Voluntary Carbon Standard
Project Description Template

19 November 2007

[Date of the VCS PD]
11.12.2009
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1 Description of Project:

1.1 Project title
Version 3

"Bundled Grid connected 2.9 MW Wind Power Project in India by Kamal Engineering Corporation [Unit of KEC Industries Ltd]"

1.2 Type/Category of the project
According to the Appendix B of the simplified modalities & procedures for small-scale CDM-project activities set by Executive Board of **UNFCCC for Clean Development Mechanism** Project under the Kyoto Protocol, the project is a small scale CDM project activity. The project activity is a renewable energy project with maximum output capacity of 2.9 MW (<15 MW, the maximum output for small scale project). The project activity conforms to the following category;

Project Type 1: Renewable Energy Projects
Project Category I.D: Grid connected renewable electricity generation

1.3 Estimated amount of emission reductions over the crediting period including project size:

Year	**Estimation of annual emission reduction in tonnes of CO_2e**
2006-07	*5016*
2007-08	*5016*
2008-09	*5016*
2009-10	*5016*
2010-11	*5016*
2011-12	*5016*
2012-13	*5016*
2013-14	*5016*
2014-15	*5016*
2015-16	*5016*
Total estimated reductions (tonnes of CO_2e)	***50160***
Total number of crediting years	***10 years for fixed crediting period***
Annual average of estimated reductions over the crediting period (tonnes of CO_2e)	***5016***

The project activity is neither a micro project nor a mega project, since the emission reductions are neither below 5000 tCO2e/annum or nor above 1000000 tCO2e/annum. Hence, the project activity falls under **"project category"** as per VCS guidelines. Since the project is developed by single project promoter, **option 1: Individual**

Validation and Verification of a GHG Project has been chosen as per the latest VCS guidelines.

1.4 A brief description of the project:

The project intends to install two Wind Turbine Generators (WTGs) of 1.65 MW and 1.25 MW capacity totaling to an installed capacity of 2.9 MW. The project activity is located across two states of India namely, Maharashtra, and Tamilnadu (Table1).

Table 1. Details of the WTGs

State	Village	District	Date of commissioning	WTG ID Number	Capacity MW
Tamilnadu	Devarkulam	Tirunevelli	29.03.2005	K-118	1.25
Maharashtra	Brahmanvel	Dhule	08.02.2006	L-12	1.65

The annual net power generation of the proposed project activity is estimated to be 5460 MWh, which is exported to the respective regional grid. These regional grids are predominantly fossil fuel dependent and have high grid emission factor 0.906 and 0.931 tCO_2/MWh [1], respectively. In the absence of the project, the equivalent amount of power generated by the proposed wind project would have been supplied by fossil fuel dominated respective regional grids. Therefore, the proposed project will contain greenhouse gas (GHG) emission by 5016 tCO_2 per annum. Project activity offers both, a source of power that completely avoids the emission of carbon dioxide, the main GHG and also produces none of the other pollutants (SOx, NOx, Soot, Suspended particulates, Fly ash, etc.) associated with fossil fuel combustion.

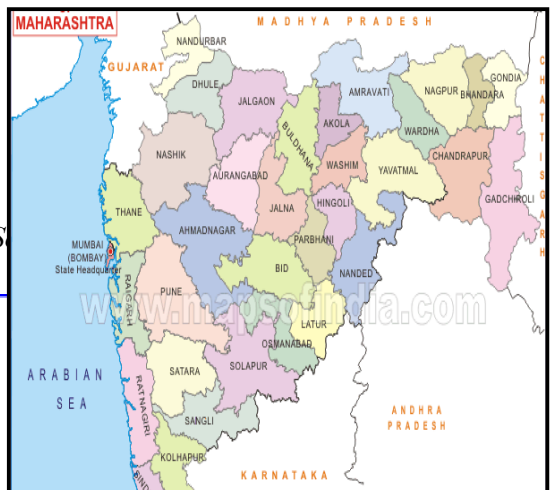
1.5 Project location including geographic and physical information allowing the unique identification and delineation of the specific extent of the project:

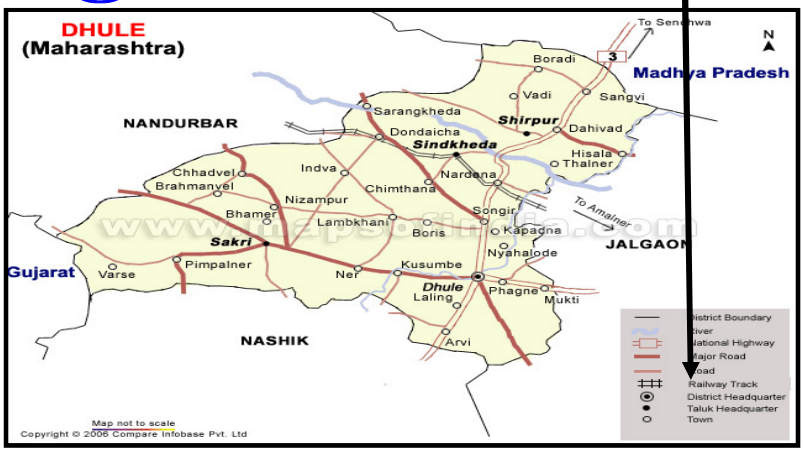
Tamilnadu:

The nearest railway station is Tiruneveli which is approximately 40 km from the site and nearest airport is Madurai. The latitude and longitude of the WTG are 8° 57' 18.3" N 77° 35' 14.9" E respectively.

Maharashtra:

The site is located at a distance of about 12 kms north of Dhahivel Naka on the Dhule – Surat state highway. The nearest railway station is Nandurbar which is approximately 50 km from the site and nearest airport is Aurangabad/Baroda. The latitude and longitude of the WTG are 21° 09' 57.2" N and 74° 12' 28.7" E respectively.




DHULE
(Maharashtra)
NANDURBAR
NASHIK
Gujarat
Madhya Pradesh
JALGAON
To Amalner
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Dondaicha
Sindkheda
Shirpur
Dahivad
Hisala
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Nardana
Chimthana
Nizampur
Bhamer
Lambkhani
Songir
Boris
Kapadna
Sakri
Nyahalode
Pimpalner
Varse
Kusumbe
Ner
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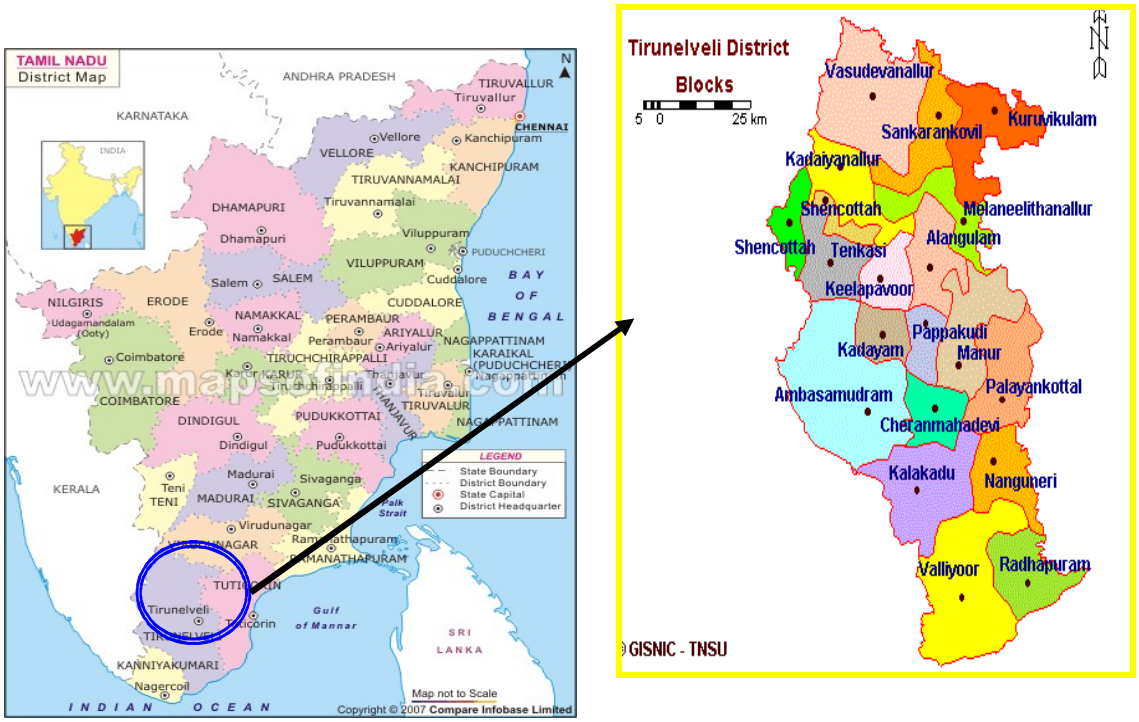

1.6 Duration of the project activity/crediting period:

- Project Start Date: 29/03/05 (The date of the commissioning of 1ST WTG in Tamilnadu 29.03.3005 [2])
- Crediting Period Start Date: 28/03/2006
- Working /project activity life shall be 20 years
- Crediting Period: 10 Years (Fixed)

1.7 Conditions prior to project initiation:

In the absence of the project, the equivalent amount of power generated by the proposed wind project would have been supplied by fossil fuel dominated respective regional grids (NEWNE and Southern. The annual net power generation of the proposed project activity is estimated to be 5966 MWh, which is exported to the respective regional grid. These regional grids are predominantly fossil fuel dependent and have high grid emission factor 0.906 and 0.931 tCO_2/ MWh, respectively.

1.8 A description of how the project will achieve GHG emission reductions and/or removal enhancements:

The project activity involved setting up of WTGs to harness renewable energy i.e., the power of wind to produce electricity. In the absence of the project activity, the equivalent amount of power would have been supplied by the respective regional grids i.e., Southern and NEWNE grid which are dominated by fossil fuel fired plants. Hence, the baseline for the project activity is the equivalent amount of power from the respective state grids.

[2] http://v-c-s.org/100908deadline.html

1.9 Project technologies, products, services and the expected level of activity:

The project activity is a renewable energy project with maximum output capacity of 2.9 MW (<15 MW, the maximum output for small scale project) this comes under the Appendix B of the simplified modalities & procedures for small-scale CDM-project activities.

Technology:

KAMAL ENGINEERING CORPORATION has procured the two WTGs (1.25 and 1.65 MW capacities) from M/s SUZLON Energy Ltd. and M/s NEG-MICON (VESTAS WIND TECHNOLOGY INDIA PVT LT) respectively. Technical details of these WTGs are given in Table below.

Table Technical specification of the WTGs

Sr. No.	Item	Description	Description
1	Make & Model No	Suzlon S-66	Vestas NM/V-82
2	Rating in KW	1250	1650
3	Rotor Diameter	64m	82m
4	Rotor Swept Area	3218 m2	5281 m2
5	Cut in Wind Speed	4 m/s.	3.5 m/s
6	Cutout Wind Speed	25 m/s.	20 m/s
7	Number of Blades	3	3
8	Rotational Speed	13.9/20.8 rpm	14.4 rpm
9	Hub Height	65 m	78m
10	Gear Ratio	1:74.917	1:70.2
11	Mechanical Power	1390 KW	1800 Kw

There is no greenhouse gas emissions associated with this type power generation. The technology used in the project activity is environmentally safe and sound.

1.10 Compliance with relevant local laws and regulations related to the project:

The project activity is not mandated by any local or national laws [3] .Electricity generation from wind farm is not a legal requirement or a mandatory choice. The Indian Electricity Act of 2003 does not restrict or empower any authority to restrict the fuel choice for power generation. ***As per Section 7 of the Electricity Act, 2003 "..A generating station may be established, operated and maintained without obtaining a license under the Act."*** It should be noted that the generating station also include wind power projects.

Further, project proponent has obtained necessary approvals from respective state electricity boards, which includes No Objection Certificate (NOC) for setting up of the project/WTGs and commissioning certificates. The Power Purchase Agreement (between

[3] Clarification on Section 7 of the Electricity Act 2003 http://www.powermin.nic.in/acts_notification/electricity_act2003/pdf/Setting%20up%20of%20generating%20station.pdf

the PP and TNEB and MSEB) which is related to the regulatory requirements is available as compliance evidence. Other than this, no other local law/regulation is related to the project activity.

1.11 Identification of risks that may substantially affect the project's GHG emission reductions or removal enhancements:

Wind power generation is considered in-firm due to its dependence on like availability of wind, machine, grid etc. at any time. This is unlike conventional power sources where PLF is dependent on availability of fuel (coal or diesel), which is not a significant problem in India. CUF in case of WTG may be further affected by the non-availability of grid and can affect the emission reduction.

1.12 Demonstration to confirm that the project was not implemented to create GHG emissions primarily for the purpose of its subsequent removal or destruction.

The project proponents have invested in WTGs primarily for the purpose of selling the power generated to the state grid and does not involve emission of any GHG. Hence, the project was not implemented to create GHG emissions primarily for the purpose of its subsequent removal or destruction.

1.13 Demonstration that the project has not created another form of environmental credit (for example renewable energy certificates).

PP has applied for project registration under CDM as well. As per the UNFCCC guidelines, crediting period start date will be the project registration date. Under VCS, project crediting period will be from 08/02/2006 to 07/02/2016. PP intends to apply for VERs from 08/02/2006 till project registration with UNFCCC under CDM.

PP will take the necessary steps to assure that VCUs and CERs are not claimed for the same electricity generation. PP understands that it cannot generate VCUs and CERs simultaneously as this is considered 'double counting' and embraces its responsibility to protect the integrity of the environmental programs to which it applies. There are no other environmental credits similar to renewable energy certificates that the project creates for the VCU period.

1.14 Project rejected under other GHG programs (if applicable):

The project activity has not been rejected under any other GHG programme.

1.15 Project proponents roles and responsibilities, including contact information of the project proponent, other project participants:

Roles and Responsibilities:

The activity specific responsibilities of various participants are as follows.

Overall project coordination:
The project proponent will be responsible for overall coordination for VCS/CDM registration and subsequent verification. The maintenance, calibration and quality of monitoring and record keeping of data required for validation and verification will be managed by the PP. The data will be suitably archived and protected for future reference.

JMR preparation & Calibration of meters:
Respective State Electricity Board (SEBs) will be responsible for installation and calibration of energy meter(s) which will be used to monitor power supplied to the respective grid. SEBs personnel will take reading of power generation and issue the Joint Meter Reading sheets every month, which will forms the basis for emission reduction estimations.

Training and O&M Activities:
Wind farm developer's O&M team will be responsible for preventive maintenance and trouble free operation of WTGs under the overall responsibility of site in-charge. O&M team will ensure JMR with state authorities too.

Table: Responsibility of CDM Project Team

Participant	Responsibilities
Project Manager (representative of PP)	Project overall coordination for VCS/CDM registration and project management
Site In-charge	Operation, data verification, Operation and Maintenance, regular Site Visit to check the data storage and take corrective actions, wherever is necessary (O&M Team)
Shift In- Charge	Operation and Maintenance, Data recording and storage (O&M team)

Contact Information:
The contact details of the project proponent is

Mr. S.K. Gupta

Manager
KAMAL ENGINEERING CORPORATION [UNIT OF KEC INDUSTRIES LTD]
22 Kasturba Gandhi Marg,
616, Antriksh Bhawan,
New Delhi, India.
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Telephone: +91-11-23351365, 23723158
FAX:+91-11-23721656, 23351369, E-Mail:kamal@kecindustries.com

1.16 Any information relevant for the eligibility of the project and quantification of emission reductions or removal enhancements, including legislative, technical, economic, sectoral, social, environmental, geographic, site-specific and temporal information.):

Project activity's contribution to sustainable development
This project activity by its inherent nature of green electricity generation stimulates sustainable development of Maharashtra and Tamilnadu in several ways as described as under:

Social- economic wellbeing:

- The proposed project activity is situated in remote rural location. The project activity has contributed significantly to the economic development of the region by generating income through land sale, permanent and temporary employment generation by onsite (construction site) as well as offsite (technology suppliers/manufacturers) employment opportunities.
- The operation and maintenance of the power plant also needs skilled manpower and professionals. Moreover, the local job opportunities also help in minimizing migration to urban areas.
- The infrastructure in and around the project area will also improve due to project activity.
- The generated electricity is fed into the regional grids, thereby improving the availability of electricity to the local consumers (villagers & sub-urban habitants) which will provide new opportunities for industries and economic activities ultimately leading to overall development.

Environmental well being:

- Regional grids are highly dependent on fossil fuels which emit greenhouse gases and other harmful pollutants (NOx, SOx, PM, flyash, etc.) in the atmosphere. The wind technology in the project activity is environmentally safe and will contribute towards reducing the emissions of GHGs and other pollutants.
- In summary - promotion of such projects ensures adequate power supply, improved air quality, conservation of natural resources (fossil fuels), alternative sources of energy and improved local livelihoods.

Technology well being:

- The project activity implementation will set an example for other industries/business houses to come up with similar projects for sustainable power generation.
- In addition, the project activity will also encourage technology suppliers and manufactures to put in more efforts/funds for further improvement of equipment/machinery and help in removing technological barriers in such projects.

The project activity meets the approved guidelines for CDM projects stipulated by the Government of India and received Letter of Approval (HCA) from National DNA on 29/01/2009.

1.17 List of commercially sensitive information (if applicable):

Not Applicable

2 VCS Methodology:

2.1 Title and reference of the VCS methodology applied to the project activity and explanation of methodology choices:

Methodology: AMS I.D. "Grid connected renewable electricity generation", Version: 13
Reference: EB 36, Sectoral Scope: 01

Tool: "Tool to calculate the emission factor for an electricity system" Version 01.1,
Reference: EB 35

2.2 Justification of the choice of the methodology and why it is applicable to the project activity:

The project status is in line with the methodology AMS I.D. Specific features of the project activity and applicability of methodology AMS I.D. /Version 13 are discussed in Table below.

Table: Applicability justification of the AMS I.D

S. No.	Applicability of AMS I.D	Project Status
1	This category comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal, and renewable biomass, that supply electricity to and /or displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel firing power station	The project activity will displace fossil fuel dominated electricity generation in NEWNE and Southern grids by renewable source i.e., wind power.
2.	If the unit added has both renewable and non renewable components (e.g. a wind/diesel unit), the eligibility limit of 15MW for a small-scale CDM project activity applies only to the renewable component.	The project has only renewable component. The aggregate capacity of these newly installed units is 2.90 MW which is lower than the threshold limit of 15 MW.
3.	Combined heat and power (co-generation) systems	The project activity does not involve any co-

	are not eligible under this category.	generation system. The only output from a wind installation is electricity.
4.	In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.	This is a Greenfield project and does not involve the addition of renewable energy generation unit an existing renewable power generation facility.
5.	Project activities that seek to retrofit or modify an existing facility for renewable energy generation are included in this category. To qualify as a small scale project, the total output of the modified or retrofitted unit shall not exceed the limit of 15 MW.	This is a Greenfield project activity that does not seek to retrofit or modify an existing facility for renewable energy generation.

Conclusion:

The project activity is a renewable energy based power generation which will export generated power to the NEWNE and Southern grid of India. The geographic and system boundaries for the relevant electricity grids are clearly identified therefore the project activity matches the applicability criteria of the methodology AMS I.D. /Version 13.

2.3 Identifying GHG sources, sinks and reservoirs for the baseline scenario and for the project:

As per the methodology AMS I.D "the project boundary encompasses the physical, geographical site of the renewable generation source". The project boundary consists of the WTGs, the metering equipments for each WTG, and connected electricity grid.

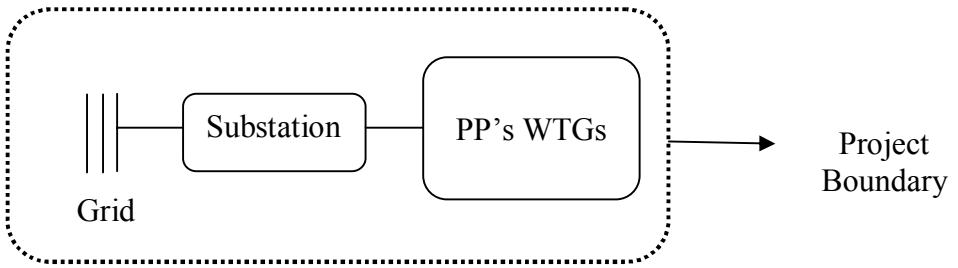

Figure: Project boundary

	Source	Gas	Included (Y/N)	Justification / Explanation
Baseline	Grid Electricity Generation	**CO2**	**Y**	Main emission source
		CH_4	**N**	Minor emission source
		N2O	**N**	Minor emission source
Project Activity	Electricity Generation	**CO2**	**N**	The project activity is a renewable energy project
		CH_4	**N**	
		N2O	**N**	

2.4 Description of how the baseline scenario is identified and description of the identified baseline scenario:

The project activity involved setting up of WTGs to harness renewable energy i.e., the power of wind to produce electricity. In the absence of the project activity, the equivalent amount of power would have been supplied by the respective regional grids i.e., Southern and NEWNE grid which are dominated by fossil fuel fired plants. Hence, the baseline for the project activity is the equivalent amount of power from the respective state grids. Following sections provide an insight of power generation scenario in India and regional grids to which WTGs are connected.

Power generation, supply and demand scenario in India:

In 2007, the total Indian power generation capacity amounted to 138 GW, of which thermal based system constituted 65%, hydro 25%, nuclear 3% and renewable 7% (Table and Figure below)[4]. The current fuel mix shows diversity, however coal continues to be the dominant fuel with over 50% usage. By 2004-05, coal and lignite accounted for about 57% of installed capacity (68 GW out of 118 GW) and 71% of generated electricity (424 TWh out of 594 TWh) in the country[5]. Despite huge potential, India has not done enough in the area of renewable energy, as the current renewable capacity is a little more than 10000 MW, half of which was added in the last two years[6].

[4] Power Scenario At A Glance, CEA Planning Wing, Integrated Resource Planning, December, 2007. www.cea.nic.in

[5] Ananth P. Chikkatur and Ambuj D. Sagar. Cleaner Power in India: Towards a Clean-Coal-Technology Roadmap. A joint project of the Science, Technology and Public Policy Program and the Environment and Natural Resources Program Belfer Center for Science and International Affairs. December 2007. www.energytechnologypolicy.org

[6] Report of the Working Group on New and Renewable Energy for 11th Five Year Plan (2007-12), Ministry of New and Renewable Energy, Government of India, December 2006.

Table Installed power generation in India (Source)

Installed power generation capacity in India (MW)							
Year	Hydro	Coal	Gas	Diesel	Nuclear	RES	Total
2007	34680.7	73492.4	14581.8	1201.8	4120	10175	138251.7
2012	51233.7	127847.4	18848.2	1224.7	7500	23675	216829

Electricity availability India still falls far short of the global benchmarks. In 2004, per-capita consumption was 457 kWh, in contrast to the global average of 2500 kWh and the OECD average of 8200 kWh (IEA, 2006b) the country's power sector lags behind most other industrializing countries. In-spite of significant growth in electricity generation over the years, shortage of power continues to exist in India primarily on account of growth in demand for power outstripping generation capacity addition (Table below).

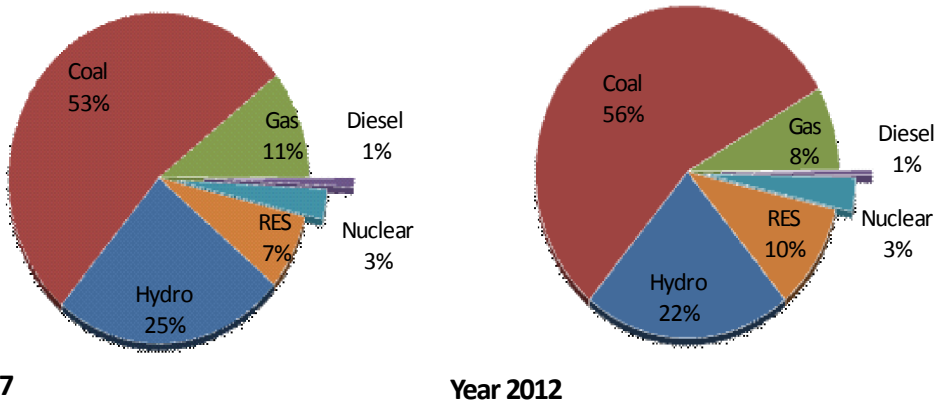

Figure 6: Percentage share of different fuels used for power generation in India

Table: 5.2 Energy and peak demand shortage (%) in India, WR, NR and SR Grid7

Period	India		Western Grid		Southern Grid	
	Peak deficit	Energy deficit	Peak deficit	Energy deficit	Peak deficit	Energy deficit
2001-02	12.6	7.5	16.9	10.4	15.6	8.8
2002-03	12.2	8.8	20.3	12.6	8.9	7.2
2003-04	11.2	7.1	20.4	10.7	5.4	5.2
2004-05	11.7	7.3	22.4	11.3	3.1	1.5
2005-	12.3	8.4	20.5	13.5	6.1	0.9

www.planningcommission.nic.in/aboutus/committee/wrkgrp11/wg11_renewable.pdf

[7] Power Scenario at A Glance, CEA Planning Wing Integrated Resource Planning Division, December 2007. www.cea.nic.in

06 2006-07	13.8	9.6	25.0	15.6	7	2.7
2007-08	12.9	7.9	23.0	13.2	7.1	2.5

Power generation capacity expansion plan in India:
The power sector has been given a high priority in the national planning processes in India and a concerted focus on enhancing this sector has resulted in significant gains in generation and availability of electricity in the years since last two decades. The Government of India has planned power generation capacity addition of over 100000 MW to achieve the promise "Power to All by 2012," increasing the per capita availability of power to over 1000 units by 2011-2012. Accordingly, it has planned to add 62000 MW in the XIth Five Year Plan (2007-2012) (Table below) and at least 66500 MW (2012-2017) in the XIIth Five Year Plan[8].

Power generation, supply demand scenario and expansion plan for regional grids:
Historically, Indian electricity system is divided into five regional grids, viz. Northern, Eastern, Western, Southern, and North-Eastern. However, recently all regional grids except the Southern Grid have been integrated and are operating in synchronous mode, i.e. at same frequency. Consequently, the Northern, Eastern, Western and North-Eastern grids will be treated as a single grid and is being named as NEWNE grid. The Western regional grid (now it is part of NEWNE grid) and Southern grid are major contributor to installed power generation capacity of India. These grids are also characterized by the dominance of the thermal fuels (Coal, gas and diesel). At present thermal based system, which is composed of coal fired system, gas and diesel are contributing have major share to the installed capacity as given in table below. The demand for power in these states is outstripping its availability.

Table: Installed power generation capacity in different regional grid

Installed power generation capacity in Western regional grid (MW)							
Year	Hydro	Coal	Gas	Diesel	Nuclear	RES	Total
2007	7198.5	23635.2	6600.8	17.5	1840	2670.3	41962.3
2012	8368.5	39435.2	6925.8	17.5	1840	2670.3	59257.3
Installed capacity in Southern regional grid (MW)							
2007	10646.2	16182.5	3586.3	939.3	1100	5899.3	38353.6
2012	11863.2	25542.5	4587.5	939.3	4040	5899.3	52871.8

[8] Report of the Working Group on Power for 11th Five Year Plan (2007-12), Ministry of New and Renewable Energy, Government of India, December 2006. www.planningcommission.nic.in/aboutus/committee/wrkgrp11/wg11_power.pdf

There is an urgent need to add more capacity to cope with ever increasing demand in these regions. The Central Electricity Authority (CEA) has estimated that meeting electricity demand over the next ten years, it will require more than doubling the existing capacity, from about 138 GW in 2007 to about 280 GW by 2017, of which at least 80 GW of new capacity is expected to be based on coal. Balance capacity addition would come largely from hydro power plants. But hydro power plants take more time to implement and any shortfall in achieving hydro capacity addition would also have to be made good by additional coal based projects[9]. Further, the Planning Commission of India also indicates that coal will fuel the power sector for at least the next three decades. In addition, it may be noted that the draft National Electricity Policy (2005) asserts ***'coal would necessarily continue to remain the major fuel***[10]. It clearly reflects the present as well as the future dominance of coal in these grids. Therefore in near future, the composition power generation would be dominated by the thermal power plants.

The methodology AMS-I.D. suggests that, for all such systems, the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO2e/kWh) calculated in a transparent and conservative manner.

(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 CO2e/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.

To calculate grid emission factor, Option A is selected. The required data is officially published by the Central Electricity Authority (CEA) of India, following the approaches and rules defined in Tool to calculate emission factor for an electricity system (Version 01.1) EB 35, Annex 12. For details and further information on data, following link can be followed:

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

Baseline Methodology procedure:
As per the "Tool to calculate the emission factor for an electricity system" project participants shall apply the following six steps:

STEP 1. Identify the relevant electric power system.
STEP 2. Select an operating margin (OM) method.

[9] Report of the Committee to Recommend Next Higher Unit Size for Coal Fired Thermal Power Stations. CEA Ministry of Power, Government of India, 2003

[10] National electricity policy India, 2005
http://powermin.nic.in/indian electricity scenario/national electricity policy.htm

STEP 3. Calculate the operating margin emission factor according to the selected method.
STEP 4. Identify the cohort of power units to be included in the build margin (BM).
STEP 5. Calculate the build margin emission factor.
STEP 6. Calculate the combined margin (CM) emissions factor.

Step 1. Identify the relevant electric power system:
A project electricity system is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity (e.g. the renewable power plant location or the consumers where electricity is being saved) and that can be dispatched without significant transmission constraints.

The Central Electricity Authority (CEA), Government of India has divided the Indian Power Sector into two regional grids, the New Integrated Northern, Eastern, Western, and North-Eastern regional grids (NEWNE) and the Southern Grid (see table below).

Table: Geographical Scope of regional grids in India

NEWNE Grid				Southern Grid
Northern	Western	Eastern	North Eastern	Southern
Chandigarh	Chhattisgarh	Bihar	Arunachal Pradesh	Andhra Pradesh
Delhi	Gujarat	Jharkhand	Assam	Karnataka
Haryana	Daman & Diu	Orissa	Manipur	Kerala
Himachal Pradesh	Dadar & Nagar Haveli	West Bengal	Meghalaya	Tamil Nadu
Jammu & Kashmir	Madhya Pradesh	Sikkim	Mizoram	Pondicherry
Punjab	Maharashtra	Andaman Nicobar	Nagaland	Lakshadweep
Rajasthan	Goa		Tripura	
Uttar Pradesh				
Uttarakhand				

However, Regional grid consists of independent state level electricity systems including public sector undertakings that exchange significant power within the region depending on the demand. Power generation and supply within the regional grid is managed by Regional Load Dispatch Centre (RLDC). Since the project supplies electricity to the Southern and NEWNE Grid, emissions generated due to the electricity generated by these regional grids as per CM calculations will serve as the baseline for this project.

Step 2: Selecting an Operating Margin (OM) Method:
The calculation of the operating margin emission factor (EFOM,y) is based on one of the following methods:
(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch data analysis OM, or

(d) Average OM.

Any of the four methods can be used, however, the simple OM method (option a) can only be used if low-cost/must-run resources constitute less than 50% of total grid generation in:
1) average of the five most recent years, or
2) based on long-term averages for hydroelectricity production.

According to CEA data, the percentage of total grid generation by low-cost/must-run plants (on the basis of average of five most recent years) for all three regional grids is much lesser than 50% of the total generation.

Share of Must-Run (Hydro/Nuclear) (% of Net Generation)			
Grid	2005-06	2006-07	2007-08
NEWNE	18.0%	18.5%	19.0%
Southern	27.0%	28.3%	27.1%
India	20.1%	20.9%	21.0%

Hence, simple OM can be used as the share of low cost must run sources are less than 50% for the NEWNE and Southern regional grid of India.

For the simple OM, the simple adjusted OM and the average OM, the emissions factor can be calculated using either of the two following data vintages:

Ex ante option: A 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period, or

Ex post option: The year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required to calculate the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year (y-1) may be used. If the data is usually only available 18 months after the end of year y, the emission factor of the year proceeding the previous year (y-2) may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting periods.

STEP 3: Calculate the operating margin emission factor according to the selected method

The simple OM emission factor is calculated as the generation-weighted average CO2 emissions per unit net electricity generation (tCO2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units.

In the project activity, (ex-ante) the full generation-weighted average for the most recent 3 years for which data are available at the time of PDD submission has been considered. It is confirmed that ex-ante vintage is considered in the project activity and cannot be changed during the crediting period. The CEA baseline emission

factor is derived using the following formulae to calculate simple OM.

$$EF_{grid\ OM,\ simple,\ y} = \frac{\sum_{i,m} FC_{i,m,y} x NCV_{i,y} x EF_{CO2,i,y}}{\sum_{m} EG,m,y}$$

Where;

$EF_{grid\ OM,simple,y}$	Simple Operating Margin CO2 emission factor in year y (tCO2/MWh)
$FC_{i,m,y}$	Amount of fossil fuel type i consumed by plant/unit m in year y (mass or volume unit)
$NCV_{i,y}$	Net calorific value (energy content) of fossil fuel type i in the year y (GJ/mass or volume unit)
$EF_{CO2,i,y}$	CO_2 emission factor of fossil fuel type i, in the year y (tCO2/GJ)
EGm,,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/must-run power plants/units
i	All fossil fuel types combusted in power plant/unit m in year y
y	Either the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option)

The data vintage option selected is the ex-ante approach, where a 3 year average OM is calculated. The most recent three year CEA data11 published on the emission factor of NEWNE and Southern grid is considered.

Year	NEWNE Grid	Southern Grid
	Value (tCO2/ MWh)	Value (tCO2/ MWh)
2005-06	1.02	1.01
2006-07	1.01	1.00
2007-08	1.00	0.99
Simple OM, average	1.01	1.00

STEP 4: Identify the cohort of power units to be included in the build margin (BM)

The value of the data has been taken from the data published by CEA as referred in earlier step. The CEA Baseline Database has been calculated as per the methodology ACM0002 and the details of the key assumptions considered to calculate the figure can be found in the User Guide of the same.

As per the "Tool to calculate the emission factor for an electricity system "the Project participants can choose between one of the following two options:

[11] CO_2 Baseline Database for the Indian Power Sector User Guide Version 4.0 http://www.cea.nic.in/planning/c%20and%20e/user guide ver4.pdf

Option 1
Calculate the Build Margin emission factor EFBM,y ex-ante based on the most recent information available on plants already built for sample group m at the time of PDD submission. The sample group m consists of either the five power plants that have been built most recently or the power plant capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently. Project participants should use from these two options that sample group that comprises the larger annual generation.

Option 2
For the first crediting period, the Build Margin emission factor EFBM,y must be updated annually ex-post for the year in which actual project generation and associated emissions reductions occur. For subsequent crediting periods, EFBM,y should be calculated ex-ante, as described in option 1 above. The sample group m consists of either the five power plants that have been built most recently or the power plant capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently. Project participants should use from these two options that sample group that comprises the larger annual generation.

STEP 5: Calculate the build margin emission factor (EFgrid, BM,y)
Option 1 as described above is chosen in the project activity. BM is calculated ex-ante based on the most recent information available at the time of submission of PDD and is fixed for the entire crediting period.

Grid	BM (tCO2/MWh)
NEWNE	0.60
Southern	0.71

STEP 6: Calculate the combined margin (CM) emissions factor (EFgrid, CM, y)
The CM can be calculated as per the following:

EFgrid,CM,y = EFgrid,OM,y * WOM + EFgrid,BM,y * WBM

Where:

Parameter	Detail
EFgrid,OM,y	Operating Margin CO2 emission factor in the year y (tCO2/GWh)
EFgrid,BM,y	Build Margin CO2 emission factor in the year y (tCO2/GWh)
WOM	Weighting of operating margin emission factor (%)
WBM	Weighting of build margin emission factor (%)

Owing to their intermittent and non-dispatchable nature, the default weights for wind and solar projects are as follows: WOM = 75% and WBM = 25%

Method adopted for CM in the project activity:

In the project activity, combined margin has been chosen as the baseline emission factor for grid emission factor. The value chosen is taken from relevant official sources and is publicly available12.

Grid	Operating Margin (tCO2/ MWh)	Build Margin	Combined Margin
NEWNE Grid	1.01	0.60	0.9060
Southern Grid	1.00	0.71	0.931

2.5 Description of how the emissions of GHG by source in baseline scenario are reduced below those that would have occurred in the absence of the project activity (assessment and demonstration of additionality):

The additionality of the project activity has been assessed using the small scale tool for assessment and demonstration of additionality under CDM, Attachment A to Appendix B:

Implementation Barriers

The project shall face one (or more) distinct barrier(s) compared with barriers faced by alternative projects.

•Investment Barrier – Project faces capital or investment return constraints that can be overcome by the additional revenues associated with the generation of VCUs.

•Technological Barriers – Project faces technology-related barriers to its implementation.

•Institutional Barriers – Project faces financial, organizational, cultural or social barriers that the VCU revenue stream can help overcome.

Of the barriers listed above, the project proponents have decided to demonstrate the additionality of the project activity by **investment barrier**, technological and institutional barriers.

The project activity consists of installation of WTGs in the states of Tamilnadu and Maharashtra. The power produced from the WTGs is sold to the respective state grid through a PPA arrangement. The investment risks associated with the project activity have been shown in the investment analysis section. In the following sections, additionality of the project activity is established based on the barriers such project activities face.

Investment Barrier:

Investment analysis is done following the guidelines specified in "Tool for the demonstration and assessment of additionality" version

[12] http://www.cea.nic.in/planning/c%20and%20e/user guide ver4.pdf

5.2 and "Guidance on the Assessment of Investment Analysis" (EB 39, Annex 35).

The project activity is the generation of power from WTGs and selling the power to the respective regional grids. Since the project activity involves generation of revenues for the project proponents through sale of power, benchmark analysis is applied. With the help of this analysis, the economic or financial attractiveness of project activity is determined.

The project proponents have used Equity Internal Rate of Return (IRR) as the financial indicator to identify the investment barriers for the project activity. Benchmark analysis is then used to compare the financial return of the project activity against the standard market return based on risk, location and type of the project activity.

Determination of Benchmark:

According to the additionality tool Version 5.2 Sub-step 2b: Option III. Apply benchmark analysis paragraph 6; discount rates and benchmarks shall be derived from:

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

The benchmark has been derived as per option III (a) as follows;

The project was initially assessed with benchmark calculated as per Dividend Capitalization Method. However, in response to the request by the DoE, PP has assessed the post tax equity IRR for the following appropriate benchmarks:

Benchmark

The benchmark has been determined in accordance with para 6(a) sub step 2b of the Additionality tool i.e. Government bond rates increased by a suitable risk premium to reflect private investment and / or project type. The required rate of return on equity for the

project has been calculated using the Capital Asset Pricing Model (CAPM). As per CAPM, the required return on equity investment is the return of a risk-free security plus beta times the difference between the market return and the risk-free return. The Government Securities have been taken to represent the risk free return. Stock index has been used to represent the market return.

While considering a new project, CAPM can provide the required rate of return that the project needs to yield, taking into account the volatility (risk) of the stock relative to the market (Beta). This required return on equity represents the cost of equity benchmark for the project.

The formula of CAPM is as follows:
$Ri = Rf + \beta (Rm-Rf)$

where:
Ri = Rate of return on equity;
Rf = Risk-free rate of return;
B = Beta or systematic risk for this type of equity investment coefficient reflecting the volatility (risk) of the stock relative to the market,;
Rm = Expected market returns
Rm – Rf = Market risk premium

Wherein return on BSE 500 index has been taken to represent Rm, average beta of power companies has been taken to quantify the risk (β). The risk free rate of return is a benchmark figure against which all the investments in an economy should be measured. Reserve Bank of India provides information on Weighted Average Yield on Market Loans, which is actually risk free return. The value for the year 2004-05 was 6.11[13] and 2005-06 was 7.34%.The required rate of return works out to 15.09% for the year 2004-05 and 16.18% for the year 2005-06 %. Detailed calculations are enclosed as part of the worksheet.

IRR Calculation

The parameters and assumptions used for calculations have been mentioned in table below.

Parameters	Unit/remarks	Tamilnadu	Maharashtra	Total
Capacity	MW	1.25	1.65	2.90
No of WTGs		1	1	2
Project Cost	INR Lac14	598.0	1011.7	1609.07
Debt	INR Lac	381.0	650.0	1031.0
Equity	INR Lac	217.0	361.07	578.07
Insurance	INR Lac/annum	0.90	1.80	2.70
Interest Rate	%	8	8	-
Moratorium	Months	12	12	-
Quarterly	No.	24	24	-

[13] http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/86544.pdf

[14] 1 Lac = 0.1 million

installments				
CUF	%	*25.29*[15]	20[16]	-
Power Generation	MWh/annum	3219	2746	5966
Tariff rate	INR/kWh	2.70	3.5017	-
O&M Cost	INR/annum	10.00	9.36	19.36
Annual Escalation	%/annum	5	5	-
Depreciation Rate	% (SLM Method)	1.25	1.65	2.90
Tax rate	%	36.59%	36.59%	36.59%
MAT rate	%	8.42%	8.42%	8.42%
Service tax	%	12.36%	12.36%	12.36%

Based on the above information/ data Equity IRR is estimated which comes out to be only 8.22% for Tamil Nadu WTG and 9.58% for Maharashtra.

The equity IRR without CDM benefits was below the chosen benchmark, which shows that investing in the project activity was not a financially attractive proposition.

Sensitivity Analysis:

The following sensitivity analysis has been conducted to check the robustness of the financial attractiveness of the project without CDM revenue by using Guidance on the Assessment of Investment Analysis, version-02, Annex-45, EB 41. The investment in project activity is affected by the following cost parameters more than 20% during its complete lifetime of 20 years:

Project Cost
O&M Charges
Interest on Debt

Out of these three parameters project cost and Interest on debt are fixed and no variation will take place during the crediting period. Therefore, these parameters are not considered for conducting sensitivity analysis.

The project revenue is mainly affected by following parameters:

O&M Cost
Capacity Utilization Factor (CUF)
Tariff

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[15] Group I Projects: (a) Wind power projects Commissioned, and to be commissioned based on agreements executed prior to the date of this order. TNERC order No. 3 Page no. 70 dated 15/05/2006

http://tnerc.tn.nic.in/orders/nces%20order%20-approved%20order%20host%20copy.pdf

[16] MERC Tariff Order 2.2.2 B (page 33 of 176)

[17] *The purchase rate shall be increased at 15 paise per unit every year for a period of thirteen years from the date of commissioning of the project.* Wind Project Tariff Order 03-04, MERC.

Interest Rate
Hence, for the purpose of sensitivity analysis O&M cost, CUF and Tariff have been chosen as the sensitive parameters to check the financial robustness for the project activity.

O & M Cost:
During the course of its lifetime, a WTG experiences wear and tear in almost all of its moving parts. Thus, regular maintenance is required for proper operations of the equipment. This also results in recurring maintenance costs. Wear and tear of a machine is something which is entirely not in the service provider's control. Increase in the O&M costs can increase the expenses significantly, resulting in lesser returns to the project activity. Thus, variation in O&M cost is a crucial factor in determining the return to a project activity. Thus, a sensitivity analysis O&M costs becomes logical. The following table depicts the sensitivity of the Equity IRR with the O&M cost.

Tamil Nadu

O&M Cost Change	-10%	-5%	0%	5%	10%
Equity IRR	8.78	8.50	8.22	7.93	7.64
Equity IRR with CDM	10.90	12.63	14.35	16.05	17.75

Maharashtra

O&M Cost Change	-10%	-5%	0%	5%	10%
Equity IRR	9.83	9.70	9.58	9.45	9.31
Equity IRR with CDM	12.70	12.60	12.47	12.34	12.21

CUF:
CUF is a critical parameter determining the returns to the project activity. CUF depends on factors like availability of wind, machine, grid etc. Any change in the CUF value has a direct impact on the power generated by the WTG, which in turn affects the revenues from power sale to the project proponents. The following table depicts the results of the sensitivity analysis:

Tamil Nadu

CUF Change	-10%	-5%	0%	5%	10%
Equity IRR	5.11	6.67	8.22	9.77	11.32
Equity IRR with CDM	10.26	12.30	14.35	16.40	18.48

Maharashtra

CUF Change	-10%	-5%	0%	5%	10%
Equity IRR	7.08	8.34	9.58	10.80	12.01
Equity IRR with CDM	9.60	11.04	12.47	13.88	15.29

In the sensitivity analysis, it is clear that even after a 10% increase in the CUF, the equity IRR remains below the chosen benchmark. From the table, it is clear the project activity remains financially unviable even with an unlikely increase in the CUF.

Tariff:

A change in the rate at which power is sold to the respective grid shall also have an impact on the earnings of the promoters. However, through the PPA, power purchase rates have been fixed for initial few years. A sensitivity analysis has been carried out for change in rate of power after the initial years. The results of the sensitivity analysis are as follows:

Tamil Nadu

Tariff Change	-10%	-5%	0%	5%	10%
Equity IRR	5.11	6.67	8.22	9.77	11.32
Equity IRR with CDM	10.90	12.63	14.35	16.05	17.75

Maharashtra

Tariff Change	-10%	-5%	0%	5%	10%
Equity IRR	7.14	8.38	9.58	10.75	11.90
Equity IRR with CDM	10.02	11.26	12.47	13.66	14.82

Interest rate:

A change in interest rate can also affect the project IRR. The results of the sensitivity analysis are as follows:

Tamil Nadu

Change in Interest Rate	-10%	-5%	0%	5%	10%
Equity IRR	8.66	8.44	8.22	8.00	7.79
Equity IRR with CDM	14.95	14.65	14.35	14.05	13.76

Maharashtra

Change in	-10%	-5%	0%	5%	10%

Interest Rate					
Equity IRR	9.95	9.76	9.58	9.39	9.20
Equity IRR with CDM	12.91	12.69	12.47	12.25	12.04

Equity IRR for this project activity is 6.44% without considering the revenues from the sale of CERs, which is below the chosen benchmark. Thus, it is evident that CDM will definitely help the project to overcome certain.

Technological barriers

Low CUF:
Wind power generation is considered in-firm due to its dependence on like availability of wind, machine, grid etc. at any time. The capacity utilization may vary depending on these factors. This is unlike conventional power sources where PLF is dependent on availability of fuel (coal or diesel), which is not a significant problem in India. CUF in case of WTG may be further affected by the non-availability of grid.

As supplemented by the data during the period 2005-2006, 2006-07, 2007-08 and 2008-09 CUF is the dominant fluctuating factor which may affect project returns.

Year	**Tamilnadu (1.25 MW)**	**Maharashtra (1.65 MW)**
2005-06	25%	8%
2006-07	24%	15%
2007-08	20%	17%
2008-09	22%	16%
2009-10	13%	15%
Average	**21%**	**14%**

It is evident from above discussion that the proposed project activity is not a financially viable option available to the project proponent. Thus the project activity is additional and project proponent seeks CDM benefits to mitigate the above mentioned risks.

PP has provided the references, which reflects the uncertainty of PLF. PP has considered the risk of low PLF at the time decision making considering the significant variation in the reported PLF. The project has already been implemented therefore PP has provided the project specific performance data to substantiate the risk involved in the project activity.

PP would like to remove the institutional barrier as does not seem convincing.

Summary:

The project proponent faces investment and technological barriers. In addition, the proposed project activity is not common practice. Therefore based on these discussion points, it can be concluded that the project is additional.

3 Monitoring:

3.1 Title and reference of the VCS methodology (which includes the monitoring requirements) applied to the project activity and explanation of methodology choices:

The following small scale methodologies approved by CDM EB have been applied to the project activity:
Methodology: AMS I.D. "Grid connected renewable electricity generation", Version: 13
Reference: EB 36, Sectoral Scope: 01

3.2 Monitoring, including estimation, modelling, measurement or calculation approaches:

The power generated will be supplied to the respective the State Electricity Boards i.e. Tamil Nadu Electricity Board (TNEB) and the Maharashtra State Electricity Board (MSEB). The methodology requires monitoring of the electricity generation from the project activity. Following will be the monitoring plan for project activity.

Responsibility:
Analysis of daily power generation reports, performance report and monthly meter reading will be handled by project proponent on a regular basis. Project proponent has signed an agreement with project developer M/s Suzlone Energy Pvt Ltd. and M/s Vestats India Pvt. Ltd. for O&M of WTGs. Project developer's O&M team will be responsible for preventive maintenance, handling emergency situations and improvement measures. The installation, maintenance and calibration of energy meters is entirely in the hands of State electricity board.

Monitoring plan for Maharashtra WTG:

- The WTG of proposed project activity is connected to evacuation facilities to supply electricity to grid and the evacuation facility is essentially maintained by MSEB.
- The project activity has two independent measurements of generated electricity from the wind turbine.
- The primary recording of the electricity fed to the state utility grid is carried out jointly at the incoming feeder of the state power utility (MSEB).
- The joint measurement will be carried out once in a month in presence of both parties (the developer's representative and officials of the state electricity board). Both parties sign the recorded reading. A joint monitoring report is issued by State electricity board and that form the basis for billing and VCUs estimation.
- The secondary monitoring, which provides a backup (fail-safe measure) in case the primary monitoring is not carried out, would be done at the individual WEGs. Each WEG is equipped

with an integrated electronic meter. These meters are connected to the Central Monitoring Station (CMS) of the entire wind. The generation data of individual machine can be monitored as a real-time entity at CMS. The snapshot of generation on the last day of every calendar month will be kept as a record both in electronic as well as printed (paper) form.

- If during any of the monthly meter readings, the variation between the main meter and the check meter is more than the permissible limit of error of 0.5%, all the meters are retested and calibrated immediately.

Calculation from net meter to individual meters

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

1. Substation meter reading = Yn i.e., net electricity supplied to grid
2. The sum of generation of all the wind turbines connected to a particular substation Xt = (X1+X2+X3..Xn)
3. Transmission losses T_L = Xt - Yt
4. Individual machine generation contribution X1/Xt = G1; X2/Xt = G2... Xn/Xt=Gn
5. Transmission loss distribution TL1= G1/(G1+G2+G3..Gn) * TL
6. Net generation by individual machine = X1- TL1

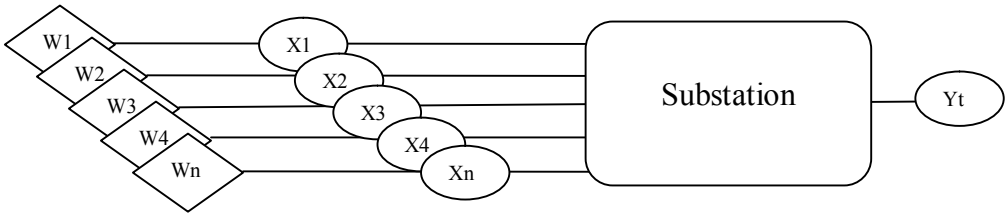

Fig. Positioning of Meter

Monitoring plan for Tamil Nadu WTG:

- The WTG of proposed project activity is connected to evacuation facilities to supply electricity to grid and the evacuation facility is essentially maintained by the state power utility (TNEB).
- The project activity has therefore envisaged two independent measurements of generated electricity from the wind turbines.
- The primary recording of the electricity fed to the state utility grid is carried out at the HT side of the step up transformer of the Transformer yard at each individual location.
- The joint measurement is carried out once in a month in presence of both parties (the developer's representative and officials of the state power utility). Both parties will sign the recorded reading.

- The secondary monitoring, which will provide a backup (fail-safe measure) in case the primary monitoring is not carried out, would be done at the individual WEGs. Each WEG is equipped with an integrated electronic meter. These meters are connected to the Central Monitoring Station (CMS) of the entire wind farm. The generation data of individual machine can be monitored as a real-time entity at CMS. The snapshot of generation on the last day of every calendar month will be kept as a record both in electronic as well as printed (paper) form.

Calculation from net meter to individual meters

Individual energy meter measure net power supplied to the grid by WTGs. Following figure reflects the meter position.

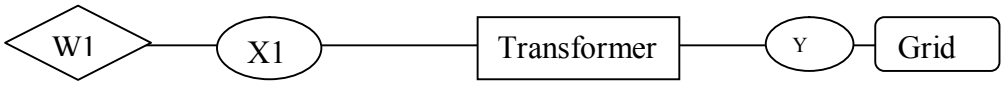

Fig. Positioning of Meter

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Calibration of Meters:
Main and backup meter are calibrated at least once in three years[18] by the respective State Electricity Board's representative.

Operation and Maintenance:
The project proponents have contracted the technology suppliers for the operation and the maintenance of the WTGs. The O&M team at the site would be responsible for the maintenance and operation of the WTGs in accordance with the Quality Instructions and Operation and Maintenance Manuals of the technology supplier. The O&M team would comprise of adequately trained and experienced technicians and would be responsible for provision of tools and supply of consumables and spare parts to carry out the above mentioned activities efficiently.

On a daily basis a production report would be generated detailing the daily and accumulated production for each WTG at controller, daily WTG and grid availability and details of stoppages. On a monthly basis an operating report would be generated detailing the Operating & Availability data, consumption of main components & spare parts. The production reports would be reviewed by the O&M In-Charge at the plant on a daily basis. The operating report would be forwarded to the Project Manager for review of the operational performance of the plant and for suggestion of corrective action if necessary.

Internal Audit:
The internal audit team lead by the project manager will audit and verify the monitoring data on a monthly basis. As per the advices of the Internal Audit team, corrective actions will be taken up for

[18] http://cdm.unfccc.int/EB/035/eb35_repan35.pdf, page 3

more accurate future monitoring and reporting system. The invoices would also be reviewed as a part of the statutory audit.

Training:
The project management does not require any extensive training of personnel. The respective EPC contractors do the operation and maintenance of the installations and measurement of generated electricity is done by state electricity utility. The EPC contractors are ISO certified organizations and follow designated procedures for the assigned tasks.

Leakage:
The project activity involves generation of electricity from wind, the installed WEGs convert wind energy into electrical energy. There is no other mean to use any other input fuel for electricity generation. Thus no special ways and means are required to monitor leakage from the project activity. Since the project activity does not involve any leakage and only measurement of generated electricity from wind farm installations will form the basis of annual GHG reduction by the project.

Emergency Preparedness Plan:
The project promoters have contracted the technology supplier for providing O&M services for the power project. The service provider would be responsible for maintenance of the necessary spare parts and consumables for the maintenance of the WTGs such as anemometers, wind vanes and sensors, oil filters, batteries, auxiliary motors and pumps, WTG controllers, slip rings, limit switches and sensors, detergents & solvents etc. The service provider would also be responsible for supply of necessary main components of the WTG such as main gearboxes, blades, generators, towers, hubs, main shafts & bearings, ground and top controller and hydraulic systems. The service provider would also ensure that occupational health and safety procedures are adhered to during the operation & maintenance activities. Additionally, spare meters would also be kept available at the site for replacement in case of failure of any of the monitoring equipments.

Procedures for data uncertainties

Failure of energy meter:
In the event of failure of energy meter the project proponent might depend upon the panel meter as fitted with the individual WTGs. Further it may be noted that in case of failure of energy meter, during the period when the faulty meter is replaced by new calibrated meter, the readings from the concerned WTG would not be available and therefore the emission reductions would not be accounted for. In this context it is to be noted that there would be separate joint meter readings (JMRs) for the faulty meter and new meter (for the faulty meter up to the time of replacement and for the new meter from the time of replacing the old faulty meter). As the emission reductions would be estimated based on the JMRs, the readings during the period of replacement of old faulty meter by new meter would not be accounted for in the calculations.

Data and parameters

Please refer section 3.3 for details of parameter that will be monitored during credit period.

3.3 Data and parameters monitored / Selecting relevant GHG sources, sinks and reservoirs for monitoring or estimating GHG emissions and removals:

Data and Parameters that available at the time of validation

Data / Parameter:	CM
Data unit:	tCO_2 / MWh
Description:	Combined Margin for Southern and NEWNE grid
Source of data to be used:	Central Electricity Authority, India
Value of data applied for the purpose of calculating expected emission reductions	<table><tr><td>Grid</td><td>CM (tCO2/MWh)</td></tr><tr><td>Southern Grid</td><td>0.931</td></tr><tr><td>NEWNE Grid</td><td>0.906</td></tr></table>
Justification of the choice of data or description of measurement methods and procedures actually applied :	Central Electricity Authority (India) is a government body and data published is in line with the methodological requirements CO_2 Baseline Database for the Indian Power Sector User Guide Version 4.0 http://www.cea.nic.in/planning/c%20and%20e/user_guide_ver4.pdf
Any comment:	-

Data / Parameter:	OM
Data unit:	tCO2 / MWh
Description:	Operating Margin for NEWNE and Southern grid
Source of data used:	Central Electricity Authority, India
Value applied:	<table><tr><th>Year</th><th>Southern Grid</th><th>NEWNE Grid</th></tr><tr><td>2005-06</td><td>1.01</td><td>1.02</td></tr><tr><td>2006-07</td><td>1.00</td><td>1.01</td></tr><tr><td>2007-08</td><td>0.99</td><td>1.00</td></tr><tr><td>Simple OM, average</td><td>1.00</td><td>1.01</td></tr></table>
Justification of the choice of data or description of	Central Electricity Authority (India) is a government body and data published is in line with the

measurement methods and procedures actually applied :	methodological requirements http://www.cea.nic.in/planning/c%20and%20e/user_guide_ver4.pdf
Any comment:	Central Electricity Authority ,India

Data / Parameter:	BM
Data unit:	tCO2 / MWh
Description:	Build Margin for WR grid
Source of data used:	Central Electricity Authority,India
Value applied:	<table><tr><th>Grid</th><th>BM (tCO2/MWh)</th></tr><tr><td>NEWNE</td><td>0.60</td></tr><tr><td>Southern</td><td>0.71</td></tr></table>
Justification of the choice of data or description of measurement methods and procedures actually applied :	Central Electricity Authority (India) is a government body and data published is in line with the methodological requirements http://www.cea.nic.in/planning/c%20and%20e/user_guide_ver4.pdf
Any comment:	

Data and Parameters that will be monitored at the time of validation

Data / Parameter:	EGy
Data unit:	MWh
Description:	Electricity supplied by WTGs in the project activity to the respective regional grids
Source of data to be used:	Joint Meter Reading (JMR) sheets issued by the respective State Electricity Board
Value of data applied for the purpose of calculating expected emission reductions	5460 PP has considered estimated value (section 4.2) in the PDD for net generation value. For the purpose of emission reduction calculation during credit period, net energy exported from each WTG will be taken as per Joint Meter Reading sheets which represent the actual net units supplied to respective grid.
Description of measurement methods and procedures to be applied:	Monitoring: Continuously monitoring, Monthly and Yearly accumulation

	Data Type: Calculated Recording: Monthly from joint meter at substation Archiving Policy: Paper & Electronic Responsibility: Respective State electricity board representative will be responsible for regular calibration of the meter. Calibration Frequency: Once in three year
QA/QC procedures to be applied:	Monthly joint meter readings will be taken by the designated officials of the O&M service provider and respective state electricity board representative. The net electricity supplied to the grid can be cross verified with the invoices raised. The energy meters shall be periodically calibrated and calibration records shall be maintained for each of the WTGs. The maintenance and upkeep of the energy meters is entirely in charge of the state electricity board. The calibrations are done on a yearly basis by the respective state electricity boards.
Any comment:	- Data will be archived for two years after the end of crediting period

3.4 Description of the monitoring plan

Please refer section 3.2 for detailed monitoring plan.

4 GHG Emission Reductions:

4.1 Explanation of methodological choice:

The emission reduction resulting from the project activity is computed ex-ante as a difference between the baseline emissions, project emissions and leakage emissions as explained below:

Emission reduction,

ERy = BEy - PEy- Ly ----------(1)

Where,

Parameter	Details
ERy	Emission reduction of the project activity during the year y in tons of CO2,
BEy	Baseline emission in year y due to displacement of electricity during the year y in tons of CO2
PEy	Project emission during the year y in tons of CO2

Baseline emission (BEy):

BEy = EGy * CM ---------- (2)

Where,

Parameter	Details
BEy	Baseline emission in tCO2/MWh
EGy	Electricity supplied by the project activity in MWh
CM	Combined margin of WR grid in tCO2/MWh

Project emissions:

There is no emission due to the project activity and hence,
PEy = 0

Leakage:

As the energy generating equipment is not transferred from another activity or the existing equipment is transferred to another activity, hence leakage is not to be considered.
L = 0

4.2 Quantifying GHG emissions and/or removals for the baseline scenario:

Ex ante emissions are calculated as follows:

Electricity generation (EGy) = {Capacity * CUF * Run hours (8760 Hours)}-Losses
= MWh/ year
Combined margin (CM) = tCO2e/ MWh
Emission reduction (ERy) = (EGy)*(CM)

Location	Capacity(MW)	CUF	Run hour	Loss	EGs (MWh)	CM	ERs
Tamilnadu	1.25	25.29%	8760	2%	2714	0.931	2527
Maharashtra	1.65	20%	8760	5%	2746	0.906	2489

Leakage emissions:

As per AMS I.D version 13, leakage is to be considered if the energy generating equipment is transferred from another activity or if the existing equipment is transferred to another activity. Since this is not the case in the project activity, leakage is not to be considered.

Emission reductions:

Hence, total emission reductions for the project activity are: 2527+2489 = 5016 tCO2 per annum

Year	Estimation of baseline emissions (tCO2e)
2006-07	5016
2007-08	5016
2008-09	5016
2009-10	5016
2010-11	5016
2011-12	5016
2012-13	5016
2013-14	5016
2014-15	5016
2015-16	5016
Total (tonnes of CO2e)	50160

4.3 Quantifying GHG emissions and/or removals for the project:

Year	Estimation of project activity emissions (tCO2e)	Estimation of Leakage (tCO2e)
2006-07	0	0
2007-08	0	0
2008-09	0	0
2009-10	0	0
2010-11	0	0
2011-12	0	0
2012-13	0	0
2013-14	0	0
2014-15	0	0
2015-16	0	0
Total (tonnes of CO2e)	0	0

4.4 Quantifying GHG emission reductions and removal enhancements for the GHG project:

Year	Estimation of project activity emissions (tCO2e)	Estimation of baseline emissions (tCO2e)	Estimation of leakage (tCO2e)	Estimation of overall emission reductions (tCO2e)
2006-07	0	5016	0	5016
2007-08	0	5016	0	5016
2008-09	0	5016	0	5016
2009-10	0	5016	0	5016
2010-11	0	5016	0	5016
2011-12	0	5016	0	5016
2012-13	0	5016	0	5016

2013-14	0	5016	0	5016
2014-15	0	5016	0	5016
2015-16	0	5016	0	5016
Total (tonnes of CO2e)	0	50160	0	50160

5 Environmental Impact:

As per the Schedule 1 of Ministry of Environment and Forests (MoEF - Government of India) notification dated September 14,2006, - 39 activities are required to undertake environmental impact assessment studies.19 This project activity does not fall under the specified categories therefore EIA is not required for. Moreover, the project activity i.e., electricity generation from wind, clean and green source of power which will result in no negative impact on environment. Thus no EIA was conducted.

6 Stakeholders comments:

The stakeholders identified for the project are as under.
1. Employees of project proponent
2. Equipment Suppliers
3. Local villagers
4. Respective State Electricity Board

Several government & other stakeholders got involved with the project activity during various stages of its implementation. Project proponent shared the salient information of the project activity with all the stakeholders enlisted above. Project promoter organized stakeholder consultation meeting to collect the views of local stakeholders.
Stakeholders consultation meetings were held by the project proponent at both the WTGs site. The meetings were held at the Suzlon office in Tiruneveli City in Tamil Nadu on 23/04/05 and Vestas site in Dehivel-Taluka Sakri, Maharashtra villages on 21/01/06 in order to review the concerns of the local stakeholders and seek their opinion about the project activity.

PP has notified about the meeting on 1/03/2005 and 20/01/2006 about the meeting using public notice for Tamilnadu and Maharashtra respectively. The meeting had been attended by local villagers residing in the nearby villages. The project promoters and WEG suppliers explained the various technology features, operation and function of the WEGs and associated benefits of this project activity. They also explained the stakeholders about the eco-friendly nature of the project.

[19] Environmental Impact Assessment Notification – 2006(14/9/06) Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), Ministry of Environment and Forest, Government of India. http://envfor.nic.in/legis/eia/so1533.pdf

The local village people unanimously agreed that due to this project activity the employment opportunities for the local people have increased to some extent. There has also been considerable improvement in the communication facilities of the respective villages in terms of construction of roads etc. The villagers also promised their continuous support to the projects to ensure smooth construction and operation of the project. The local people also agreed that their infrastructure facility like road and transportation was improved due this project activity. No negative comments were received from the stakeholders who attended the meeting and in the visitor's book kept at the both projects offices.

Comments received:
Following comments were responded;

1. What are the benefits for Local people;
   Local people are getting benefited with direct and indirect employment, contractor's jobs, security jobs, local transporters, taxi.
2. Is there any problem for agriculture and cultivation pattern?
   Erection and commissioning of wind mills has not resulted in any hindrance in the agriculture and its cultivation process of local people.
3. Is there any effect on rain pattern?
   There will be no impact on rain pattern and this is only myth and there is no basis at all.
4. What will be impact on loving standard?
   Infrastructural support to the local area for roads and power is also being enhanced giving rise in living standards of local people.

7 Schedule:

Following is the chronology of the events in the project activity –

Period	Activity
27/12/2004	Board Decision to invest in Wind power project
27/01/2005	Purchase order for 1.25 MW WTG
29/03/2005	Commissioning of 1st WTG
23/04/2005	Stakeholder meeting
2/9/2005	Board Decision for 2nd WTG (1.65 MW) in Maharashtra
16/09/2005	Purchase order date of 1.65 MW WTGs
08/02/2006	Commissioning of 2nd WTG
21/01/2006	Stakeholder meeting
25/09/2008	DNA submission for HCA
29/01/2009	HCA approval date

8 Ownership:

8.1 Proof of Title:

- Company registration certificate
- Loan document

8.2 Projects that reduce GHG emissions from activities that participate in an emissions trading program (if applicable):

NA