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THE GOLD STANDARD:
Project Design Document for Gold Standard Voluntary Offset Projects

(GS-VER-PDD)

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Explanatory information on how to complete the PDD and how to obtain Gold Standard registration can be found in the project developer's manual available on the Gold Standard website.

This template of the PDD is applicable for micro-, small- and large-scale projects. Note that the shaded boxes present information on the Gold Standard VER project development procedures. Project developers should delete these shaded boxes when preparing their PDD.

VOLUNTARY OFFSET PROJECTS

PROJECT DESIGN DOCUMENT FORM (GS-VER-PDD)
Version 01 - in effect as of: January 2006

CONTENTS

Annexes

SECTION A. General description of project activity

A.1 Title of the project activity

Title: 0.75 MW Kerala Wind Power Project
Version: 05
Date: 06/09/2010

A.2 Description of the project activity

MITCON Consultancy Services Ltd. has proposed the Kerala Wind Project which would utilize wind power (a renewable form of energy) to generate electrical energy with a purpose of feeding the generated electricity to the grid. The installed capacity of the project is 0.75 MW[1], which comprises of 1 no. Wind Electric Generator (WEG). The wind turbine is located at Karunapuram village, Ramakkalmedu region, in the Idukki district of Kerala State, India. The electricity generated will be exported to the southern regional grid system thereby displacing an equivalent amount of electricity from the southern regional grid which would have otherwise been generated using fossil fuels[2].

The project activity will generate around 1,634 MWh of electricity annually, leading to a reduction in emissions of 1,180 tonnes of CO_2 equivalent per year. The project activity would be utilizing fully automated technology supplied by Vestas Wind Technology India Pvt. Ltd.

The electricity generated by the project would be sold to the State Electricity Utility viz. Kerala State Electricity Board under a Power Purchase Agreement.

Purpose of the project activity

The main purpose of the project activity is to generate and sell renewable electrical energy to the state electricity utility thereby supplementing their energy supply and contributing to climate change mitigation. Apart from generation of renewable electricity, the project also offers the following benefits:

- Enhancement of the level of propagation of both private and public commercial wind turbines in the Ramakkalmedu region.
- Contribution to the sustainable development of the region, socially, environmentally & economically.
- Reduction of the prevalent risks associated with wind project through use of revenues from the sale of emission reduction for the project implementation and operation purposes.

Contribution of project activity to sustainable development

As the Indian economy grows, so will it's energy requirement and the country is now increasingly dependent on fossil fuels for the generation of energy to meet the growing demand. This increased use of fossil fuels causes environmental problems both locally and globally due to widespread GHG emissions, leading to immense stress on the environment.

In order to address and mitigate the impact, there is need for changing fossil fuel consumption patterns. This will require a multi-pronged strategy focusing on demand, reducing wastage of energy and the optimisation of renewable energy sources. Use of renewable resource for energy generation has been adopted by the project

[1] WEG supply agreement will be provided for reference
[2] http://www.cea.nic.in/power_sec_reports/executive_summary/2007_11/6.pdf

developer as a way of addressing climate change by private investment. The Government of India has stipulated the following indicators for sustainable development in the Interim Approval Guidelines[3] for projects.

1. Social well being:

- The project site is situated in an isolated rural area where unemployment, poverty and other economic hardships are prevalent. Slow initiation of new investment in the region is attributed to lack of supportive infrastructure which doesn't favour private investment. The project will therefore, lead to the development of this region through opening up of opportunities for income generation.
- During civil works, the construction work provided employment opportunities for local people at the wind farm site.
- Going forwards, operation and maintenance contracts at the site will provide employment opportunities on a longer-term and permanent basis.

2. Economic well being:

- The project activity would lead to investment in a rural region which otherwise would not have happened in the absence of project activity, resulting in a strengthened local economy. The proposed project has shown that there is potential for private investment in renewable energy and with time, other private parties will move in and start initiating projects which will eventually help rural people in generating income.
- The generated electricity will be fed into the regional grid through the local grid, thereby improving the availability of electricity to the local consumers who are served by the southern regional grid system. With the injection of electricity from the project, there will be reliability in power supply which provides new opportunities locally for businesses, in turn providing new opportunities for local development.
- The project activity also leads to the diversification of the national energy supply, which is dominated by fossil fuel based generating units, and boosts confidence in investing on renewable energy projects.

3. Environmental well being:

- The project utilizes wind energy for generating electricity which otherwise would have been generated through fossil fuel based power plants in the system or commissioning of new ones, therefore contributing to a reduction in specific emissions (emissions of pollutant per unit of energy generated), including GHG emissions.
- Wind projects generate electricity without external inputs (fossil fuels). Being a clean form of power generation, natural resources which will have been used or destroyed by thermal power plants are conserved. It is therefore apparent that the project causes no adverse negative impacts on the surrounding environment.
- Use of renewable energy sources (wind energy) also helps in the conservation of natural resources and their associated landscapes i.e. the in situ conservation of coal beds.

4. Technological well being:

- There are two sites in Kerala, namely Ramakkalmedu and Palakkad, where the WEG installations are in progress. The Agency for Non–conventional Energy and Rural Technology (ANERT), the State Nodal Agency, has estimated that there is a potential for 80 MW of wind power generation in the Ramakkalmedu region[4]. The site where the project would be located is identified as the most potential site in the State for the development of wind power project.

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

[4] http://www.thehindubusinessline.com/bline/2005/09/19/stories/2005091900500200.htm

- In March 2008, Vestas commissioned a total of 5 WEGs at this site for electricity generation for various PPs, and the project activity is one of these 5 WEGs commissioned. Being one of the pioneers in the region, the project activity is therefore one of the first in the Ramakkalmedu site and will lead to the promotion of wind power generation technologies (see technical details in Annex – 4) in the region to achieve the 80 MW estimated potential. In order to achieve 80 MW, about 107 WEGs of 0.75 MW capacities are needed to be commissioned at this site. Upon successful installation of the wind plant, the project will demonstrate the success of power generation technology and open a new frontier for private investment in the region.

In view of the above, the project participants consider that this scheme will contribute to the sustainable development of the region and India, as a whole, having met the Sustainable Development Criteria as set out by the Indian Government.

Sustainable development

The sustainable development assessment was conducted by the project promoter as per the guidelines of the Gold Standard. The stakeholder consultation report is annexed separately to this PDD.

The matrix provides a demonstration and description of impacts on specific components of sustainability by the project activity. Changes are considered relative to the baseline scenario (without proposed project) as defined in Section B.

As shown below, the sustainability of the project activity is assured. Both the sub-total score and the total score is positive and no indicator has a score of negative. In addition, because of their non-negative qualities, no indicators are subject to the EIA pre-screen checklist. There are some indicators viz. employment generation and livelihood of the poor etc. which are crucial for an overall positive impact on sustainable development or particularly sensitive to changes in the framework conditions or where concerns of stakeholders have emerged.

Indicators	**Score -2 to 2**
Local / regional / global environment	
Water quality and quantity	2
Air quality (emissions other than GHGs)	2
Other pollutants (including, where relevant, toxicity, radioactivity, POPs, stratospheric ozone layer depleting gases)	2
Soil condition (quality and quantity)	1
Biodiversity (species and habitat conservation)	1
Sub total	**8**
Social sustainability and development	
Employment (including job quality)*	2
Livelihood of the poor (including poverty alleviation, distributional equity and access to essential services)*	1
Access to energy services	1
Human and institutional capacity (including empowerment, education, involvement, gender)	0
Sub total	**4**
Economic and technological development	
Employment (numbers)*	2
Balance of payments (sustainability)	1
Technological self reliance (including project replicability, hard currency liability, skills development, institutional capacity, technology transfer)	0
Sub total	**3**
Total	**15**

The scores in the sustainable development matrix result from mostly qualitative considerations on project activity, baseline and professional experiences of experts, partners and stakeholders. The criteria that provide the scores are discussed below.

Water quality and quantity:
Any lubricants used during the operation and maintenance of the wind turbine are subject to careful handling in order to ensure that environmental management standards are adhered to so that there is no pollution of surface and underground water. Water itself is not used in operation of the project activity, thus there are no impacts on the water availability or accessibility in the local or regional area.

Air quality:
Conventional power projects utilise fuels such as coal, fuel oil, gas etc. Utilisation of such fuels leads to air pollution. The project has no impact on air quality, locally and regionally, as polluting fuels are not utilised. Instead the use of wind energy for electricity generation gives an overall reduction in emissions through the displacement of fossil fuel intensive grid electricity.

Other pollutants:
No toxic and radioactive materials are used or generated from wind turbines. The substitution of the baseline electricity generation results in less SOx and NOx emissions. The electricity generated by the project will be fed to the grid to displace fossil fuel electricity. This will lead to less generation and release of oxides of nitrogen and sulphur substances associated with burning of fossil fuels for electricity generation.

Soil condition:
Due to its small scale, the project does not have significant negative impact on the soil condition. Furthermore, it has to be considered that the project activity is located in a designated 80 MW wind mill farm and the proposed wind mill is one among 107 wind mills planned for the farm. The project activity therefore does not disturb the existing ecology of the area. Thus no additional erosion and no further extent of land use are expected.

Biodiversity:
This is a single turbine project at a site carefully chosen for minimal disturbance of the fauna and flora. Once constructed, the wind turbines operate on a stand–alone mode. There will be neither further construction activities nor heavy movement of vehicles to transport fuel. Wind turbines are simply rotated by blowing wind and therefore they have negligible disturbance of the local biodiversity.

Employment (social and economic aspects):
The installation of wind turbines generate direct (on site) and indirect (off site) employment. It is estimated that jobs were created for 5.7 personnel directly and 22.87 personnel indirectly per MW adding up to a total of 28.6 jobs per MW of installed capacity. The jobs in occupational category includes professional, technical and managerial, clerical and sales, service, processing machinery trades, bench work, structural work miscellaneous.

The project activity enhances the local economy bringing new business opportunities to fulfill the demands of new people (new investment ventures) to the area. Also, the project will contribute to the economic sustainability of the local area through the creation of labour for civil construction, project operation and maintenance, security and drivers. Furthermore, as the project generates more investment in the region, more job opportunities will be generated in the future.

Additional income to local people due to above opportunities generated by the project will improve the living standard of the community, as they can now utilize better facilities such as education for children, medical facilities, entertainment etc.

Livelihood of the poor:
Apart from employment generation at site, where some jobs have been offered to the local community (which leads to poverty alleviation), the implementation of the project activity would trigger the commencement of new commercial activities in the area. Improved electricity supply leads to reliability on power supply that will also encourage local people to start new commercial activities, which otherwise were not viable due to existing poor power supply. Due to the jobs offered, there is a steady income inflow for the people due to which people get access to an appropriate quantity, quality and variety of food.

Balance of payments (sustainability):
By supporting renewable energy power generation, fossil fuels will be displaced in India's power mix. The dependence on these fossil fuel imports will decrease, improving the balance of payments.

Technological self- reliance:
The used technology (NM 48 / 750 kW) is well established in India. There are more than 300 installations of the same technology in different parts of the country. The project activity does not lead to further dependency of the region in terms of know-how matters as the technology is indigenous in nature. The technically skilled operators are available in India for the operation and maintenance. However, the technology is the first of kind in the region where the project is installed.

A.3 Project participants:

Name of Party involved (*) (Host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
India	MITCON Consultancy Services Limited.	No
Kenya	JP Morgan Ventures Energy Corporation Limited	No

A.4 Technical description of the project activity:

A.4.1 Location of the project activity:

A.4.1.1 Host Party(ies):
India

A.4.1.2 Region/State/Province etc.:
Kerala

A.4.1.3 City/Town/Community etc:
Karunapuram village, Ramakkalmedu region

A.4.1.4 Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):

Identification No.	Survey No.	Village	Latitude (N)	Longitude (E)	Machine Registration No.
KUR 492	495	Karunapuram	9°47'53.4"	77°13'14.9"	KL-2007-003

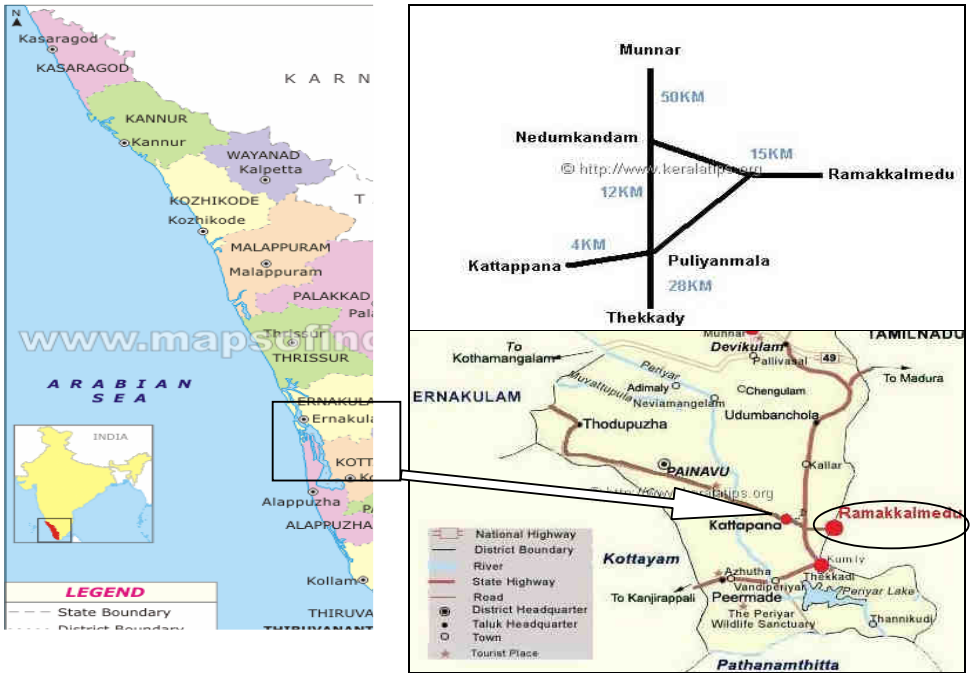

Figure1: Project Site map.

The site Ramakkalmedu can be reached by rail and air as mentioned below –

Nearest railway station: Changanacherry to Ramakkalmedu (90 km)

Nearest airport: Madurai (145 km) and Cochin International Airport (Nedumbasery – (185 km)

A.4.2 Size of the project:

Micro-scale project.

The proposed micro-scale project activity is not a fragmentation of a large scale project activity into smaller parts, hence as per 'Compendium of guidance on the debundling for SSC project activities' EB 36 annex 27 this project is not a debundled part of a large project because the other wind turbines are implemented by different project proponents.

A.4.3 Category(ies) of project activity:

The proposed project activity falls under the following type and category:

Project Type : **I –** Renewable Energy Projects
Project Category : **I. D.** Grid connected renewable electricity generation
Reference : **AMS I.D.** (Version 15, EB 50)[5]

According to the conditions of the Gold Standard the project falls within cut-off threshold of Micro-scale projects since the yearly emission reductions is less than 5,000 tonnes of CO_2e.

[5] http://cdm.unfccc.int/UserManagement/FileStorage/7QXAZ5036WN8BEYKUDFRPJGL21V4I9

A.4.4 Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed project activity, including why the emission reductions would not occur in the absence of the proposed project activity, taking into account national and/or sectoral policies and circumstances:

Proposed Project is a wind power project which would utilize wind energy for electricity generation which is a renewable form of energy. The generated electricity would be fed into the southern regional grid for sale of power. The technology is a clean and safe technology since there are no GHG emissions associated with Wind electricity generation. The Kerala wind power project is located in the Ramakkalmedu region, and the project supplies renewable electricity to the Southern regional grid of India. Kerala State Grid falls under Southern Regional grid. A Power Purchase Agreement has been signed between the project promoter and Kerala State Electricity Board for the purchase of supplied power.

In the absence of the project, electricity supplied to the grid will typically be generated by existing power plants or new addition of power plants in the southern grid which might be of a higher capacity than the project activity.

The above statement can be substantiated with the help of the following figures which are sourced from the Monthly review report of power sector [6](Nov 2007) by the Central Electricity Authority of India:

Table 1: Installed Generation Capacity of southern region as on 30 November 2007

Mode	Installed Generation(MW)
Hydro	10,646.18
Thermal	20,708.12
Nuclear	1100.00
Renewable Energy Sources	5,899.33
Total	**38,353.63**

From the above statistics it can be clearly seen that thermal power projects (with a share of over 53%) had the major contribution towards the total installed power generation in the southern regional grid. Whereas, renewable energy sources (including small hydro power, biomass gas, biomass power, Urban & Industrial waste power and Wind Energy) had a small share of only 15%.

The domination of power generation by thermal power plants signify that in the absence of the proposed project activity, equivalent power would have been generated using fossil fuels and hence no emission reduction would occur and present situation i.e., generation of electricity by fossil fuels by the grid would continue.

By generating electricity using renewable source, the project will therefore displace an equivalent amount of electricity which would have otherwise been generated in the thermal power plant dominated regional grid leading to a net reduction in GHG emissions. The implementation of the project is not a legal or regulatory requirement but a private investment initiative. There is no legal regulation which requires private investors in the energy sector to invest in renewable energy sector in order to reduce GHG emissions.

From the above therefore, it can be concluded that the proposed project leads to a reduction in GHG emissions associated with energy generation and these emission reductions would not have occurred without the proposed project.

[6] http://www.cea.nic.in/power_sec_reports/executive_summary/2007_11/6.pdf

A.4.4.1 Estimated amount of emission reductions over the crediting period:

Annual estimation of emission reductions are mentioned in the table below and are calculated as described in Section B.2.

Years	Annual estimation of emission reductions in tonnes of CO_2 e
1	1,180
2	1,180
3	1,180
4	1,180
5	1,180
6	1,180
7	1,180
Total emission reductions (t CO_2 e)	**8, 260**
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (t CO_2e)	1,180

Table 2: Yearly Emission Reduction

SECTION B. Application of a baseline methodology

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

The project aims to reduce green-house gas emissions through displacement of grid electricity with renewable electricity generated by wind. This renewable energy generation will reduce the amount of fossil fuel used in power generation by thermal plants in the southern regional grid system. The project uses AMS-I.D-Grid Connected Renewable Electricity Generation methodology version 15 in calculating the baseline emissions.

The methodology also draws upon the Tool to calculate the emission factor for an electricity system version 01 in calculating the emission factor of the grid.

B.1.1 Justification of the choice of the methodology and why it is applicable to the project activity:

The methodology used requires clear determination of the amount of electricity exported into the grid. Due to the fossil fuel intensity of the Southern Indian Grid, all wind electricity generated and exported to the grid from the project displaces an equivalent amount of electricity which would have been supplied by fossil fuel based thermal plants.

Requirements with respect to technology/measure under Version 15 of AMS I. D. – "Grid connected renewable electricity generation" are as follows –

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 fired generating unit.	The project activity will generate electricity by using renewable source of energy (i.e. Wind) and supplies the generated electricity to the electricity distribution system (Southern regional grid). Hence the project displaces electricity from Southern regional grid that is or would have been supplied by at least one fossil fuel fired electricity generation unit. Since the project

	activity will supply electricity from a renewable source to the regional grid, hence the project activity satisfies this condition.
2. Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: *• The project activity is implemented in an existing reservoir with no change in the volume of reservoir;* *• The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m2;* *•The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m2.*	The project activity is wind power project, hence this criteria is not applicable for the project.
3 .If the unit added has both renewable and non-renewable components (e.g., a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel1, the capacity of the entire unit shall not exceed the limit of 15 MW.	The project activity has only renewable component (i.e. wind electric generator) having total capacity of 0.75 MW which is less than the eligibility limit of 15 MW for small scale CDM project activity. Hence the project activity can be considered as a small scale CDM project activity.
4. Combined heat and power (co-generation) systems are not eligible under this category.	The project activity involves only power generation component hence this criteria is not applicable for the project activity.
5. 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 distinct2 from the existing units.	The project activity is Greenfield project and not involves any addition to the existing renewable power generation facility. Hence, this criterion is not applicable for the project activity.
6. Project activities that seek to retrofit or modify an existing facility for renewable energy generation are included in this category. To qualify as a small-scale project, the total output of the modified or retrofitted unit shall not exceed the limit of 15 MW.	The project activity is Greenfield project and does not seek/involves any retrofit or modification of an existing facility for renewable energy generation. Hence this criterion is not applicable for the project activity.

Since the proposed project meets all the above requirements, hence the methodology is therefore applicable for the project and has been applied in accordance with the requirement.

B.2 Description of how the methodology is applied in the context of the project activity:

This project generates electricity for the grid from renewable sources (wind). Being a renewable source, the electricity generated displaces fossil fuel based electricity in the grid thereby increasing the renewable component of electricity in the grid mix. This leads to reduction of fossil fuel usage in electricity generation.

Since the electricity generation of the project is from a renewable source, the project therefore falls under category Type I.D, 'Grid connected renewable electricity generation'. In addition, the project's installed capacity is 0.75 MW which is less than 15 MW threshold for small-scale projects.

As per para 10 of the methodology AMS I.D. version 15, for wind electricity generation systems, the baseline emissions are the product of electrical energy baseline $EG_{BL,y}$ expressed in kWh of electricity produced by the renewable generating unit multiplied by an emission factor.

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

Where:
BE_y = Baseline Emissions in year y; t CO_2
$EG_{BL,y}$ = Energy baseline in year y; kWh
EF_{CO2} = Emission Factor in year y; t CO_2 e/kWh

Energy baseline is determined as the net electricity supplied to the grid, generated by the renewable energy unit during the year y. The amount of supplied electricity is determined by the monthly joint metering records.

The methodology provides following approaches for calculation of emission factor (para 11 of the methodology)–

(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_2 e/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

The combined margin emission factor for the southern regional grid calculated as per the 'Tool to calculate the Emission Factor for an electricity system", works out to be 0.9293 t CO_2/MWh. Whereas the value of weighted average emission factor for the Southern regional grid is found to be 0.7219 t CO_2/MWh[7] (as published in the Central Electricity Authority of India, CO_2 Baseline database version 3).

Since the value of weighted average emission factor is found to be more conservative than combined margin emission factor hence, hence the same is considered for baseline emission calculation with ex-post approach where emission factor (EF_{CO2}) will be monitored for each periodic verification during the crediting period.

B.2 Ex-ante calculation of emission reductions:

As per para 16 of the approved project category I.D. version 15, emission reductions for a project are calculated as follows:

[7] http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm baseline CO_2 emission database version 03

$ER_y = BE_y – PE_y – LE_y$

Where –
ER_y = Emission reductions in year y (t CO_2 e/y)
BE_y = Baseline emissions in year y (t CO_2 e/y)
PE_y = Project emissions in year y (t CO_2 e/y)
LE_y = Leakage emissions in year y (t CO_2 e/y)

Project Emissions (PE_y):

As per para 14 of the approved project category I.D. version 15, for most renewable energy project activities, $PE_y = 0$.

The project would utilize wind potential for electricity generation hence the project emissions are considered as zero.

$PE_y = 0$

Leakage Emissions (LE_y):

As per para 15 of the approved project category I.D. version 15, if the energy generating equipment is transferred from another activity, leakage is to be considered.

The project activity involves the implementation of one new WEG hence the above mention condition is not relevant for the project activity hence the leakage emissions are considered as zero.

$LE_y = 0$

Emission Reductions (ER_y) :

$ER_y = BE_y – PE_y – LE_y$

Since the project emissions as well as the leakage emissions are considered as zero, the emission reductions are equal to the baseline emissions.

$ER_y = BE_y - 0 - 0$

Hence, $ER_y = BE_y$

And baseline emissions are calculated as:

$BE_y = EG_{BL,y} * EF_{CO2}$ (as explained in the section above)

$EG_{BL,y}$ = 1,634,616 KWh/yr

EF_{CO2} = 0.7219 t CO_2/MWh (as explained in the above section)

Hence,

BE_y = 1,634,616 kWh/yr * 0.0007219 t CO_2/kWh

BE_y = 1,180 t CO_2e/yr.

B.3 Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered VER project activity:

The project has not been announced to go a head without the carbon finance consideration. During project planning phase, carbon funds were considered as one way of raising additional capital needed to implement the project. See MITCON annual report extract attached separately with the PDD.

Timeline for the project activity

Date	Particulars
September 24, 2007	Annual General Meeting of Board members for decision to invest in Wind power project. .
November 13, 2007	Invitation of Bids for wind power project, Advertisement published in Times of India.
December 29, 2007	After completion of bidding process, MITCON's Managing Director concluded in the internal note to take necessary actions to avail carbon credit revenue.
January 2, 2008	WEG supply agreement signed with technology supplier (Vestas)
March 27, 2008	Power Purchase Agreement signed with Kerala State Electricity Board
March 31, 2008	WEG commissioned and started GHG reductions.

This project involves the generation of electricity using wind energy for export to the southern region grid. The southern region grid system serves 6 states, namely Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, Pondicherry and Lakshadweep. Because of its highly capital intensive nature and the fixed tariff and revenue from electricity sales in India, it is difficult for the private sector to invest in and construct small wind generation schemes in the region.

Of the established technical wind potential of 605 MW in the Kerala region[8], only 2.35 MW has been installed. This is attributed to most investors preferring other alternative sectors such as the manufacturing and telecommunications sectors where one can see expansion and growth opportunities as opposed to electricity generation where project revenues can only increase if the tariffs are increased.

Step 1: Identification of alternatives to the project activity consistent with current laws and regulations.

Sub-step 1a: Define alternatives to the project activity

The following are the identified alternatives to the project activity:

(a) Proposed project activity undertaken without being registered as a VER project
(b) Continuation of the current situation

Alternative (a): The proposed project activity undertaken without being considered as a VER project activity

This is a realistic and credible alternative but the project activity faces several barriers which would prevent the project activity from getting implemented. The barriers faced by the project are discussed in the sections below.

Alternative (b): Continuation of the current situation

[8] http://mnes.nic.in/annualreport/2002_2003_English/ch5_pg2.htm

The continuation of the current scenario means that more electricity will be generated from fossil fuel based thermal plants as per the current generation mix of the Southern Region. There would be no displacement of fossil-fuel based electricity in the grid and this alternative will not lead to a reduction of emissions in the project boundary. In other words, an equivalent amount of electricity would be generated by conventional power plants presently connected to the Southern regional grid. As these power plants are predominantly thermal based, an increase in greenhouse emissions, especially CO_2, would result from this alternative.

Outcome of step 1a: Identified realistic and credible alternative scenario to project activity

All the alternatives identified above are realistic and credible to the project activity.

Sub-step 1b: Consistency with mandatory laws and regulations:

All the identified alternatives are consistent to legal and or regulatory requirements governing power projects in India.

Step 2: Investment analysis

The project follows the "Non-binding best practice examples to demonstrate additionality for SSC project activities." option (a), i.e. Investment barrier and Attachment A to Appendix B to demonstrate additionality. Since the project uses the approved methodology AMS I.D. which defines the baseline of the projects, hence for this project discussion on alternatives is not necessary.

Though the detail methods are not mentioned in above tool, the PP has carried out investment analysis by using UNFCCC *"Tool for the demonstration and assessment of additionality",* (Version- 05.2, Annex 10, EB- 39).To demonstrate the Investment barrier, the PP has carried out an Investment analysis as follows :

As per this tool, it is to be determined that the project activity is not:

(a) The most economically or financially attractive; or
(b) Economically or financially feasible, without the revenue from the sale of verified emission reductions (VERs).

By applying the following sub-steps:

Sub-step 2a: Determine appropriate analysis method

As per Sub-step 2a, Paragraph (1), as the project activity is selling the generated electricity to state electricity utility & getting financial benefits other than VER benefits hence, Option- I is not applicable under this situation. Also as per EB-51, Annex 58, clause no.16 "If the alternative to the project activity is the supply of electricity from a grid this is not to be considered an investment and a benchmark approach is considered appropriate. Hence the project promoter has chosen to apply Option- III or benchmark analysis as an appropriate analysis method to demonstrate the investment barrier.

Sub-step 2b: Option III. Apply benchmark analysis

The Benchmark for the project activity has been determined according to the "*Tool for demonstration and assessment of additionality*" *(Version 05.2, Sub-step- 2b, Option- III, Clause- 6(b))* which says that discount rates and benchmarks shall be derived from "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."

Hence the benchmark has been selected as 13 %, which was the applicable average commercial prime lending rate published by Reserve Bank of India during Nov, 2007[9] i.e. at the time when investment decision was taken.

Sub-step 2c. Calculation and comparison of financial indicators

As per EB-51, Annex 58, clause no. 12 "In cases where a benchmark approach is used the applied benchmark shall be appropriate to the type of IRR calculated. Local commercial lending rates or weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR.

Hence the PP has selected Project IRR as a suitable financial indicator for a comparison with the selected benchmark.

The Project IRR for the proposed project activity without VER revenues was computed for a period of 20 years i.e. lifetime of the 0.75 MW wind power project, based on the following assumptions as presented in table below:

Parameters	Units	MITCON
No. of machine[10]	Nos.	1
Capacity/machine	kW	750
Total capacity	kW	750
Plant Load Factor[11]	Percentage	24.88
Annual generation	Kwh (in Lac units)	16.35
Electricity Selling rate considered[12]	INR / kWh	3.14
Insurance[13]	INR Lacs / yr	0.64
O & M Charges[14]	INR (In Lacs)/yr	6
Escalation in the O & M expenses[15] from third year	Percentage	7.5 %
Free O & M[16]	Years	1
Deration in energy after 10 Years[17]	Percent	5 %
Project cost[18]	INR (In Lacs)	429.99
MITCON's Contribution	INR (In Lacs)	429.99

Based on the above assumptions the project IRR value for the project activity without VER benefits was computed and was found out to be 9.31% which is lower than the benchmark rate of 13%.

Since the internal rate of return for the proposed project activity is less than the benchmark of 13%. Thus, we can say that the proposed project activity cannot be considered as financially attractive.

Sub-step 2d. Sensitivity analysis

In order to demonstrate the robustness of the investment analysis even on subjecting the critical variables of the project to reasonable variation, a sensitivity analysis is conducted.

[9] http://rbidocs.rbi.org.in/rdocs/Wss/PDFs/81574.pdf
[10] As per offer letter from WEG supplier
[11] As per PLF assessment study report
[12] As per KSERC tariff policy
[13] As per TAC order
[14] As per offer letter from WEG supplier
[15] As per offer letter from WEG supplier
[16] As per offer letter from WEG supplier
[17] As per TERI report
[18] As per offer letter from WEG supplier

The guidelines on the assessment of investment analysis (Version 03, EB 51 Annex 58 clause no 17) states that for conducting a sensitivity analysis only variables, including the initial investment cost, that constitute more than 20 % of either total project costs or total project revenues should be subjected to reasonable variation.

The different parameters that affect the viability of the proposed project as per the above clause are mentioned below –

The project returns or project IRR have been found sensitive to factors like annual electricity generation, project cost and the O & M cost. The effects of a range of variations imposed on the identified factors on the project returns have been demonstrated below:

Sensitivity Analysis based on Annual Generation

Variation	-10%	-5%	0%	5%	10%
Project IRR	7.24%	8.29%	9.31%	10.29%	11.26%
Annual Generation kWh (in Lac Units)	14.71	15.53	16.35	17.16	17.98

Sensitivity Analysis based on Project Cost

Variation	-10%	-5%	0%	5%	10%
Project IRR	11.15%	10.18%	9.31%	8.49%	7.74%
Project Cost (INR Lacs)	386.99	408.49	429.99	451.49	472.99

Sensitivity Analysis based on Operation and Maintenance

Variation	-10%	-5%	0%	5%	10%
Project IRR	9.65%	9.48%	9.31%	9.13%	8.96%
O & M Cost (INR Lacs)	5.40	5.70	6.00	6.30	6.60

It can be seen from the above that even a 10% increase in annual net generation, 10% reduction in project cost, and 10% reduction in O & M Expenses/ cost does not result in the IRR crossing the benchmark settled by the promoter. Hence it can be said that project activity is clearly unattractive in absence of VER revenues. The promoter was aware of this fact and had considered this investment only in light of VER revenues being available for this project. Inclusion of VER revenues in project inflow will help to mitigate the risk associated with the project up to some extent. The project IRR with VER revenue comes to 13.07% which is closing the selected benchmark of 13%.

Hence it can be concluded that VER revenue that the project activity would obtain through sale of the emission reductions, will be very crucial to sustain the operations of the project activity over its intended lifetime.

B.4 Description of how the definition of the project boundary related to the baseline methodology selected is applied to the project activity:

According to para 7 of the methodology I.D. version 15, “The physical, geographical site of the renewable generation source delineates the project boundary.”

It also covers the southern regional grid system where the generated electricity is exported to. Therefore all the power plants contributing electricity to the Southern grid are included in the connected (project) electricity system for the purpose of baseline estimation.

B.5 Details of baseline information, including the date of completion of the baseline study and the name of person (s)/entity (ies) determining the baseline:

Date of completion of the baseline study:

04/05/2010

The baseline study has been conducted by:

MITCON Consultancy Services Ltd.,
1st Floor, Kubera Chambers, Shivajinagar,
Pune - 411 005 Maharashtra, India

And

JP Morgan Ventures Energy Corporation Limited
Eden Square Business Centre, Westlands Rd.
PO Box 856 00606, Nairobi. Kenya.
Email: joash.obare@jpmorgan.com

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1 Starting date of the project activity:

02/01/2008 (on the basis of WEG supply agreement with Vestas)

C.1.2 Expected operational lifetime of the project activity:

20 years

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

C.2.1 Renewable crediting period

C.2.1.1 Starting date of the first crediting period:

31/03/2008 (Commissioning date of the WEG)

C.2.1.2 Length of the first crediting period:

7 years 0 Months

C.2.2 Fixed crediting period

C.2.2.1 Starting date:

N/A

C.2.2.2 Length:

N/A

SECTION D. Application of a monitoring methodology and plan

D.1 Name and reference of approved monitoring methodology applied to the project activity:

The approved monitoring methodology applied to the project activity is included in the methodology for small-scale projects of category I. D.

Reference : **AMS I. D.** (Version 15, EB 50)[19]

D.2 Justification of the choice of the methodology and why it is applicable to the project activity:

D.2. 1 OPTION 1: Monitoring of the emissions in the project scenario and the baseline scenario

D.2.1.1 Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

The project will not have any project emissions as outlined in the applicable methodology.

D.2.1.2 Data to be collected in order to monitor project performance on the most sensitive sustainable development indicators:

ID number	Data variable	Source of data	Data unit	Frequency of monitoring	Comment
D.2.1.2.a	Employment (including job quality)	EPC Contractor	Numbers of people trained	Annually	Data will be collected on labour requirement in the occupational category includes professional technical and managerial (highly trained skilled engineers in electrical and civil) clerical and sales, service, processing machinery trades, bench work, structural work miscellaneous jobs etc. Along with the above, data will be collected with respect to the training records of the plant personnel on site to ensure that the occupational health and safety procedures are in place to demonstrate quality of employment.

[19] http://cdm.unfccc.int/UserManagement/FileStorage/7QXAZ5036WN8BEYKUDFRPJGL21V4I9

D.2.1.2.b	Employment (numbers)	EPC Contractor and Project proponent	Numbers	Annually	Data will be recorded on employment numbers created as a result of the project to demonstrate the changes compared to the baseline situation.
D.2.1.2.c	Livelihood of the poor (Commencement of new commercial activities)	Assessed from the Local / regional area	Numbers	Annually	Data collected to ensure the development of this parameter are referred in under other sub-heads and hence monitored.

Note: The monitoring of the above D.2.1.2c would be carried out considering the actual local situation their monitoring should be estimated based on local knowledge (i.e. verbal interviews) instead of actual monitoring using Gold Standard set parameters.

D.2.1.3 Description of formulae used to estimate project emissions (for each gas, source, formulae/algorithm, emissions units of CO2 equ.)

. Refer to section B.2 above.

D.2.1.4 Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary and how such data will be collected and archived :

ID number	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
(a)	Energy generation	Joint Meter reading records	kWh	m	Monthly	100 %	Electronic and paper	Data will archive for crediting period + 2 years.
(b)	Weighted average emission factor of the southern regional grid	CEA : CO_2 Baseline database	t CO_2/MWh	m	Annually	100%	Electronic and paper	The values would be sourced from the latest CEA : CO_2 Baseline database

D.2.1.5 Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

Estimation of Baseline Emissions:
The wind power project produces electricity which would otherwise be produced by the regional grid consisting of fossil fuel dominated thermal power plants. The electricity produced by the project activity, being GHG neutral, will reduce the associated emissions from fossil fuel based thermal power generation in the southern regional grid of India. As per the guidelines in AMD I.D. version 15 in order to estimate the baseline emissions, the emission factor is calculated as per the procedures laid in paragraph 11 (a) or 11(b) of the methodology.

The PP has opted for option 11(b) i.e. weighted average emission factor since it is found to be more conservative than combined margin emission factor hence, hence the same is considered for baseline emission calculation with ex-post approach where emission factor (EF_{CO2}) will be monitored for each periodic verification during the crediting period. More information is mentioned in section B.2.

The following are the variables used to determine the baseline emissions

Variable	**Data Source**
$EG_{BL,y}$ = Net Electricity supplied to the grid	Joint metering records maintained by project proponent and realigned with electricity sale invoices.
Parameter	**Data Source**
EF_{CO2} = weighted average emission factor of the southern regional grid (tCO_2/MWh)	CEA CO_2 Baseline Database, Version 3 dated 15/12/2007

The baseline emissions are calculated as follows:

$BE_y = EG_{BL,y} \times EF_{CO2}$

D. 2.2 OPTION 2: Direct monitoring of emission reductions from the project activity (values should be consistent with those in section E).

D.2.2.1 Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

Not applicable. Please refer to section B.2.

D.2.2.2 Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.):

Not applicable. Please refer to section B.2.

D.2.3 Treatment of leakage in the monitoring plan

Not applicable. Please refer to section B.2.

D.2.3.1 If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project activity

There is no leakage associated with the project activity since the energy generating equipment is not transferred from another activity.

D.2.3.2 Description of formulae used to estimate leakage (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

Not applicable. Please refer to section B.2.

D.2.4 Description of formulae used to estimate emission reductions for the project activity (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

Since there is no leakage and no project emissions associated with the project activity, the emission reductions from the project are equal to the baseline emissions (See section B.2). The emission reductions from the project are therefore calculated using the formulae used to calculating the baseline emissions as shown above under section B.2.

D.3 Quality control (QC) and quality assurance (QA) procedures are being undertaken for data monitored

As part of the quality control and quality assurance, two energy metres (one on the project proponent side and other on the grid side) will be installed and used to cross check each other. Joint measurement will be carried out as per the procedures in PPA in presence of both parties (the developer's representative and officials of the state power utility). In case of a discrepancy between the meters, the calibration status of both will be verified. In any case, each of the meters will be calibrated at least once a year.

The meter readings will be taken daily and aggregated to monthly figures for invoicing purposes.

Data (Indicate table and I D number)	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
D.2.1.4.a	Low	The data will be collected as outlined in the monitoring plan and be archived and will be used for cross checking with state utility's data.
D.2.1.4.b	Low	No such procedures are necessary, since the data is published by the Central Electricity Authority of India which is a reliable and authentic source.

D.4 Please describe the operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects, generated by the project activity

The roles and responsibilities for the operational and management structure is provides as follows –

Roles	Responsibilities
PP - Technical Project Manager	Review the performance of project, prepare & submit the annual reports, supporting documents for validation & verification of VERs.
Vestas- Site Incharge	Judge the performance of project through reports from clerks & plant operators on site. Visits to plant site & instruct to plant operators for improvement in performance. Compile data & reports to available for audit, review the performance of the project
Vestas- Clerks	Day to day monitoring, record, report & archive data as received contains overall conditions on wind farm.

Vestas- Plant Operators (O & M Staff)	Daily monitoring, checking routine Operation & Maintenance activities, reporting for any major O &M, Preventive Maintenance etc.

All the relevant data & reports during project construction and commissioning have been archived. This documentation is important for maintaining accuracy in future monitoring and reporting of GHG emission reductions. All these documents are in custody of the Project developer.

D.5 Name of person/entity determining the monitoring methodology:

Tushar Chaudhari, Principal Consultant
MITCON Consultancy Services Ltd.,
1st Floor, Kubera Chambers, Shivajinagar,
Pune - 411 005 Maharashtra, India

SECTION E. Estimation of GHG emissions by sources

E.1 Estimate of GHG emissions by sources:

The sources and gases included in the project boundary are as follows:

	Sources	Gas	Included?	tCO_2e/ yr.	Justification / Explanation
Project Activity	Emissions from the WEG due to electricity generation	CO_2	No	0	As per AMS I. D, project emission is not considered for wind project
		CH_4	No	0	As per AMS I. D, project emission is not considered for wind project
		N_2O	No	0	As per AMS I. D, project emission is not considered for wind project
Estimated emission reductions due to project activity	Emissions from the power plants connected to the southern grid of India (Base Line)	CO_2	Yes	1,180	Considered. This is major component of the emissions from electricity generation by fossil fuel based power plants.
		CH_4	No	0	Not considered. This is conservative
		N_2O	No	0	Not considered. This is conservative

E.2 Estimated leakage:

As the project activity does not lead to any GHGs emission leakages, there is no leakage as per the definition of leakage, as explained above in section B.2.

	Sources	Gas	t CO_2 e/year	Justification / Explanation
Leakage emissions	Emissions from the WEG due to electricity generation	CO_2	0	Wind is used as fuel which is a clean source of energy and doesn't leads to any emissions through electricity generation.
		CH_4	0	
		N_2O	0	

E.3 The sum of E.1 and E.2 representing the project activity emissions:

PE_y = E.1 +E.2
PE_y = 0 + 0
PE_y = 0 t CO_2 e / year

E.4 Estimated anthropogenic emissions by sources of greenhouse gases of the baseline:

	Sources	Gas	t CO_2 e / year
Anthropogenic baseline emissions	Burning of fossil fuels for electricity generation	CO_2	1,180
		CH_4	0
		N_2O	0

E.5 Difference between E.4 and E.3 representing the emission reductions of the project activity:

ER_y = E.4 – E.3
ER_y = 1,180 - 0
ERy = 1,180 t CO_2 e/year

E.6 Table providing values obtained when applying formulae above:

Year	Estimation of project activity emission reductions (tonnes CO_2 e)	Estimation of baseline emission reduction (tonnes CO2 e)	Estimation of leakage (tonnes CO_2 e)	Estimation of emission reductions (tonnes CO_2 e)
1	0.0	1,180	0.0	1,180
2	0.0	1,180	0.0	1,180
3	0.0	1,180	0.0	1,180
4	0.0	1,180	0.0	1,180
5	0.0	1,180	0.0	1,180
6	0.0	1,180	0.0	1,180
7	0.0	1,180	0.0	1,180
Total	**0.0**	**8, 260**	**0.0**	**8, 260**

SECTION F. Environmental impacts

F.1 Documentation on the analysis of the environmental impacts, including transboundary impacts:

According to the Gold Standard VER Manual, an Environmental Impact Analysis is necessary if it is required by appropriate host country law or by the Gold Standard. In order to decide if an EIA must be performed, the results of the Sustainable Development Assessment Matrix and first stakeholder consultation are considered. The sustainability matrix in Section A.2 does not contain any negative scores, every sub-total and total score is positive. Furthermore the First Stakeholders' Consultation outlined in Section G showed that the stakeholders are positive about the project. No significant negative impacts have been identified or raised by the stakeholders.

Finally, as per the guidelines of Ministry of Environment and Forest, Government of India, wind power projects do not require an EIA in India[20]. Hence, an EIA was not carried out for the project.

However, following minor environmental impacts are required to be monitored-

- Almost all sources of power generate noise, and the key to acceptability is the same in every case - sensible siting. Wind turbines generate noise from the rotation of the blades and from the machinery,

[20] http://envfor.nic.in/legis/eia/so1533.pdf dated14th September, 2006

principally the gearbox and generator. At low wind speeds wind turbines generate no noise, simply because they do not generate. The noise level near the cut-in wind speed is important since the noise perceived by an observer depends on the level of local background noise (the masking effect) in the vicinity. At very high wind speeds, on the other hand, background noise due to the wind itself may well be higher than noise generated by a wind turbine. The intensity of noise reduces with distance and it is also attenuated by air absorption[21].

- Some trees were cut in order to clear surrounding project site area and access road for about 1 km. Also, the trees within the site must be maintained short; however, the project proponent instead plants trees in the surrounding area periodically to ensure that forest conservation. Under Social Corporate Responsibility the technology supplier i.e. NEG Micon (Vestas) has planted trees and also the PP has also planted & distributed the sapling to local resident to increase the vegetation.
- There is no literature/research available on the route of bird migration in the turbine area. However; overall other literature research shows that the bird deaths due to wind turbines are negligible compared to human encroachment, environmental despoliation, and collisions with man-made objects[22]. In addition, radar studies from other country area show that birds - by day or night - tend to change their flight route some 100-200 metres before the turbine and pass above the turbine at a safe distance[23].

F.2 If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

Not applicable[24]

SECTION G. Stakeholders' comments

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

Refer Annex – 5 for report on stakeholder consultation meeting.

G.2 Summary of the comments received:

Refer Annex – 5 for report on stakeholder consultation meeting.

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

During the meeting, the discussion was done in the local language and English. Combination of local language / English gave the stakeholders a good atmosphere to express themselves freely. The forum moderator briefed the participants on the purpose and objectives of the meeting and that they were expected to air their views freely and openly. He requested all in attendance to give their views both positive and negative. After the meeting, the stakeholders were asked to fill out the questionnaire regarding the project

[21] http://www.terienvis.nic.in/windenergy.pdf
[22] http://www.awea.org/faq/sagrillo/swbirds.html,
[23] http://www.windpower.org/en/tour/env/birds.htm
[24] http://envfor.nic.in/divisions/iass/eia/Annex1.htm

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

BASELINE INFORMATION

CENTRAL ELECTRICITY AUTHORITY: CO_2 BASELINE DATABASE
VERSION : 03
DATE : 15 December 2007

Weighted Average Emission Rate (tCO2/MWh) (incl. Imports)							
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North	0.72	0.73	0.74	0.71	0.72	0.73	**0.7373**
East	1.06	1.03	1.09	1.08	1.05	1.05	**0.9957**
South	0.74	0.75	0.82	0.84	0.79	0.74	**0.7219**
West	0.90	0.92	0.90	0.90	0.92	0.89	**0.8629**
North-East	0.42	0.41	0.40	0.43	0.52	0.33	**0.3974**
India	0.82	0.83	0.85	0.85	0.84	0.81	**0.8001**
Simple Operating Margin (tCO2/MWh) (incl. Imports)							
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North	0.98	0.98	1.00	0.99	**0.9801**	**0.9992**	**0.9985**
East	1.22	1.19	1.17	1.20	**1.1745**	**1.1291**	**1.0909**
South	1.02	1.00	1.01	1.00	**1.0009**	**1.0079**	**1.0030**
West	0.98	1.01	0.99	0.99	**1.0129**	**1.0039**	**0.9936**
North-East	0.74	0.71	0.74	0.74	**0.9019**	**0.6994**	**0.7031**
India	1.01	1.02	1.02	1.02	1.02	1.02	1.01
Build Margin (tCO2/MWh) (not adjusted for imports)							
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North					0.53	0.60	**0.6283**
East					0.90	0.97	**0.9281**
South					0.70	0.71	**0.7055**
West					0.77	0.63	**0.5938**
North-East					0.15	0.15	**0.2265**
India					0.69	0.68	0.68

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

Annex 3

MONITORING PLAN

The responsibility of collecting and recording all the monitored data will be with wind turbine project manager who reports to the managing director. As part of the monitoring work, the project manager will record and keep the records of the following:

- The electronic meter that will be used for monitoring is the Export-Import Energy meter and is, installed at interconnection point and at high voltage side of the step up transformer installed at project site. A fall back meter of the same specification at the generator end in accordance with Kerala State Electricity Board Grid Code is also installed.
- All meters will be jointly inspected, and sealed by authorized representatives on behalf of the project developer and State Electricity Board.
- The joint reading of the meters is undertaken on the date of synchronization, of every month at pre-appointed time.
- The meters will be calibrated annually as specified in metering code of Kerala State Electricity Board Grid Code and tested for accuracy semi annually. Meter shall be treated as working satisfactorily so long as the errors are within the limits prescribed for meters of the class.
- The reading of the main meter recorded jointly and signed will form the basis for billing, so long as the results of the half- yearly checks thereof are within the prescribed limits.
- In the event of computer monitoring system is found to be inaccurate by more than two percent (2%), fall back meter (check meter) reading may be adopted. If fall back meter is also faulty, the parties shall estimate the amount of power generation during the period of inaccurate measurements based on the certified power curve of WEG and wind data as per wind mast installed at project premises and the actual machine availability achieved.

The monitoring will be carried out as follows:

- Monthly monitoring (Joint meter reading) will be performed jointly since it is the responsibility of both owner as well as State Electricity Board. Whereas daily monitoring is in the scope of project owner and the data generation records will be done by the project site manager. The recording will be compiled at the end of the each shift.
- Operation and maintenance of the WEG is conducted annually as per the joint agreement between the project promoter and contractor (Vestas). Project promoter signed O & M agreement for 5 years with contractor with annual escalation clause in fees.

The ownership of the meter lies with project owner (developer), but it is in possession of State Electricity Board who seal it under lock & key as per statutory requirements. Owner can only take readings through glass window of sealed meter box.

Sustainable Indicators

The identified crucial indicator will be monitored by a project manager from MITCON consultancy limited. The monitoring will be documented as part of the internal ISO processes which has been established company. The project manager will prepare the report on all monitored parameters and submit it to the Executive Director for review and approval. Once approved, the report will be used to report on proposed project performance and submitted to the DOE for verification.

Annex - 4

TECHNICAL SPECIFICATION OF NM 48/750 KW WEG

Parameters	
Operational Data	
Nominal output	750 kW
Power regulation	Stall
Cut-in Speed	4 m/s
Cut-out Speed	25 m/s
Rotor	
Rotor diameter	48.2 m
Rotor swept area	1824 cm^2
Number of blades	3 nos.
Brake System	
Blade tip air brake	Hydraulic, fail safe
Disc brake	Hydraulic
Drive Train	
Gear type	Planetary - parallel axle
Ratio	1:67.5 - 50Hz
Main shaft	High quality forged shaft
Main bearing	Spherical roller bearing
Cooling	Closed circuit liquid cooling
Generator	
Type	Asynchronous
Nominal voltage	690 V
Nominal frequency	50 Hz
Name plate rating	750/200 kW
Cooling	Closed circuit liquid cooling
Yaw	
Type	Ball Bearing
Drive mechanism	4 electrical planetary gears
Tower	
Type	Conical, Steel, PU Painted
Hub Height	According to type approvals
Controller	
Type	Computer controlling
Capacitor bank	No load compensated