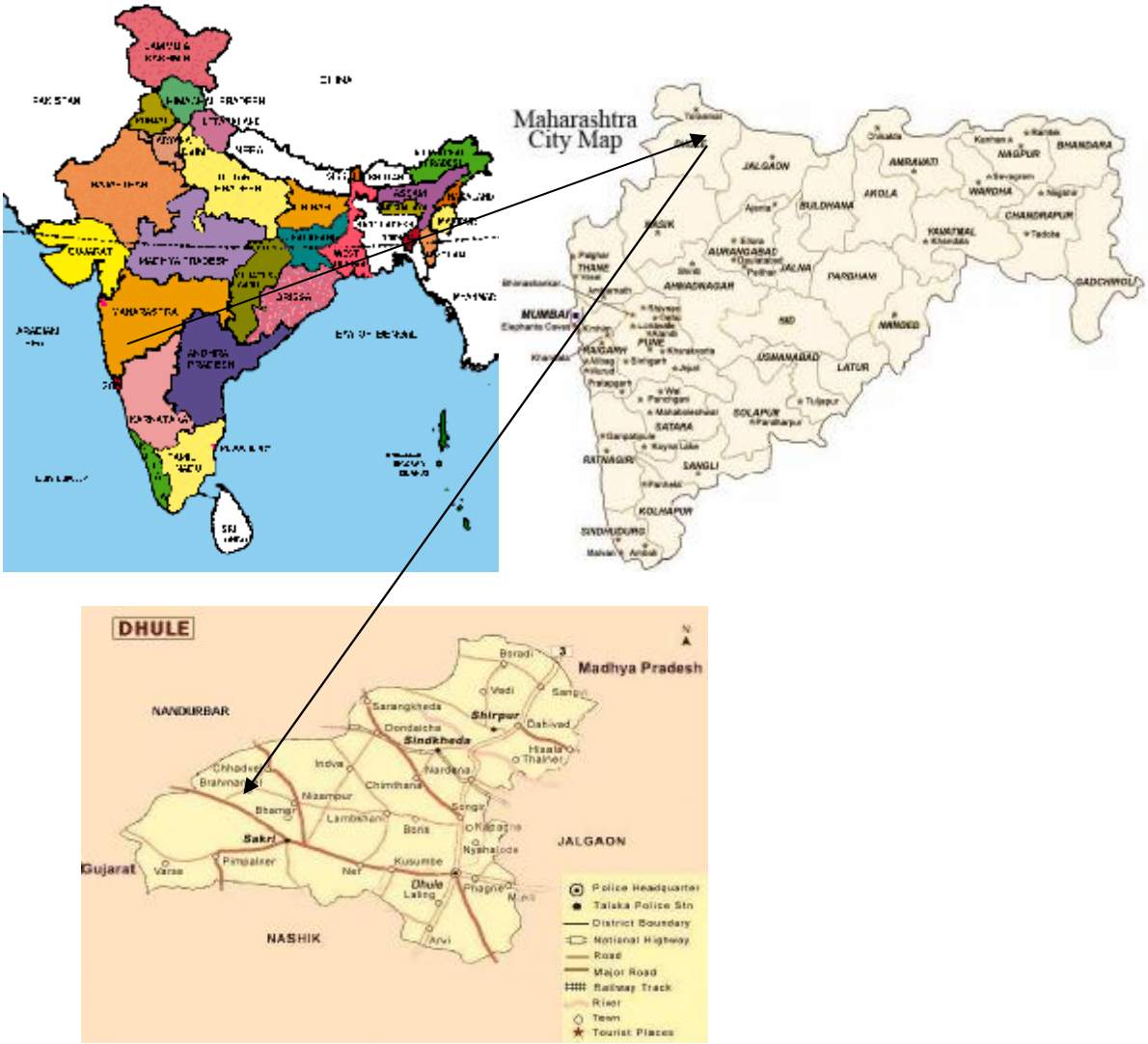
>> Amkhel, Basar, Chhadvel, Isharde, Jamde and Petle villages of Dhule district

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

>>The project activity is located in Sakri taluka in Dhule district in the following villages:

Village	WTG capacity (MW)	Number of WTGs	Total installed capacity (MW)	WTG number	S.No.	Latitude	Longitude
Amkhel	1.25	1	1.25	K-273	64043528	N21° 13' 59.2"	E74° 15' 48.8"
Amkhel	1.25	1	1.25	K-280	64043527	N 21° 13' 59.2"	E74 ° 15' 51.8"
Basar	1.25	1	1.25	K-296	64043382	N 21° 13' 57.2"	E74° 15' 50.8"
Basar	1.25	1	1.25	K-274	64043530	N 21° 13' 58.2"	E74° 15' 50.8"
Chhadvel	1.25	1	1.25	K-241	64044105	N 21° 13' 59.2"	E74° 15' 49.8"
Chhadvel	1.25	1	1.25	K-256	64043402	N 21° 13' 58.2"	E74° 15' 47.8"
Isharde	1.25	1	1.25	J-111	64043529	N 21° 13' 43.2"	E74° 15' 06.7"
Isharde	1.25	1	1.25	J-125	64043383	N 21° 13' 44.2"	E74° 15' 06.2"
Jamde	1.25	1	1.25	K-297	64043525	N 21° 13' 60.2"	E74° 15' 49.8"
Jamde	1.25	1	1.25	J-105	64042889	N 21° 13' 28.2"	E74° 15' 32.7"
Petle	1.25	1	1.25	J-102	64042892	N 21° 13' 29.2"	E74° 15' 31.8"
Petle	1.25	1	1.25	J-103	64043167	N 21° 13' 30.2"	E74° 15' 31.6"

The area is well connected by road as well as rail. An approximated cartographic representation of the taluka is given below



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

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As per Appendix B to the Simplified Modalities and Procedures for Small Scale CDM Project Activities, The type and category of the project activity are mentioned below:

Type: I. Renewable Energy Project
Category: D. Grid Connected Renewable Electricity Generation
Version: 15
Date: October 30, 2009

Technology/Measure: Wind Based renewable energy generation unit supplying electricity to and/or displaces 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 has an installed generation capacity of 15 MW by utilising the wind energy. The technology to be employed for the generation of power is provided by the WTG manufacturer and supplier Suzlon, and includes twelve 1.25 MW WEGs of the S-70 model type supplied by them. The technology employed for the project activity is environmentally safe and sound, as there are no emissions arising from the implementation of the activity. Moreover, it uses a renewable energy source, wind, to generate electricity, which ensures that it does not cause any pollution that may affect the surrounding environment. The turbines involved have the following salient features:

Sr.No	**Item**	**Description**
1	Make	SUZLON
2	Model No	S70
3	Rating in kW	1250
4	Rotor Diameter(m)	70
5	Highest hub Height(m)	75
6	Type of Tower(Tubular/Lattice)	Tubular
7	No of Blades	3
8	Power Regulation(Pitch/Stall)	Pitch
9	Type of Generator(Synchronous/asynchronous)	Asynchronous
10	Single Speed/Dual speed/ Variable speed (Generator)	Dual
11	AC/DC/AC System (Yes/No)	NO
12	Rated Voltage(V)	690V(50MHZ) 600V(60Hz)
13	Geared/Gearless	Geared
14	Cut-In-Wind speed(m/s)	3m/s
15	Cut-out-Wind Speed(m/s)	20m/s
16	Rated Wind Speed(m/s)	12m/s
17	Survival Wind Speed(m/s)	67m/s
18	Weight of Tower in (Kg) Weight of Nacelle(Kg) Weight of Rotor(Kg) Total Weight(Kg)	113000 44000 19800 176800

Based on the purchase order, the technology provider has guaranteed a generation of. 2800 MWh for the first year at 100% grid availability and 95% machine availability for each wind turbine generator.

Moreover, the penalty clause in the purchase order is conditional subject to the availability of the machine and other factors. Hence this figure cannot represent the generation during the entire project period. Hence, while estimating the electricity exported to the grid, the data provided to the bank at the time of project financing has been taken. Thus the PLF has been calculated to be 21.05[2] %, and a Net electricity generation at evacuation point of 26280 MWh per annum shall be achieved by the wind power project. Separate spreadsheets for the above calculations have been submitted to the DOE.

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

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Years	Estimation of annual emission reductions in tonnes of CO_2 e
2010	23814
2011	23814
2012	23814
2013	23814
2014	23814
2015	23814
2016	23814
2017	23814
2018	23814
2019	23814
Total estimated reductions (tones of CO2e)	**238140**
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO2 e)	**23814**

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

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The project proponent availed no public funding for undertaking the project activity, neither did it seek any Official Development Assistance for the same. No Annexure-I parties are involved with this activity, and hence the question of ODA does not arise.

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[2] The PLF is calculated based on the net electricity export to the grid, (measured at the evacuation point) which was submitted to the bank at the time of project financing.

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

According to Appendix C of Simplified Modalities & Procedures for small scale CDM project activities, 'De-bundling' is defined as 'the fragmentation of a large project activity into smaller parts'. A small-scale project activity that is part of a large project activity is not eligible to use the simplified modalities and procedures for small-scale CDM project activities. A small-scale project activity shall be deemed to be a de-bundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

- With the same project participants;
- In the same project category and technology/measure;
- Registered within the last 2 years; and
- Whose project boundary is within 1 km of the project boundary of the small- scale activity at the closest point

The project activity stands on the above stated criteria as follows:

- The activity has been taken up by the project proponent for the first time
- No such activity has been registered by SSL within the last 2 years
- Being the first of its kind for the proponent, SSL's activity is not within 1 km of any other project activity's boundary that belongs to SSL

Hence, the project activity is not a de-bundled fragment of a larger activity and hence qualifies as a small scale 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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Title:

Grid connected Renewable electricity generation

Methodology: AMS-I. D **(**Version 15)

Type I: Renewable Energy Projects

Category: "D", Grid connected renewable electricity generation

Date: October 30, 2009

Reference:

The project activity meets the eligibility criteria to use the simplified modalities and procedure for small-scale CDM project activities as set out in Annex II of Appendix B of the Simplified Modalities and Procedures (which again refers to the same), as the project activity has a maximum output capacity of 15

MW.[3]

Details of methodology for baseline calculations for CDM projects of capacity up to 15 MW (e) are available in Appendix B of the "simplified modalities and procedure for small scale CDM project activities", and reference has been taken from indicative simplified baseline and monitoring methodologies for selected small scale (CDM projects of up to 15 MW (e)) project activity categories. Renewable technologies supplying electricity to the grid are covered in category I.D. The category comprises renewable energy sources such as small hydro, wind, geothermal and renewable biomass, which 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 generation unit.

Tool: Tool to Calculate the Emissions Factor of an Electricity System
Version: 1.1
Date: July 29, 2008

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

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Para reference	**As per Methodology**	**As per Project Activity**
1	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	This is a grid connected wind power project hence this methodology is applicable.
2	Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: • The project activity is implemented in an existing reservoir with no change in the volume of reservoir; • The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m2;	This is not applicable as the project activity is not a hydro power plant.

[3]Please refer to the CDM site for small scale methodologies for the methodology as well as the tool reference http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html

	• The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m2.	
3	The eligibility limit of 15MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15MW.	The total capacity of the project activity is 15 MW. There is no fossil fuel co-fired with this project activity. Also, the proponent does not intend to add to the wind farm's capacity, in accordance with the SSC_ CDM _PDD guidelines throughout the crediting period, thus ensuring that the project activity remains small scale.
4	Combined heat and power i.e Cogeneration	Being a renewable energy generation activity utilizing wind, the criteria for co-generation is not applicable.
5	For project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct2 from the existing units.	The project activity is a green field project and there is no capacity addition to the existing activity. Hence not applicable.
6	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.	There is no retrofitting to the existing project. Hence not applicable.

As can be seen in the above table, the project meets the relevant criteria to justify the choice of the project category. Moreover, the proponent has no intention to alter the project activity's capacity during the crediting period. Thus the project meets the conditions applicable as per the methodology.

B.3. Description of the project boundary:

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As mentioned under Category ***I.D. Grid connected renewable electricity generation,*** *version 15 (para7)* physical, geographical site of the renewable generation source delineates the project boundary.

For the proposed project activity the project boundary includes electricity generation from the wind farm of total capacity 15 MW (e) located at Sakri taluka in Dhule district of Maharashtra, with the transport of electricity through the electricity grid. Hence, project boundary is considered with in these terminal points. The project boundary, as has been delineated below.

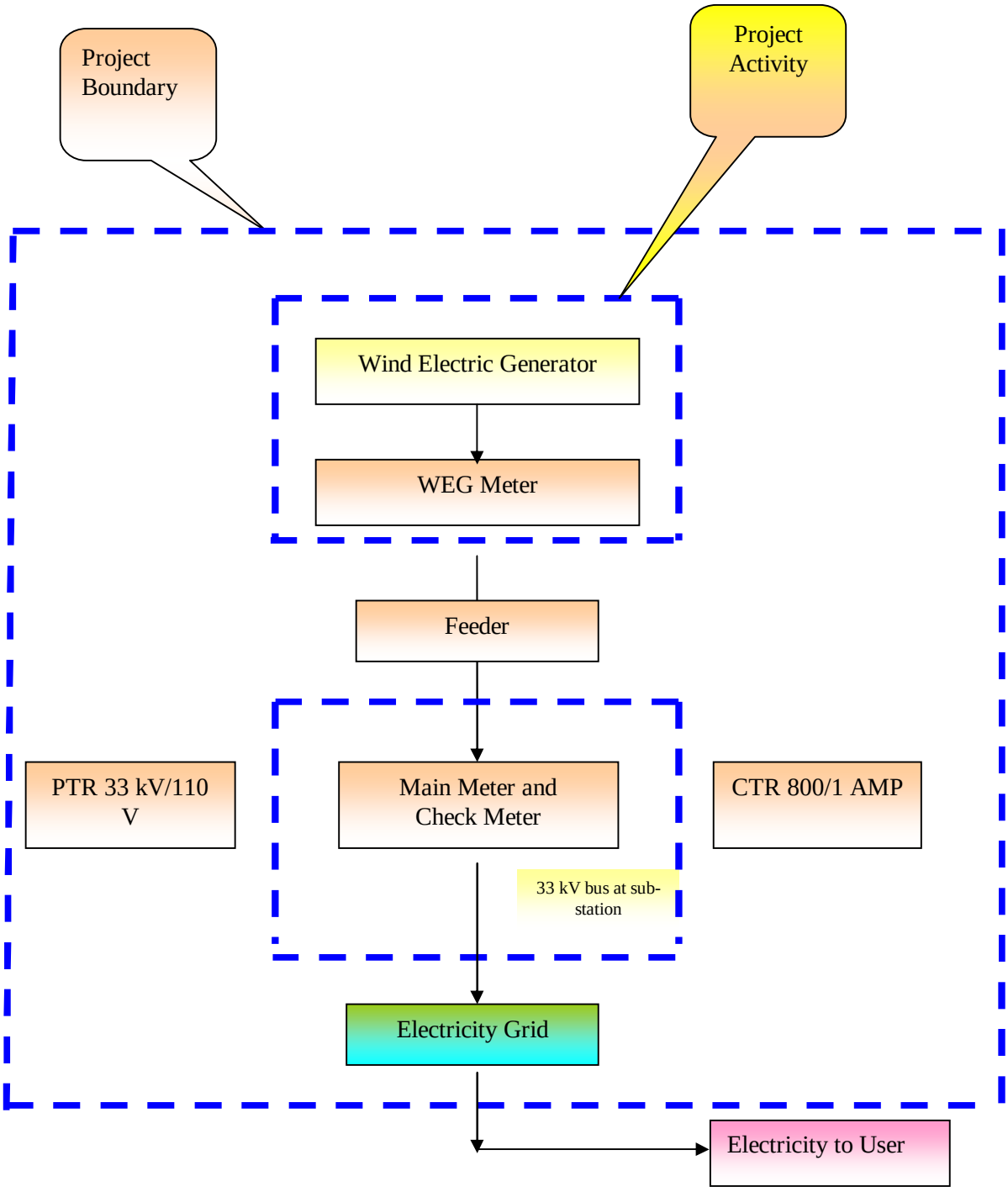

Figure: Project Boundary Diagram

B.4. Description of baseline and its development:

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Annexure 3 of the EB 22 clearly states that national and/or sectoral policies and circumstances have to be accounted for when considering the baseline.

Para 7(a) of same states that, only those national and/or sectoral policies or regulations under paragraph 6(a) i.e. type E+ policy that increase GHG emissions, that have been implemented before adoption of the Kyoto Protocol by the COP (decision 1/CP.3, 11 December 1997), shall be taken into account when developing a baseline scenario. For more emitting power sector, there was no policy with comparative advantage existed before 11 December 1997. Hence it is not applicable for establishing baseline scenario.

The government has given comparative advantage to less emissions-intensive technologies over more emissions-intensive technologies which can be substantiated by a regulation, Electricity Act 2003, which promoted cogeneration and generation of electricity from renewable sources of energy by providing suitable measures for connectivity with the grid and sale of electricity (Refer Section 86(1) of Electricity Act 2003). Hence, it could be seen that the provincial and sectoral policies are E-, policies that decrease GHG emissions. However, these policies were implemented since the adoption by the COP of the CDM M & P (decision 17/CP.7, 11 November 2001). Hence as per Para 7 (b) of Annex 3 of EB 22, they were not considered in developing the baseline scenario for the project activity. Instead the baseline scenario is based on hypothetical situation without the provincial and sectoral polices being in place. Hence the baseline scenario is the electricity generation by grid connected fossil fuel dominated power plants confirming to Annex 3 of EB 22.

Baseline as per Paragraph 10 and 11 of "Type AMS. I-D Grid connected renewable electricity generation (Version 15:)" of Appendix B of the simplified M&P for small scale CDM project activities state that:

For all other systems, the baseline emissions are the product of electrical energy baseline $EG_{BL,y}$ expressed in kWh of electricity produced by the renewable generating unit multiplied by an emission factor.

The Emission Factor can be calculated in a transparent and conservative manner as follows:

1. 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
2. The weighted average emissions (in kg CO2e/kWh or tCO2e/GWh) of the current generation mix.

The baseline grid emission factor for this project activity has been chosen as per para 11 (a) of AMS.I.D. i.e combined margin 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", Version 01.1. Although the latest version of "Tool to calculate the emission factor for an electricity system ", which is co-applicable for the applied methodology, i.e., AMS.I.D Version 15 is

version 02 (effective from 16 October 2009), in accordance with para 16 of annex 13 of EB 35 the applied tool version ,i.e., Version 1.1 remains valid till 8 months from 16 October 2009.

The data of the year in which project generation occurs must be used.

Since the Central Electricity Authority of India calculates the emission factors (i.e. OM and BM) with respect to the regional grids and provides the same publicly, the combined margin approach has been selected for determining the baseline for the project activity. Refer B.6.1 for calculation of grid emission factor.

The combined margin (CM), that consists of operating margin (OM) and build margin (BM) will be computed as per the tool to calculate the emission factor for an electricity system for this project activity (referenced in AMS I.D, version 15). Values for OM and BM needed to calculate combined margin have been referred from the latest Central Electricity Authority's (CEA) CO2 database, version 4.0 as viewed on December 16, 2008.4

The project activity displaces an equal amount of electricity that would have been generated otherwise by fossil fuel dominated power plants from the NEWNE Grid. Hence, for the calculation of baseline emission factor, all generating sources connected to NEWNE Grid of India have been considered as per the tool to calculate emission factor for an electricity system.

Electricity generation from the SSL project activity:

The project activity is expected to export (net export) 26280 MWh of electricity annually. Without the concerned project activity, the same energy load would have been taken up by power plants of the project electricity system – NEWNE Grid and equivalent CO_2 emissions would have been occurred due to fossil fuel combustion.

In addition to the net export achieved by the project activity, the following parameters shall also be used for determining the baseline of the project:

1. Emission factor values: These shall be accessed from the Central Electricity Authority (CEA) database, which published the data periodically[5]. These include the operating margin (OM) values as well as the build margin (BM) values given for the relevant grid, i.e. the NEWNE Grid by the CEA. These shall be used to determine the combined margin (CM) emission factor, which in turn will help to determine the baseline emissions.

[4] Source: http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm as viewed on December 16, 2008

[5] Please refer to Annex 3 as well as above stated reference for corroborating the values used

Weights being used for determining the combined margin emission factor: These shall be in accordance to the tool for calculating the emission factor for an electricity system (version 1.1) as issued by the CDM Executive Board.

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:

"As per Additionality Tool (Ver 05.2) PP is required to iIdentify realistic and credible alternative(s) available to the project participants or similar project developers that provide outputs or services comparable with the proposed CDM project activity. Additionality Tool also states a coal-fired power station or hydropower may not be an alternative for an independent power producer investing in wind energy. Accordingly, there are two alternatives to the project activity, viz.,

a) Continuation of the current situation or Status quo; and
b) Setting up the project as non-CDM activity.

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Status quo would mean that no project would be set up and the equivalent amount of energy would be generated by the grid, either by expanding already existing fossil fuel based power plants or by setting up new fossil fuel based power plants – both of which would lead to GHG emission. Alternatively, the project can be set up as a non-CDM activity. However, as the subsequent paragraphs would reveal that the project faces barriers and hence it would not have been possible. Both the alternatives are

a) Voluntary in the sense that the they are not mandated by any law or regulation;
b) Generation of electricity using wind power is not prevented by any regulation;
c) Applicable environmental regulations do not restrict the use of wind energy; and
d) there is no legal requirement on the choice of a particular technology.

Therefore both the alternatives are in compliance with all the regulatory and legal requirements of the country.

Serious consideration of CDM benefits

At the time of conceptualization of the project, PP was aware of the Clean Development Mechanism as the WEG supplier and the Consultant had informed the PP about the entitlement of the project to CDM benefits even before the placement of order. PP had to slow down the CDM registration process process due to the massive losses incurred on account of unforeseen circumstances that took place in the project activity region leading to the shut down of turbines for a considerable period of time.. PP could recommence the activity only after the problems were taken care of. A chronology of events giving the details of project implementation and steps taken to get the project registered as CDM activity is given in the following table:

Date	PROJECT ACTIVITY EVENT	CDM ACTIVITY EVENT
17/02/2006	Board Resolution approving the windmill purchase and developing the project as CDM activity.	Serious consideration of CDM benefits
19/04/2006		Appointment of consultant, M/s Shah and Kirtane for CDM advisory services.
25/05/2006	PO issued to Suzlon	Start Date of project activity
08/06/2006		Shah and Kirtane seek proposal from MITCON on CDM process and fee proposal
16/08/2006	Commissioning of J105 and K297	
19/03/2007	Theft related to J102	
24/03/2007	Fire damage to J103	
25/03/2007	Theft related to J103	
21/04/2007	FIR lodged	
03/05/2007		Appointment of consultant, M/s MITCON for CDM process
Oct-07	Repeated instances of burglary of cables etc	
15/10/2007		Repealing of appointment of MITCON consultancy
20/10/2008		Appointment of Designated Operational Entity for CDM process
26/11/2008		Appointment of Ernest & Young as CDM consultant
20/01/2009		Local Stakeholders meeting
12/03/2009		Global Stakeholder consultation

It could be seen from the above, the serious consideration of CDM benefits was made in the Board Meeting held on 17th February 2006, wherein the Board had decided to go ahead with the project activity after taking into consideration the CDM benefits as the project was not otherwise financially attractive. The board appointed a consultant M/s Shah and Kirtane for CDM advisory services on 19 April 2006. M/s Shah and Kirtane approached MITCON Consultants for CDM process (on 08/06/2006) and were appointed as CDM consultants on May 3, 2007. However, subsequent thefts and fire damage at the site required the PP to devote attention to solving the local problems and this delayed the CDM process. Having solved the problem, PP appointed the DOE on October 20, 2008 and conducted the local stake holders' meeting on January 20, 2009 and the PDD was web-hosed on March 12, 2009. It could be seen from the foregoing that the gap between any two CDM activity (serious consideration of CDM benefits, appointment of CDM consultant and the appointment of DOE) is less than 2 years and hence the project activity conforms to the stipulations made in Annex 22 of EB 49.

Additionality

As stated in Attachment A to Appendix B of the Simplified Modalities and Procedures for small scale CDM activities, 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:

- Investment barrier: a financially more viable alternative to the project activity would have led to higher emissions;
- 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;
- Barrier due to prevailing practice: prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions;
- 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.

The project proponent has chosen the investment barrier to demonstrate the additionality of the project, herewith discussed as follows:

INVESTMENT ANALYSIS:

Investment Analysis: Benchmark analysis has been chosen to demonstrate the additionality of the project. This is in conformity with Guidance 15 of Annex 45 of EB 41 in as much as the baseline (grid) is outside the direct control of the project developer and the choice of the developer is to 'invest or not to invest'.

In the webhosted PDD, equity IRR was selected as financial indicator and expected/required return on equity was selected as the benchmark. However, during the validation process, DOE questioned the appropriateness of using equity IRR in as much as the project is funded by both debt and equity. In response, the financial indicator has been changed to Project IRR, which is more appropriate for the project type and decision making context. Consequent, upon the change in the financial indicator, the benchmark has also been changed to the Govt. bond rate increased by a suitable risk premium to reflect the project.

Benchmark: As stated above, Government bond rate increased by a suitable premium to reflect the risk of the project type has been chosen as the benchmark. This is in conformity with the guidance given in the additionality Tool [sub-step 2b paragraph 6(a)]. This involves computation of Government bond rates and suitable risk premium to reflect the risk of the project type.

Yield to Maturity of central Government securities for the four month period ended November 2005 has been chosen as proxy for Government Bond rates6. This works out to 7.46%7 .

Capital Asset Pricing Model (CAPM) provides the framework for computing risk premium. Risk premium or market risk premium as commonly known as, is the difference between market return and risk free return (YTM on Govt. Securities). As required by CAPM market index representing a widely diversified portfolio has been selected to compute the market return. Among the stock indices available in the country at present, BSE 500 consists of 500 stocks. BSE 500 index was introduced in February 1999. The return on BSE 500 has been computed from 1.2.1999 to 31.12.2005, which works out to 21.29%. This is taken as proxy for market return. The market risk premium, therefore, works out to 13.83% (21.29 %-7.46%).

The risk of the project type has been computed using beta. Beta has been computed for all power generating companies listed and traded in the stock exchanges and having a trading track record of a minimum of 3 years. Six companies have been selected, viz., Reliance Infrastructure Ltd., Tata Power Company Ltd., CESC Ltd., Gujarat Industrial Power corporation Ltd., BF Utilities Ltd. and Neyveli Lignite Corporation Ltd. The beta of these companies was computed using 3 years trading data by regressing the stock return on BSE 500 and the resultant beta represents both business and leverage risk. The leverage risk has been eliminated by using the well accepted Hamada equation and using the gearing and tax rate of respective companies. Out of the unlevered beta, normally known as asset beta, the lowest beta has been chosen to compute the risk premium to reflect the risk of the project type. This works out to 0.52. Risk premium of the project type is nothing but a product of risk and the risk premium, i.e., 13.83 X 0.52 = 7.19.

The benchmark is obtained by adding this risk premium reflecting the risk of the project type to the Govt. Bond rates, which works out to 14.65% (7.19+7.46), which is selected as benchmark for the project. This benchmark is conservative to the one given in the web-hosted PDD (16.17%). Detailed computation of benchmark is given in the worksheet.

The benchmark conforms to the requirements of Additionality Tool in as much as the data used in the computation of benchmark are publicly available and the benchmark represents the return below which the investment would not have taken place. The return is also conservative to the benchmark fixed by the State Elecricity Regulatory Commission and the benchmark given in the web-hosted PDD.

6 Government securities are Government bonds and at the time of decision making, December 2005 issue of Reserve Bank of India Bulletin was the latest issue available, which provides data on Yield to Maturity (YTM) of Govt. Securities with various maturity. 20 year maturity has been chosen (in line with the operating life of the project) and the last four months average YTM was considered as suggested by CRISIL Study (http://www.cercind.gov.in/rep1304.pdf P.29)

7 http://rbidocs.rbi.org.in/rdocs/Bulletin/PDFs/68273.pdf (Average of last four months)

Financial indicator computation: A project proponent can assess the financial viability of a project using various parameters, with IRR or the Internal Rate of Return being one. IRR for a wind energy project is dependent on Plant Load Factor (PLF) or the capacity utilization factor of the project activity, tariff policy and capital expenditure volumes.

An assessment was done with the Internal Rate of Return of the project taken as the indicator (information provided as follows). 'Internal Rate of Return' is one of the known financial indicators used by banks, financial institutions and project developers for making investment decisions, and can be used to demonstrate additionality of the project.

Location related assumptions		
PLF	21.05 %	As per data provided to the bank. The letter has been provided to the DOE and separate sheet for determination of PLF is also provided to the DOE.
11th year onwards one time deration	5%	MERC tariff order for % of deration (Pg 34)
HT tariff (INR per kWh)	3.50	PPA
HT tariff escalation (INR per kWh)	0.15	PPA
Turbine / Vendor related assumptions		
Capacity of turbine (MW)	1.250	Purchase order
Number of turbines offered	12	Purchase order
Price per turbine (INR lakhs)	639	Purchase order
Cost per MW (INR lakhs)	511	Purchase order
O&M cost (INR lakhs pa/turbine)	10.50	Purchase order
Free O&M (years)	2	Purchase order
O&M escalation (% PA)	5.00%	Purchase order
Insurance cost (INR lakhs pa/turbine)	0.97	
Financial assumptions		
Debt	5652	
- Karnataka Bank (Rs. Lakhs)	2362	Loan sanction letter
- Bank of Maharashtra (Rs. Lakhs)	3290	Loan sanction letter
Loan moratorium (Quarters)	3.00	Loan sanction approval letter (Karnataka Bank)
	2.68	Loan sanction approval letter (Bank of Maharashtra)
Loan repayment (Quarters)	24	Loan sanction approval letter (Karnataka Bank)
	28	Loan sanction approval letter (Bank of Maharashtra)
Interest rate (% PA)	10.50%	Loan sanction approval letter (Karnataka Bank)
	10.25%	Loan sanction approval letter (Bank of Maharashtra)

Tax depreciation (% PA)	80%	IT Rules – Appendix I
Book depreciation (% PA)	5.28%	Schedule XIV, Companies ACt
Corporate tax rate (%)	33.66%	Income Tax Act,
MAT rate (%)	11.22%	Income Tax Act
Service tax (%)	12.24%	Service Tax Rules

IRR has been computed for a period of 20 full operating years, which is the technical life of the project as specified by the machinery supplier. Salvage value has been taken at the terminal year and the projections have been made after taking into consideration all fiscal and financial benefits available to the project activity. The tax shield enjoyed by the company on account of accelerated depreciation has been added to the cash inflow as notional income. Based on the above, the project IRR works out to 13.45% in contrast to the benchmark of 14.64%. As evident, the project is not financially attractive. Detailed computations are given in the worksheet.

Sensitivity analysis : As per the Para 18 of annex 58 of EB 52 mentions "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. Guidance on investment analysis states that only those variables which constitute more than 20% of either total project costs or total project revenues should be subjected to variations. It also states that all parameters need not necessarily be subjected to both negative and positive variations of the same magnitude.

Sensitivity analysis has been carried out taking into consideration the project cost, PLF and O&M cost. The results of the same are as mentioned in the table below:

Factor	-5%	0%	5%
Project Cost	15.90%	13.45%	11.35%
PLF	12.31%	13.45%	14.57%
O&M cost	13.61%	13.45%	13.34%

In this context, it needs to be stated that none of the assumptions made above in computing sensitivity analysis is not practically achievable due to the following reasons:

Project cost: since the project is already commissioned, variation in the project cost is not a possibility. Therefore, with the current project cost the project activity is additional.

PLF: The WEGs in Maharashtra do not even achieve a PLF of 20% leave alone 21.05%. The MEDA study reveals that the PLF has been hovering around 19%. The project activity itself had achieved a PLF of

only 16 to 17 % in the last two years. Hence, any increase in PLF is ruled out. Therefore, the possibility of a variation in the PLF leading to higher returns is not possible.

O&M Cost: O&M cost is based on O&M agreement already entered into by the company. With the annual escalation of 5% in the O&M cost, any reduction in O&M cost is impossible. However, even with a 5% reduction in the O&M cost, the project activity is additional.

That apart the calculations do not factor in losses likely to be sustained by the PP on account of force majeure reasons like theft, fire etc. which happened in the past and the insurance companies have refused to entertain the claim. If these are factored in, the project is unlikely to earn a return commensurate with the benchmark. Hence the project is additional and not a business-as-usual scenario. The CDM benefits would enable the project to become financially attractive and hence CDM benefits are imperative for the project in as much as the CER income would enable the project to cross the benchmark.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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Monitoring methodologies / guidelines mentioned in the UNFCCC document of Appendix B of the simplified modalities and procedures for small scale CDM project activities" for small scale projects (Type I: D) is considered as basis for monitoring methodology for the activity. The document states that monitoring shall consist of metering the net electricity exported by the renewable technology.

Details of approved methodology for baseline calculations for CDM projects of capacity of up to 15 MW are available in "Appendix B of the simplified modalities and procedure for small scale CDM project activities". As the project activity is 15 MW in size, reference has been taken from indicative simplified baseline and monitoring methodologies for selected small scale project activity categories.

For all other systems, the baseline emissions are the product of electrical energy baseline expressed in kWh of electricity produced by the renewable generating unit multiplied by an emission factor.

The Emission Factor can be calculated in a transparent and conservative manner as follows:

1. 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
2. The weighted average emissions (in kg CO2e/kWh or tCO2e/GWh) of the current generation mix.

The data of the year in which project generation occurs must be used.

Since the Central Electricity Authority of India calculates the emission factors (i.e. OM And BM) with

respect to the regional grids and provides the same publicly, the combined margin approach has been selected for determining the baseline for the project activity.

NEWNE Grid is considered for baseline analysis and calculation of anthropogenic emissions by fossil fuels during power generation. Note that the Grid exhibits a generation mix of coal, diesel and gas based power projects are responsible for GHG emissions. The data published by Central Electricity Authority (CEA) has been used as the baseline emission factor. The baseline emission factor calculated based on the data published by CEA8 for wind power projects is 0.9062 tCO2/MWh (Refer Annex 3 for detailed calculation).

The Ministry of Power intends to achieve 100% rural electrification by the year 2012. India is highly dependent on its coal reserves which provide a sense of energy security. Hence, coal has been identified as the main fuel source for electricity generation. Several ultra mega power projects have been planned and are being commissioned in India in a phased manner by 2012. Considering the above fact, it is evident that in the future, the grid electricity generation using fossil fuel is likely to increase in NEWNE Grid. Hence, the baseline factor considered for calculating emission reductions may be considered conservative.

The following is the process of calculating the baseline CO2 emission of the grid, according to the "Tool to calculate the emission factor for an electricity system" version 01.1.

Step 1: Identification of Grid

For the purpose of determining the electricity emission factors, a **project electricity system** is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity (e.g. the renewable power plant location or the consumers where electricity is being saved) and that can be dispatched without significant transmission constraints. As the project exports electricity to the North East West North-East (NEWNE) Grid to displace an equivalent amount of electricity generated from dominant fuel based power plants, the grid for which the emission factor shall be calculated is identified as the NEWNE Grid.

Step 2: Calculate the Operating Margin emission factor(s) ($EF_{OM,y}$)

$EF_{OM,y}$ will be calculated based on one of the four following methods:

(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch Data Analysis OM, or
(d) Average OM.

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

As per the tool to calculate the emission factor for an electricity system, any of the four methods can be used. Simple OM can be used only if low-cost/must-run resources[9] constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.

Share of Must-Run (% of Net Generation)					
	2003-04	2004-05	2005-06	2006-07	2007-08
North	28.1%	26.8%	28.1%	27.1%	19.0%
East	10.3%	10.5%	07.2%	09.0%	
West	09.1%	08.8%	12.0%	13.9%	
North-East	41.9%	55.5%	52.7%	44.1%	
South	16.2%	21.6%	27.0%	28.3%	27.1%
India	17.1%	18.0%	20.1%	20.9%	21.0%

From the above table as the share of low-cost/must-run resources is less than 50% of total grid generation in average of the five most recent years, it is reasonable to select the method (a) to calculate the OM emission factor.

Moreover, the CEA of India provides data for the simple OM for the various regional grids publicly, due to which the same is being used in determination of baseline emissions.

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

- Ex ante option: A 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period, or
- Ex post option: The year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring

  Here ex-ante vintage is chosen, and EFOM is fixed during the crediting period.

Step 3: Simple Operation Margin (OM):

Option (a) which is simple OM is being used to calculate the OM. According to "Tool to calculate the emission factor for an electricity system, version 1.1" simple OM can be calculated by the following methods.

[9] Low-cost/must-run resources are defined as power plants with low marginal generation costs or power plants that are dispatched independently of the daily or seasonal load of the grid. They typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. If coal is obviously used as must-run, it should also be included in this list, i.e. excluded from the set of plants.

- Based on data on fuel consumption and net electricity generation of each power plant / unit4 (Option A), or
- Based on data on net electricity generation, the average efficiency of each power unit and the fuel type(s) used in each power unit (Option B), or
- Based on data on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system (option C)

Option B and B1 has been adopted to calculate the simple OM. (equation 2 and 3 of the tool to calculate the emission factor for an electricity system, version 1.1), as follows:

$$EF_{grid,OM,simple,y} = \sum_{m} EG_{m,y} * EF_{EL,m,y} \Big/ \sum_{m} EG_{m,y}$$

Where:

$EF_{grid,OMsimple,y}$	Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$	CO_2 emission factor of power unit m in year y (tCO_2/MWh)
m	All power units serving the grid in year y except low-cost / must-run power units
y	Either the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option) or the applicable year during monitoring (ex post option), following the guidance on data vintage in step 2

The Simple OM emission factor is calculated by the Central Electricity Authority, Ministry of Power under the Government of India for all the grids in India. The Simple OM emission factor for the NEWNE Grid is given as 1.0090[10] tCO_2/MWh (average of the last three years) refer annex 3.

Step 4: The sample group of power units m used to calculate the build margin consists of either:

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

The built margin has been taken from CEA database version 4 for the year 2007-08 which is calculated by the CEA for the set of power capacity additions in the electricity system that comprise 20% of the system generation and that have been built most recently. Ex-ante option is chosen for EFgrid,BM,y for the entire crediting period.

Step 5: Calculation of Build margin emission factor for each source of baseline generation mix

[10] The value is calculated from CEA version 4 without rounding up each year emission factor. The value of Simple OM shown in Annex 3 are after rounding upto second decimal place.

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units m during the most recent year y for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \sum_m EG_{m,y} \times EF_{EL,m,y} \Big/ \sum_m EG_{m,y}$$

Where:

$EF_{grid,BM,y}$	Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$	CO_2 emission factor of power unit m in year y (tCO_2/MWh)
m	Power units included in the build margin
y	Most recent historical year for which power generation data is available

The Build Margin as given by the Central Electricity Authority, Ministry of Power under the Government of India for the NEWNE Grid is **0.5977** for the year 2007-2008. The CO2 emission factor of each power unit $EF_{EL,m,y}$ has determined as per the guidance given in step 3(a) for the simple OM, using option B_1 of the tool.

Step 6: Combined Margin Factor

The combined margin emissions factor is calculated as follows (equation 13):

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

Where:

$EF_{grid,BM,y}$	Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,OM,y}$	Operating margin CO_2 emission factor in year y (tCO_2/MWh)
w_{OM}	Weighting of operating margin emissions factor (%)
w_{BM}	Weighting of build margin emissions factor (%)

As per the version 1.1 of the *tool to calculate the emission factor for an electricity system*, the following default values should be used for w_{OM} and w_{BM}:

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

The values for w_{OM} and w_{BM} applied by project participants should be fixed for a crediting period and may be revised at the renewal of the crediting period. Since the proponent wishes to opt for fixed crediting period, the same weights as given above shall remain applicable for the entire crediting period.

Since the project activity relies on the wind power for generation of electricity, the weights assigned to the operating margin and the build margin should be 0.75 and 0.25 respectively, as given in the tool to calculate emission factor for an electricity system.

Hence, as per the tool's guidelines, in accordance with the emission factor data given by CEA[11], the combined margin emission factor is calculated[12].

Emission factor of the grid = 0.9062 tCO_2/MWh

The procedure for determining the emission reductions achieved through the project activity is as follows:

Determining the baseline emissions: The basic assumptions for calculating project activity's baseline emissions are due to the displacement of grid electricity. Hence, the following formula is applied for estimation of baseline emissions.

$BEy = EG_{BL,y} * EF_{CO2}$

Where
BEy = Baseline Emission in year y; tCO2
EF_{CO2}= CO2 emissions factor in year y; tCO2e/kWh
$EG_{BL,y}$ = Energy baseline in year y; kWh

The anticipated net electricity export from the project activity during the year y, multiplied with emission factor calculated for Wind Power using the data published by CEA for NEWNE Grid.

Project Emissions (PEy)

As per para 14 of the methodology, project emissions for this project activity is 0.

Leakage (LEy)

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

Also given in Annex 3

[12] For detailed calculation refer Annex 3

In accordance with the applied methodology, if the energy generating equipment is transferred from another activity, leakage is to be considered. The project activity is a new project activity and does not involve any transfer of equipments, thus leakage has not been considered. (LEy = 0)

Emission Reductions: The emission reductions achieved by the project activity (ERy) are calculated as

ERy = BEy – PEy - LEy

Where,

ERy = Emission reduction in year y (tCO2e/y)

BEy = Baseline emissions in year y; (tCO2e/y)

PEy = Project emissions; in year y; (tCO2e/y)

LEy = Leakage Emissions in year y; (tCO2e/y)

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

Data / Parameter:	$EF_{grid, OM,y}$
Data unit:	tCO_2/MWh
Description:	Operating Margin emission factor of the Western grid
Source of data used:	Central Electricity Authority (CEA) CO_2 Baseline Database values have been used for calculation. *Source:* http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm
Value applied:	1.0090
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated nationally and published by Central Electricity Authority (CEA) (national published data)
Any comment:	

Data / Parameter:	$EF_{grid, BM,y}$
Data unit:	tCO_2/MWh
Description:	Build Margin emission factor of the Western grid
Source of data used:	Central Electricity Authority (CEA) CO_2 Baseline Database values have been used for calculation. *Source:* http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm
Value applied:	0.5977
Justification of the choice of data or description of measurement	Calculated nationally and published by Central Electricity Authority (CEA) (national published data)

methods and procedures actually applied :	
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

>>

Baseline Emissions (Emission Reductions due to displacement of electricity or $ER_{electricity,y}$)

EFgrid, CM,y= 0.9062 tCO2/MWh (Refer Annex 3 for detailed calculation)

$EG_{BL,y}$ = 26280 MWh/annum

The detail for estimation of $EG_{BL,y}$ is described in Annex 4.

Hence, BE_y = 0.9062*26280 = 23814 tCO2e / year

As described in section B.6.1 the value of PEy = 0 and LEy = 0.

Emission Reductions

The emission reductions achieved by the project activity (ERy) are calculated as

ERy= 23814- 0 - 0= 23814 tCO_2e

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

>>

Year	Estimation of Project Activity Emissions (tCO_2e)	Estimation of baseline emissions (tCO_2e)	Estimation of Leakage (tCO_2e)	Estimation of overall emission reductions (tCO_2e)
2010	0	23814	0	23814
2011	0	23814	0	23814
2012	0	23814	0	23814
2013	0	23814	0	23814
2014	0	23814	0	23814
2015	0	23814	0	23814
2016	0	23814	0	23814
2017	0	23814	0	23814
2018	0	23814	0	23814
2019	0	23814	0	23814
Total (tonnes of CO_2e)	**0**	**238140**	**0**	**238140**

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

B.7.1 Data and parameters monitored:

Data / Parameter:	$EG_{BL,y}$
Data unit:	MWh
Description:	Net electricity supplied (= Total export – Total import) to the grid by the project activity per annum during the crediting period.
Source of data to be used:	Monthly billing records/Credit report of the MSEB for the net electricity supplied by the project activity to the grid.
Value of data	26280 (estimated)
Description of measurement methods and procedures to be applied:	The meter installed is a two way meter capable of measuring both import and export at a same time. The total export and the total import values from the project activity, required to calculate the net export will be generated from the credit report for the project activity. The net electricity export by the project activity will be calculated from the difference of the total export and the total import value as detailed in Annex 4
QA/QC procedures to be applied:	Energy meters are calibrated at regular intervals as per the requirements from MSEDCL (discussed in annex 4), and the calibration certificates for the same are maintained. The same will be followed throughout the crediting period. The credit report will be cross checked with the invoice raised by the PP.
Any comment:	Continuous measurement and monthly recording. Data would be archived for CP + 2 years

B.7.2 Description of the monitoring plan:

>>

SSL implemented the following operational and management structure in order to monitor emission reductions, generated by the project activity

The project proponent has signed an operation and maintenance agreement with the supplier of wind turbines i.e M/s Suzlon Windfarm Services Limited. The performance of the turbine, safety in operation and scheduled/breakdown maintenance is responsibility of M/s Suzlon Windfarm Services Limited and are organized and monitored by them. So the authority and responsibility of project management lies with O&M contractor.

Operation & Maintenance Services:-Operation and maintenance labour work involves making available suitable manpower for operation and maintenance, cleaning and upkeep of the equipment include:-

1. Tower Torquing
2. Blade Cleaning
3. Nacelle Torquing & Cleaning
4. Transformer Oil Filtration
5. Site & Transformer Yard Maintenance

Management Services:-

1. Taking joint meter reading (JMR) of the main meters along with representative of MSEDCL.
2. Data logging in for power generation, grid availability, Machine availability.

3. Preparation & submission of monthly performance report in agreed format.
4. Taking monthly metering readings, if the variation between main meter and check meter is more than 0.5% all the meters will be retested and calibrated immediately by MSEDCL.
5. Providing all necessary data to MSEDCL for apportioning of net export by the project activity.

Technical Services:-

1. Visual inspection of WEGs and all parts there of.
2. Technical assistance including checking of various technical, safety and operational parameters of the equipment, trouble shooting and relevant technical services.

The CDM co-ordinator of Suma Shilp is responsible for following tasks:

1. Preparation of Project document.
2. Make all arrangement for Validation & verification of project activity
3. Preparation of Monitoring Report.
4. Archiving of all relevant data
5. Organising periodic audits.

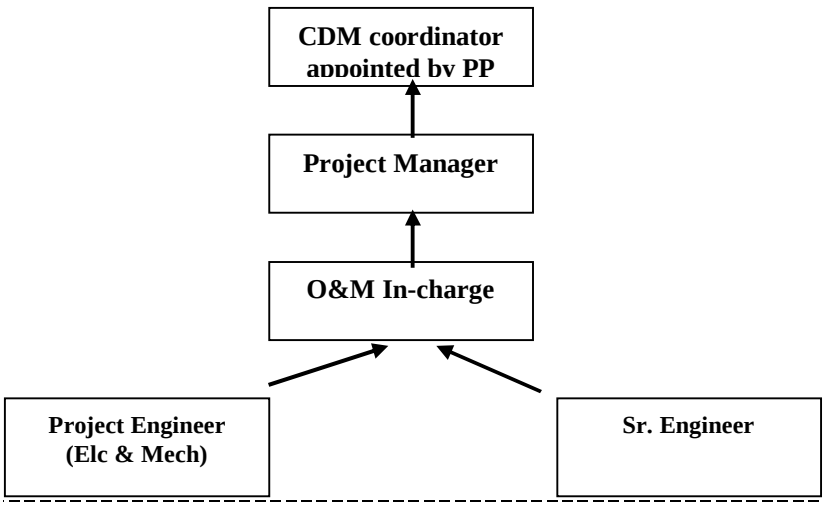
The operation and maintenance team consists of Senior Engineers, Engineers and Technicians who will record the readings and prepare daily generation reports of all the WEGs. The primary recording (Joint Meter Reading) of the electricity fed to the state utility grid will be carried out jointly at the incoming feeder of the state electricity utility. The joint measurement will be carried out once in a month in the presence of both parties (Suma Shilp Limited representative and the officials of the MSEDCL), and the records will be signed by the officials from the project proponent and MSEDCL. This generation record will form the basis of payment by the MSEDCL to the project proponent. The net export as per the report by MSEDCL to the PP will be the basis for calculation of CER (please refer to annex 4 for more details). Such records will be maintained and would be made available on demand throughout the crediting period of the project.

The daily generation reading, taken from the meter installed in each WEGs will be recorded by the O&M company. The daily generation report will be sent to the PP by the O&M company will be archived for two years in addition to the crediting period.

Both the O&M service provider as well as Suma Shilp's CDM coordinator shall ensure robustness of the data archiving system so that accuracy as well as authenticity can be maintained by undertaking a periodic review the entire data archiving procedure.

The SSL management shall be responsible for conducting periodic review of the data so as to ensure that the data collection and archiving procedures are done properly in regular intervals of time. Wherever any

lapses arise, corrective action shall be initiated instantly to rectify the problem so as to keep the entire procedure of data collection and archiving on track.



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

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Date of completion of the application of baseline and monitoring methodology: 06/03/2009

Project Proponents: Suma Shilp Limited. (Refer to Annex I)

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:

>>

25/05/2006 (based on the purchase order issued by SSL)

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

>>

20 years 0 months (As per the letter provided by the Equipment manufacturer).

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

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:

>>

15/07/2010. The crediting period will not start prior to registration with UNFCCC

C.2.2.2. Length:

>>

10 years 0months

SECTION D. Environmental impacts

>>

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

>>

As per the prevailing host party law, the applicable Environment Impact Assessment (EIA) Notification-2004 of Ministry of Environment and Forests (MoEF), the said industry was not listed in the Schedule 1, which require Environmental Clearance from MoEF. Thus, an environmental Impact Assessment is not required.

Though the project activity does not have any significant impacts on the environment, some of the likely impacts are:

- During the construction phase, due to the transportation of material, there could be some amount of impact on the air as well as some impact due to noise. Since the transportation is quite low, the impact on air is negligible. Though the impact on noise is low, all workers were provided with Personal Protective Equipments (PPE's) as precaution.
- During the project's operation and maintenance phase, there is no impact on air or water or noise.
- With regard to land use, the project is located on barren and largely unfertile land. No dislocation of people is involved in the course of the project activity. In fact, land value appreciated due to the project activity coming in, and the landowners have since benefited due to the project activity.

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:

>>No significant impacts are associated with the project activity were identified.

SECTION E. Stakeholders' comments

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

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SSL identified the following local stakeholders to be associated with the project activities, directly or indirectly:

- Employees of MSEB
- Local villagers
- Panchayat officials
- Contractors (Suzlon)

The stakeholders were informed about the agenda, venue and date of the meeting through notices issued well in advance. The consultation meeting was conducted by SSL on January 20, 2008 at the Chhadvel village in Sakri taluka, Dhule district, Maharashtra, close to the wind farm site office. The stakeholder consultation meeting was attended by participants.

The consultation meeting was conducted by SSL on January 20, 2008 at the Chhadvel village in Sakri taluka, Dhule district, Maharashtra, close to the wind farm site office. The stakeholder consultation meeting was attended by participants. The meetings started with a brief presentation on Clean Development Mechanism under Kyoto Protocol. Thereafter, SSL explained to the stakeholders how the wind farm project has led to significant reduction in emissions of greenhouse gases either directly or indirectly, and how it helps in contributing to the global efforts towards combating global warming. SSL further explained the other sustainable development benefits associated with the project. The languages of communication for the meeting were Marathi and Hindi, both of which are understood by the local people. Questionnaires were also distributed amongst the attendants of the meeting, who were then asked to give their opinion on the project both in writing as well as verbal communication, which was recorded in a video format.

E.2. Summary of the comments received:

>>

The local stakeholders highly appreciated the project, and expressed their satisfaction with the project, stating that all such efforts that help to reduce greenhouse gas emissions should be lauded. The power scenario in the region is really grave, with load shedding of up to twelve hours being experienced by the local people, and the local people asked the proponent to come up with more such projects in the region to help tide that crisis quickly. Moreover, a lot of local people got employment due to the proponent's project activity, and they asked for more projects so that the unemployed people remaining could also get job options. The comments received from stakeholders in writing have been summarized in the following table:

Name	Status	Comment Given
Jalinder S Deore	Resident of Chhadvel	The project is providing employment to the local people

		Some projects should be planned that cater to the local area's electricity requirements
Bharat Naik	Assistant Manager CRM for Suzlon	More projects of this sort should come up so that there could be greater development of the area
Praveen Kamble	Resident of Chhadvel	Stakeholder session as conducted by SSL are necessary to solve the misunderstandings that local people had developed
Sadade Pankaj Dinkar	Resident of Chhadvel	Due to wind power, electricity can be generated without any pollution, Such projects need to be expanded in the area so that employment opportunities can be increased, education levels of the people improves and overall living standard of people and living environment can improve in the area.

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

>>No adverse comments were received by the proponent about the project activity. The positive comments received by the proponent, however, were welcomed, and while thanking the people, the SSL representative promised to look into the possibility of any more wind power based projects being set up 'in the area by SSL. Also, the proponent said that the project was grid connected, and hence it was the responsibility of MSEDCL to ensure that the local area gets electricity from the project. Also, through meetings like these, efforts were being made by Suzlon officials as well as project proponents to remove everyone's misunderstandings about the wind farms. Moreover, the SSL representative said that as job opportunities for skilled people were rising through the project's inception in the local area, this ensures that the education standard of the local people rises who then make attempts to enable themselves educationally qualified for these opportunities.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Suma Shilp Limited
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Represented by:	
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding has been availed for the project activity, nor did the proponent seek any ODA for the same. No Annexure-I parties are involved with this activity, and hence the question of ODA does not arise.

Annex 3

BASELINE INFORMATION

Generation Data, Emission Data published by Central Electricity Authority, Government of India. (Version 04). http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

EMISSION FACTORS

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

	2005-06	2006-07	2007-08
NEWNE	1.02	1.01	1.00
South	1.01	1.00	0.99
India	1.02	1.01	1.00

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

	2005-06	2006-07	2007-08
NEWNE	0.67	0.63	0.60
South	0.71	0.70	0.71
India	0.68	0.65	0.63

Net Generation Total (GWh)

	2005-06	2006-07	2007-08
NEWNE	437,877	465,361	496,119
South	138,329	152,206	157,315
India	576,206	617,567	653,434

Net Generation in Build Margin (GWh)

	2005-06	2006-07	2007-08
NEWNE	87,764	93,524	100,707
South	28,228	30,442	31,613
India	115,991	123,965	132,320

Net Generation in Operating Margin (GWh)

	2005-06	2006-07	2007-08
NEWNE	359,271	379,471	401,642
South	100,978	109,116	114,702
India	460,249	488,587	516,343

20% of Net Generation (GWh)

	2005-06	2006-07	2007-08
NEWNE	87,575	93,072	99,224
South	27,666	30,441	31,463
India	115,241	123,513	130,687

The combined margin emission factor is calculated according to the the formula given below:

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

$EF_{grid,CM,y}$ = (0.75*1.009 + 0.25*0.5977) = 0.9062 tCO_2/MWh

Annex 4

MONITORING INFORMATION

As per the applied Baseline and Monitoring methodology: Version 15 of AMS-1.D., the Net Electricity supplied by the project activity to the grid is required to be monitored during implementation of the project activity and to be reported for calculating emission reductions:

The meter used here is capable of measuring both export and import. The joint meter reading shall record both total export and total import for a particular period, thus generating net electricity supplied, which is the difference of total export and total import. The net electricity generated by each WEGs will be monitored from the controller meter. Electricity generated by the activity will be exported to the NEWNE Grid. Throughout the CDM crediting period and beyond, electricity generated from the project will be monitored by both the project proponent and the state utility Maharashtra State Electricity Board (MSEB). The project promoter has hired services of M/S Suzlon Windfarm Services Limited for the project activity at Sakri taluka in Dhule district, Maharashtra for Operation and Maintenance (O&M) of the wind farm under a contract.

All the WEGs of the Suma Shilp Limited which are the part of the project activity are distributed in 7 feeders. Other WEGs (Non PP) are also connected to those feeders. The JMR will be taken for all the 7 feeders at the respective substations and MSEDCL will generate "WINDMILL'S BREAK UP ENERGY REPORT" mentioning the net export for each WEG owners. The net export report by MSEDCL for each WEG owner will be made on the basis of apportioning (percentage share of total power generation of each WEG) of electricity generation by each WEG. The JMR and apportioning[13] will be done as per section 11.05 of the PPA.

Based on "WINDMILL'S BREAK UP ENERGY REPORT" the O & M company generate a report[14] to the PP. MSEDCL will give a detailed report to PP on net electricity export to grid. The report contains the WEG number, total export, total import and net Export. The net electricity supplied ($EG_{BL,y}$) by the project activity to the grid in year y, will be determined as per Net electricity export report covering all the WEGs under project activity.

[13] The apportionment exercise is conducted by MSEDCL only as per section 11.05 of the PPA and their internal norms

[14] The report is as per format "EXHIBIT – G" of the PPA containing the reference no of the WINDMILL'S BREAK UP ENERGY REPORT. The report contains the total export and total import and net export in kWh for a particular period. Refer page 34 of PPA

Metering and Metering Equipment

The power generated shall be recorded at a 33KV substation owned by MSEB in Sakri taluka, Dhule. The metering equipment consisting of Main and Check Meters are identical in their make and technical features. WEGs different from the project activity are also connected to the same main and check meters, and the net export is calculated as per PPA by MSEDCL. The Main and Check Meters are of 0.5 % accuracy class[15] and comply with the requirements of local electricity regulations. The meters installed at the Metering Point are four quadrant, three phase, and four wire, with provision for on-line reading and time slots as required. The metering equipments are duly approved, tested, and sealed by MSEB for the project activities in Dhule. The procedures for testing and reading of the metering equipment are summarized in the paragraphs below.

Testing of the Metering Equipment

1. The Main and Check Meters are tested for accuracy with a portable standard meter by the testing divisions of MSEDCL's Testing Division.

2. MSEDCL shall carry out the calibration, periodical testing, sealing and maintenance of meters in the presence of authorized representative(s) of the Company and representative(s) of the Company shall sign on the result thereof.

3. The frequency of meter testing will be periodical as per MSEB requirements. All meters will be tested only at the Metering Point. MSEB will promptly provide a copy of test reports to the Company.

4.It is to be noted that testing of the main and check meters shall be done by MSEDCL as per the energy purchase agreements signed with Suma Shilp Limited. As per the Energy purchase agreement, if during testing, any of the Main Meter is found to be within the permissible error limit but the corresponding check meter is beyond the permissible limit, the energy computation will be as per the main meter, and the Check Meter shall be calibrated immediately.

5. If during testing, both the Main and Check Meter are found within the permissible limits of error i.e. 0.5%, the energy computation will be as per the Main Meter. If during test, any of the seven Main Meters is found to be within the permissible limits of error but the corresponding Check Meter is beyond the permissible limit, the energy computation will be as per the Main Meter. The Check Meter would then be re-calibrated immediately.

[15] Page 16 of Energy Purchase Agreement, Artilce 11 Measuring and Metering, Section 11.01 paragraph [c]

6. If during any of the monthly meter readings, the variation between the Main Meter and the Check Meter is more than 0.5% and then all meters shall be re-tested and calibrated immediately by MSEDCL. The correction required as per result of the testing will be applied to the generation and consumption of energy for the period from last meter reading to the time of such test checks. Energy for the periods thereafter is in accordance with the calibrated Main Meter.

Reading of Joint Metering Equipment

1. Meter readings at the Metering Point will be undertaken jointly by the representatives of MSEDCL, and authorized representative of the Company on the 1st day of every month for the preceding month. The meter readings are jointly certified by both representatives of MSEDCL and the PP's representative.

2. The joint meter reading will be furnished by MSEDCL's Jurisdictional Officer to their respective Office of Superintending Engineer for further processing. A final judgment of the total units received for sale of Wind Energy to MSEDCL will be made by the Superintending Engineer on the basis of joint meter readings.

3. The Joint Meter Reading taken at the common evacuation system will be supported by meter readings of Individual WEGs using such common evacuation system. Based on this data, the power generated from individual units will be certified by MSEDCL.

Necessary document to support the above description, a letter from MSEDCL to the authorized representative of the company stating the procedure for JMR and Credit Report for Wind Mill generation, has been submitted to the DOE.

WEG Controller meters

Controller meters will be installed at WEG. These meters shall be monitored by SCADA real time monitoring. In event of any error in these meters alarm will be generated and recorded in SCADA. The O&M team will take immediate corrective action to rectify the fault. Such faults will be reported immediately to the SSL representative followed by a detailed report of corrective actions. If required, a joint- investigation will be carried out.

The project proponent has undertaken an operation and maintenance agreement with the supplier of the WEGs for a period of 4 years. The performance of the WEGs, safety in operation and scheduled/ breakdown maintenance is to be organized by the service provider. Therefore, the responsibility of the operation of the project lies with the service provider.

The various activities to be carried out by the O&M team as per the agreement with the project promoter are as follows:

1. Routine Maintenance Services: Routine maintenance services involve the operation and maintenance of the equipment along with periodic preventive maintenance, cleaning and upkeep of the equipments.

2. Security Services: This service includes watch and ward and security of the wind farm and the equipments.

3. Management Services: Suzlon Wind farm Services Limited is a group which is ISO 9001:2000 and ISO 14001: 2000 certified company[16] and apart from the maintenance of the wind farm their services also include the following:

- Data logging in for power generation, grid availability and machine availability.
- Preparation and submission of monthly performance report in the agreed format.
- Taking monthly meter reading, jointly with MSEDCL of power generated at the wind farm and supplied to Maharashtra state grid for the purpose of co-ordination and to obtain necessary power credit report/certificate

The readings taken for generation shall be archived for a period of two years in addition to the crediting period. Both hard and soft copy formats of the same shall be carefully maintained. This data shall be shared by Suzlon, in addition to the official management team of Suma Shilp, with officials of MSEDCL, who then perform the apportionment for calculation of losses and subsequent export by each project that has been set up in the area as per the formula given above.

As part of good management practices that have been adopted by Suzlon Windfarm Services Limited, periodic training is undertaken by the employees involved in the operation and maintenance as well as the monitoring as required for compliance with the various ISO certifications that Suzlon has obtained for itself. This ensures that the service provided by Suzlon employees is of the highest standards.

4. Technical Services: Technical assistance includes checking of various technical, safety and operational parameters of the equipments, trouble shooting and relevant technical services. The O&M team consists of Senior Engineers, Engineers and Technicians who will record the readings and prepare daily generation reports of all the WEGs. Joint meter reading of the electricity fed to the state utility grid will be carried out jointly at the feeder of the state electricity utility. Joint measurement will be carried out once in a month in the presence of both parties (SSL representative and the officials of MSEDCL), and the records will be signed by officials from the project proponent and MSEB. This generation record will form the basis of payment by MSEDCL to the project proponent. Such records will be maintained and would be made available on demand throughout the project's crediting period. Each WEG is also equipped with an integrated electronic meter. These meters will be connected to the Central Monitoring System (CMS) for

[16] Please refer to http://www.suzlon.com/manufacturing/l3.aspx?l1=5&l2=21&l3=34 for more information

the wind farm through a wireless radio frequency network. A snapshot of the generation on the last day of the month will be kept as a record both in electronic as well as in printed form.

WTG no.	Feeder Name	Main Meter Number	Check Meter Number	Type of meter installed	Monitoring and Recording Frequency	Unit of Measurement	Person responsible for meter reading, recording and calibration
K-273	Valve Feeder 01	04725793	04725788	Real Time TOD Meter having Four quadrant, three phase and four wire, with provision for online reading and time slots	Monthly, on the 1st day of every month	kWh	MSEDCL on behalf of MSEB in presence of the representative of the project proponent.
K-280	Valve Feeder 02	04725786	04738064	Real Time TOD Meter having Four quadrant	Monthly, on the 1st day of every month	kWh	MSEDCL on behalf of MSEB in presence of the representative of the project proponent.
K-296	Valve Feeder 02	04725786	04738064	Real Time TOD Meter having Four quadrant	Monthly, on the 1st day of every month	kWh	MSEDCL on behalf of MSEB in presence of the representative of the project proponent.
K-274	Valve Feeder 02	04725786	04738064	Real Time TOD Meter having Four quadrant	Monthly, on the 1st day of every month	kWh	MSEDCL on behalf of MSEB in presence of the representative of the project proponent.
K-241	Jamde Feeder 11	04725799	04725805	Real Time TOD Meter having Four quadrant	Monthly, on the 1st day of every month	kWh	MSEDCL on behalf of MSEB in presence of the representative of the project proponent
K-256	Valve Feeder 01	04725793	04725788	Real Time TOD Meter having Four quadrant	Monthly, on the 1st day of every month	kWh	MSEDCL on behalf of MSEB in presence of the representative of the project proponent.

J-111	Jamde Feeder 03	04862465	04725796	Real Time TOD Meter having Four quadrant	Monthly, on the 1st day of every month	kWh	MSEDCL on behalf of MSEB in presence of the representative of the project proponent
J-125	Jamde Feeder 09	04725791	04763795	Real Time TOD Meter having Four quadrant	Monthly, on the 1st day of every month	kWh	MSEDCL on behalf of MSEB in presence of the representative of the project proponent.
K-297	Valve Feeder 02	04725786	04738064	Real Time TOD Meter having Four quadrant	Monthly, on the 1st day of every month	kWh	MSEDCL on behalf of MSEB in presence of the representative of the project proponent.
J-105	Jamde Feeder 12	04725806	04725809	Real Time TOD Meter having Four quadrant	Monthly, on the 1st day of every month	kWh	MSEDCL on behalf of MSEB in presence of the representative of the project proponent.
J-102	Jamde Feeder 10	04890562	04863441	Real Time TOD Meter having Four quadrant	Monthly, on the 1st day of every month	kWh	MSEDCL on behalf of MSEB in presence of the representative of the project proponent.
J-103	Jamde Feeder 12	04725806	04725809	Real Time TOD Meter having Four quadrant	Monthly, on the 1st day of every month	kWh	MSEDCL on behalf of MSEB in presence of the representative of the project proponent.

Appendix 1

Abbreviations Used

ABBREVIATION USED	EXPANDED FORM
BSE	Bombay Stock Exchange
CAPM	Capital Asset Pricing Model
CEA	Central Electricity Authority
CMS	Central Monitoring System
CO_2	Carbon Dioxide
CP	Crediting Period
GHG	Green House Gas
HT	High Tension
INR	Indian National Rupees
NEWNE	North, East, West, North East
MAT	Minimum Alternative Tax
MEDA	Maharashtra Energy Development Agency
MSEDCL	Maharashtra State Electricity Distribution Company Limited.
MSEB	Maharashtra State Electricity Board
MW	Mega Watt
O&M	Operation and Maintenance
PLF	Plant Load Factor
SSL	Suma Shilp Limited
T & D	Transmission and Distribution
WEG	Wind Energy Generator
WTG	Wind Turbine Generator
UNFCCC	United Nations Framework Convention on Climate Change

Appendix 2

CER Calculations

Year of offer		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
On-Site Project Emission Reductions	**Unit**										
Generation capacity	**kW**	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000
Plant load factor	**%**	21.05%	21.05%	21.05%	21.05%	21.05%	21.05%	21.05%	21.05%	21.05%	21.05%
No. of hours of plant operation per annum	**Hrs/year**	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760
Net Electricity generated in a year	**MWh/year**	27663	27663	27663	27663	27663	27663	27663	27663	27663	27663
Auxilliary consumption per annum	**MWh/year**	0	0	0	0	0	0	0	0	0	0
T&D losses considered on generation at WEG	**MWh/year**	1383.16	1383.16	1383.16	1383.16	1383.16	1383.16	1383.16	1383.16	1383.16	1383.16
Net Electricity supplied by the project activity	**MWh/year**	26280	26280	26280	26280	26280	26280	26280	26280	26280	26280
Baseline emission factor considered,	**tCO2/MWh**	0.9062	0.9062	0.9062	0.9062	0.9062	0.9062	0.9062	0.9062	0.9062	0.9062
Baseline emissions	**tCO2/year**	23814	23814	23814	23814	23814	23814	23814	23814	23814	23814
Project emissions	**tCO2/year**	0	0	0	0	0	0	0	0	0	0
Emission Reductions from the project activity	**tCO2/year**	23814	23814	23814	23814	23814	23814	23814	23814	23814	23814