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:

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Generation of electricity from 4.8MW capacity wind mills by Sun-n-Sand Hotels Private Limited at Maharashtra

Version: 05
Date: 14-September-2011

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

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Sun-n-Sand Hotels Pvt. Ltd. (hereafter referred to as SNS in the subsequent sections of this document) is the flagship Company of the Sun-n-Sand Group. The Company was incorporated on 29th June 1961 in Maharashtra (Com Reg.No.12075) with the main objective to carry on hotel and resort business.

The CDM project activity proposed by SNS involves installation and operation of 6 wind turbine generators (WTGs) of 0.8 MW capacity each in Maharashtra. These WTGs are supplied by Enercon (India) Limited (hereafter referred to as EIL in the subsequent sections of this document). EIL has also taken the contract for operating and maintaining the machines for ten years from the date of commissioning of the machines. The WTGs are located in the village Nivi and Karpewadi of Satara district and village Ambevangan of Ahmednagar district in the state of Maharastra

The distribution of power generation from the wind mills of this project activity are as follows:

Owner	*Total capacity of wind mills*	*No. of wind turbines*	*Capacity of each turbine*	*Date of commissioning*
Sun-n-Sand Hotels Pvt. Ltd.	4.0 MW	5	0.8MW	10/12/2008
	0.8 MW	1	0.8 MW	30/03/2009
Total	**4.8 MW**	**6**		

The WTGs installed by SNS are proposed to generate and supply power to Maharashtra State Electricity Distribution Company Limited (hereafter referred as MSEDCL) or to the third party. The generated electricity will be supplied to MSEDCL grid at 132-110/33kV to Bhambarwadi Sub station which in turn is connected to the new integrated Northern Eastern Western and North Eastern (NEWNE) regional grid.

Contribution of the project activity to sustainable development

Ministry of Environment and Forests, Govt. of India has stipulated the social well being, economic well being, environmental well being and technological well being as the four indicators for sustainable development in the interim approval guidelines host country approval eligibility criteria for Clean Development Mechanism (CDM) projects[1]. The contribution made by the proposed CDM project activity towards each of these parameters is presented in the paragraphs below:

[1] http://cdmindia.in/approval_process.php

Social well being

- Rural and infrastructural development in the areas around the project.
- The project activity has assisted in higher interaction amongst the local villagers thereby increasing the flow of information in the villages thereby levels of awareness and knowledge in the community.
- Contribution towards achieving the objective of the policy on wind power generation of Government of India and Government of Maharashtra., which is to promote generation of energy through non-conventional sources to supplement the ever increasing demand of the state.

Environmental well being

- Reduction in the consumption of fossil fuels in the grid for generating additional electricity equivalent to that generated by the wind mills;
- CO_2 abatement and thereby reduction of green house gas emission through development of renewable technology.
- The project has reduced the local air pollutants and environmental impacts due to increased share of electricity generation through wind power.

Economic well being

- Help in economic development of remote villages in Maharashtra by making investment in that area.
- A number of electric sub stations have come in the area resulting in further employment.
- All the turbines need maintenance personnel, which in turn gives employment to local people.

Technological well being

- Encourage other entrepreneurs irrespective of sector to adopt this technology and invest in wind energy

A.3. Project participants:

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Name of party involved (*) ((host) indicates a host Party)	Private and/ or public entity(ies) project participants (*)(as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/ No)
Govt. of India (Host)	Sun-n-Sand Hotels Pvt. Ltd. (Private entity)	No

The Sun-n-Sand Hotels Pvt. Ltd. will be the lead and nodal entity for all communication with CDM-EB and Secretariat. Contact information has been provided in Annex-I.

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.:

>> Western region/ Maharashtra

A.4.1.3. City/Town/Community etc:

>>

Location No. (as identified in EIL's Wind farm)	Village	Taluka	District
SNS – 45	Nivi	Patan	Satara
SNS – 46	Nivi	Patan	Satara
SNS – 48	Karpewadi	Patan	Satara
SNS – 49	Karpewadi	Patan	Satara
SNS – 59	Karpewadi	Patan	Satara
SNS - 509	Ambevangan	Akole	Ahmednagar

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

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The site of the project activity is at Satara district and Ahmednagar district. The project site at Satara is grossly represented by latitude from 17 °08'43.6" to 17 °09'38.7" N longitude from 73 °54'52.8"to 73 °55'15.4" E and the project site at Ahmednagar district is represented by latitude 19 °36'43.6"N and longitude 73 °47'19.9" E. The GPS details for unique identification of each WTG are presented below:

S No.	Location No.(as identified on EIL's Wind farm)	Latitude (N)	Longitude (E)
WTG-1	SNS – 45	17°09'02.3"	73 °54'52.8"
WTG-2	SNS – 46	17 °08'56.6"	73 °54'53.2"
WTG-3	SNS – 48	17 °08'43.6"	73 °55'15.4"
WTG-4	SNS – 49	17 °08'47.6"	73 °55'14.0"
WTG-5	SNS – 59	17 °09'38.7"	73 °55'07.6"
WTG-6	SNS – 509	19 °36'43.6"	73 °47'19.9"

The nearest railway station to the project site at Satara is Pune which is about 215km from the project site and the nearest railway station to the project site at Ahmednagar is Nashik which is about 50 km from the project site.

The location of Maharashtra in India, district Satara and Ahmednagar in Maharashtra and project site in Satara and Ahmednagar have been presented in Appendix 1 of this document.

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

>> As per the scope of the project activity listed in the 'list for sectoral scopes and approved baseline and monitoring methodologies', the project activity will principally fall in Scope Number 1, Sectoral scope – energy industries (renewable/ non-renewable sources).

The project falls under

Type – I : Renewable Energy Project

Category: I.D "Grid connected renewable electricity generation"

The project produces renewable energy from the wind mills. The project falls within the small scale rating as the total generation capacity of the existing plant is 4.8 MW, i.e., below the 15MW outlined in section ID of Appendix B of the simplified modalities and procedures for small-scale CDM project activities. Electricity generated from the wind farms is being sold to Maharashtra State Electricity Distribution Company Limited (MSEDCL) or to the third party. The capacity of the CDM project activity will remain below 15 MW throughout the crediting period.

Technology of the Project Activity

The project activity involves 6 WTGs each of 0.8 MW capacity. These WTGs are of Enercon make (E-48 gearless type) WEC.

Salient features of the technology are:

- Turbine concept: Gearless, variable speed, variable pitch control
- Rotor: Diameter of 48 m. Upwind rotor with active pitch control. Blades are specially designed for optimisation of energy generation at low and medium wind speed. The blade tips have been optimised to improve energy yield and handle the turbulences very effectively. This allows the blades to be used in its entire length without any loss of energy caused by turbulences.
- Variable Speed function ensuring optimum efficiency at all times. Having speed range of 16 to 32.0 RPM.
- Pitch control: Enercon blade pitch system, one independent pitching system per rotor blade with allocated emergency supply. Three synchronised blade pitch system with battery back up.
- Less Wear & Tear since the system eliminates mechanical brake, which are not needed due to low speed generator which runs at maximum speed of 32.0 rpm and uses Air Brakes.
- Three Independent Aero Brakes with emergency power back up supply.
- Starts generation of power at wind speed of 3.0 m/s.
- Generation of power at rated wind speed of 12 m/s.
- Incorporates lightning protection system, which includes blades.

The electricity generated from the wind farm is evacuated to the MSEDCL Grid System through their Extra High Voltage (EHV) sub-station. There are high voltage (HV) transmission lines and complete installation of allied equipments from individual wind turbines to the facility's switchyard and from the switchyard up to the MSEDCL EHV sub-station, for evacuation of wind energy. There is a capacitor bank of required capacity installed so as to maintain the Power Factor as per MSEDCL's requirements.

SNS is responsible for payment for the procurement, construction and installation of interconnection facilities at the Point of Delivery at the MSEDCL EHV sub-station. SNS has made arrangements at its cost for connecting the Facility with the State Grid System at the Point of Delivery in consultation with an authorized officer of the MSEDCL, designated by the MSEDCL on its behalf.

Installation and operation of the windmills does not pose any environmental hazards. The technology of harnessing wind power through windmills is environmentally safe and sound. The host Government also

agrees to this fact and does not ask for Environmental Impact Assessment for this type of project. As supplier of wind energy converters (wind mills), Enercon (India) Ltd. is well known in the market.

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

>> The estimated amount of emission reductions over the chosen 10 years of crediting period is **76,210 tCO_2**. The year wise details are presented below:

Year	Annual estimation Emission Reductions (tCO_2e/yr)
Year 1	7,621
Year 2	7,621
Year 3	7,621
Year 4	7,621
Year 5	7,621
Year 6	7,621
Year 7	7,621
Year 8	7,621
Year 9	7,621
Year 10	7,621
Total estimated reductions (tonnes of CO2e)	76,210
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO2e)	7,621

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

>> No public funding has been sought for the project activity.

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

>> As mentioned under Appendix C of the Simplified Modalities and Procedures for Small-Scale CDM project Activities, the following results into de-bundling of large CDM project:

"A proposed 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; and
- Registered within the previous 2 years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point."

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the small-scale project activity:

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Project has applied approved methodologies available for small-scale CDM project at United Nations Framework Convention on Climate Change (UNFCCC) website under Appendix B of the simplified modalities and procedures for small-scale CDM project activities. The methodology used for this project is the approved small-scale CDM baseline methodology AMS-I. D (Version 17, EB 61) "Grid connected renewable electricity generation".

The project activity also uses the methodological tool "Tools to calculate the emission factor for an electricity system" (Version 02.2.0, EB 61).

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

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The project activity produces renewable energy by using wind mills. The project activity would follow small scale methodology. We therefore proceed to determine the applicability of the methodology to this project activity.

Type I: Renewable Energy Projects

Category D: Grid Connected Renewable Electricity Generation

S.No	Applicability Criteria	Project Case
1.	This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass a. supplying electricity to a national or a regional grid. b. supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	The project activity comprises generation of electricity using renewable energy based on wind power and is supplying to the NEWNE regional grid. Power generated by the project activity is not wheeled to any consumer facility via national/ regional grid.
2.	Illustration of respective situations under which each of the methodology (i.e. AMS-I.D, AMS-I.F and AMS-I.A) applies is included in Table 2.	The following is one of the illustrative situations (S.no 1 in the table) mentioned in the table where methodology AMS-1.D is applicable: "Project supplies electricity to a national/regional grid" The candidate project supplies electricity generated to the NEWNE regional grid.
3.	This methodology is applicable to project activities that (a) install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) involve a capacity addition[2]; (c) involve a retrofit[3] of (an) existing plant(s); or (d) involve a replacement[4] of (an) existing plant(s).	All the windmills that have been installed are new and there was no renewable energy power plant operating prior to the implementation of the project activity (a Greenfield project)

[2] A capacity addition is an increase in the installed power generation capacity of an existing power plant through: (i) the installation of a new power plant besides the existing power plant/units, or (ii) the installation of new power units, additional to the existing power plant/units. The existing power plant/units continue to operate after the implementation of the project activity.

[3] Retrofit (or Rehabilitation or Refurbishment). It involves an investment to repair or modify an existing power plant/unit, with the purpose to increase the efficiency, performance or power generation capacity of the plant, without adding new power plants or units, or to resume the operation of closed (mothballed) power plants. A retrofit restores the installed power generation capacity to or above its original level. Retrofits shall only include measures that involve capital investments and not regular maintenance or housekeeping measures.

S.No	Applicability Criteria	Project Case
4.	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; • 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.	Not applicable; the candidate project is a Greenfield wind power project.
5.	If the new unit has both renewable and non-renewable components (e.g.. a wind/diesel unit), the eligibility limit of 15MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel[5], the capacity of the entire unit shall not exceed the limit of 15MW.	There is neither non-renewable component added, nor co-firing is required for the proposed project activity. The renewable project capacity is 4.8 MW, below the limit of 15 MW.
6.	Combined heat and power (co-generation) systems are not eligible under this category.	Not applicable; the candidate project is a Greenfield wind power project.
7.	In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct[6] from the existing units.	Not applicable, all the windmills are new and this project is not capacity enhancement or up-gradation project
8.	In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.	Not applicable, this project is not a retrofit or modification of existing facility.

The above comparison confirms that the chosen methodology is applicable for this project activity**.**

B.3. Description of the project boundary:

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[4] Replacement. It involves investment in a new power plant or unit that replaces one or several existing unit(s) at the existing power plant. The installed capacity of the new plant or unit is equal to or higher than the plant or unit that was replaced.

[5] A co-fired system uses both fossil and renewable fuels.

[6] Physically distinct units are those that are capable of generating electricity without the operation of existing units, and that do not directly affect the mechanical, thermal, or electrical characteristics of the existing facility. For example, the addition of a steam turbine to an existing combustion turbine to create a combined cycle unit would not be considered "physically distinct".

The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system[11] that the candidate project power plant is connected to. Five WTGs within the project activity is located at Satara District & one WTG islocated at Ahmednagar District in state of Maharashtra. It includes the wind turbine installations and pooling and the sub-stations. According to the approved baseline methodology, AMSID, version -17 and the tool to calculate the emission factor for an electricity system (version 2.2) the spatial extent of the project boundary includes the project site and all power plants connected physically to the electricity system that the CDM project power plant is connected to.

The Indian electricity system is divided into two grids, the new integrated Northern, Eastern, Western, and North-Eastern (NEWNE) regional grids and the Southern Grid. Each grid covers several states. As the regional grids are interconnected, there is inter-state and inter-regional exchange. A small power exchange also takes place with neighbouring countries like Bhutan and Nepal.

Power generation and supply within the regional grid is managed by Regional Load Dispatch Centre (RLDC). The Regional Power Committees (RPCs) provide a common platform for discussion and solution to the regional problems relating to the grid. Each state in a regional grid meets its demand with its own generation facilities and also with allocation from power plants owned by the Central Sector such as NTPC and NHPC etc. Specific quotas are allocated to each state from the Central Sector power plants. Depending on the demand and generation, there are electricity exports and imports between states in the regional grid. The regional grid thus represents the largest electricity grid where power plants can be dispatched without significant constraints and thus, represents the "project electricity system" for the Project. As the Project is connected to the NEWNE regional electricity grid, the NEWNE grid is the "project electricity system".

Accordingly, the project boundary encompasses the spatial extent of the NEWNE electricity grid which includes the project site and all power plants connected physically to the electricity system. Following are the main emission sources that could be a part of the project boundary:

	Source	**Gas**	**Included?**	**Justification / Explanation**
Baseline	Electricity generation from power plants connected to the NEWNE Grid	CO_2	Yes	Main emission source.
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	Excluded for simplification. This is conservative.
Project Activity	On-site fuel combustion due to implementation of the project activity	CO_2	No	Wind energy generation does not have any direct GHG emissions.

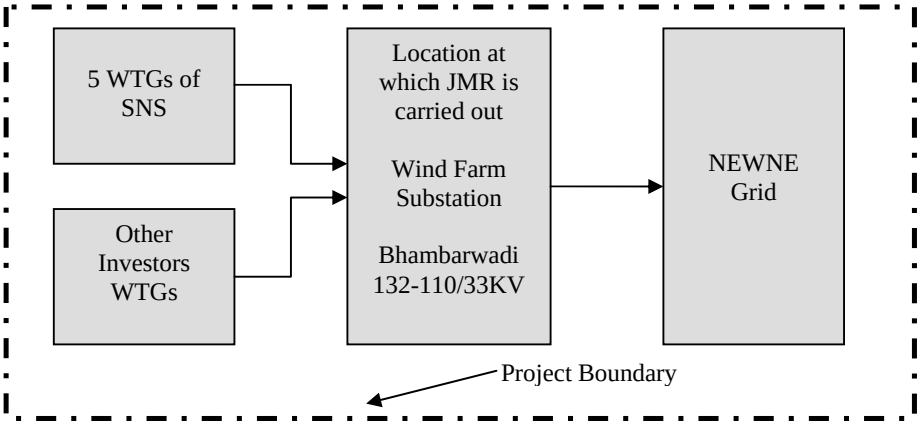

Figure: Project Boundary for 5 WTGs at Satara site

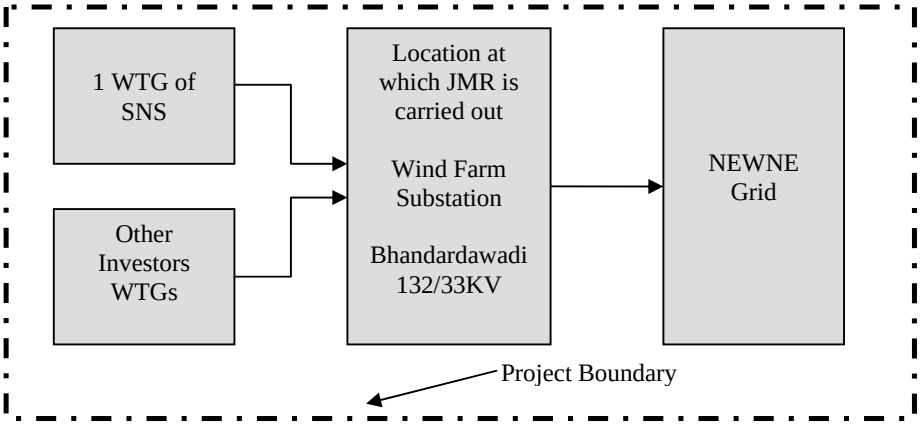

Figure: Project Boundary for 1 WTG at Ahmednagar site

B.4. Description of baseline and its development:

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The candidate project activity is a 4.8 MW grid connected wind power project in Maharashtra, Inida. The power generated by the project activity will be supplied to the western regional grid that forms part of the NEWNE grid. Hence baseline of the candidate project activity has been established in accordance with the guideline recommended in the approved small scale methodology, AMS ID, version 17.

Using the methodology available in paragraph 11 of Type – I: Renewable Energy Projects (D: Grid connected renewable electricity generation, Version 17) of the "Indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories", the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO_2e/kWh) calculated in a transparent and conservative manner as:

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the "Tool to calculate the emission factor for an electricity system".
OR

(b) The weighted average emissions (in kg CO_2e/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

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

In order to determine the emission coefficient applicable to the present project activity "Option (a)" i.e. combined margin has been used. The combined margin emission factor has been ascertained following the "Tool to calculate the emission factor for an electricity system" version 02.2.0 Please refer to section B.6.1 of this document for further details.

In line with the discussion presented above the baseline emissions have been estimated as

$$BE_y = EG_{BL,y} * EF_{CO2,grid,y}$$ ***……..Equation (1) of AMS ID, Version 17***

Where:

- BE_y Baseline emissions in year y (tCO_2)
- $EG_{BL,y}$ Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)
- $EF_{CO2,grid,y}$ CO_2 emission factor of the grid in year y (t CO2/MWh) (calculated as per option (a) specified above)

The key information and data used for calculation of baseline have been taken from following sources:

S.No.	Key Information/data used for baseline	Source of data/information
1.	Electricity generation	Month wise data collected and compiled from the concerned State electricity utility reports.
2.	Emission factor based on combined margin of the NEWNE electricity grid	Baseline Carbon Dioxide Emission Database Version 4.0 as published by the Central Electricity Authority[7].
3.	Plant Load Factor	Third party PLF Assessment Report[8]

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

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The project activity has demonstrated the serious CDM consideration following the guideline on the demonstration and assessment of prior consideration of the CDM, version - 01[9]. The paragraph 2 of the guideline has specified the following in order to demonstrate prior consideration of the CDM.

"The Board decided that for project activities with a starting date on or after 02 August 2008, the project participant must inform a Host Party DNA and/or the UNFCCC secretariat in writing of the

[7] http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm, CO2 database, version -04.

[8] Appraisal report for estimation of wind energy generation prepared by third party engineering consultant viz. Kentech Konsulteam. The same report has been submitted to the DOE during validation.

[9] http://cdm.unfccc.int/UserManagement/FileStorage/PU2ARNBM3KFXS9HZ6OELGTICJ81VYD

commencement of the project activity and of their intention to seek CDM status. Such notification must be made within six months of the project activity start date and shall contain the precise geographical location and a brief description of the proposed project activity. Such notification is not necessary if a PDD has been published for global stakeholder consultation or a new methodology proposed to the Executive Board before the project activity start date."

Serious prior consideration of the CDM is demonstrated through the following real and continuing actions taken by the project proponent:

The project proponent had notified the Host Party DNA (MoEF) and the UNFCCC secretariat in writing of the commencement of the project activity and of their intention to seek CDM status. The notification to the Host party DNA and to UNFCCC was sent on 14th January, 2009 and 15th January, 2009 respectively i.e. within 6 months of the project activity start date.

In addition to the discussion presented above please find below the chronology of events as undertaken by the project proponent to commission the project activity and also to secure CDM status.

S.N.	Activity	Date	Reference
1.	Indicative proposal received from Enercon India Limited (EIL)	4th April 2008	Proposal from EIL
2.	Board meeting according approval to call for proposal to put up 4.8 MW wind power project at Maharashtra.	28th April 2008	Copy of the Board Note
3.	Final proposal received from EIL for the proposed wind power project.	4th June 2008	Proposal from Enercon India Limited
4.	Board meeting according investment approval for the 4.8 MW wind power project.	20th June 2008	Board Meeting Note
5.	Date of work order for CDM consultant	20th June 2008	Copy of the work order
6.	Purchase order being placed to EIL for the proposed wind power project.	05th August 2008	Copy of the purchase order
7.	Acceptance of Purchase order by EIL.	07th August 2008	Copy of acceptance letter
8.	Date of Local stakeholders consultation meeting	10th December 2008	Minutes of meeting
9.	Date of commissioning of 5 wind mill	10th December 2008	Copy of commissioning certificate
10.	Power Purchase Agreement (PPA) for 4MW (5 x 0.8MW) at Satara	20th December 2008	Copy of PPA
11.	Intimation to MoEF for the CDM project	14th January 2009	Copy of the letter to NCDMA
12.	Intimation to UNFCCC for the CDM project	15th January 2009	Copy of the letter to UNFCCC
13.	Confirmation receipt from UNFCCC	20th January 2009	Copy of email from UNFCCC
14.	Work order issued to DOE	29th January 2009	Copy of the work order

S.N.	Activity	Date	Reference
15.	Date of commissioning of last wind mill	30th March 2009	Copy of commissioning certificate
16.	Power Purchase Agreement (PPA) for 0.8MW (1 x 0.8MW) at Ahmednagar	20th April 2009	Copy of PPA
17.	Application for the Host Country Approval of the project	8th July 2009	Copy of letter to MoEF
18.	Web-hosting of the PDD for the International Stakeholder's consultation	10th July 2009 to 8th August 2009	-

It is quite apparent from the chronology of events mentioned above that continuing and real action have been undertaken by the project participant in order to secure CDM status of the project in parallel with its implementation.

Hence the above discussion quite evidently demonstrates prior consideration of CDM by the project proponent.

Additionality Check:

Please refer to the section B.5. of the guideline for completing the simplified Project Design Document (CDM–SSC-PDD), version – 05[10]. The section B.5 of the guideline recommends to demonstrate additionality of the project activity using Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM. As per Attachment A to Appendix B of the Simplified modalities and procedures for small-scale CDM project activities[11] option 1(a) i.e. investment barrier has been considered in order to demonstrate additionality of the project activity. .

Investment Barrier:

An investment analysis has been conducted in order to demonstrate invest barrier to the project activity. Paragraph 19 of the guidelines on the assessment of investment analysis (Version -05 ;EB 62; Annex -5)[12] states the following in order to determine the approach to be followed to carry out investment analysis

"If the proposed baseline scenario leaves the project participant no other choice than to make an investment to supply the same (or substitute) products or services, a benchmark analysis is not appropriate and an investment comparison analysis shall be used. If the alternative to the project activity is the supply of electricity from a grid this is not to be considered an investment and a benchmark approach is considered appropriate."

It is apparent that in absence of the project activity the project proponent would have not invested in any other alternative power generation projects and equivalent power would have been generated from the power plants connected to the NEWNE grid. In appreciation to this benchmark analysis has been considered appropriate to carry out the investment analysis of the project activity.

[10] http://cdm.unfccc.int/Reference/Guidclarif/pdd/PDD_guid02.pdf

[11] https://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC_guid05.pdf

[12] http://cdm.unfccc.int/UserManagement/FileStorage/OHNFC4T6RUZEQXDL20JVG7MWK35YI1

An investment analysis of the project activity was conducted considering equity IRR (Post-tax)[13] as the most suitable financial indicator and Weighted Average Cost of Capital (WACC) as the investment benchmark.

WACC of the project activity has been computed considering debt equity ratio at 70:30. . This is mostly attributable to the fact that several regulations and orders refer this as the normative debt equity ratio for wind power projects[14]. In this regard it is worthwhile to mention that at the time of decision making the project was envisaged to be funded completely by internal accrual of capital. Hence cost of equity should have been the appropriate benchmark considering the capital structure of the project in the context of investment decision making. However, consideration of WACC at debt equity ratio of 70:30 should be considered as a conservative approach. In order to draw a comparison between WACC (Debt :Equity – 70:30) and cost of equity please find below the respective values.

Parameter	WACC (Debt :Equity – 70:30)	Cost of equity
Investment Benchmark	11.91%	20.43%

The discussion above demonstrates that a conservative approach has been followed while determining the investment benchmark of the project activity.

Cost of Debt:
In order to reflect the standard rate in the market the bank prime lending rate prevailing at the time of project start date has been considered as the cost of debt. The Prime Lending Rate (PLR) at the time of investment was in the range of 12.25 – 12.75[15]. The average PLR of 12.50% has been considered as the cost of debt.

Cost of Equity:
The cost of equity has been determined as per the guidance provided in the option B of paragraph 15 of the guidelines on the assessment of investment analysis, version - 05 i.e. "calculting the cost of equity using best financial practices, based on data sources which can be clearly validated by the DOE, while properly justifying all underlying factors." The Capital Asset Pricing Model (CAPM) has been followed considering Beta values of selected power generating companies in India that were listed at the time of this investment. Detailed calculations of cost of equity and WACC along with an elaboration of the approach are provided in Appendix – 03 of this document.

The WACC of the project activity has been ascertained at 11.91%.

The input data/parameter for the calculation of post tax equity IRR has been presented in the table below along with the means of validation for parameters.

Items	**Value**	**Reference**
Capacity of Machines in kW	800	Purchase order of all the WTGs included within the project activity
Number of Machines	6	Purchase order of all the WTGs included within the project activity

[13] In the present context project IRR would be similar to equity IRR.

[14] http://www.mercindia.org.in/pdf/Detail_Wind_Energy_Order.pdf (Page 37 of 176)

[15] http://www.rbi.org.in/scripts/WSSView.aspx?Id=12236

Project Capacity in MW	4.80	Calculated Value
Project Commissioning Date	31-Dec-2008	Proposal received from Enercon India Limited dated 4th June, 2008. As per the proposal five (5) WTGs will be commissioned by end of December, 2008 and one (1) WTG will be commissioned by end of March 2009. In order to avoid any complication in calculation due to such staggered commissioning schedule it has been assumed that all the WTGs will be commissioned by end of December, 2008.
Project Cost (Rs. Million)	270.00	Proposal received from Enercon India Limited (EIL) dated 4th June, 2008
Project Cost per MW (Rs. In Millions)	56.25	Calculated Value
Operations		
Plant Load Factor	20%	PLF assessment report of the third party engineering consultant.
Insurance Charges as per actuals	0.15%	As per the quote received from the insurance company dated 15th June, 2008.
Operation & Maintenance Cost from the date of commissioning for a period of 10 years	1.37%	Proposal received from Enercon India Limited (EIL) dated 4th June, 2008 specifies the O&M cost as INR 0.55 Million per WTG and service tax as 12.36%. This amounts to INR 3.71 million considering six (6) WTGs. The total project cost is INR 270 Million. Hence the O&M cost has been estimated as 1.37% or the total project cost.
Annual O & M Escalation	5.00%	Proposal received from Enercon India Limited (EIL) dated 4th June,, 2008
Tariff (Note-1)		
Base year Tariff (2008-09) - Rs./kWh	3.50	As per Maharashtra Electricity Regulatory Commission (MERC) tariff order (Page no 18 of 176) dated 24th November 2003.[16]
Annual Escalation (Rs./kWh per Year)	0.15	As per Maharashtra Electricity Regulatory Commission (MERC) tariff order (Page no 18 of 176) dated 24th November 2003.[17]
Tariff applicable after year 13th	3.50	-
Project Cost	*Rs Million*	

[16] http://www.mercindia.org.in/pdf/Detail_Wind_Energy_Order.pdf ; page no 18 of 176

[17] http://www.mercindia.org.in/pdf/Detail_Wind_Energy_Order.pdf ; page no 18 of 176

Land and Infrastructure, Generator & Electrical Equipments, Mechanical Equipments, Civil Works, Instrumentation & Control, Other Project Cost, Pre operative Expenses, etc.		
Total Project Cost	270.00	Proposal received from Enercon India Limited (EIL) dated 4th June, 2008
Means of Finance		
Own Source	100.00%	Certificate from the statutory auditor of Sun-n- Sand Hotels Private Limited
Term Loan	0.00%	Certificate from the statutory auditor of Sun-n- Sand Hotels Private Limited
Income Tax Depreciation Rate (Written Down Value basis)		
on Wind Energy Generators	80%	Section 32 of the Income Tax Act 1961 (Reference : http://www.vakilno1.com/bareacts/incometaxact/s32.htm) http://www.mnre.gov.in/prog-wind.htm
On other Assets	10%	Section 32 of the Income Tax Act 1961 (Reference : http://www.vakilno1.com/bareacts/incometaxact/s32.htm) http://www.mnre.gov.in/prog-wind.htm
Book Depreciation Rate (Straight Line Method basis)		
On all assets	5.28%	Companies Act, Schedule XIV, Item II (i) (b) ; http://www.vakilno1.com/bareacts/companiesact/SCHEDULE%20659%20-%20674/sSCXIV%20-%20672.htm Depreciation on Fixed Assets used for Generation of Wind Power is charged @ 5.28% on Straight Line Method (SLM), i.e. treating it as a continuous process (Source: http://www.reiljp.com/pdf/SchB0809.pdf)
Book Depreciation up to (% of asset value)	90%	Income Tax Act
Income Tax		
Income Tax rate	33.99%	http://www.iadvisory.gov.sg/upload/India_Budget2008-Highlights.pdf
Minimum Alternate Tax	11.33%	http://www.iadvisory.gov.sg/upload/India_Budget2008-Highlights.pdf

Working Capital Requirements (Days)		
Receivables	60	Normative Working capital and interest liability thereon have been considered as part of O&M expenses in the Maharashtra Electricity Regulatory Commission (MERC) tariff order dated 24th November 2003. As per this approach the O&M cost has been estimated at 1.5% of the total project cost in first three years of operation and 2% in the fourth year of operation. Escalation of 5% would be applicable after fourth year of operation. (Reference : http://www.mercindia.org.in/pdf/Detail_Wind_Energy_Order.pdf) In the MERC (Terms and Conditions of Tariff) Regulations 2005, the components and normative rates applicable for working capital for various types of energy generation have been provided, including coal based/ lignite/ oil based/ gas turbine / combined cycle and hydropower generating plants. The normative rates applicable for hydropower generation are Operation and maintenance expenses for one month and Receivables for sale of electricity equivalent to two months of the annual fixed charges. (Source: MERC (Terms and Conditions of Tariff) Regulations 2005; http://www.mercindia.org.in/regulations.htm). In the present context the O&M expenses (1.37% of the project cost) has been computed as per the proposal received from Enercon dated 4th June, 2008 which is exclusive of the working capital interest. Hence interest on working capital has been considered separately as per the reference cited above.
O & M Expenditure	30.0	Same as receivables
Working Capital Interest Rate	12.50%	http://rbidocs.rbi.org.in/rdocs/Wss/PDFs/84164.pdf
Baseline Emission Factor for NEWNE (tCO2/GWh)	906.18	CEA Emission Factor Database, Version – 04

Based on the assumptions enlisted above the equity IRR of the project activity has been estimated at 9.24%. Hence it is evident that the equity IRR remains well below the investment benchmark value of 11.91%.

Sensitivity Analysis

In order to ensure robustness of the investment analysis the equity IRR has been subjected to sensitivity analysis. Parameters viz. PLF, capital cost, O&M expenses and applicable tariff after 13th year have been considered as critical variable to carry out the sensitivity analysis.

Sensitivity Analysis			
Parameter	**Variation**	**Value applied**	**Equity IRR**
PLF	-10%	18.00%	7.47%

Sensitivity Analysis			
Parameter	**Variation**	**Value applied**	**Equity IRR**
	Base case	20.00%	9.24%
	10%	22.00%	10.91%
Capital cost (Million INR)	Actual as per Purchase Order	240	11.02%
	-10%	243	10.82%
	+10%	297	7.91%
	Base case	270	9.24%
O&M Expenses	As per actual O&M contract dated 5th August, 2008	Please refer to the work sheet in the IRR model viz "O&M schedule"	10.08%
O&M Expenses	-10% O&M expenses	Please refer to the work sheet in the IRR model viz "O&M schedule"	9.51%
O&M Expenses	+10% O&M expenses	Please refer to the work sheet in the IRR model viz "O&M schedule"	8.96%
O&M Expenses	Base Case (As per proposal dated 4th June, 2008)	Please refer to the work sheet in the IRR model viz "O&M schedule"	9.24%
Tariff applicable after 13th Year	As calculated based on cost plus approach, refer sheet "Tariff after 13 year"	2.34	8.29%
	-10%	3.15	8.97%
	+10%	3.85	9.49%
	Base case	3.50	9.24%

It is quite evident that Equity IRR remains below the investment benchmark at all the different sensitivity scenarios as presented above. The investment analyses discussed above explain that the proposed project activity is not a business as usual case for the project proponent.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>>

The emission reductions ***ERy*** by the project activity during a given year "*y*" is

ERy = BEy – PEy – Ly

where *BEy* is the baseline emissions

PEy is project activity emissions and;
Ly is the amount of emissions leakage resulting from the project activity.

Baseline emission rate calculation: The baseline emissions (BEy in tCO_2) as per paragraph 11 of methodology AMS I.D (Version 17) is the product of baseline emissions factor (EFy in tCO_2/GWh) times the electricity supplied by the project activity to the grid (EGy in GWh), as follows:
$BEy = EG_{BL,y} * EF_{CO2,grid,y,}$
Where,
$EG_{BL,y}$ is the Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh),
$EF_{CO2,grid,y}$ is the CO_2 emission factor of the grid in the year y (t CO_2/MWh).

Paragraph 11 of AMS-I-D (Version 17) states that baseline emissions are product of electrical energy baseline $EG_{BL,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor.

The grid emission factor is calculated in a transparent and conservative manner as follows:

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the "Tool to calculate the emission factor for an electricity system"

OR

(b) The weighted average emissions (in kg CO_2e/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

Project proponent has chosen to go with option (a) above.

The emission factor EF*y* of the grid is represented as a combination of the Operating Margin (OM) and the Build Margin (BM). Considering the emission factors for these two margins as $EF_{OM,y}$ and $EF_{BM,y}$, then the EF*y* is given by:

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

with respective weight factors w_{OM} and w_{BM} (where $w_{OM} + w_{BM} = 1$).

The Central Electricity Authority, Ministry of Power, Government of India has published a database of Carbon Dioxide Emission from the power sector in India based on detailed authenticated information obtained from all operating power stations in the country. This database i.e. The CO_2 Baseline Database provides information about the Operating Margin and Build Margin Emission Factors of all the regional electricity grids in India. The Operating Margin in the CEA database is calculated ex ante using the Simple OM approach and the Build Margin is calculated ex ante based on 20% most recent capacity additions in the grid based on net generation as described in the "Tool to calculate the emission factor for an electricity system". We have, therefore, used the Operating Margin and Build Margin data published in the CEA database, for calculating the Baseline Emission Factor.

The Operating Margin emission factor

$EF_{OM,y}$ is defined as the generation-weighted average emissions per electricity unit generated (tCO_2 /GWh) for all sources serving the NEWNE grid, excluding zero or low-operating cost power plants based on the average of the five most recent year data. In India, hydro and nuclear stations qualify as low-cost/ must run sources and are excluded.

As per the "Tool to calculate the emission factor for an electricity system" (Version 02.2), one of the methods of calculating the operating margin is is by dividing the region's total CO_2 emissions by the net generation of all power plants serving the system.

$$EF_{grid,OMsimple,y} = \frac{\sum_{i,m} FC_{i,m,y} \cdot NCV_{i,y} \cdot EF_{CO2,i,y}}{\sum_{m} EG_{m,y}}$$

Where,
$EF_{grid,OMsimple,y}$ = Simple operating margin CO2 emission factor in year y (tCO2/MWh)
$FC_{i,m,y}$ = Amount of fossil fuel type i consumed by power plant / unit m in year y (mass or volume unit)
$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)
$EF_{CO2,i,y}$ = CO2 emission factor of fossil fuel type i in year y (tCO2/GJ)
$EG_{m,y}$ = Net electricity generated and delivered to the grid by power plant / unit m in year y (MWh)
m = All power plants/ units serving the grid in year y except low-cost/ most run power plants / units
i = All fossil fuel types combusted in power plant / unit m in year y
y = the three year most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for the validation

The Simple Operating Margin approach is appropriate to calculate the Operating Margin emission factor applicable in this case. As per the "Tool to calculate the emission factor for an electricity system" (version 02.2), the Simple OM method can only be used where low cost must run resources constitute less than 50% of grid generation based on average of the five most recent years. In this regard please refer to the user guide (Reference : Page no. 41) of the "CO_2 Baseline Database for Indian Power Sector" version 4.0 dated September, 2008 wherein it has been stated that simple OM is the preferred approach for India.We have therefore considered the OM numbers provided in the CEA database. Operating margin data for the NEWNE regional electricity grid for the latest three years available in the CEA database are given below:

Year	**Operating Margin (tCO_2e/MWh)**
2005-2006	1.0195
2006-2007	1.0083
2007-2008	0.9992
Average of 3 years	1.0090

The Operating Margin applicable for the project activity is taken as average of the latest three years operating margins. Accordingly the Operating Margin is determined as 1.0090 tCO_2e/MWh and this value of OM has been fixed *ex-ante* for the entire crediting period for the project activity.

Build Margin Emission Factor

The Build Margin emission factor EF_{BMy} (tCO_2/GWh) is given as the generation-weighted average emission factor of the selected representative set of recent power plants represented by the 5 most recent plants or the most recent 20% of the generating units built (summation is over such plants specified by m):

$$EF_{grid,BM,y} = \frac{\sum_{m} EG_{m,y} \cdot EF_{EL,m,y}}{\sum_{m} EG_{m,y}}$$ ---------- (13) of "Tool to calculate the emission factor for an electricity system" (version 02.2)

Where,

$EF_{grid,BM,y}$ = Build margin CO2 emission factor in year y (tCO2/MWh)
$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$FE_{EL,m,y}$ = CO2 emission factor of power unit m in year y (tCO2/MWh)
m = Power units included in the build margin
y = Most recent historical year for which power generation data is available

The choice of method for the sample plant is the most recent 20% of the generating units built as this represents a significantly larger set of plants for a large regional electricity grid having a large number of power plants connected to it and is therefore appropriate.

The build margin value for the NEWNE regional grid for 2007-08 as per the CEA database is 0.5977 tCO_2e/MWh and this value of BM has been fixed *ex-ante* for the entire crediting period for the project activity.

Combined Margin Emission Factor

As already mentioned, baseline emission factor (EFy) of the grid is calculated as a combined margin (CM), calculated as the weighted average of the operating margin (OM) and build margin (BM) factor. In case of wind power projects default weights of 0.75 for EF_{OM} and 0.25 for EF_{BM} are applicable as per "Tool to calculate the emission factor for an electricity system" (version 02.2). No alternate weights are proposed.

Using the values for operating margin and build margin emission factors for NEWNE regional electricity grid provided in the CEA database and their respective weights for calculation of combined margin emission factor, the baseline carbon emission factor (CM) is 906.18 tCO_2e/GWh or 0.9062 tCO_2e/MWh.

Project Emissions:
The project activity uses wind power to generate electricity and hence the emissions from the project activity are taken as nil.
PEy = 0

Leakage:
Emissions Leakage on account of the project activity is considered as zero as neither the wind turbine generators are transferred from another activity nor any existing equipment of the project site would be transferred from the project site in accordance with the applied methodology.
Ly = 0

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

Data / Parameter:	$EF_{BM,y}$
Data unit:	tCO_2e/MWh
Description:	Build Margin Emission Factor of NEWNE Regional Electricity Grid
Source of data used:	"CO_2 Baseline Database for the Indian Power Sector" version 4.0 dated 1 September 2008 published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO_2 Baseline Database for Indian Power Sector" is available at www.cea.nic.in
Value applied:	0.5977
Justification of the choice of data or	Build Margin Emission Factor has been calculated by the Central Electricity Authority in accordance with "Tool to calculate the emission factors for an

description of measurement methods and procedures actually applied :	electricity system", version 02.2.0.
Any comment	-

Data / Parameter:	$EF_{OM,y}$
Data unit:	tCO_2e/MWh
Description:	Operating Margin Emission Factor of NEWNE Regional Electricity Grid
Source of data used:	"CO_2 Baseline Database for the Indian Power Sector" version 4.0 dated 1 September 2008 published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO_2 Baseline Database for Indian Power Sector" is available at www.cea.nic.in
Value applied:	Operating Margin - 2005-06: 1.0195 Operating Margin - 2006-07: 1.0083 Operating Margin - 2007-08: 0.9906 Average Operating Margin: 1.0090
Justification of the choice of data or description of measurement methods and procedures actually applied :	Operating Margin Emission Factor has been calculated by the Central Electricity Authority using the simple OM approach in accordance with "Tool to calculate the emission factors for an electricity system".
Any comment	-

Data / Parameter:	**Ratio OM:BM**
Data unit:	
Description:	Ratio of Operating margin to build margin used for calculation of combined margin for wind energy project
Source of data used:	Tool to calculate emission factor of an electricity system, version – 02.2
Value applied:	75:25
Justification of the choice of data or description of measurement methods and procedures actually applied :	Tool to calculate emission factor of an electricity system, version – 02.2 specifies the ratio of operating margin to build margin as 75:25 for the wind power projects.

Data / Parameter:	$EF_{CM,y}$
Data unit:	tCO_2e/MWh
Description:	Combined Margin Emission Factor of NEWNE Regional Electricity Grid
Source of data used:	The Build Margin (BM), Average Operating Margin (OM) emission factor and the ratio of OM to BM as mentioned above.
Value applied:	0.90618
Justification of the	Build Margin Emission Factor has been calculated in accordance with "Tool to

choice of data or description of measurement methods and procedures actually applied :	calculate the emission factors for an electricity system", version 02.2.
Any comment	-

B.6.3 Ex-ante calculation of emission reductions:

>>

The emission reductions ER_y by the project activity during a given year y is:

$$ER_y = BE_y = EG\ BL,\ y * EF\ CO2,\ grid,\ y,$$

where

$EG_{BL,\ y}$ is Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh).$EF_{CO2,\ grid,\ y}$ is the CO_2 emission factor of the grid in year y.

The emission factor *EFy* of the grid is represented as a combination of the Operating Margin and the Build Margin. Considering the emission factors for these two margins as $EF_{OM,y}$ and $EF_{BM,y}$, then the EF_y is given by:

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

with respective weight factors w_{OM} and w_{BM} (where $w_{OM} + w_{BM} = 1$); as per the "Tool to calculate the emission factors for an electricity system" (version 02.2) for a wind project, the weightage for operating margin has been taken as, $w_{OM} = 0.75$ and that for build margin, $w_{BM} = 0.25$ has been considered.

The details of the values to arrive into combined margin emission factor are provided in Annex-3 (baseline information)

Ex-ante calculation of emission reductions is equal to ex-ante calculation of baseline emissions as project emissions and leakage are nil.

Baseline emission factor (combined margin)
= 0.90618 tCO2e/MWh

Annual electricity supplied to the grid by the Project
= 4.8 MW (Capacity) x 20.00% (PLF) x 8760 (hours) GWh
= 8409.6 MWh

Annual baseline emissions
= 0.90618 tCO2e/GWh x 8409.6 MWh
= 7621 tCO2e

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

>> The estimated emission reduction to be achieved during the 10 - year crediting period aggregates to 76,210 tCO_2e.

Years	Estimation of project activity emissions (tCO_2e)	Estimation of baseline Emissions (tCO_2e)	Estimation of Leakage (tCO_2e)	Estimation of overall emission reductions (tCO_2e)
Year 1	0	7,621	0	7,621
Year 2	0	7,621	0	7,621
Year 3	0	7,621	0	7,621
Year 4	0	7,621	0	7,621
Year 5	0	7,621	0	7,621
Year 6	0	7,621	0	7,621
Year 7	0	7,621	0	7,621
Year 8	0	7,621	0	7,621
Year 9	0	7,621	0	7,621
Year 10	0	7,621	0	7,621
Total (tonnes of CO2e)	0	76,210	0	76,210

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

B.7.1 Data and parameters monitored:

>> The following parameters will be monitored during the project activity:

1. Data / Parameter:	Electricity generation (EG_{BL}, y)
Data unit:	MWh (Mega-watt hour)
Description:	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh) . This is the summation of the net electricity supplied by the project activity at Satara and Ahmednagar site.
Source of data used:	As available in the project proponent records
Value applied:	Annual electricity supplied to the grid by the Project = 4.8 MW (Capacity) x 20.00% (PLF) x 8760 (hours) = 8409.6 MWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	Net electricity supplied to grid will be calculated based on the measured values of "export" and "import" on the MSEDCL meter, where joint reading is taken by EIL representative and MSEDCL officials. Since this meter is common to project activity and other wind turbines that are not under this project activity, the apportioning of net electricity would be done based on electricity generated from individual wind turbines. Refer Section B.7.2 below for the details of apportioning methodology followed by EIL and accepted by MSEDCL.
QA/QC procedures to be applied:	The quantity of net electricity supplied will be cross-verified from the invoice raised on MSEDCL by the project proponent. Also refer Section B.7.2 below.
Any comment:	The data will be archived for crediting period + 2 years.

2.Data / Parameter:	Total Electricity generation from project activity ($\sum_{0}^{n} EG_{n,y}$)
Data unit:	MWh (Mega-watt hour)

Description:	Total Electricity Generated from 6 wind turbines
Source of data used:	Metered at windmill site metering station. $EG_{n,y}$ will be a summation of values taken from individual meters of the 5 wind turbines at Satara site and 1 wind turbine at Ahmednagar site
Value applied:	-
Justification of the choice of data or description of measurement methods and procedures actually applied :	This value will be used for apportioning of the net electricity supplied to the NEWNE grid by the CDM project activity, as metered in "joint meter" of MSEDCL.
QA/QC procedures to be applied:	Refer Section B.7.2 below.
Any comment:	The data will be archived for crediting period + 2 years.

3. Data / Parameter:	Total Electricity generation ($\sum_{0}^{m} EG_{m,y}$)
Data unit:	MWh (Mega-watt hour)
Description:	Total Electricity Generated from the other wind turbines attached to the common MSEDCL meter at the Satara sub-station and Ahmednagar Substation.
Source of data used:	From Enercon India Limited
Value applied:	-
Justification of the choice of data or description of measurement methods and procedures actually applied :	This value will be used for apportioning of the net electricity supplied to the NEWNE grid by the CDM project activity, as metered in "joint meter" of MSEDCL.
QA/QC procedures to be applied:	-
Any comment:	The data will be archived for crediting period + 2 years.

4. Data / Parameter:	Electricity Supplied to the grid from EIL wind farm ($EG_{JMR,export}$)
Data unit:	MWh (Mega-watt hour)
Description:	Electricity supplied to the grid from EIL wind farm from all wind turbines (including project activity) attached to the common MSEDCL meter at the sub-station and metered jointly by EIL representative and MSEDCL
Source of data used:	Metered as "export" value from MSEDCL meter and presented in the Joint Meter Reading (JMR) report
Value applied:	-
Justification of the choice of data or description of measurement methods and procedures actually applied :	This value will be apportioned to the project activity based on the values of $\sum_{0}^{m} EG_{m,y}$ and $\sum_{0}^{n} EG_{n,y}$ as per the formula given in Section B.7.2 below
QA/QC procedures to	-

be applied:	
Any comment:	The data will be archived for crediting period + 2 years.

5. Data / Parameter:	Electricity drawn from the grid by EIL wind farm ($EG_{JMR,import}$)
Data unit:	MWh (Mega-watt hour)
Description:	Electricity drawn from the grid by EIL wind farm for all wind turbines (including project activity) attached to the common MSEDCL meter at the sub-station and metered jointly by EIL representative and MSEDCL
Source of data used:	Metered as "import" value from MSEDCL meter and presented in the Joint Meter Reading (JMR) report
Value applied:	This value will not be directly used for estimation of emission reduction.
Justification of the choice of data or description of measurement methods and procedures actually applied :	This value will be apportioned to the project activity based on the values of $\sum_{0}^{m} EG_{m,y}$ and $\sum_{0}^{n} EG_{n,y}$ as per the formula given in Section B.7.2 below
QA/QC procedures to be applied:	-
Any comment:	The data will be archived for crediting period + 2 years.

6. Data / Parameter:	Electricity Supplied to the grid from project activity ($EG_{JMR,SNS,\ export}$)
Data unit:	MWh (Mega-watt hour)
Description:	Electricity supplied to the grid from the project activity
Source of data used:	Calculated from $EG_{JMR,export}$ which is a metered value as per the formula presented in Section B.7.2 below.
Value applied:	-
Justification of the choice of data or description of measurement methods and procedures actually applied :	This value will be apportioned to the project activity based on the values of $\sum_{0}^{m} EG_{m,y}$ and $\sum_{0}^{n} EG_{n,y}$ as per the formula given in Section B.7.2 below
QA/QC procedures to be applied:	-
Any comment:	The data will be archived for crediting period + 2 years.

7. Data / Parameter:	Electricity drawn from the grid by project activity ($EG_{JMR,SNS,\ import}$)
Data unit:	MWh (Mega-watt hour)
Description:	Electricity drawn from the grid by the project activity
Source of data used:	Calculated from $EG_{JMR,import}$ which is a metered value as per the formula presented in Section B.7.2 below.
Value applied:	-
Justification of the choice of data or description of measurement methods and procedures actually	This value will be apportioned to the project activity based on the values of $\sum_{0}^{m} EG_{m,y}$ and $\sum_{0}^{n} EG_{n,y}$ as per the formula given in Section B.7.2 below

applied :	
QA/QC procedures to be applied:	-
Any comment:	The data will be archived for crediting period + 2 years.

B.7.2 Description of the monitoring plan:

>>

The applied small-scale methodology, AMS-I-D, requires monitoring of the electricity supplied to the grid.

Project proponent has signed an 'Operation and Maintenance' contract with the supplier, Enercon (India) Ltd. to operate the wind mills for a period of ten years from the date of commissioning of each Wind Energy Converter. The performance of the mills, safety in operation and scheduled /breakdown maintenances are organized and monitored by the contractor. EIL will monitor the generation of the WEC daily on a regular basis and will maintain a log book recording daily generation details for each WEC comprising the project, as metered at the wind farm. EIL will also provide daily generation data through website.

A power purchase agreement will be signed with MSEDCL. SnS has installed Real Time TOD Meters with online reading features at the Metering Point (the Main Meter). The metering equipment is duly approved, tested and sealed by MSEDCL. The metering equipment (consisting of the Main Meter and the Check Meter) is identical in make and technical standards and is of 0.2% accuracy class and calibration. They comply with the requirements of the Electricity Rules. The meter readings at the Metering Point are undertaken jointly by the representatives of the State Grid/ MSEDCL and the representative of EIL in the first week of every month. The meter readings are jointly certified by representatives of the State Grid/ MSEDCL and EIL.

The MSEDCL carries out the calibration, periodical testing, sealing and maintenance of meters in the presence of EIL representative. The frequency of meter testing is annual. All meters are tested only at the Metering Point.

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, Enercon India Limited, are always present on site to monitor various parameters of power generation and deal with any problems related to generation, transmission or maintenance.

$EG_{n,y}$ is the electricity generated from an individual wind turbine of the project proponent (SNS) measured through its individual controller meter. The summation of total Electricity Generated from 5 wind turbines at Satara site and 1 wind turbine at Ahemdnagar site measured by individual wind turbine controller meters in MWh is presented as

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

$EG_{m,y}$ is the electricity generated from an individual wind turbine of the other project proponent measured through its individual controller meter. The summation of total Electricity Generated from the other wind turbines attached to the common MSEDCL meter at Satara sub-station and Ahmednagar substation in MWh is presented as

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

A ratio based on these two set of measured values would used for apportioning the net electricity supplied to the NEWNE 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 on 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 NEWNE grid. There is a single meter which gives both the export and import values, this metered reading would give value net of line losses and auxiliary consumption.

Further, as there is a common MSEDCL joint meter for multiple project proponents, the joint meter reading (JMR) is 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, EIL, based on the power generation from the individual wind turbines connected to this MSEDCL meter. EIL 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.

$EG_{JMR,SNS,export}$, the electricity supplied to the grid by the project activity is calculated as follows:

$$EG_{JMR,SNS,export} = EG_{JMR,export} * \frac{\sum_{0}^{n} EG_{n,y}}{\left(\sum_{0}^{n} EG_{n,y} + \sum_{0}^{m} EG_{m,y}\right)}$$

$EG_{JMR,SNS,import}$, the electricity drawn from the grid by the project activity is calculated as follows:

$$EG_{JMR,SNS,import} = EG_{JMR,import} * \frac{\sum_{0}^{n} EG_{n,y}}{\left(\sum_{0}^{n} EG_{n,y} + \sum_{0}^{m} EG_{m,y}\right)}$$

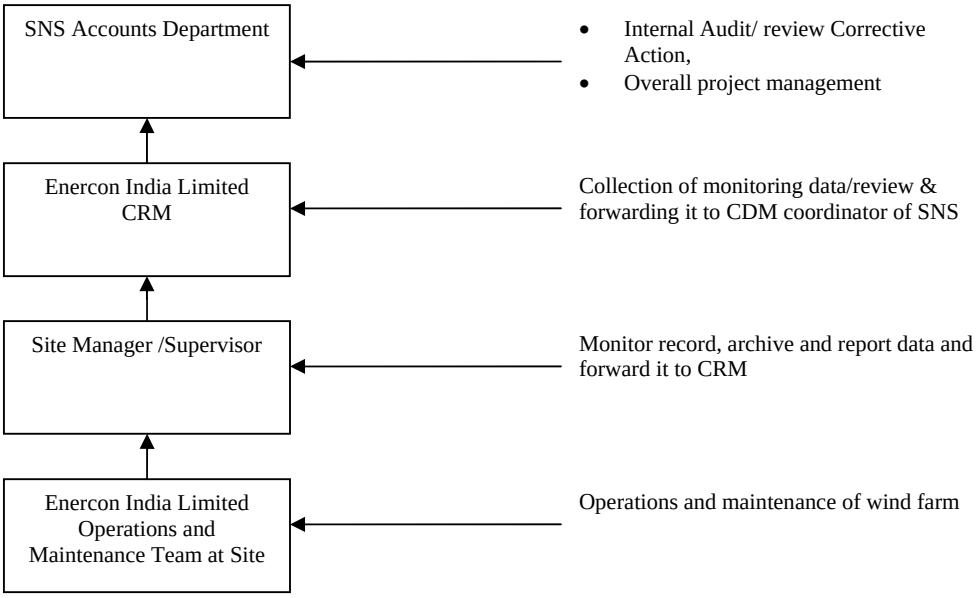
EG_y, the net electricity supplied to the grid by the project activity, is calculated as follows:

$EG_y = EG_{JMR, SNS, export} - EG_{JMR, SNS, import}$

The meters located at the grid sub-station are sealed, maintained and calibrated by the state electricity utility. 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.

Project management structure

The operation and maintenance team consists of representatives of technology supplier, EIL, who will record the readings and prepare daily generation reports of all the WECs. The primary recording of the electricity fed to the electricity grid will be carried out jointly at the Bhambarwadi Substation for 5 WTGs located in Satara site and at the Bhandardarwadi Substation for 1 WTG located in Ahmednagar site. The operations and maintenance structure for the project activity is as follows:



The Accounts department of SNS 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.

Further background information on measurement equipment, procedures etc are provided in Annex -4

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

>>

Date of completing the final draft of this baseline section : 14/09/2011

Name of entity determining the baseline: Sun-n-Sand Hotels Pvt. Ltd have determined the baseline and the application of monitoring methodology for the identified CDM project. The contact details of the entity i.e. the project proponent determining the baseline has been presented in the Annex 1.

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:

>>

05/08/2008

The start date of a CDM project activity is "the earliest date at which either the implementation or construction or real action of a project activity begins". In light of the above definition, SnS has taken the start date as the date issuance of the purchase order to Enercon India Limited.

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

>>

20Years

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:

>>

01/02/2012 or the date of registration of the project with UNFCCC whichever is later.

C.2.2.2. Length:

>>

10 Years

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 Schedule 1 of Ministry of Environment and Forests (Government of India) notification dated January 27, 1994, - 30 activities are required to undertake environmental impact assessment studies[18]. It should be noted here that EIA is not a regulatory requirement in India for wind energy projects. Also in the notification S.O. 1533[19], dated 14th September 2006 by Ministry of Environment and Forests (Government of India), the wind projects are not included in the lists of the projects that has to get prior environmental clearance either from state or central government authorities.

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:

>>

There is no major impact on the environment due to the installation and operation of the windmills. The local ecology is not likely to get impacted by this type of project activity.

[18] http://envfor.nic.in/divisions/iass/notif/eia.htm

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

SECTION E. Stakeholders' comments

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

>>

The local stakeholders were intimated of the stakeholder consultation meeting on 24/11/2008 by public notice to local stakeholder. The meeting was conducted at Enercon India Limited Satara office in Karpewadi village on 10/12/2008. The meeting commenced at 3:00pm on the scheduled time.

The local stakeholder consultation meeting had representatives from the nearby villages, representative of SNS, consultant representatives of SNS and EIL. The villagers freely expressed their views about the development of wind farm in the area. No negative comments were received during the course of the meeting by any of the local stakeholders

E.2. Summary of the comments received:

>>

The stakeholders raised their queries about the information on the projects such as installed capacity, O&M arrangements, and environmental benefits. The stakeholders were quite enthusiastic during the meeting and requested representatives of SNS to share the details about the project activity. SNS shared the details of the project activity and explained how the clean energy contributes to the climate change. The stakeholders viewed SNS as a reputed company contributing to the local social economy. The details of the comments received has been attached in Appendix 2 as local stakeholders consultation minutes of meeting

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

>>

There were no negative comments received for the project activity. Overall there was unanimous agreement that the proposed project was a beneficial project from sustainability view point. The details of the comments received and replied has been attached in Appendix 2 as local stakeholders consultation minutes of meeting

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Sun-n-Sand Hotels Pvt. Ltd.
Street/P.O.Box:	39, Juhu Beach
Building:	Juhu
City:	Mumbai
State/Region:	Maharashtra
Postcode/ZIP:	400 049
Country:	India
Telephone:	91-22-66938888
FAX:	91-22-26201972
E-Mail:	ab@omnitex.com
URL:	
Represented by:	
Title:	Managing Director
Salutation:	Mr.
Last Name:	Advani
Middle Name:	Gul
First Name:	Rajesh
Department:	
Mobile:	91-09820702302
Direct FAX:	91-22-26202170
Direct tel:	91-22-66938888
Personal E-Mail:	rgadvani@hotmail.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No ODA is flowing to the project.

Annex 3

BASELINE INFORMATION

The Operating Margin data for the most recent three years and the Build Margin data for the NEWNE Regional Electricity Grid as published in the CEA database are as follows:

Grid Emission Factors[20]:

The Operating Margin data for the most recent three years and the Build Margin data for the NEWNE Regional Electricity Grid as published in the CEA database are as follows:

Simple Operating Margin

	NEWNE Grid (tCO2e/MWh)
Simple Operating Margin - 2005-06	1.0195
Simple Operating Margin - 2006-07	1.0083
Simple Operating Margin - 2007-08	0.9906
Average Operating Margin of last three years	1.0090

Build Margin

	NEWNE Grid (tCO2e/MWh)
Build Margin	0.5977

Combined Margin Calculations

	Weights	NEWNE Grid (tCO_2e/MWh)
Operating Margin	0.75	1.0090
Build Margin	0.25	0.5977
Combined Margin		0.9062

[20] "CO_2 Baseline Database for the Indian Power Sector" version 4.0 dated 1 September 2008 published by the Central Electricity Authority, Ministry of Power, Government of India on http://cea.nic.in

Annex 4

MONITORING INFORMATION

The points given below detail the monitoring plan and are for the MSEDCL meter:

The general conditions set out for metering, recording, meter readings, meter inspections, Test & Checking and communication are as per the PPA (power purchase agreement) with MSEDCL.

Metering: The Delivered Energy is metered by MSEDCL and SNS at the high voltage side of the step up transformer installed at the Project Site.

Metering Equipment: Metering equipment is electronic trivector meter of accuracy class 0.2% required for the Project. Dedicated core of both CT's and PT's of required accuracy is made available by the SNS to MSEDCL. The metering equipment is maintained in accordance with electricity standards. The meter has the capability of recording hourly and monthly readings. The meter installed is capable of recording and storing half hourly readings of all the electrical parameters for a minimum period of 90 days with digital output.

Meter Readings: The monthly meter reading will be taken jointly by the MSEDCL and EIL representative on the first week of the following month. At the conclusion of each meter reading an appointed representative of the MSEDCL and EIL sign a document indicating the number of kWh indicated by the meter.

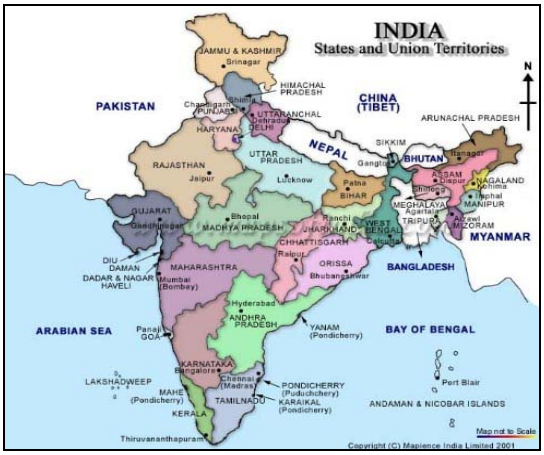
Inspection of Energy Meters: The main meters (export and import) and all associated instruments (CTPT) installed at the Project shall be of 0.2% accuracy class. Each meter is jointly inspected and sealed on behalf of MSEDCL and SNS is interfered with by either Party except in the presence of the other Party or its accredited representatives.

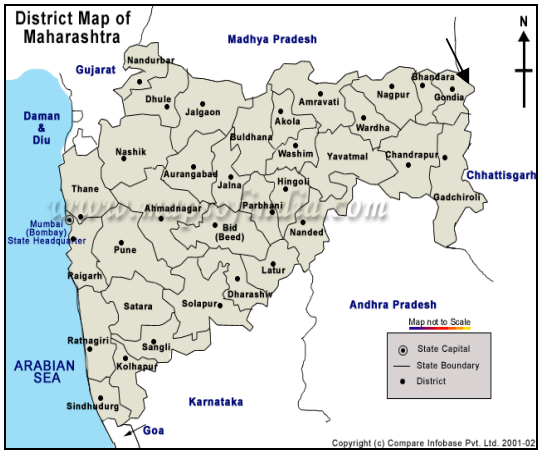
Meter Test Checking: The meter is tested for accuracy annually with reference to a portable standard meter which is of an accuracy class of 0.1%. The portable standard meter is owned by the MSEDCL at its own cost and tested and certified from an accepted laboratory standard meter in accordance with electricity standards. The consumption registered by the meter will hold good for the purpose of billing as long as the error in the main meter is within the permissible limits.

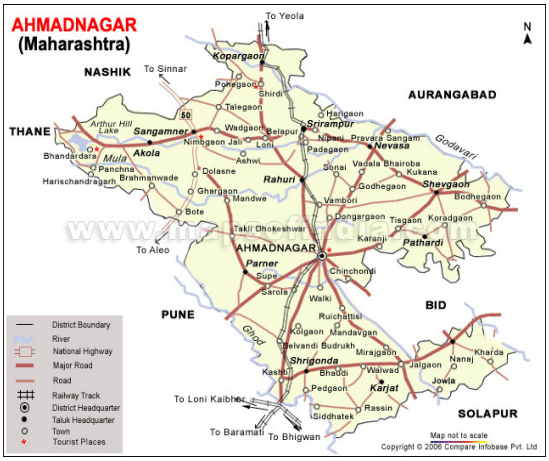
If during the tests, the meter is found to be beyond the permissible limits of error, the meter shall be immediately calibrated and the correction applied to the reading registered by the meter to arrive the correct reading of energy supplied for billing purposes for the period from the last month's meter reading up to the current test. Billing for the period thereafter till the next monthly reading shall be as per the calibrated meter.

- - - - -

Appendix 1: Project Location Map







Appendix 2: Local Stakeholders Consultation Minutes of Meeting

Local Stakeholder Consultation meeting at Satara for the Wind Power Projects of Sun-n-Sand Hotels Private Limited at Karpewadi and Nivi villages on 10.12.2008

Context:

The Sun-n-Sand Hotels Private Limited (SnS) is setting up wind farms for power generation at Patan in Satara district in the state of Maharashtra. These farms will generate 4.8 MW power and the electricity generated from this wind farm is used for supplying the power to the state grid. The project activity comprises of supply, erection, commissioning & operation of 6 numbers of gear-less wind electric converter each capacity 800 kW of Enercon make.

The local stakeholders were intimated of the stakeholder consultation meeting on 24.11.2008 by public notice to local stakeholder. The meeting was held at Enercon India Limited Satara office on 10.12.2008 at 3:00pm in Karpewadi village.

The agenda of the meeting has been as follows:

1. Election of the chair of the meeting and approval of the proposed agenda
2. Presentation about the project undertaken by SnS
3. Introduction to Kyoto protocol and CDM and the role of stakeholders
4. Discussion ad articulation of concerns
5. Chair summarizing the local stakeholders concerns
6. Vote of thanks

Welcome Speech:

Mr. Sharad started with the brief introduction and welcomed stakeholders. He explained that meeting has been convened for discussing the opinions, concerns and benefits from the wind power project established in this region by the Sun-n-Sand Hotels Private Limited.

Mr. Bhumaiya began his speech with brief background of the company and explained that SnS is committed to protect the environment and to be part of this process; the organization has developed the wind farm which generates pollution free power. It adds to national resources and above all it generated employment to the local villagers and helps in increasing the standard of living of the society. He also said that wind farm helps in economic well being of the society through various job opportunities i.e. civil construction, drivers, security personnel, technicians and casual labors etc.

The consultant representative of SnS explained about the Kyoto protocol and CDM to all the stakeholders and in his speech he explained how carbon levels in the atmosphere is increasing and to reduce the green house gas emission various non-polluting initiative are to be initiated. He further explained how wind farm project generated pollution free energy and helps in creating employment opportunities to the villagers. He further added wind power projects also helps in catering the power shortage faced by the nation.

After the presentation by SnS and their consultant representative the interactive session with the stakeholders was held. The detail of the interactive session is presented below:

Queries from the stakeholders and responses by the project proponent

Query 1: Will the project help in improving the electricity supply to the villagers/ village school?
Reply: It is expected that the power generated from wind farm is fed to the state electricity grid and the distribution of electricity is in the domain of state utility authorities.

Query 2: Does the earthing inserted by you in the fields render them safe to walk on? Does this affect the groundwater in any manner?
Reply: The wires are inserted inside as insulated covering which prevents any leakage of electricity and these are extremely safe to walk over and do not pose any danger to the villagers. The earthing too does not affect the groundwater at all.

Query 3: What are the factors affecting Global warming and the bad effects thereon?
Reply: The major factors causing global warning is increase in CO_2 and other greenhouse gases level in the atmosphere. The major ill effects of the global warming are the increase in the average ambient temperature level, increase in the sea water level, changes in the weather conditions etc.

Queries from the project proponent and responses by the stakeholders
Query 1: Are there any benefits of wind power project that you have observed?
Reply: The villagers of the nearby villages have got employment as security guards, drivers, laborer etc. The medical facility in the area has been improved and there is also a well equipped ambulance made available for the villagers to transport them quickly to the nearby dispensary, clinic in case of an emergency.

Query 2: Are there any problem for cattle grazing or any other activity that you were carrying out in past at the site?
Reply: There are no effects for the cattle grazing and other activities in the site after the installation of the wind mill.

Query 3: Have you observed any disturbances due to noise from the project?
Reply: No there have been no disturbances.

Query 4: Do the project personnel and authorities maintain a good relationship with villagers?
Reply: Yes, they maintain the good relationship.

Query 5: Have the installation of the wind farm affected your agricultural activities?
Reply: No, it has not affected the agricultural activities.

Query 6: Should such kind of projects be promoted in the region.
Reply: Yes, more of such kind of projects should be installed in the region.

Vote of thanks:
The representative of the SnS and their consultant along with the people from Enercon India Limited at the project site thanked the villagers who participated in the meeting. They thanked the villagers for their time and effort taken to come to the venue of the meeting and for sharing the opinion about the project. The meeting concluded at 5:00pm.

Appendix 3: Weighted Average Cost of Capital

Weighted Average Cost of Capital:

WACC = [D/ (D+E)]*[Cost of Debt] + [E/ (D+E)]*[Cost of Equity]

Cost of Debt:
In order to reflect the standard rate in the market the bank prime lending rate prevailing at the time of project start date has been considered as the cost of debt. The Prime Lending Rate (PLR) at the time of investment was in the range of 12.25 – 12.75[21]. The average PLR of 12.50% has been considered as the cost of debt.

Interest costs are tax deductible, therefore in order to arrive at the post tax cost of debt, the cost of debt is multiplied with marginal tax rate. The loan tenure of the project is 10 years, it may be noted that for the first 10 years, all power projects in India are required to pay income tax (as per section 80 IA of Income Tax Act). Accordingly applicable income tax rate has been considered as 33.66%. The post tax cost of debt therefore works out to: 12.5% * (1-33.66%) = 8.29%

Calculation of Cost of Equity:
The expected return on equity has been determined using the Capital Asset Pricing Model (CAPM)[22]. The CAPM economic model is used worldwide to determine the required/expected return on equity based on potential risk of an investment. The CAPM framework is the Nobel award winning work of financial economist Dr. William Sharpe.

Ke = Rf + B x (Rm - Rf)
where:
Ke = Rate of return on equity capital;
Rf = Risk-free rate of return;
B = Beta;
Rm – Rf = Market risk premium;

Risk free rate:
The risk free rate is understood as the rate of return on an asset that is theoretically free of any risks, therefore the rate of interest on government bonds are considered as risk free rates. Page 191 of text book on "Corporate Finance Theory and Practice" by Dr. Aswath Damodaran[23] of Stern School of Business, New York University describes that the long term government bond rates are suitable indicators of risk free rates since the time horizon for this investment is long term.

[21] http://www.rbi.org.in/scripts/WSSView.aspx?Id=12236
[22] The Capital Asset Pricing Model (CAPM) was published in 1964 by William Sharpe, for his work on CAPM Sharpe received the Nobel Prize in 1990. http://www.investopedia.com/articles/06/CAPM.asp

[23] Dr. Damodaran is one of the foremost authorities in the world in the field of Investment Analysis

Accordingly the risk free rate has been taken from long dated Indian government bond rates prior to the project investment decision. The data on government bond rates is published by Reserve Bank of India[24].

The applicable risk free rate is 7.89 %.

Risk Premium:
The most common approach for estimating the risk premium is to base it on historical data, in the CAPM, the premium is estimated by looking at the difference between average return on stocks and average return on government securities over an extended period of history [page 190, Corporate Finance Theory and Practice, Dr. Aswath Damodaran.[25]]. It is preferred to use long term premiums, i.e. over a period of 25 years, since considering shorter time periods can lead to large standard errors because volatility in stock returns [page 191, Corporate Finance Theory and Practice, Dr. Aswath Damodaran.] It is also preferred to calculate the risk premium based on geometric mean of the returns since arithmetic mean overstates the risk premium. Geometric mean is defined as the compounded annual return over the same period [page 191, Corporate Finance Theory and Practice, Dr. Aswath Damodaran]. Therefore the risk premium has been calculated as the difference in compounded annual return between the BSE-Sensex and the Government bond rates since the year of inception of BSE Sensex, i.e. 1979 – 80. The detailed calculations are presented in the attached excel sheet. Source: BSE Stock Exchange (www.bseindia.com)

The applicable risk premium is 8.82 %.

Beta:
Beta (B) indicates the sensitivity of the company to market risk factors. For companies that are not publicly listed, the beta is determined by referring beta values of publicly listed companies that are engaged in similar types of business. The project activity type is wind power generation; the approach therefore should be to base the beta for the project on the beta values of listed wind power generation companies in India. However, there was only one wind energy or renewable energy power generation company (BF Utility) listed on any stock exchange in India (both BSE- Bombay Stock Exchange and NSE-National Stock Exchange) in year 2007[26]. Therefore, in the absence of adequate data on companies which are exclusively into the exactly same type of business (i.e wind power projects), the next best option for assessing the risk of these projects is to consider the data available on companies which are involved in similar businesses.

Therefore, we have considered beta values of all electricity generating companies in India. The group of companies considered includes renewable as well as conventional power generating companies. Investors demand a higher return from renewable energy projects than from conventional energy ones, given the higher risks in renewable, including risks of technology, risks from significantly varying and unpredictable resource availability (e.g. wind), and a lower established support base for such projects relative to that for conventional power (e.g. grid connections, bank finance, suppliers, etc.). The use of

[24] (Web-link: http://rbidocs.rbi.org.in/rdocs/Publications/PDFs/80303.pdf)

[25] All such related sources would be submitted to the DOE during validation.

[26] This can be verified from the database available at the web-link www.securities.com (This website is owned by a Euromoney Institutional Investor Company and It delivers hard-to-get information on more than 80 emerging markets through its award-winning online Emerging Markets Information Service.)

this Beta value is therefore considered conservative, as it does not add for the higher risk of non conventional energy.

The applicable Beta value has been determined on the basis of the Beta values of all power generating companies in India which were listed on the stock exchange at the time of this investment. Beta values of individual companies have been sourced from Bloomberg and screenshots are available in appendix - 4. The table below summarises the beta values:

Beta Values of all Lised Power Generating Companies in India at the time of Project Investment		
Bloomberg Symbol	**Company Name**	**Beta**
NRELE Equity	RELIANCE INFRASTRUCTURE	1.256
GIP IN Equity	GUJARAT INDS	0.902
TPWR IN Equity	TATA POWER CO	1.196
NLC IN Equity	NEYVELI LIGNITE	1.285
CESC IN Equity	CESC LTD	1.265
BFUT IN Equity	BF Utility	2.632
		1.423

Source:Bloomberg[27]

WACC = [D/ (D+E)]*[Cost of Debt] + [E/ (D+E)]*[Cost of Equity]

For calculation of WACC, a debt : equity ratio of 70:30 has been considered, as typical for the project Type[28].

WACC = 70%* 12.50%*(1-33.99%) + 30%*(7.89 % +1.42* 8.82%)
Therefore, WACC = 70% * 8.25% + 30% * 20.4% = **11.91%**

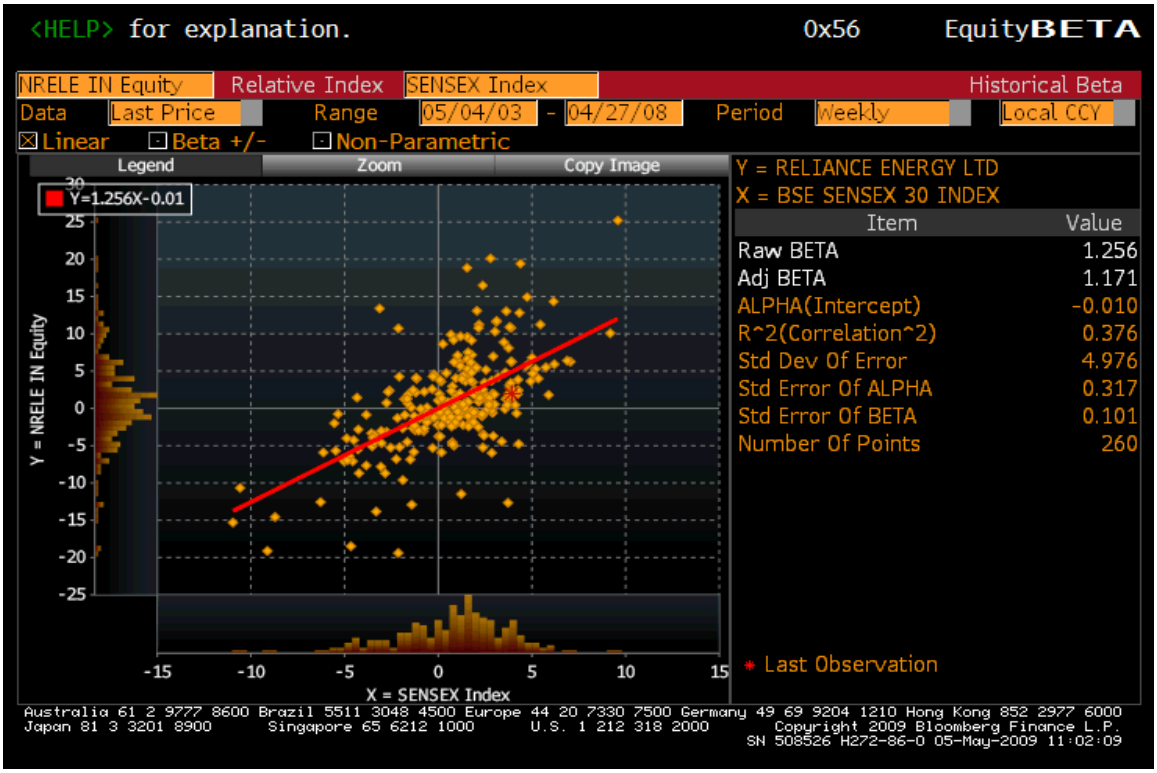
[27] The beta value used, are the regression betas calculated by Bloomberg based on periodic stock returns. Bloomberg also provides an adjusted beta value after making the following adjustments:
Adjusted Beta=Regression Beta (denoted as Raw beta) *(0.67) +1.00*(0.33)

Bloomberg states that this is a default adjustment on the assumption that in future, over a period of time all betas may tend towards the average beta i.e. one. The approach outlined in corporate finance states: the conventional approach to estimate the beta of an investment is a regression of return on investment against returns on a market index (please see attached page no. 196 from "Corporate Finance Theory and Practice by Aswath Damodaran). Accordingly, the regression beta (and not the adjusted beta) value has been considered.

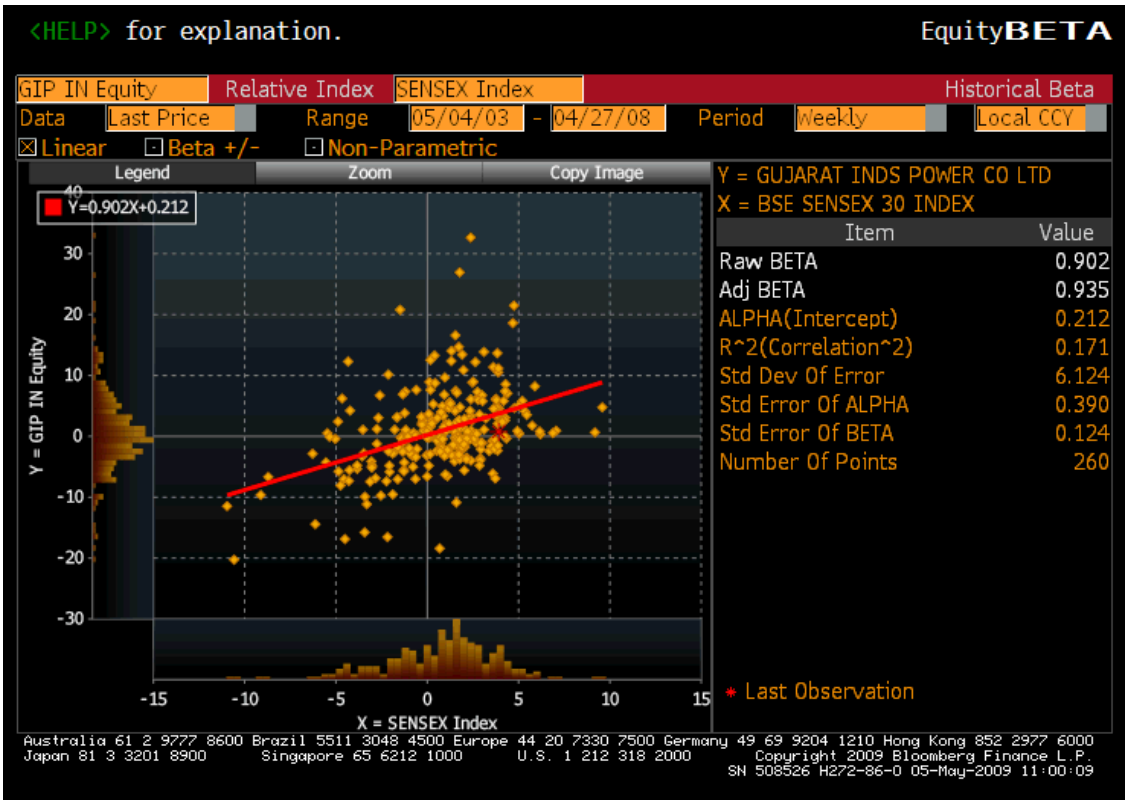
[28] Several regulations and orders refer this as the normative debt equity ratio for wind power projects.

Appendix 4: Bloomberg's screenshots of individual companies for Beta Value

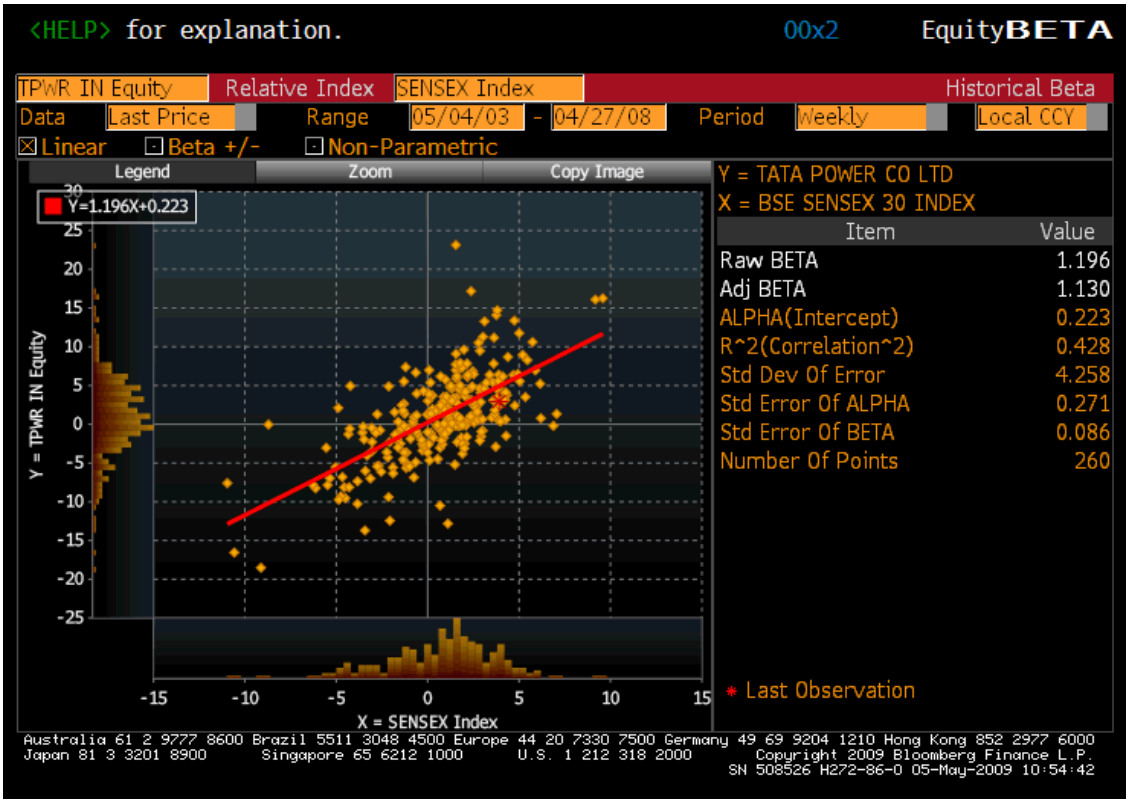
RELIANCE INFRASTRUCTURE



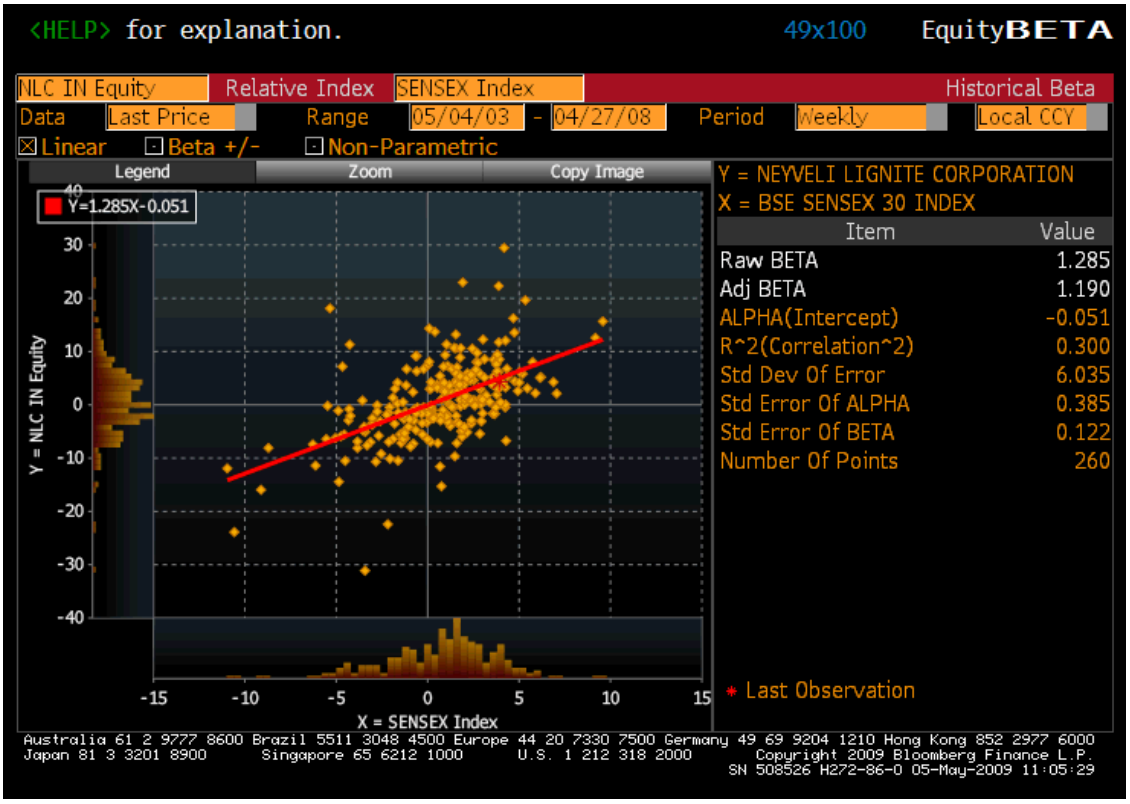
GUJARAT INDUSTRIES



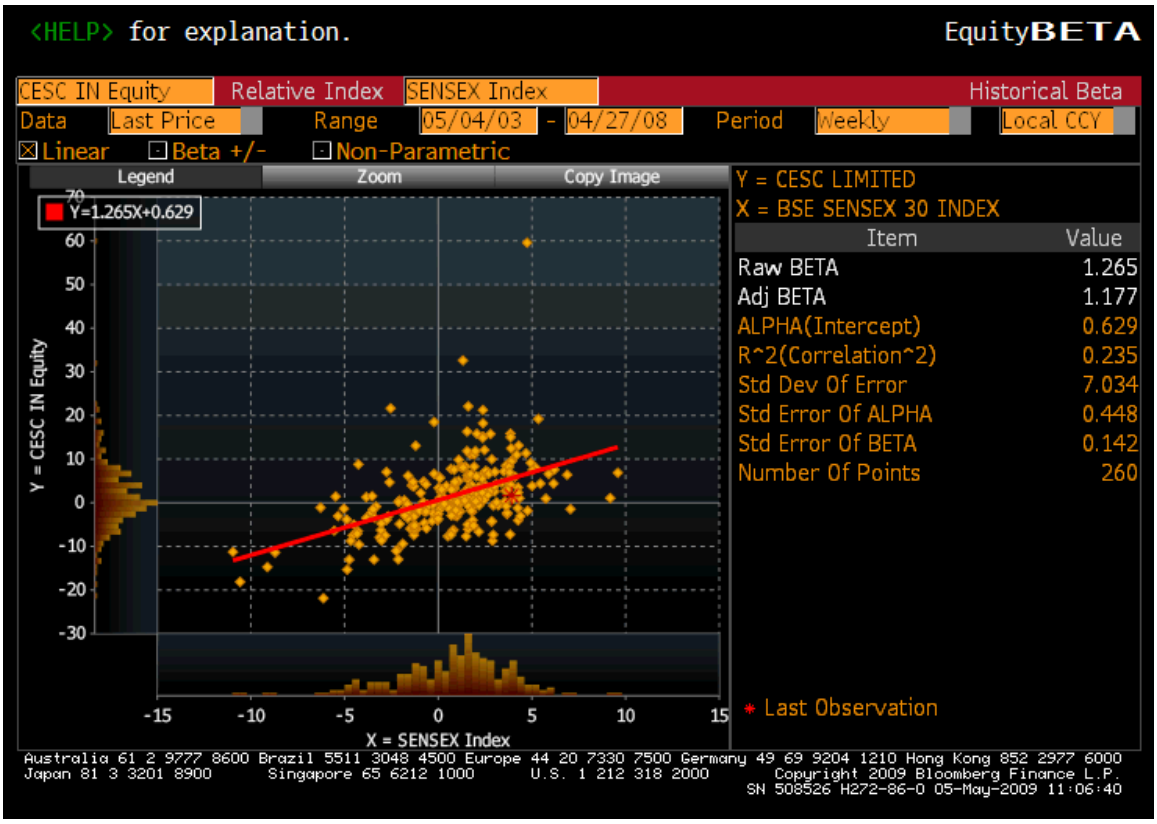
TATA POWER COMPANY



NEYVELI LIGNITE



CESC LIMITED



BHARAT FORGE UTILITY