



**Voluntary Carbon Standard
Project Description Template
19 November 2007**

*Date of VCS PD: 10 November 2009
Version: 04*

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1 Description of Project:

1.1 Project title

15 MW Grid Connected Renewable Energy Wind Turbine Project in Karnataka

1.2 Type/Category of the project

The VCS program approved the use of “Clean Development Mechanism” (CDM) methodologies approved by the CDM Executive Board (CDM EB). Accordingly the proposed VCS project activity uses one of the baseline and monitoring methodologies approved by the CDM EB.

The methodology applicable to this project activity is “Grid connected Renewable Electricity Generation - AMS I.D.”, Version 13, Scope 1 (14 December 2007)

According to small-scale CDM modalities & procedures this project activity falls under:

Type – I Renewable Energy Projects¹

Category I-D Renewable Electricity Generation for a grid.

As per the VCS 2007.1 guidelines, “a project can be grouped when a number of projects and their related methodologies are included in a single VCS Project Description (VCS PD) at the time of the validation.” The proposed project activity applies single approved methodology AMS I D. Thus, the proposed VCS project activity is not a grouped project.

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

The proposed VCS project activity considers a total power generated of 34821 MWh per annum Thus the project activity is expected to reduce 32275 t CO₂e annually.

Table below gives the estimated amount of emission reduction during the crediting period. The first crediting period of ten years will start retroactively from 28th March 2006 onwards as described in the table below:

Years	Estimation of annual emission reduction in tCO ₂ e
28 March 2006-27 March 2007	32275
28 March 2007- 27 March 2008	32275

¹ Type and category of the project is according to small scale CDM modalities and procedures taken from the UNFCCC website-- <http://cdm.unfccc.int/Reference/COPMOP/08a01.pdf#page=52>

28 March 2008 -27 March 2009	32275
28 March 2009 -27 March 2010	32275
28 March 2010-27 March 2011	32275
28 March 2011 -27 March 2012	32275
28 March 2012 -27 March 2013	32275
28 March 2013 -27 March 2014	32275
28 March 2014 -27 March 2015	32275
28 March 2015 -27 March 2016	32275
Overall Emission reductions for 10 Years	322750 tCO ₂ e over 10 years
Average emission reductions per year	32275

The proposed VCS project activity is reducing emissions of 32275 tCO₂e per year and is therefore categorized as “**Projects**”.

1.4 A brief description of the project:

The project activity involves the development and operation of wind based electricity generation facilities to be connected to the grid, with aggregate installed capacity of 15MW located within wind park. The individual sub-projects for this project activity are as follows:

The objective of the project activity is to construct, operate, maintain and aggregate wind power projects within the same wind park at Chitradurga in the Indian state of Karnataka for providing reliable, renewable power to the Karnataka Electrical Grid and reduce greenhouse gas emissions caused by reliance on fossil fuels. The project will lead to reduced greenhouse gas emissions because it will be displacing electricity from fossil fuel based electricity generating systems.

The electricity generated from this wind sites is supplied using internal electrical lines to a common local sub-station using local transmission lines.

The aggregate 15MW project activity comprises of 20 numbers of Enercon-make wind converters, with each machine having a capacity of 600KW to 800KW. Enercon (India) Ltd (EIL) is the turbine supplier and is also the operations and maintenance contractor. The generated electricity is being supplied to southern grid under long-term power purchase agreement (PPA). The purpose of the project is to harness renewable resources in the region, and thereby displacing non renewable natural resources thereby ultimately leading to sustainable economic and environmental development. The project activity includes development, design, engineering, procurement, finance, construction, operation and maintenance of wind energy based electric generating stations supplying electricity to the southern grid.

The project is promoted by Mineral Enterprises Limited, a company engaged in the mining industry in India, in the state of Karnataka, of which one is located in the same

district as the project, i.e. Chitradurga. The project began in May 2004 with the issue of the purchase order by the project promoter and implementation was completed by March, 2006 when the last WEG was installed.

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

The Project activity is located in the Jogimatti Wind Zone at Chitradurga District in Karnataka, India. Chitradurga is approximately 200 km from Bangalore, the capital of Karnataka. It is located on the Bangalore–Mumbai highway, encompassing the sites of Vanivilasagar, Gim2 (West), Gim2 (Central) and MMCL. Specifically, they are located as detailed below in Hiriyur and Hosadurga talukas of Chitradurga district in Karnataka. The nearest railway station is at Chitradurga.

S. No	Capacity (KW) of each wind turbine	Date of Comm	HTS C Number/R Rno	Village	Taluka	Dis trict	Longitude	Latitude
1	600 kW	30 th Sept 2004	VVS26	Elladekere	Vanivilasagar	Chitradurga	N13 ⁰ 51' 21"	E76 ⁰ 29' 33"
2	600 kW	30 th Sept 2004	VVS26	Elladekere	Vanivilasagar	Chitradurga	N13 ⁰ 51' 21"	E76 ⁰ 29' 33"
3	600 kW	30 th Sept 2004	VVS26	Elladekere	Vanivilasagar	Chitradurga	N13 ⁰ 51' 21"	E76 ⁰ 29' 33"
4	600 kW	30 th Sept 2004	VVS26	Elladekere	Vanivilasagar	Chitradurga	N13 ⁰ 51' 21"	E76 ⁰ 29' 33"
5	600 kW	30 th Sept 2004	VVS26	Elladekere	Vanivilasagar	Chitradurga	N13 ⁰ 51' 21"	E76 ⁰ 29' 33"
6	800 kW	28 th Oct 2005	MMCL 05	Mathighatta & berebahalli	Holalkere	Chitradurga	N14 ⁰ 05' 22"	E76 ⁰ 20' 35"
7	800 kW	28 th Oct 2005	MMCL 05	Mathighatta & berebahalli	Holalkere	Chitradurga	N14 ⁰ 05' 22"	E76 ⁰ 20' 35"
8	800 kW	28 th Oct 2005	MMCL 05	Mathighatta & berebahalli	Holalkere	Chitradurga	N14 ⁰ 05' 22"	E76 ⁰ 20' 35"
9	800 kW	31 st March 2006	ELP 39 RRNO	kitthadalhill	Hiriyur	Chitradurga	N13 ⁰ 56' 46"	E76 ⁰ 25' 10"
10	800 kW	31 st March 2006	ELP 39 RRNO	kitthadalhill	Hiriyur	Chitradurga	N13 ⁰ 56' 46"	E76 ⁰ 25' 10"
11	800 kW	31 st March 2006	ELP 39 RRNO	kitthadalhill	Hiriyur	Chitradurga	N13 ⁰ 56' 46"	E76 ⁰ 25' 10"
12	800 kW	31 st March	ELP 39	kitthadalhill	Hiriyur		N13 ⁰ 56' 46"	E76 ⁰ 25' 10"

1.6 Duration of the project activity/crediting period:

According to the policy announcement dated 10th September 2008 from the VCS Association, the project start date will be considered as the date the project activity began reducing or removing GHG emissions. The first WEG of the proposed VCS project activity was commissioned on 30th September 2004.

The VCS project crediting period starts from 28th March 2006 to 27th March 2016 i.e., for a maximum of 10 years which may be renewed twice.

1.7 Conditions prior to project initiation:

Based upon the Central Electricity Authority (a Government of India organization) database, the region-wise installed capacity as on 31st March 2006 for various grids is shown in the Table below. As can be observed from the table that fossil fuels (mainly coal and gas) have a majority share in power generation, and accordingly influence the electricity generation system, via various grids in India, thereby the emissions generated from the same. Prior to the initiation of the project activity the said power would have been generated from the power plants connected to the Southern regional grid, which is still within the Southern grid, as described in the subsequent paragraphs.

Region wise installed capacity (MW) as on 31.3.2006

Region	Hydro	Thermal				Nuclear	Renew.	Total
		Coal	Gas	Diesel	Total			
Northern	11061.88	17592.50	3213.19	14.99	20820.68	1180.00	694.59	33757.15
Western	6681.33	20941.50	5080.72	17.48	26039.70	1300.00	1098.83	35119.86
Southern	10967.71	15992.50	3434.50	939.32	20366.32	880.00	4233.49	36447.52
Eastern	2496.53	13662.38	190.00	17.20	13869.58	0.00	111.67	16477.78
N. Eastern	1113.07	330.00	771.50	142.74	1244.24	0.00	46.86	2404.17
Islands	5.25	0.00	0.00	70.02	70.02	0.00	5.42	80.69
All India	32325.77	68518.88	12689.81	1201.75	82410.54	3360.00	6190.86	124287.17

Source: CO2 Baseline Database for the Indian Power Sector, Version 3, December 2007, Government of India, Ministry of Power, Central Electricity Authority

If the current sector wise installed capacity on a country wide basis is analyzed as per the Table below, the same scenario of heavy reliance on energy produced from fossil fuels emerges. Here again, fossil fuels form a major component of power generation units set up by the Central and various State governments.

India - Sector-wise installed capacity (MW) as on 31.03.2008

Sector	Hydro	Thermal				Nuclear	Renew.	Total
		Coal	Gas	Diesel	Total			
State	26086.76	42047.50	3834.22	604.61	46486.33	0.00	2200.04	74773.13

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Central	8592.00	29010.00	6638.99	0.00	35648.99	4120.00	0.00	48360.99
Private	1230.00	4991.38	4183.00	597.14	9771.52	0.00	9994.53	20996.05
All India	35908.76	76048.88	14656.21	1201.75	91906.84	4120.00	12194.57	144130.17

Source: CO2 Baseline Database for the Indian Power Sector, Version 4, October 2008, Government of India, Ministry of Power, Central Electricity Authority

It can be observed that after analyzing the conditions prior to project initiation, as well as the current data, fossil fuels still contribute more than 50% of the total power generation capacity in the country, thus having major implications on the GHG emissions resulting out of the sector.

It is thus understood, that prior to the initiation of the proposed project activity, the electricity produced in the baseline of the Southern Grid was generated by burning of the fossil fuels in the fossil fuel fired power plants. The new wind electric generators installed in the proposed VCS project substitute the baseline consumption of electricity produced from fossil fuel operated power plants, with cleaner zero GHG emitting fuel (wind) to operate the wind power plant. Thus, more carbon intensive fossil fuels are substituted with zero carbon intensive fuels for the operation of the proposed VCS power plant.

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

The proposed VCS project is a renewable power generation unit which uses wind as the source of energy supplementing the power needs of the grid with clean wind power which otherwise is fed by fossil fuel based power plants. Thus, the proposed VCS project displaces electricity by renewable means (through wind power) that would otherwise have been generated through fossil fuel sources.

The Project is wind based renewable energy source, zero emission power project connected to Southern grid. The Project will displace fossil fuel based electricity generation that would have otherwise been provided by the operation and expansion of the fossil fuel based power plants in Southern regional electricity grid.

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

The project proponent has selected the Enercon make gearless technology, which features a synchronous generator suitable for variable speed options. (Please refer Enercon manufacturers website ²). This enables power generation at very low speeds, which has the potential to improve power generation from any particular site, and therefore improve the potential of wind power in the country. Thus, in addition to being technologically superior, it also is resource efficient. For the proposed project, the project employs 600 kW (E-40) and 800 kW (E-48) turbines of Enercon make for power generation. Enercon has introduced synchronous generator (SG) in place of

² www.enercon.de

induction type generators usually used with gears; the generator is used with a high frequency inverter for operating even under variable wind speeds.

The technical specifications are given below:

Turbine model	Enercon E 40	Enercon E-448
Rated power	600	800
Rotor diameter	48m	48m
Hub height	74.85 m	56.85 m
Turbine Type	Gearless horizontal axis wind turbine with variable rotor speed	Gearless horizontal axis wind turbine with variable rotor speed
Power regulation	Independent electromechanical pitch system for each blade.	Independent electromechanical pitch system for each blade.
Design lifetime	20years	20years
Cutin windspeed	2.5 m/s	2.0 m/s
Rated wind speed	12 m/s	14 m/s
Extreme Wind Speed	59.5 m/s	59.5 m/s
Rated rotational speed	31.5 rpm	31.5 rpm
Operating range rot. speed	16.0 - 31.5 rpm	16.0 - 31.5 rpm
Orientation	Upwind	Upwind
No of Blades	3	3
Blade Material	Glass Fibre reinforced Epoxy	Glass Fibre reinforced Epoxy
Gear box type	Gear less	Gear less
Generator type	Synchronous generator	Synchronous generator
Braking	Aerodynamic	Aerodynamic
Output Voltage	400 V	400 V
Yaw System	Active yawing with 4 electric yaw drives with brake motor and friction bearing	Active yawing with 4 electric yaw drives with brake motor and friction bearing
Tower	74 m concrete	56 m concrete

Once the wind electricity is generated by the turbines described above, it is sent via transmission lines to the consumers via the existing grid transmission structure.

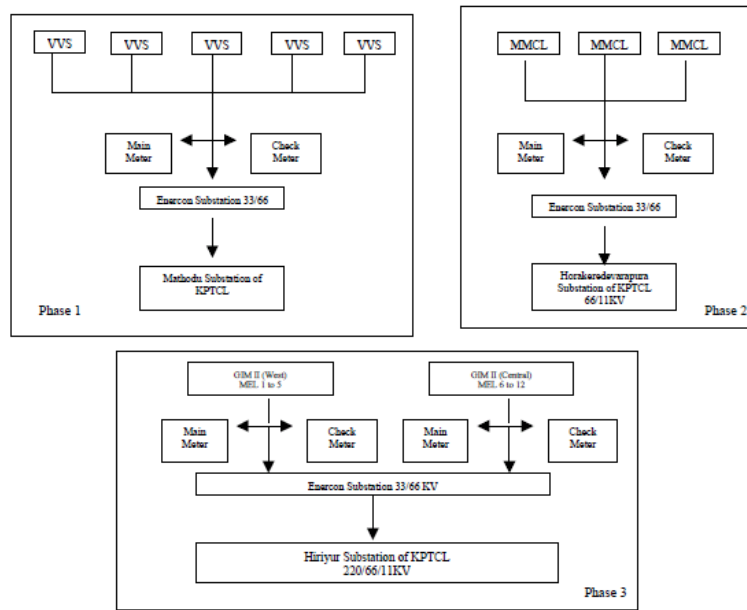


Diagram showing proposed VCS Project Boundary

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

Renewable energy projects are not mandated in India by any enforced law or other regulatory framework. However, for guidance on voluntary wind energy based electricity generation, there are policies introduced/incentives declared by the state governments. These policies have been considered for the project activity and are available at <http://www.windpowerindia.com/govtinc.html>.

The project proponent has obtained all the statutory clearances required to set up the wind farm in the state of Karnataka. The local law mandates that the project participant first obtains land, from private owners, for the installation. After this the nodal agency (KREDL-Karnataka Renewable Energy Development Limited) issues the infrastructure and commissioning clearances.

The Project proponent then enters into the long term power purchase agreement with the distribution utility (KPTCL: Karnataka Power Transmission Corporation Limited) for sale of Power.

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

One major risk that can substantially affect the project’s GHG emission reduction is the wind unreliability factor. Wind is intermittent and does not always blow when electricity is needed. Wind cannot be stored (although wind-generated electricity can be stored) and not all winds can be harnessed to meet the timing of electricity demands.

The wind turbine technology requires a higher initial investment than fossil-fuelled generators. Roughly 80% of the cost is the machinery, with the balance being site

preparation and installation and the capital cost involved is much higher than other fossil fuel based power plants.

Renewable energy in the southern part of India, especially hydro and wind is heavily dependent on the monsoon situation. There are no perennial rivers for hydro power projects and the wind density is highest only during the monsoons. The lack of proper monsoon rainfall affects both the hydro and wind power projects severely. Continuous droughts over three years led to a drop in output from renewable energy projects in the entire southern region, including Karnataka. This affects the wind projects and reduces power generation that affects the projected income.

The extent of GHG mitigation due to the project activity is directly related to extent of power generated in the wind turbines. There is a possibility of lesser generation of power and hence the GHG emission mitigation due to any or a combination of the following reasons:

- Seasonal variations in the wind flow patterns
- Variations in the machine availability and machine down time
- Problems with the evacuation of the power generated due to non-availability of grid

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 activity involves installation of the wind turbine machinery for the generation of electricity by harnessing renewable source of energy, that is, wind power. Hence, there were no emissions at the onset of the project activity so the possibility of the subsequent removal or destruction is ruled out.

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

The proposed VCS project activity has not created any other form of environmental credits. An undertaking letter from Mineral Enterprises Limited stating that the project has not been created another form of environmental credit has been submitted to the DOE.

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

Not Applicable as project has neither applied nor been rejected by any other GHG program.

However the Project was withdrawn from CDM on 9th September 2007; vide project number 1796 CDM UNFCCC project activities.

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

The project proponent has entrusted the operations and maintenance of the project to Enercon India, since they themselves lack the technical expertise to do so. Enercon

India, the technology supplier, is an ISO 9000 company and has elaborate procedures and well trained staff to carry out the various functions to ensure that the project delivers energy as planned and that the data is duly recorded and communicated to the Project Proponent on a regular basis.

Enercon India, has a management structure to carryout the operation and maintenance as per its ISO 9000 manual: The project proponent has constituted a CDM Team to monitor the emissions reductions commitment of the company. The team consists of Manager Technical, Manager Commercial, both reporting to the Managing Director of the company .and supported by Vijayaillu.

Specifically, they will check the Main & Check Meter readings at each site and compare with the B-form for that month. They will also check the quarterly Preventive Maintenance reports as well as Breakdown Maintenance Reports.

In addition, Manager Commercial will review the daily generation report that is received by him online from Enercon India.

Contact information on participants in the project activity

Organization:	Mineral Enterprises Ltd.
Street/P.O.Box:	#300/1-B, 16 th Cross, Sadashivanagar,
Building:	
City:	Bangalore
State/Region:	Karnataka
Postfix/ZIP:	560 080
Country:	India
Telephone:	+91-80-23612569, 23613182, 23619939
FAX:	+91-080-23612737
E-Mail:	minent@blr.vsnl.net.in
URL:	www.mineralenterprise.com
Represented by:	Mr. Basant Poddar
Title:	Managing Director
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Last Name:	Poddar
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First Name:	Basant
Department:	Mr N.B Sanjay, General Manager, (Environment), MEL)

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Mr Mukund
 Chartered accountants
 Bangalore

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.):

The project category applicable to the proposed VCS project is AMS ID. Accordingly, the energy baseline being considered is as directed in paragraph 9 of the AMS.I.D/Version 13, that provides that the applicable baseline is the energy (in kWh) produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO₂e/kWh) calculated in a transparent and conservative manner as:

- (a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the approved methodology ACM0002. Any of the four procedures to calculate the operating margin can be chosen, but the restrictions to use the Simple OM and the Average OM calculations must be considered.

OR

- (b) The weighted average emissions (in 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.

With the purpose of providing a ready reference for the emission coefficients to be used in CDM projects, Central Electricity Authority (CEA), Government of India, has published, “CO₂ Baseline Database for the Indian Power Sector”, Version 4.0, October 2008. This database is an official publication of the Government of India for the purpose of CDM baselines. It is based on the most recent data available with the Central Electricity Authority (CEA), Government of India.

Using the values of emission factors for OM and emission factor for BM, provided in the official database and the weights provided above the value of the emission factor for the combined margin has been determined to be 0.9269 tCO₂equivalent / MWh. Thus the emission factor considered is 0.9269 t CO₂e/MWh, calculated by applying a weight of 75% to the Simple Operating Margin and 25% to the Build Margin for the Southern grid. In order to determine GHG mitigation in a conservative manner, no transmission and distribution losses have been considered. In order to determine the emission in a baseline scenario, the emission factor is multiplied by the net power generated by the wind energy generators. The project emission in the proposed CDM project has been taken as zero tCO₂e/MWh, as wind is a zero GHG emitting renewable form of energy.

The project assists in enhancing sustainable development in India as detailed in the following aspects:

Social well being: The proposed VCS project activity leads to alleviation of poverty by generating additional employment opportunities for the local people of the project area both during the construction phase and the entire lifetime of the project. This

would lead to removal of social disparities and therefore, the project is contributing to provision of basic amenities to people leading to improvement in quality of life of people.

Economic well being: The proposed VCS project activity required additional investment to be made to set up the wind turbines, and infrastructure like approach roads, substations, etc.

Environmental well being: The project uses natural resource, wind, to generate clean and green power. Thus, the impact of the project activity on the state of Karnataka is that it reduces Karnataka's dependency on fossil fuels due to use of wind as fuel source. There is no degradation of resources used for the project. Wind power is a bio-diversity and environmental friendly mode of power generation with no negative impact on human health and leads to reduction of pollution in general as compared to the alternative sources of power such as fossil fuel.

Technological well being: The project activity utilises environmentally safe and sound wind power technology that is comparable to best practices across the world.

Thus, the project assists in the sustainable development of the country, and the state of Karnataka by reducing its dependency on fossil fuels, reducing local air pollution, providing emission free clean electricity and employment to rural youth both during the construction phase and the entire lifetime of the project.

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:

The project under consideration has been developed using UNFCCC CDM program approved methodology for small-scale CDM Project activity **AMS-I.D, Version 13.0** as approved by VCS 2007.1 The title of this baseline and monitoring methodology is "Grid connected renewable electricity generation"

The size of the project activity is 15 MW. Moreover the project proponent does not have plans to increase the capacity of the project in near future. The project thus qualifies for small scale project activity.

As is therefore evident, the proposed VCS project meets all the applicability criteria set out under the selected small scale methodology and hence the project category is applicable to the project.

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

In accordance with Appendix B of the simplified modalities and procedures for small-scale CDM project activities, the project is categorized as Type – I.D.: Version 13, Scope 1, “Grid Connected renewable electricity generation”. Category ID is applicable to projects that use renewable energy technologies which supply electricity to a grid.

The proposed project activity leads to reduction in the emission of GHG due to the switching of fuel for power generation (substitution of grid power which is primarily generated in coal based power plant with power generated in wind turbines using renewable energy of wind).

The applicability criteria of the above methodology in the context of the proposed project are as follows:

- 1. This category comprises renewable energy generation units, such as photovoltaics, hydro, tidal/wave, wind, geothermal and renewable biomass, that supply electricity to and displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit.*

The proposed project is supplementing the power needs of the Southern grid with clean wind power which otherwise is fed by fossil fuel based power plants. Thus, the proposed project displaces 15 MW of electricity by renewable means (through wind power) that would otherwise have been generated from fossil fuel sources.

- 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. If the unit added co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15MW.*

The proposed project falls under this eligibility limit of 15 MW as the electricity generation potential of the proposed project is 15 MW of wind power.

Further, the renewable electricity generation capacity of the proposed project is 15 MW, which is equal to the qualifying capacity of 15 MW. The proposed project activity will continue to generate power from the 20 WEGs at the total installed capacity of 15 MW during each year of the crediting period.

As is therefore evident, the proposed project meets all the applicability criteria set out under the selected small scale methodology according to CDM baseline and monitoring methodologies and hence the project category is applicable to the project.

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

The GHG sources for the baseline scenario would have been the emissions due to fossil fuel used for the generation of same amount of electricity. The atmosphere would serve as GHG sink or reservoir for emissions generated out of fossil fuel based power plants.

The major sources and justification for GHG emissions are identified as below;

	Source	Sinks & Reservoirs
Baseline (Southern grid entity)	Mainly due to fuel combustion, during power generation from the fossil fuel based electricity generation plants, interconnected with the grid.	The reservoirs and sinks would not change and be constant for both the baseline as well as the project activity. Hence for simplicity purposes, these are not considered as significant.
Project Activity (Wind Based Power Generation facility)	In accordance with the applicable methodology AMS I D, there are no GHG emissions from the wind based project activity, and thus it can be safely considered that there are no sources of GHG emissions after the implementation of the project activity. The leakages are also considered as zero.	

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

The usual practice for the generation of electricity is fossil fuel based power plants hence the most probable option for the identification of baseline scenario is the use of fossil fuel such as coal. The proposed VCS project activity is located in Karnataka state of India that lies in the Southern grid of India.

Historically, the Indian power system was divided into five independent regional grids, namely Northern, Eastern, Western, Southern, and North-Eastern. Each grid covered several states as depicted in the following Table.

Geographical scope of the two electricity grids

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

Source: Central Electricity Authority (CEA), Government of India, "CO2 Baseline Database for the Indian Power Sector", Version 4.0, October 2008

Since August 2006, however, 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 from FY 2007-08 onwards in the CO2 Baseline Database. The Southern grid has also been planned to be synchronously operated with rest of all Indian Grid by yearly 12th Plan (2012-2017). Presently Southern grid is connected with Western and Eastern grid through HVDC link and HVDC back to back systems.

With the purpose of providing a ready reference for the emission coefficients to be used in carbon credit projects, Central Electricity Authority (CEA), Government of India, has published, "CO2 Baseline Database for the Indian Power Sector", Version 4.0, October 2008. This database is an official publication of the Government of India for the purpose of carbon credit baselines. It is based on the most recent data available with the Central Electricity Authority (CEA), Government of India.

The project category applicable to the proposed project is AMS ID. Accordingly, the energy baseline being considered is as directed in paragraph 9 of the AMS.I.D/Version 13 as;

"The baseline (emissions) is the energy (in kWh) produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO₂e/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'³.

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 the data from an official source (where available) and made publicly available. The wind power project displaces power which would have otherwise been generated from the Southern regional grid. Thereby the energy baseline for this project would be the energy produced by the wind based power generation facility, multiplied by the emission coefficient as calculated for the Southern grid.

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 new wind electric generators installed in the proposed VCS project substitute the baseline consumption of fossil fuel operated power plants with cleaner zero green house gas emitting wind power plant. Thus, carbon intensive fossil fuels are

³ http://cdm.unfccc.int/methodologies/Tools/EB35_repan12_Tool_grid_emission.pdf

substituted with zero carbon emission sources of energy for the operation of the proposed VCS power plant.

According to the Clause 5.8 of the VCS 2007 guidance document, the additionality of the project is required to be demonstrated using any one of the three tests specified. The proposed VCS project activity is shown to be additional using the Test 1.

Step 1: Regulatory Surplus:

The proposed VCS project activity is not mandated by any statutory law or regulatory framework.

The implementation of project activity is a voluntary initiative and it is not mandatory or a legal requirement. For power generation, the Electricity Act 2003 does not restrict or empower any authority to restrict the fuel choice, the applicable environmental regulations do not restrict the use of wind energy and there is no legal requirement on the choice of a particular technology.

Step 2: Implementation Barrier:

Investment Barrier

The project proponent carried out the financial viability assessment of the investment proposition and it was not found to be attractive enough. An investment analysis of the investment proposition in the proposed VCS project activity was carried out by the project proponent with the Internal Rate of Return (IRR) of the project as the indicator. 'Internal Rate of Return' is one of the known financial indicators used by banks, financial institutions, investors and project developers for making investment decisions.

The local commercial lending rate for May 2004 (the time of placing of purchase order for the project activity) for the company is the applicable Prime Lending Rate (PLR) of the Reserve bank of India⁴ which is 10.25% -11%. This has been set as the benchmark as per the CDM-EB guidance document Annex 45, EB 41. The applicable PLR 10.75% was used as the benchmark for comparison with the project IRR of the investment proposition in the proposed VCS project activity.

The parameters used for determination of project IRR for the project activity are provided below:

Considerations	Value	Unit	Basis
Installed Capacity	15	MW	Purchase Order
Emission Reduction Factor	0.9269	tCO ₂ /Ths kWh	CEA CO ₂ Baseline Database, Version 4
PLF	26.5%		KERC order

⁴ <http://www.rbi.org.in/Scripts/WSSView.aspx?Id=7543>

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O & M Expenses as % of Capital Cost	1.25%		KERC order
Annual Escalation in O & M Expenses	5.0%		KERC order
Administrative Overheads	5.0%	of Revenues	As per standard practice
Income Tax Rate as per companies act	36.59%		As per Companies Act
Depreciation Rate as per IT act (WDV)	13.91 %		Section 32 of the Income Tax Act.
Interest rate	7%		HSBC bank loan sanction letter
Life of the project	20	Yrs	Lifetime of a wind power plant as per the Directory, Indian Wind Power 2007, Page 4-17

The investment analysis has been carried out. The post tax project IRR for the project activity at 26.5% PLF has been arrived at 9.75% which is less than the benchmark 10.75%. From the financial analysis calculations, it is clear that the Project is financially unattractive. Thus the VCU revenues can alone make this Project financially viable.

Sensitivity analysis of post tax project IRR of the MEL Wind Energy Project has been carried out on the basis of varying the plant Load Factor with +/-10% variation.

The results of the sensitivity analysis carried out for the proposed project activity are provided in the Tables below:

PLF	Project IRR	Benchmark
23.85%	7.77%	10.75%
26.50%	9.75%	10.75%
29.15%	11.66%	10.75%

From the sensitivity analysis, it can be seen that only when the PLF is increased to 10% the project IRR crosses the benchmark. But 10% increase in PLF is not a real case scenario. With decrease in 10% of PLF the IRR comes down to 7.77%. Arriving at PLF of 29.15 % is not a prevailing scenario. Considering the average historical PLF for two years, it is apparent that the probability of PLF reaching KERC's benchmark (26.50%) is almost nil. Hence, the IRR calculated at KERC's PLF is already very conservative and may be considered for the purpose of additionality. However during each monitoring period the PLF will be verified.

Thus it can be concluded from the analysis that project is not financially attractive and is an additional.

Step 3: Common Practice

The proposed CDM project activity pertains to generation of power using wind energy in the state of Karnataka, India. As of 31.03.06, Karnataka contributed only 11% to the total installed capacity of wind power of India.

This can be observed from the following table 1⁵

Table 1

States	2005-2006	Contribution
Tamil Nadu	800.6	49.2%
Maharashtra	545.1	20.9%
Karnataka	170.9	11%

The trend of annual addition in the installed capacity of wind power has been shown in the table below (1992-93 to 2004-06). From this table it has been observed that Karnataka has one of the lowest annual capacity additions in wind power.

State-wise annual installed capacity addition in wind power (MW)⁶- Table 2

States in MW	2002-2003	2003-2004	2004-2005	2005- 2006
Karnataka	52.4	81.4	200.4	170.9
Tamil nadu	132.9	355.1	688.3	800.6
Maharashtra	2	6.25	48.75	545.1
Rajasthan	44.9	129.5	93.8	74.5

Based upon the Central Electricity Authority, CEA (a Government of India organization, and a statutory body which works at a policy level to regulate and reform the Indian power sector) database, the region-wise installed capacity as on 31st March 2006 for various grids is shown in Table 3, below. As can be observed from the table that fossil fuels (mainly coal and gas) have a majority share in power generation, and accordingly influence the electricity generation system via various grids in India. Prior to the initiation of the project activity the said power would have been generated from the power plants connected to the southern regional grid, as described in the subsequent paragraphs.

Table 3 – Region wise installed capacity (MW) as on 31.3.2006

Region	Hydro	Thermal				Nuclear	Renew.	Total
		Coal	Gas	Diesel	Total			
Northern	11061.88	17592.50	3213.19	14.99	20820.68	1180.00	694.59	33757.15
Western	6681.33	20941.50	5080.72	17.48	26039.70	1300.00	1098.83	35119.86

⁵ <http://www.inwea.org/installedcapacity.htm>

⁶ <http://www.inwea.org/installedcapacity.htm>

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Southern	10967.71	15992.50	3434.50	939.32	20366.32	880.00	4233.49	36447.52
Eastern	2496.53	13662.38	190.00	17.20	13869.58	0.00	111.67	16477.78
N. Eastern	1113.07	330.00	771.50	142.74	1244.24	0.00	46.86	2404.17
Islands	5.25	0.00	0.00	70.02	70.02	0.00	5.42	80.69
All India	32325.77	68518.88	12689.81	1201.75	82410.54	3360.00	6190.86	124287.17

Source: CO2 Baseline Database for the Indian Power Sector, Version 3, December 2007, Government of India, Ministry of Power, Central Electricity Authority

It can be observed that after analyzing the conditions prior to project initiation fossil fuels contribute more than 50% of the total power generation capacity in the country, thus having major implications on the GHG emissions resulting out of the sector.

Carbon revenue contribution in wind power in Karnataka, as referred from unfccc website

Looking at the current scenario, approximately 75% of the wind power projects in Karnataka have considered Carbon credit revenue as an important factor in the financial viability of the project. The following Projects are registered for availing carbon credits⁷.

Project	Capacity	location	Status
Bundled wind power project by Enercon India ltd	16.8 MW	Chiradurga	Registered with unfccc
Wind power project by Ms MSPL	125MW	In various locations in Karnataka	Registered with unfccc
NSL wind power project	27.65 MW	In Karnataka	Registered with unfccc
Tungabhadra wind power projects	22.8MW	In Karnataka	request for review
15MW bundled wind power project	3.75MW	In Karnataka	Registered with unfccc
13.4MW wind power projects	13.5 MW	Chitradurga in karnataka	Registered with unfccc

Hence, it is evident that there is no project of comparable capacity in the region that has come up without considering carbon credit benefits. Thus the project activity is not a common practice.

⁷ <http://cdm.unfccc.int/Projects/registered.html>

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 proposed project activity utilizes the UNFCCC CDM methodology AMS ID.: Version 13, Scope 1, “Grid Connected renewable electricity generation”. Category ID is applicable to projects that use renewable energy technologies which supply electricity to a grid.

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

The main purpose of the monitoring is to check the electricity generation from the project under consideration.

Types of data and information to be reported, including units of measurement:

- *Type of Data:* Eg_y
- *Unit of Measurement:* MWh (Mega-watt hour)

Electricity supplied by the project activity to the grid is as per energy generation certificates by BESCOM, WTG meter, and Ex-ante Grid emission factor derived from Central Electricity Authority database (version 04)

Estimation: Annual expected electricity supplied to the grid by the Project

$$= 15\text{MW (Capacity)} \times 26.5\% \text{ (PLF)} \times 8760 \text{ (hours)}$$

$$= 34821 \text{ MWh/year}$$

Net electricity supplied to the grid will be measured by the two-way export Trivector meter.

The Net electricity is recorded as following

(Net Electricity = Net Export – Net Import)

The Net electricity supplied to the grid is recorded monthly by taking a Joint Meter Reading (JMR) in the presence of officials from BESCOM and MEL representatives. The Joint meter reading contains the value of energy imported and exported and the net export to the grid during the recording period. The metered units are recorded in a specified format on a continuous basis;

The metered units can be cross verified by the SCADA (Supervisory Control & Data Access System)

At each site, machines owned by the project proponent are connected on 33KV side to a tri-vector meter of accuracy class 0.2, as specified in the Power Purchase Agreement with BESCOM or its representative Energy Distribution Companies.

Monitoring roles and responsibilities: The sole parameter for monitoring is the electricity supplied to the grid. The project proponent has entrusted the operations and maintenance of the project to Enercon India, since they themselves lack the technical expertise to do so. Enercon India, the technology supplier, is an ISO 9000 company and has elaborate

procedures and well trained staff to carry out the various functions to ensure that the project delivers energy as planned and that the data is duly recorded and communicated to the Project Proponent on a regular basis.

The project activity will be looked after by the manager responsible for operation of the wind energy generating machines at the project site. Daily operations of the wind energy generating machines will be carried out by the staff responsible for the operation of the WEGs.

The meters used for recording the electricity generation will be of integrator type. The electricity generated will be recorded on a daily basis. The data will be captured and stored electronically, wherever possible. As a separate measure, the same data will be entered in the log book on change of every shift. The monitoring data shall also be archived by Enercon (India) Limited as a backup arrangement for the entire crediting period plus two years.

Measuring instruments of all the parameters covered under the monitoring plan which are required to be monitored regularly will be calibrated as per maintenance schedule.

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

Data / Parameter:	EGy (Net Electricity supplied to the grid by the WEGs)
Data unit:	KWh
Description:	Net generation of power (total power generated by the project – reactive power consumed by the project) from the installed WTGs under the project
Source of data to be used:	Share Certificate from BESCO providing the monthly electricity generated from project activity and uploaded to Southern grid
Value of data applied for the purpose of calculating expected emission reductions	34821000
Description of measurement methods and procedures to be applied:	Net electricity supplied to grid will be calculated based on the measured values of “export” and “import” on the meter at the delivery point, where joint reading is taken by project proponent representative and BESCO officials. The meter at the final uploading point to grid (Delivery point) is common to the project activity and other wind turbines in the wind farm that are not under this project activity. Apportioning of net electricity uploaded is done with reference to the electricity generated from individual wind turbines by the state utility department. The BESCO will issue a

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	<p>monthly certificate for actual power exported by each project owner in the wind farm to the grid, based on the individual meter readings of each wind turbine. The reading recorded in this certificate, issued by BESCO, will be used to calculate actual GHG emission reductions by the project activity.</p> <p>The data relevant to establishing the net electricity generated from the project including the electricity share certificate from BESCO, the invoice to BESCO and the monthly metering sheets available with the project proponent shall be archived for the entire crediting period plus two years.</p>
<p>QA/QC procedures to be applied:</p>	<p>The measurement of the electricity generated using an electronic meter as installed in the WEG machine and at the substation is considered to be a reliable method for measurement of electricity generated. The additional meters installed at the sub stations (grid interconnection point) will be used to measure the mentioned variable on a continuous basis and shall act as a cross check. Every month these meter readings will be recorded by site in-charge and the state utility personnel and the records will be archived for crosschecking yearly figures. The meters at the sub station will be trivector meters. The readings in these meters may be used to determine the net power wheeled to the grid and determine the extent of mitigation of GHG over a period of time.</p> <p>Data taken from the meter readings is readily verifiable by reading taken from the SCADA system that records it online</p> <p>Lastly, energy meters in each WTG tower records energy generated on a cumulative basis</p> <p>Calibration of the energy meters being used will be carried out annually as per the standard practice.</p> <p>Data archiving shall be carried out in electronic format during the crediting period</p>

	<p>and for a time period of two years greater than the total duration of the crediting period of the project activity to enable monitoring of the net electricity supplied to the grid.</p> <p>All these activities shall be carried out by trained personnel of Vestas Wind Technology that is an ISO 9001 certified company. Thus, all QA / QC procedures applicable shall be followed. The data records shall also be maintained as specified in the quality standard.</p>
Any comment:	<p>The accuracy class of the metering equipment shall be 0.2% (both main and check meters) as also mentioned in the Power Purchase Agreement.</p>

3.4 Description of the monitoring plan

The main objective of having a monitoring system is to have a constant check on the emission reductions. Energy delivered by the project as recorded in the Main Meter is the relevant data to monitor to keep a constant check on the emissions reductions achieved by the project.

Project proponents in co-ordination with BESCO or its representative Energy Distribution Companies meter the delivered energy. The project activity is supplying electricity at 33 kV through double circuit overhead transmission (suspension type) conductors to Mathodu 66/11KV substation (from Phase 1), Horakeredevapur 66/11KV substation (from Phase 2) and Hiriyur 220/66/11KV substation (Phase 3).

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

The project activity generates about 15MW equivalent of clean electricity, with efficient utilisation of the available wind energy, with Enercon turbines, The project activity displaces energy (largely from fossil fuel based sources),and also delays any planned expansion ,of the grid generations by its equivalent size ,which contributes to sustainable development and conservation through use of wind ,a renewable resource ,of green energy of MU units, per Annum , is fed to the Southern grid.

The project is promoted by Mineral Enterprises Limited, a company engaged in the mining industry in India, with at least 5 mines in the state of Karnataka, of which one is located in the same district as the project, i.e. Chitradurga. The project began in May 2004 with the issue of the purchase order by the project promoter and implementation was completed by March, 2006 when the last WEG was installed.

Mineral Enterprises Limited has entered into power generation and sale of power to the grid in the Indian state of Karnataka, through introduction and application of wind power technology. In the current global scenario, investment in renewable energy such as wind power is considered environmentally desirable and socially acceptable.

The project activity of MEL is solely owned by them through subleasing argument from Ms Enercon, who maintain the wind energy sites, as the wind turbines haven been manufactured by Ms Enercon using the technology of which the details have already been covered, the ownership of the project would be the sole transaction with VCS board.

4 GHG Emission Reductions:

4.1 Explanation of methodological choice:

The project activity meets the eligibility criteria to use simplified modalities and procedure for small scale CDM project activities as set out in paragraph 6 (c) of decision 17/CP.7. The total installed capacity of the project is 15 MW, which is equal to 15 MW prescribed for small scale project. Moreover, being a renewable energy project, the project emissions are zero.

The baseline and monitoring methodology being used for the project is AMS ID. Version 13. Accordingly the emission reduction for the project will be determined.

The proposed project will supply power to the regional grid of the southern part of the country. This is based on the consideration of free flow of electricity among the member states and the union territory through the Southern Region Load Dispatch Centre (SRLDC). Thus the entire southern grid is considered as a single entity for estimation of the emissions in the baseline.

The monitoring is part of the baseline methodology. As explained earlier, the baseline methodology is applicable to the project activity and hence the monitoring protocol given in the methodology is applicable to the project activity. Baseline emissions (BE_y in tCO₂) are then, the product of the baseline emissions factor (EF_y in tCO₂/MWh) times the electricity supplied by the project activity to the grid (EG_y in MWh) minus the baseline electricity supplied to the grid in the case of modified or retrofit facilities ($EG_{baseline}$ in MWh), as follows:

$$BE_y = (EG_y - EG_{baseline}) EF_y$$

$EG_{baseline}$ = Zero as the project activity is a new facility

Accordingly, as per the methodology AMS ID, the emission in the baseline scenario for the project activity will be determined using the following formula

$$BE_y = (EG_y) \times EF_y$$

Where

BE_y = Baseline emissions (in tCO₂e)

EF_y = Baseline Emissions Factor in tCO₂/MWh

EG_y = Net electricity supplied by the project activity to the grid in MWh

The project category applicable to the proposed project is AMS ID. Accordingly, the energy baseline being considered is as directed in paragraph 9 of the AMS.I.D/Version 13, that provides that the applicable 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.

The methodology also states that the calculations must be based on data from an official source (where available) and made publicly available.

As provided in Section B.4 above, as per the publicly available CEA publication of the CO₂ Baseline Database, Version 4.0 dated October 2008, the simple operating margin emission factor is calculated based on weighted average of 3 years data have been used and arrived at 0.9981 t CO_{2e}/MWh the Build Margin emission factor for the Southern Grid is 0.7133 t CO_{2e}/MWh. As specified in the methodology, the combined margin emission factor (in t CO_{2e}/MWh) of the current generation mix using the tool to calculate the emission factor for an electricity system has been considered to estimate the baseline emissions.

As per the monitoring procedure defined in AMS ID, the monitoring of the baseline emissions will be done by monitoring the power supplied to the grid. Monitoring shall consist of metering the electricity generated by the renewable technology. Thus, for this purpose, the electronic meters installed at each of the WEG will be used.

As wind power is a zero GHG emission technology there will not be any project emissions (PE_y). Some power gets used for maintenance of the common facilities of the wind farm. During lean phases (when the WEG are not generating power) some power gets drawn from the grid for maintenance of the common facilities. This aspect is taken care of as baseline emissions are computed on the net power supplied to the grid. For the purpose of determining the net power, two vector meters are installed at the point of power transmission to the grid.

Being a renewable and clean energy project, the project emissions (PE_y) during operation are considered zero. The emission reductions from the project activity are calculated as :

$$\text{Emission Reductions (y)} = \text{BE}_y - \text{PE}_y - \text{LE}_y$$

where

PE_y = zero

LE_y = Project Leakage = Zero

and BE_y = (EG_y) x EF_y

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

In accordance with the provisions in AMS ID described above and the Tool to calculate the emission factor for the proposed VCS project, the combined margin emission coefficient (in t CO₂e/MWh) of the current generation mix in the Southern grid has been considered for determining the emission in the baseline, as applicable to wind power projects. The tool to calculate the emission factor requires that for intermittent sources for power generation like wind as in the case of proposed CDM project the weights to be used for calculating the emission factor for Combined Margin.

$$W_{OM} = 0.75$$

$$W_{BM} = 0.25$$

Baseline emission Factor (EF_{BL}) Or Combined margin is calculated as weighted average of simple Operating Margin and build Margin emission Factors. Therefore,

$$EF_{BL} = (0.75 \times EF_{OM}) + (0.25 \times EF_{BM}) = 0.9269 \text{ tCO}_2\text{equivalent / MWh}$$

The emission factor for simple operating margin (EF_{OM}) can be calculated as the average of ex ante data vintage on the basis of methodological tool (EB35, Annex-12) to calculate emission factor for an electricity system.

Thus the three years (2005-06; 2006-07; 2007-08) weighted average data of simple operating margin has been calculated and arrived as 0.9981 t CO₂/MWh:

The Build Margin (EF_{BM}) for the year 2007-08, applicable for the project is 0.7133 tCO₂/MWh from the CEA database⁸.

Using the values of emission factors for OM and emission factor for BM, provided in the official database and the weights provided above the value of the emission factor for the combined margin has been determined to be 0.9269 tCO₂equivalent / MWh. Thus the emission factor considered is 0.9269 t CO₂e/MWh, calculated by applying a weight of 75% to the Simple Operating Margin and 25% to the Build Margin for the Southern grid. In order to determine GHG mitigation in a conservative manner, no transmission and distribution losses have been considered. In order to determine the emission in a baseline scenario, the emission factor is multiplied by the net power generated by the wind energy generators. The project emission in the proposed CDM project has been taken as zero t CO₂e/MWh, as wind is a zero GHG emitting renewable form of energy.

As per the methodology AMS ID, the emission in the baseline scenario for the project activity will be determined using the following formula

$$BE_y = (EG_y) \times EF_y$$

Where

BE_y = Baseline emissions (in tCO₂e)

⁸ http://www.cea.nic.in/planning/c%20and%20e/user_guide_ver4.pdf

EF_y = Baseline Emissions Factor in tCO₂/MWh (from the official database published by the CEA, Version 4.0, October 2008)

EG_y = Net electricity supplied by the project activity to the grid in MWh

$$\begin{aligned} \text{EG}_y &= 15000 \times 26.5\% \times 8760 \\ &= 34821000 \text{ KWh} \\ &= 34821 \text{ MWh} \end{aligned}$$

$$\begin{aligned} \text{Thus, BE}_y &= 34821 \text{ MWh} \times 0.9269 \text{ tCO}_2/\text{MWh} \\ &= 32275 \text{ tCO}_2 \end{aligned}$$

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

As described in Section 4.2, the proposed project activity being a wind power project, the project emissions PE_y are considered as zero. As per the guidance provided under section 1D, no leakage estimation is required.

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

The emission reductions for the project activity for a year y can be calculated as:

$$\text{Emission Reductions (y)} = \text{BE}_y - \text{PE}_y - \text{LE}_y$$

where

$$\text{PE} = \text{LE}_y = \text{Zero.}$$

$$\text{and BE}_y = (\text{EG}_y) \times \text{EF}_y$$

Thus, Emission reductions per annum from the proposed project activity

$$= 32275 - 0 - 0 = 32275 \text{ tCO}_2$$

For the first crediting period of ten years, the total emission reductions are calculated as $32275 \times 10 = 322750 \text{ tCO}_2$.

5 Environmental Impact:

Wind power is one of the cleanest sources of renewable energy, with no associated emissions and waste products. In India, as per the provisions under the EIA Notification of 1994, wind power projects do not require an Environmental Impact Assessment.

6 Stakeholders comments:

The stake holders in the present context were defined as the parties and individuals who are either affected or are perceived to be affected by the proposed project activity. The proposed activity pertains to replacement of grid power with the power generated in WEGs. The proposed project activity is not likely to have any adverse impact on any of stake holders.

The population in the local villages of Ittigehalli, Haladyamanahalli, Katheholle, Banjagondanahalli, Lakkihalli, Kenkere and Kereyagalhalli, constitutes the local stakeholders of the project activity. Apart from the local stakeholders, the other stakeholders are:

1. Designated National Authority, Government of India;

The Ministry of Environment & Forests is the Designated National Authority in India. The government of India, through Ministry of Environment and Forests (MoEF) is encouraging project participants to take up such Climate Change initiatives.

2. Ministry of Non Conventional Energy Sources, Government of India

The government of India, through Ministry of New and Renewable Energy Sources (MNRE), has been promoting energy conservation, demand side management and renewable energy projects including wind, small hydro and hydro / bio-mass power. Promotion of high value wind power that utilises locally available resources more effectively are appreciated by the MNRE.

Stakeholders meeting:

In order to appraise the local community about the economic, social and environmental benefits from the project activity and to invite their views on the same a local stakeholders meeting was conducted on December 28, 2006 at the project site office.

Accordingly, a public notice in Kannada (the local language) was distributed in the villages surrounding the project area on December 1, 2006. Copies of the public notice were also pasted in prominent areas such as the local temple, school, etc., so that people at large could be informed of the proposed local stakeholder meeting.

Following this, a local stakeholders' consultation meeting was conducted on December 28, 2006 at the project site.

Relevant outcomes from stakeholder consultations and mechanisms for on-going communication.

Local stakeholder response:

The respondents have indicated that the wind power projects in the area had transformed the local economy and made way for the introduction for higher levels of revenue streams for their families. The areas around the Jogimatti wind corridor being largely dryland, the land was used by the local villagers for cattle grazing, which has continued unabated as the wind power projects occupy a token area in comparison with the total area available. Moreover, the chance to work in a new installation gives the local villagers employment of up to 5-6 months per year. Finally, their assistance is also required during the processes of overhauling, renovation, maintenance and major

repairs, and they envisage the employment to keep continuing as one wind farm is retired and a second one crops up. The overall benefit to the community outweighs any possible displacement of grazing area for their cattle that they have encountered, and has improved their chances to secure sustainable livelihoods.

For the other stakeholders mentioned above, no adverse comments were received.

No adverse comments were received on the project activity by project participants.

7 Schedule:

S.No.	Activity	Date completed
1	Date of Purchase Orders for the wind machines	Started : 28 th May 2004 Completed: 22 nd August 2005
2	Date of WEG Commissioning Certificates (also Project Start date)	30 th September 2004, 17 th September 2005, 31 st March 2006
3	Expected start date for crediting period for the project activity	28 th March 2006
4	Date of Power Purchase Agreements for the wind machines	27 th February 2006, 4 th April 2006, 14 th June 2006.

8 Ownership:

8.1 Proof of Title:

The purchase orders and power purchase agreements provide the proof of title in the name of Mineral Enterprises Limited has further certified Mineral Enterprises Limited to be the focal point for all communication related to carbon credit generation from the proposed project activity.

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

Not applicable to the proposed VCS project activity.