Project design document form for small-scale CDM project activities

(Version 08.0)

PROJECT DESIGN DOCUMENT (PDD)	
Title of the project activity	Bundled Wind Power Project by M/s. D. J. Malpani
Version number of the PDD	03
Completion date of the PDD	27/04/2017
Project participant(s)	M/s. D. J. Malpani
Host Party	India
Applied methodology(ies) and, where applicable, applied standardized baseline(s)	Methodology: - AMS-I.D “Grid connected renewable electricity generation” (EB 81, Version 18)
Sectoral scope(s) linked to the applied methodology(ies)	Sectoral Scope 1: Energy Industries (renewable -/non-renewable sources)
Estimated amount of annual average GHG emission reductions	11,978 tCO2e / annum

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The proposed project activity is an initiative by M/s. D. J. Malpani towards clean electricity generation using wind energy resources in the state of Karnataka and Gujarat. M/s. D. J. Malpani is engaged in the business of processing of tobacco, packing of edible lime and power generation through wind mills. The project activity leads to the installation of 6 WEGs of total generating capacity of 6.2 MW. Two of the WEGs (1500 KW S-82 Suzlon made) have been installed at the Davangere district of the state of Karnataka. Four of the WEGs (800 KW, E-53, Enercon made) have been installed at Jamnagar district of Gujarat.
The main purpose of the project activity is to generate electrical energy through sustainable means using wind power resources, to utilize the generated output for supply to Karnataka Power Transmission Company Limited (KPTCL) and Gujarat Electricity Development Authority (GEDA) and to contribute to climate change mitigation efforts.
The project will be utilizing wind energy for generating electricity which otherwise would have been generated through alternate fuels (most likely - fossil fuel) based power plants thus, contributing to reduction in specific emissions (emissions of pollutant) including GHG emissions. Being a renewable resource, using wind energy to generate electricity contributes to resource conservation. M/s D. J. Malpani will be developing this project keeping in consideration the funding available under the Clean Development Mechanism (CDM) of the United Nations Framework Convention on Climate Change. The project activity is also responsible for sustainable economic growth and conservation of environment through use of wind as a renewable source. The Project activity would generate 6.2 MW of electricity with efficient utilization of the available wind energy through adoption of the latest, efficient and modern technology.

Sustainable development criteria

The following criteria have been considered for demonstrating sustainable development.

• Social well-being
• Economic well-being
• Environmental well-being
• Technological well-being

The project activity contributes to the sustainable development in the following way:

Social Well-being

- The proposed project activity will lead to alleviation of poverty by establishing direct and indirect employment benefits. Such benefits will, for example, be accrued out during maintenance operations of the project activity or as generation of permanent labor in the form of security services. The infrastructure in and around the project area will also improve due to project activities. This includes development of road network and improvement of electricity quality, frequency and availability.

Economic Prosperity

- The project activity leads to an investment of about INR 356.6 million to a developing region which otherwise would not have happened in the absence of project activity. The generated electricity is fed into the Southern Regional Grid through local grid & NEWNE grid, thereby improving the grid frequency and availability of electricity to the local consumers (villagers & sub-urban habitants). This attracts new opportunities for industries and economic activities to be setup in the area thereby resulting in greater local employment, ultimately leading to overall development. The project activity also leads to diversification of the national energy supply, which is dominated by conventional fuel based generating units.

Environmental Well-being

- The project will utilize wind energy for generating electricity which otherwise would have been generated through alternate fuels (most likely- fossil fuel) based power plants, contributing to reduction in specific emissions (emissions of pollutant) including GHG emissions. Being a renewable resource, using wind energy to generate electricity contributes to resource conservation. Thus the project causes no negative impact on the surrounding environment contributing to environmental well-being.

Technological Up-gradation

- The project activity involves the installation of state-of–art technology. The wind turbine generators used for the project activity are of the latest technology. This project will therefore motivate other proponents in the surrounding area to put up high-efficiency techniques.

Thus, it is ensured that the project activity meets all the criteria for Sustainable development.

A.2. Location of project activity

A.2.1. Host Party

India

A.2.2. Region/State/Province etc.

Karnataka, Gujarat

A.2.3. City/Town/Community etc.

Davangere, Jamnagar

A.2.4. Physical/Geographical location

The project activity is located in the districts of Davangere and Jamnagar in the state of Karnataka and Gujarat respectively.

Davangere:
Latitude: 14º 27'13.39'' (14.4537º) N
Longitude: 75º 55'08.15'' (75.9189º) E
Jamnagar:
Latitude: 22º 04' 54.8'' (22.0819º) N
Longitude: 70º 11' 50.9'' (70.1975º) E

Latitude & Longitude: (Jamnagar, Gujarat)

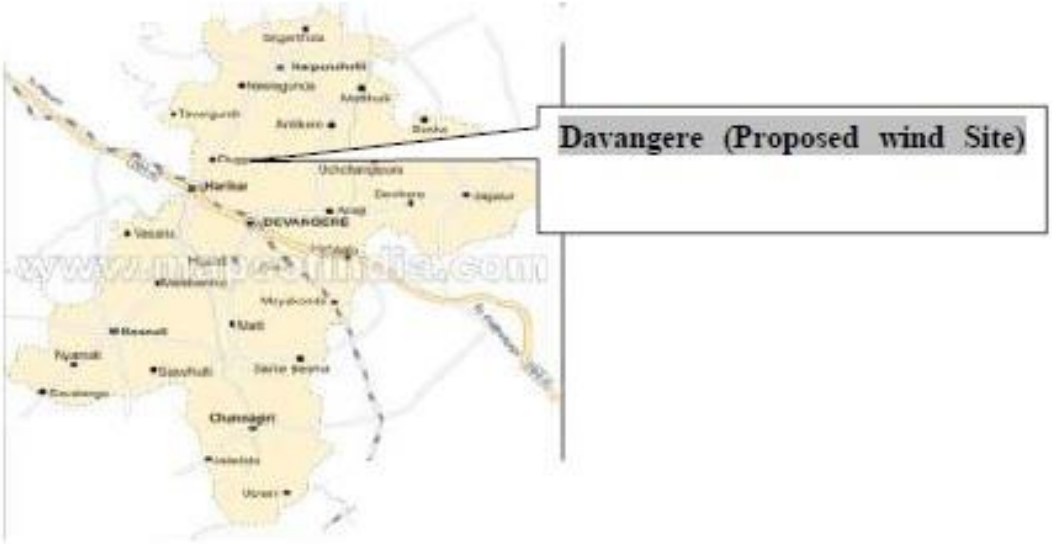
Sr. No.	Location No.	WTG Type	Tower Height	Type of Land	Survey No.
1	2045	E-53	75 Mtr. Concrete Tower	Private	151/1
2	2046	E-53	75 Mtr. Concrete Tower	Private	159/P1
3	2134	E-53	75 Mtr. Concrete Tower	Private	212/P2
4	2135	E-53	75 Mtr. Concrete Tower	Private	19/P1

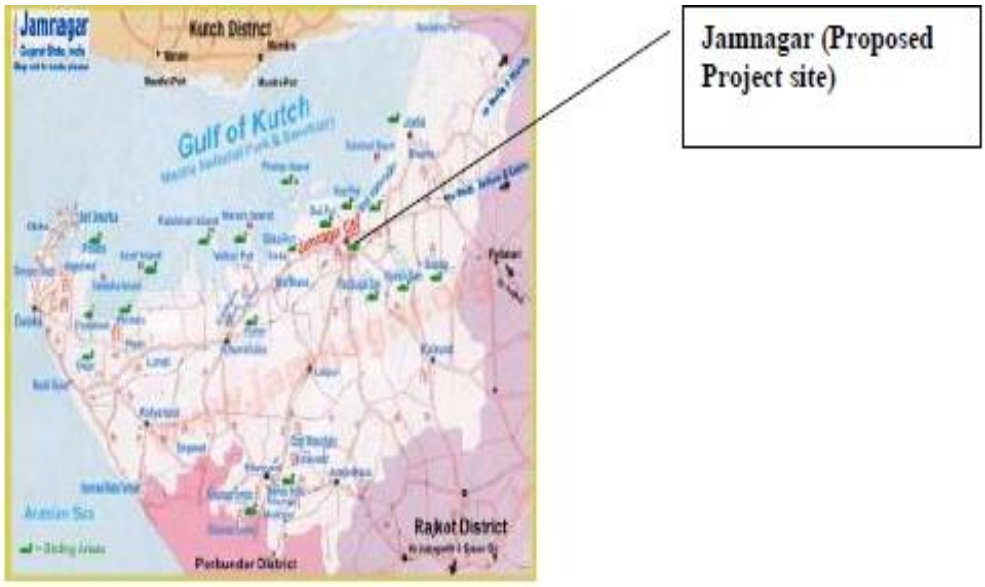
Village	Taluka	District	Latitude (Degree, Min, Sec.)	Longitude (Degree, Min, Sec.)
Mota	Kalavad	Jamnagar	N 22º 04' 54.8''	E 70º 11' 50.9''

Panchdevda				
Mota Panchdevda	Kalavad	Jamnagar	N 22º 06' 06.9''	E 70º 12' 08.0''
Nana Panchdevda	Kalavad	Jamnagar	N 22º 07' 08.2''	E 70º 11' 52.2''
Nana Panchdevda	Kalavad	Jamnagar	N 22º 07' 20.9''	E 70º 11' 54.7''

Latitude & Longitude: (Davangere, Karnataka)

Location No.	**Capacity**	**Survey No.**	**Village**	**Taluka**	**District**	**State**	**Latitude**	**Longitude**
K- 516	1.50 MW	12	Naraginakere	Honnali	Davangere	Karnataka	N14º 11' 52.8''	E75º 27 51.0''
K- 519	1.50 MW	12	Naraginakere	Honnali	Davangere	Karnataka	N14º 11' 31.1''	E75º 28' 07.4''





A.3. Technologies and/or measures

Technology

In wind energy generation, kinetic energy of wind is converted into mechanical energy and subsequently into electrical energy. Wind turbines capture wind's energy with two or three propeller-like blades, which are mounted on a rotor to generate electricity. The turbines sit high atop towers, taking advantage of the stronger and less turbulent wind as the wind blows through the blades of windmill, a pocket of low- pressure forms on the downwind side of the blade. The low-pressure pocket then pulls the blade towards it, causing the rotor to spin. The rotor turns the shaft that further spins the connected generator. The spinning of this generator produces the required electricity.

PLF (Plant Load Factor) = [Guaranteed generation (Lakh KWh) x 10^5/Installed Capacity (MW) x10^3x24x 365]
PLF = [(36.0 x 2) x 10^5/3 x 10^3 x 24 x 365] * 100 = 27.39% (**Davengere, Karnataka**).
PLF (Plant Load Factor) = [Guaranteed generation (Lakh Kwh) x 10^5 /Installed Capacity (MW) x10^3 x24x 365] * 100.
PLF = [(17.0 x 4) x 10^5 /3.2 x 10^3 x 24 x 365] * 100 = 24.25% (**Jamnagar, Gujarat**).

The salient features of the technology are:
1) For 1500 KW Suzlon S-82 WTGs: (Davangere, Karnataka)

WEC capacity	1500 KW (S- 82)
Rotor diameter	82 m
No. of blades	3
Cut in wind speed	4 m/s
Cut out wind Speed	20 m/s
Power Regulation	Independent electromechanical pitch system for each blade & SUZLON-FLEXI-SLIP SYSTEM
Hub Height	78.5 Meter
Gear box type	One planetary stage / Two helical stages
Operating range rot. Speed	15.6 – 18.4 rpm

2) For 800 KW Enercon E-53 WTGs: (Jamnagar, Gujrat)

WEC capacity	800 KW (E- 53)
Rotor diameter	52.9 m
No. of blades	3
Cut in wind speed	2.5 m/s
Cut out wind Speed	28 – 34 m/s
Power Regulation	Independent Pitch system for each blade
Hub Height	75 Meter
Gear box type	Gear less
Braking	Aerodynamic
Operating range rot. Speed	12 - 29 rpm

A.4. Parties and project participants

Party involved (host) indicates host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India	M/s. D. J. Malpani	No

A.5. Public funding of project activity

There is no public funding involved in the project activity. The project activity has been developed on the basis of in-house resources of the company & loan from the bank.

A.6. Debundling for project activity

According to paragraph 2 of Appendix C to the Simplified Modalities and Procedures for Small-Scale CDM project activities (FCCC/CP/2002/7/Add.3), a small-scale project is considered a debundled component of a large project activity if there is a registered small-scale activity or an application to register another small-scale activity:

• With the same project participants
• In the same project category and technology
• Registered within the previous two years; and
• Whose project boundary is within 1 km of project boundary of the proposed small scale activity

The project proponent hereby confirms that there is no registered small scale project activity registered within the two years in the same project category and technology whose project boundary is within 1km of the project boundary of the proposed small scale activity. Thus the project is not a debundled component of any other large-scale project activity.

SECTION B. Application of selected approved baseline and monitoring methodology and standardized baseline

B.1. Reference of methodology and standardized baseline

Title: Grid connected renewable electricity generation[1]

Reference: The project activity meets the eligibility criteria to use the simplified modalities and procedure for small-scale CDM project activities as set out in paragraph 6 (c) of decision 17/CP.7. Details of methodology for baseline calculations for CDM projects of capacity less than 15 MW are

[1] http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html

available in the "Appendix B of the simplified modalities and procedure for small scale CDM project activities".

Methodology : AMS-I.D Grid Connected Renewable Electricity Generation (Version 18)[2]
Type I : Renewable Energy Project (Small Scale)
Category : I. "D", Grid Connected Renewable Electricity Generation

Reference has been taken from indicative simplified baseline and monitoring methodologies for selected small scale (CDM projects less than 15 MW) project activity categories.

Tools referred with above methodology are:

Tool to calculate the emission factor for an electricity system, Version 05.0 EB 87, Annex 9[3].

B.2. Project activity eligibility

The project activity involves generation of grid connected electricity from renewable wind energy. The project activity has an installed capacity of 6.2 MW which is less to the maximum qualifying capacity of 15 MW for a small scale CDM project activity under Type-I of the small scale methodologies. The installed capacity will not increase throughout and even after the crediting period therefore the project activity will remain within the limit of small scale in each year of the crediting period. The project status is corresponding to the methodology AMS-I.D and applicability of methodology AMS-I.D are discussed below:

Applicability	Project activity vis-à-vis applicability Conditions
This methodology is applicable to grid-connected renewable power generation project activities that: • install a Greenfield power plant; • involve a capacity addition to (an) existing plant(s); • involve a retrofit of (an) existing operating plants/units; • involve a rehabilitation of (an) existing plant(s)/unit(s) or • involve a replacement of (an) existing plant(s)/unit(s).	The project activity is installation of a new grid connected wind power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfield plant) and hence this criterion is applicable.
The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit;	The proposed project activity is an installation of a new grid connected wind power plant and hence this condition is met.
In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation	The project does not involve any capacity additions, retrofits or replacements and therefore this condition is not applicable.

[2] https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK

[3] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v5.0.pdf

of the project activity;	
In case of hydro power plants, one of the following conditions shall apply: • The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or • The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density calculated using equation (3), is greater than 4 W/m^2; or • The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m^2.	The project activity is a grid connected wind power project and not a hydro power plant. Therefore, these criteria are not applicable for the project activity.
The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (3), is lower than or equal to 4 W/m^2, all of the following conditions shall apply: • The power density calculated using the total installed capacity of the integrated project, as per equation (4), is greater than 4 W/m^2; • Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; • Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m^2 shall be; ✓ Lower than or equal to 15 MW; and ✓ Less than 10 per cent of the total installed capacity of integrated hydro power project.	The project activity is a grid connected wind power project and not a hydro power plant. Therefore, these criteria are not relevant to the project activity.
In the case of integrated hydro power projects, project proponent shall: • Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or • Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.	The project activity is a grid connected wind power project and not a hydro power plant. Therefore, these criteria are not relevant to the project activity.
Methodology is not applicable to the following • Project activities that involve switching from	• The project activity is installation of a new grid connected wind power

fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; • Biomass fired power plants/units	project and does not involve switching from fossil fuel to renewable energy and hence this criterion is not relevant to the project activity. • This is a wind power plant and not a biomass fired plant and hence this criterion is not applicable to the project activity.
In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance".	The project activity is a new grid connected wind power plant and not a retrofits, replacement or capacity additions and therefore this criterion is not applicable to the project activity.
Applicability conditions of "Tool to calculate the emission factor for an electricity system"	
This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	This condition is applicable. OM, BM and CM are estimated using the tool under section B.6.1 for calculating baseline emissions.
Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, the conditions specified in "Appendix 2: Procedures related to off-grid power generation" should be met. Namely, the total capacity of off-grid power plants (in MW) should be at least 10 per cent of the total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.	Since the project activity is grid connected, this condition is applicable and the emission factor has been calculated accordingly.
In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	The project activity is located in India, a non-Annex I country. Therefore, this criterion is not applicable for the project activity.
Under this tool, the value applied to the CO2 emission factor of biofuels is zero.	The project activity is a grid connected wind power project and not a hydro power plant. Therefore, this criterion is not applicable for the project activity.

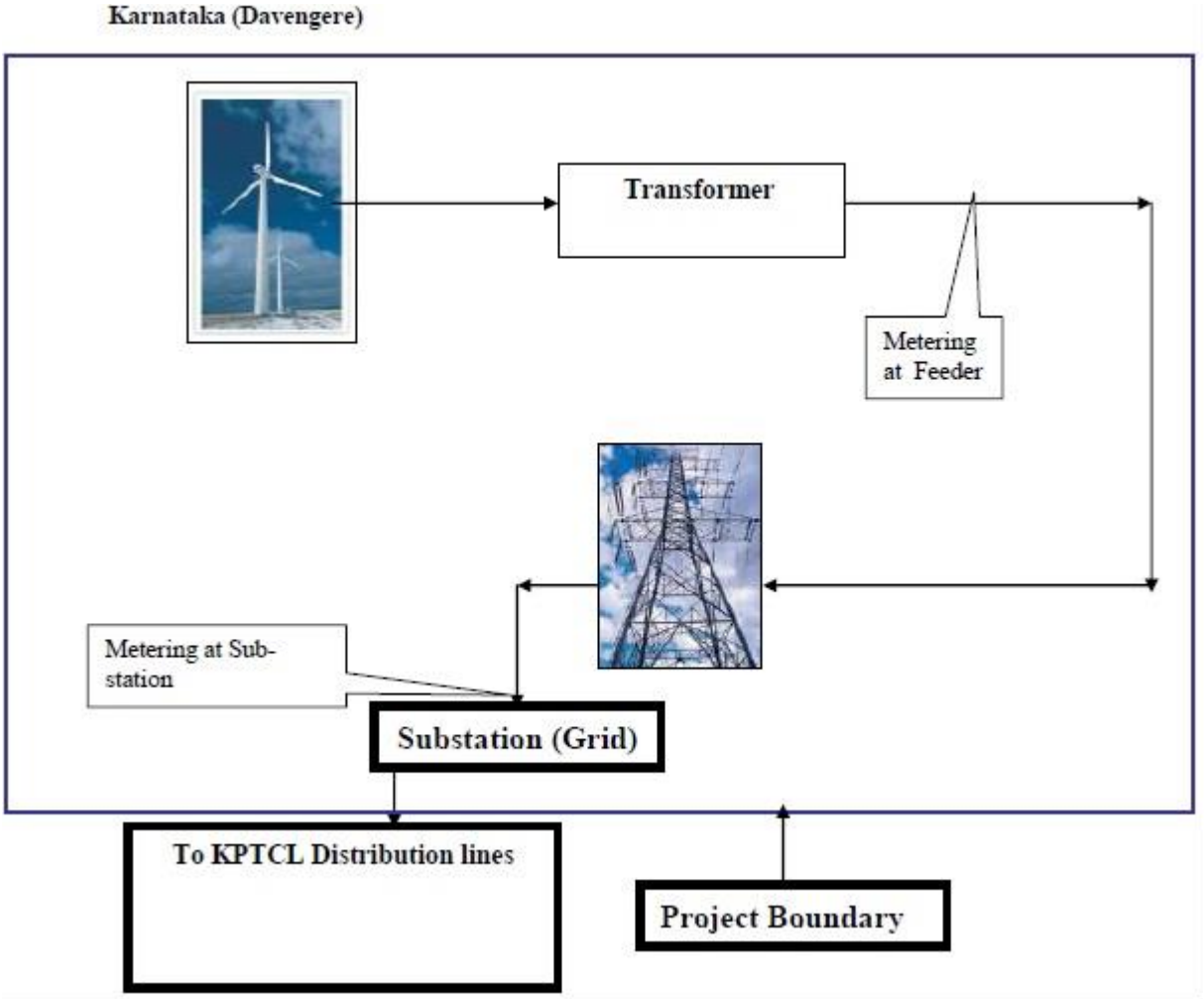
In this project, total electricity generation capacity of all six windmills is 6.2 MW, which is less than the limit of 15 MW of maximum output capacity as specified in Annex-II "Simplified Modalities & Procedures for Small Scale CDM Project Activities" for Type (I) project activities: renewable energy project activities with a maximum output capacity equivalent to up to 15 megawatts (or an appropriate equivalent) (decision 17/CP.7, paragraph 6 (c) (i). Thus, this project reduces

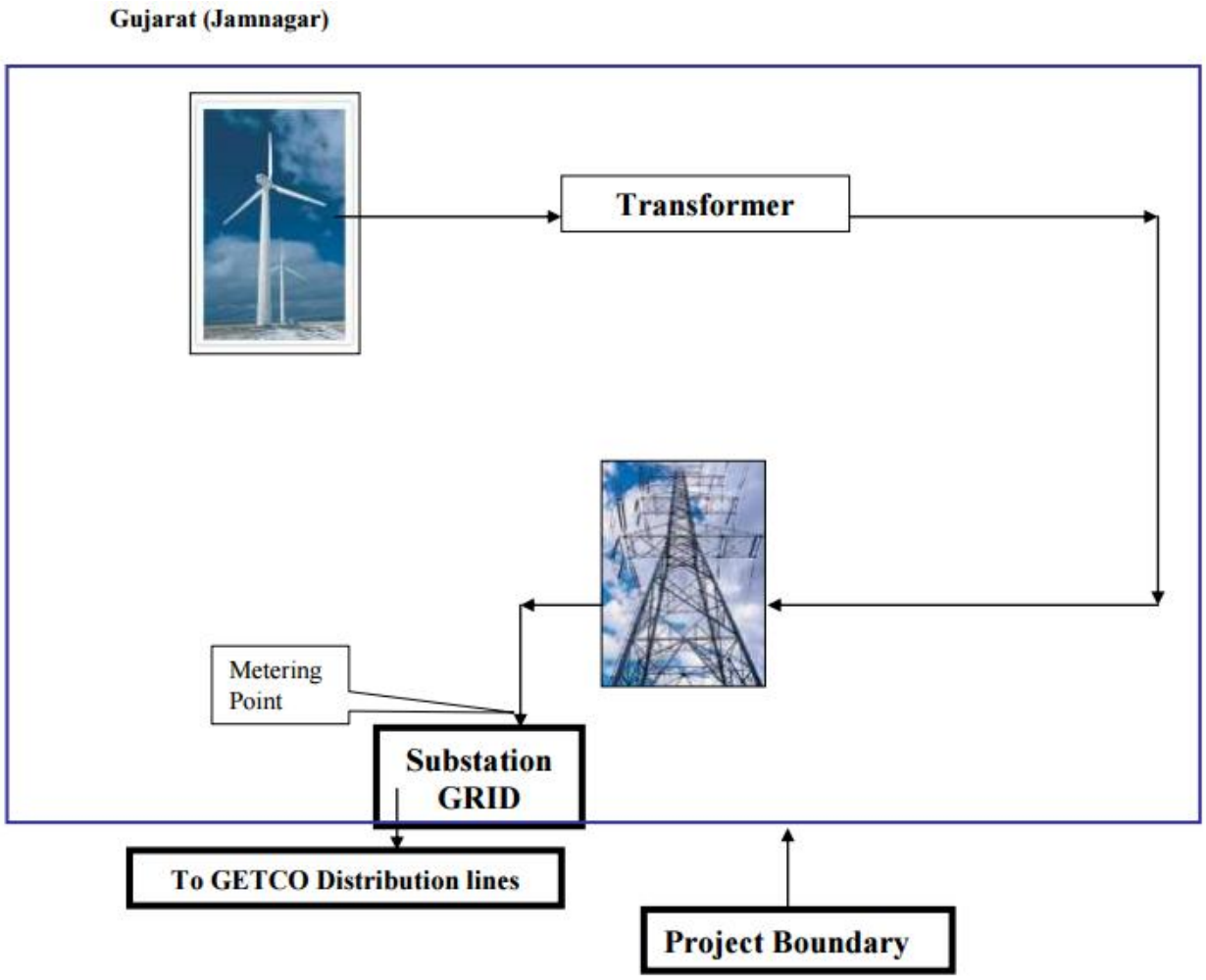
anthropogenic emissions by sources and its maximum output capacity is less than 15 MW. Therefore it confirms to this category thereby qualifying as a small-scale project activity.

B.3. Project boundary

As per AMS-I.D Version 18, EB 81 - "The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to".

The project boundary includes the wind turbine generator, sub-stations, grid and all power plants connected to grid. The proposed project activity will evacuate power to the INDIAN grid. Therefore the entire INDIAN grid and all connected power plants have been considered in the project boundary for the proposed CDM project activity. In this project activity, the project boundary is composed of Six Wind Energy Generators and the metering equipment for each generator and substation, and the INDIAN grid.





Source		GHGs	Included?	Justification/Explanation
Baseline scenario	Electricity generation from power plants connected to the Indian grid	CO_2	Included	Main emission source
		CH_4	Excluded	This source is not required to be estimated for wind energy projects under AMS I.D. version 18
		N_2O	Excluded	This source is not required to be estimated for wind energy projects under AMS I.D. version 18
Project scenario	Electricity generation from the project activity	CO_2	Excluded	Wind energy generation does not have any indirect GHG emissions
		CH_4	Excluded	
		N_2O	Excluded	

B.4. Establishment and description of baseline scenario

Updated baseline for the second crediting period in line with the "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period." Version 03.0.1.

This tool provides a stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period, as required by paragraph 305 of Project Standard version 09 & 49 (a) of the modalities and procedures of the clean development mechanism.

The tool stipulates the following steps to be carried out.

Step 1: Assess the validity of the current baseline for the next crediting period

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies

The baseline scenario remains unchanged and is in compliance with all the relevant mandatory national and/or sectoral policies.

Step 1.2: Assess the impact of circumstances

The baseline scenario identified at the validation of the project activity was the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid connected power plants and by the addition of new generation sources into the grid. Thus this project activity was a voluntary investment which intends to replace equivalent amount of electricity at grid from renewable source. PP was not bound to incur this investment; hence absence of project activity (i.e. the investment) does not lead to any continued baseline practice for PP within their scope whereas the continued operation of the project activity would continue to replace equivalent amount of electricity at grid. Hence, the same baseline as identified in the previous crediting period is still valid for the project. Therefore, the assessment of the changes in market characteristics is not required for the renewal of the project's crediting period under CDM.

Nevertheless, there is an impressive growth attained by the Indian Power Sector within the recent years, the installed capacity has grown from mere 1,713 MW in 1950 to 267,637 MW as on 31.03.2015, consisting of 188897.78 MW Thermal, 31692.14 MW Renew and 5,780 MW Nuclear. Sector-wise details of installed capacity are shown in Table 1. However, it is evident from Table 1[4] that the installed capacity is predominantly coal based and therefore, is a major source of carbon dioxide emissions in India. Hence, there exists scope for reducing the CO_2 emissions in the country by increased use of renewable energy sources. Furthermore, project participant has considered the latest available CO_2 Baseline Database (CEA database, version 11) at the time of requesting renewal of the crediting period for establishing the baseline emission factor, which itself considered all the new circumstances. Hence, the new circumstances do not have an impact on the baseline emission.

Table 1: Sector- wise installed capacity (MW) as on 31.03.2015 (CEA Database version 11)

Sector	Hydro	Thermal				Nuclear	Renew.	Total
		Coal	Gas	Diesel	Total			
State	27482.00	58100.50	6974.42	602.61	65677.53	0.00	3803.67	96963.20
Central	11091.43	48130.00	7519.73	0.00	55649.73	5780.00	0.00	72521.16
Private	2694.00	58405.38	8568.00	597.14	67570.52	0.00	27888.47	98152.99
All India	41267.43	164635.88	23062.15	1199.75	188897.78	5780.00	31692.14	267637.35

Step 1.3: Assess whether the continuation of the use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested

As explained in step 1.2, the baseline scenario was the electricity import/generation from the power plants connected to the electricity grid. Therefore this condition is not applicable to the project activity.

[4] http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf

Step 1.4: Assessment of the validity of the data and parameters

This step stipulates that "Where emission factors, values or emission benchmarks are used and determined only once for the crediting period, they should be updated, except if the emission factors, values or emission benchmarks are based on the historical situation at the site of the project activity prior to the implementation of the project and cannot be updated because the historical situation does not exist anymore as a result of the CDM project activity."

In the context of the present project activity the emission factor has been updated along with the approach used to calculate the emission factor.

Step 2: Update the current baseline and the data and parameters

As evident from the explanation provided above the baseline scenario remains unchanged. Only the approach used to calculate the baseline emission factor is updated as per the latest version available at the time of PDD submission for renewal.

In line with the paragraph 13.9.1 of the project standard version 9, the impact of new relevant national and/or sectoral policies and circumstances on the baseline taking into account relevant EB guidance with regard to renewal of the crediting period at the time of requesting renewal of crediting period; and the correctness of the application of an approved baseline methodology for the determination of the continued validity of the baseline or its update, and the estimation of emission reductions for the applicable crediting period

Impact of the national and/or sectoral policies and circumstances upon the baseline scenario of the project activity

The Government of India enacted the Electricity Act in the year 2003 to harmonize and rationalize the provisions in the then existing laws. The Act consolidated the laws relating to generation, transmission, distribution, trading and use of electricity. With the Enactment of the act, the then existing laws viz, The Indian Electricity Act 1910, The Electricity Supply Act, 1948 and The Electricity Regulatory Commissions Act, 1998 were repealed. The Electricity Act 2003 was in force at the time of the completion of the baseline study for the registered PDD.

Section 3 of the said act required the Central Government to prepare the national electricity policy and tariff policy, in consultation with the State Governments and the Authority for development of the power system based on optimal utilization of resources such as coal, natural gas, nuclear substances or materials, hydro and renewable sources of energy. In accordance with the section 3 of the Electricity Act 2003, the Central Government notified the National Electricity Policy on 12th February 2005 which was in force at the time of completion of the baseline study as stated in the registered PDD of the project activity. This policy has not been revised since then and is currently in force as well.

In addition to the above policies, State Electricity Regulatory Commissions (SERCs) have announced preferential tariffs and Indian Renewable Energy Development Agency (IREDA) provides term loan assistance towards establishing biomass power projects. All these fiscal and financial incentives were in force at the time of completion of the baseline study for the registered PDD of the project activity and still continue to exist.

However, in spite of the financial incentives given by the government to renewable power projects in India the generation from the low cost must run resources connected to the Indian Grid has not increased to such an extent that this would lead to more than 50% contribution from the low cost must run resources towards the total generation from the Indian Grid.

The approved consolidated baseline methodology, AMS I.D. (Version 18), has been used to determine the baseline and the estimation of emission reductions for the applicable crediting period. As referred in the methodology "*Tool to calculate the emission factor for an electricity*

system" *(version 05.0)* has been used to determine continued validity of the baseline based on combined margin (CM) calculations.

In light of the above discussion it is to be concluded that in accordance with relevant guidelines stipulated in the Project Standard para 13.9.1, national and/or sectoral policies and circumstances had been considered towards formulating the OM & BM baseline scenario .Hence the baseline scenario as applied for the present project activity remains justified.

As per the approved consolidated methodology AMS I.D., *If the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:*

Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system"

The project activity involved setting up of WTGs to harness the power of wind to produce electricity and supply to the grid. In the absence of the project activity, the equivalent amount of power would have been supplied by the Indian grid which is fed mainly by fossil fuel fired plants.

In the absence of the project activity, the equivalent amount of power would have been drawn from the Indian grid. Hence, the baseline for the project activity is the equivalent amount of power from the Indian grid.

The combined margin ($EF_{grid,CM,y}$) is the result of a weighted average of two emission factor pertaining to the electricity system: the operating margin (OM) and build margin (BM). Calculations for this combined margin must be based on data from an official source[5] (where available) and made publically available.

The combined margin of the Indian grid used for the project activity is as follows:

Parameter	Value	Nomenclature	Source
$EF_{grid,CM,y}$	0.9777 tCO_2/MWh	Combined margin CO_2 emission factor for the project electricity system in year y	Calculated as the weighted average of the operating margin (0.75) & build margin (0.25) values, sourced from Baseline CO_2 Emission Database, Version 11.0 published by Central Electricity Authority (CEA), Government of India
$EF_{grid,OM,y}$	0.9941 tCO_2/MWh	Operating margin CO_2 emission factor for the project electricity system in year y	Calculated as the last 3 year (2012-13, 2013-14, 2014-15) generation-weighted average, sourced from Baseline CO_2 Emission Database, Version 11.0, published by Central Electricity Authority (CEA), Government of India
$EF_{grid,BM,y}$	0.9285 tCO_2/MWh	Build margin CO_2 emission factor for the project electricity system in year y	Baseline CO_2 Emission Database, Version 11.0, published by Central Electricity Authority (CEA), Government of India

[5] http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf

B.5. Demonstration of additionality

Considering the criticality of CDM funds for the viability of the project, the project proponent initiated steps to secure CDM status for the project. The Partners of M/s. D. J. Malpani resolved to setup the project considering CDM funds and the consultant was appointed immediately. Partner of M/s. D. J. Malpani on 20th October 2008 passed the resolution stating that the monetary benefits from CDM will only make the project viable. PP raised the Purchase Orders to Suzlon on 31st December 2008 & Purchase Orders to Enercon on 17th February 2009. Accordingly PP sent enquiry to consultant on 17th February 2009. The CDM consultant was finally appointed on 23rd March 2009. This was then followed by UNFCCC intimation on 23rd March 2009. In turn UNFCC acknowledged the receipt of intimation on 6th April 2009. The stakeholder meetings were conducted on 12th January 2009 for Davengere (Karnataka) & 7th April 2009 for Jamnagar (Gujarat). DOE was appointed on 28th April 2009. The project was open for global stakeholder comments during the period 12th May 2009 – 10th June, 2009. Thereafter, MoEF presentation was held on 26th June 2009. Following this, DOE conducted site visit on 3rd July 2009 & 7th July 2009. The entire chronology of the events for securing CDM status for the project is presented below.

Events	Dated
Proposal from the Enercon	10/10/2008
Proposal from the Suzlon	15/10/2008
Partners Decision for implementation of the project (MoM)	20/10/2008
P.O. of WTG's (Suzlon)	31/12/2008
Stakeholder meeting (Kudrekonda), Karnataka	12/01/2009
P.O of WECs (Enercon)	17/02/2009
Enquiry from PP to consultant	17/02/2009
Appointment of CDM Consultant	23/03/2009
UNFCCC intimation	23/03/2009
UNFCCC acknowledgement to intimation	06/04/2009
Stakeholder meeting (Jamnagar, Gujrat)	07/04/2009
Appointing DOE	28/04/2009
Web Hosting of the PDD	12/05/2009 – 10/06/2009
MOEF Presentation	26/06/2009
DOE visit to site	03/07/2009 – 04/07/2009

The installed capacity of the project is 6.2 MW, which is less than the limiting capacity of 15 MW and is thus eligible to use small-scale simplified methodologies. Further, the project activity is generation of electricity for a grid system using wind energy. Hence, the type and category of the project activity matches with I.D. as specified in Appendix B of the indicative simplified baseline and monitoring methodologies for small-scale CDM project activities.
Referring to attachment A to appendix B document of "indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories" Version 6.0, project participants are required to provide a qualitative explanation to show that the project activity would not have occurred anyway, at least one of the listed elements. should be identified in concrete terms to show that the activity is either beyond the regulatory and policy requirement or improves compliance to the requirement by removing barrier(s); The guidance provided herein has been used to establish project additionality. Investment analysis has been considered to justify the project additionality. Technological barrier has not been taken into consideration.

The barriers that were considered are listed below:

(a) Investment barrier

Investment Barrier

Step 1:

The project activity involves setting up of 6.2 MW of wind power in Davangere district, Karnataka and Jamnagar district Gujarat of India. Thus, Benchmark analysis is selected to depict the investment barrier. The benchmark for the project was taken as prime lending rate (PLR) provided by Reserve Bank of India (RBI).

The project IRR was compared against PLR of 12.25% corresponding to the period (Link: http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/86591.pdf). The IRR for the project is coming around 9.74% which is below the returns expected of 12.25% for this project. However the Benchmark Prime Lending Rate for the month of September 2008 is in the range of 12.75%-14.00% (Link: https://rbi.org.in/scripts/WSSView.aspx?Id=12789). PP has taken conservative approach in opting for the benchmark i.e. 12.25%. However PP has taken a conservative approach in taking the benchmark for the proposed wind power project at the time of financial decision which is 12.25% (prime lending rate (PLR) (Link: http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/86591.pdf) provided by Reserve Bank of India (RBI) 2008.

Step 2

Wind power projects are investment intensive and hence the IRR analysis is selected for comparing the investment to the project with respect to standardized benchmarks. Total investment in this project activity is INR 356.6 million to install 6.2 MW capacities wind turbines in Davangere, Karnataka and Jamnagar, Gujarat.

The Project proponent was completely aware of the risk involved in investing in wind power generation. Wind is totally unreliable source as its availability is on seasons. In comparison to the conventional generation methods (thermal, hydro, etc), the establishment costs are higher for WECs. To add to the situation, the PLFs obtained by WECs are very low as compared to thermal plants. The grid is dominated by thermal power i.e. 63.2%. The investment in this project is as high as INR 356.6 million, while the alternative would have been to invest in thermal energy having higher returns. Thus the project proponents took a risk by investing in wind power. The PLF assumed in the investment analysis for the project activity is 28.91% at Davangere, Karnataka (based on equipment supplier's generation guarantee) and 25.68% at Jamnagar, Gujarat (based on equipment supplier's generation guarantee)

PLF (Plant Load Factor) = Guaranteed generation (Lakh Kwh) x 10^5 / Installed Capacity (MW) x 10^3 x 24 x 365

PLF = [(36 x 12) x 10^5 / 3 x 10^3 x 24 x 365] * 100 = 27.39% **(Davengere, Karnataka)**.

PLF (Plant Load Factor) = Guaranteed generation (Lakh Kwh) x 10^5 / Installed Capacity (MW) x 10^3 x 24 x 365

PLF = [(17 x 4) x 10^5 / 3.2 x 10^3 x 24 x 365] * 100 = 24.25% **(Jamnagar, Gujrat)**.

The Project proponent was completely aware of the risk involved in investing in wind power generation. Wind is totally unreliable source as its availability is on seasons. In comparison to the conventional generation methods (thermal, hydro, etc), the establishment costs are higher for WEGs. To add to the situation, the PLFs obtained by WEGs are very low as compared to thermal plants. The investment in this project is as high as INR 351 million, while the alternative would have been to invest in thermal energy having higher returns. Thus the project proponents took a risk by investing in wind power.

Step 3:

The benchmark is taken as per the Reserve bank of India (RBI) Benchmark Prime lending rate (BPLR) for 2008 is in the range of 12.25 - 13.50%[6] based on PLR (Prime lending rate). Benchmark during the period of financial decision in September 2008 was in the range of 12.75% - 14.00%. (Link : https://rbi.org.in/scripts/WSSView.aspx?Id=12789). However PP has taken a conservative approach in taking the benchmark for the proposed wind power project at the time of financial

[6] http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/86591.pdf

decision which is 12.25% (prime lending rate (PLR) (Link: http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/86591.pdf)provided by Reserve Bank of India (RBI) 2008.

Step 4:
Project financial analysis:

Project Details:	Karnataka	Gujarat	Gujarat	Total
Size of the Project(MW)	3.00 MW	1.60 MW	1.60 MW	6.20 MW
Location of the Project	Site : Kudurekonda, Dist.: Davangere, Karnataka (INDIA)	Site : Samana, Dist.: Jamnagar/ Rajkot, Gujarat (INDIA) , Mota Panchdeva	Site : Samana, Dist.: Jamnagar/ Rajkot, Gujarat (INDIA), Nana Panchdeva	
No of WTGs	2	2	2	6
Project Cost:				
Wind Mill, Overhead Line etc , (Rs. Lakhs)	1790.00	870.00	870.00	3530.00
Land (Rs. Lakhs)	36.00	0.00	0.00	36.00
Total Cost(Rs. Lakhs)	1826.00	870.00	870.00	3530.00
Recurring Cost:				
No. of years O & M Free	1	3	3	
Operation and Maintenance Cost (Rs. Lakhs) - Per windmill	14.50	5.50	5.50	
Escalation in Operation and Maintenance cost (%)	5.00%	5.00%	5.00%	
Insurance (Fire/Burglary/Breakdown + Service Tax)	0.0006	0.0006	0.0006	
Annual Depreciation as per companies act (%)	NA	NA	NA	
Expected commissioning	Mar-09	Mar-09	Sep-09	
Rate of Depreciation as per Income tax Act (%)- 1st Year	50%	50%	100%	
Rate of Depreciation as per Income tax Act (%)- 2nd Year onwards	80%	80%	80%	
Project Financials:				
Equity (Rs. Lakhs)	483.50	217.50	217.50	918.50
Debt (Rs. Lakhs)	1342.50	652.50	652.50	2647.50
Loan Duration (Years) including Moratarium Period	83.00	83.00	83.00	
Moratorium (Months)	9	9	9	
Interest (%)	10.50%	10.50%	10.50%	
Tariff Details:				
Tariff (Rs./KWh)				
1st Year to 10th year	3.40	3.37	3.37	
11th Year to 20th year	4.08	3.37	3.37	

Tax Components:				
MAT (%)	**NA**	**NA**	**NA**	
Income Tax(%) / (Tax Shield Rate)	**33.99%**	**33.99%**	**33.99%**	
CDM Components:				
CER Price (in Euros)	**12.00**	**12.00**	**12.00**	
Emission Factor	**0.927**	**0.906**	**0.906**	
Euro-Rupee Conversion Factor	**68.00**	**68.00**	**68.00**	
Generation:				
Generation/WTG (Lac Units) - Estimation at 100% Grid at Controller	**36.00**	**17.00**	**17.00**	
Machine Avaliability Correction Factor	**5%**	**5%**	**5%**	
Grid Avaliability Correction Factor	**5%**	**5%**	**5%**	
Transmission Loss percentage from controller to metering point	**3%**	**3%**	**3%**	
Generation/WTG (Lac Units) - Net billable/WTG (Lac units)	**31.43**	**14.84**	**14.84**	
Indirect Expenses:				
Admin salary (Rs. Lakhs)				**6.00**
Escalation in Admin salary every year				**10.00%**
Processing fees for Term Loan(For year 0 only) as % of loan amount				**1.00%**

The major assumptions for the project financial analysis are listed below:

Project Details:	**Source**
Size of the Project(MW)	Capacity finalized in Minutes of Meeting dated 20th October 2008
Location of the Project	
No of WTGs	
Project Cost:	Proposal by Suzlon dated 15th October 2008 & Enercon dated 10th October 2008
Wind Mill, Overhead Line etc , (Rs. Lakhs)	
Land (Rs. Lakhs)	
Recurring Cost:	
Operation and Maintenance Cost (Rs. Lakhs) - Per windmill (First 3 years free)	Proposal by Suzlon dated 15th October 2008 & Enercon dated 10th October 2008
Escalation in Operation and Maintenance cost (%)	
Insurance (Fire/Burglary/Breakdown + Service Tax)	Bajaj Allianz Insurance for D.J. Malpani Rajasthan wind mill
Annual Depreciation as per companies act (%)	NA (As M/s. D.J.Malpani is a partnership firm)
Rate of Depreciation as per Income tax Act (%)	**Refer Point No 1**
Project Financials:	
Equity (Rs. Lakhs)	Letter from Bank of Maharastra
Debt (Rs. Lakhs)	
Loan Duration (Years) including Moratarium Period	
Moratorium (Months)	

Interest (%)	
Tariff Details:	KERC order dated 18- 01-2005 (Rs 3.40/-),GERC order dated11th August 2006 (Rs 3.37/-)
Tariff (Rs./KWh)	Assumed with 20% escalation for Karnataka (Rs 4.08/-) & for Gujarat the tariff rate is fixed for 20 years
1st Year to 10th year	
11th Year to 20th year	
Tax Components:	
MAT (%)	NA (As D.J.Malpani is a partnership firm)
Income Tax(%) / (Tax Shield Rate)	**Refer Point No 2**
Generation:	
Generation/WTG (Lac Units) - Estimation at 100% Grid at Controller	Proposal by Suzlon dated 15th October 2008 & Enercon dated 10th October 2008
Machine Avaliability Correction Factor	
Grid Avaliability Correction Factor	
Transmission Loss percentage from controller to metering point	
Indirect Expenses:	Firm's letter dated 17th October 2008
Admin salary (Rs. Lakhs)	
Escalation in Admin salary every year	
Processing fees for Term Loan(For year 0 only) as % of loan amount	Bank of Maharastra Service charges Booklet Page no 17

Point 1: As per the IT Act the rate of depreciation is for a wind mill is 80%. Moreover there is an additional depreciation of 20% on new machinery or plant. This means the total allowable depreciation is 100%. Therefore 100% depreciation is considered for two WTGs commissioned on September 2009. However if the machine is put to use for the purposes of business for a period of less than 180 days, the depreciation on such assest will be allowed at 50%. Hence 50% depreciation is considered for the WTGs commissioned in March 2009. (Refer pages 110 & 112 of V.G.Mehta's Income tax Ready Reckoner, Assessment year 2009- 10).

Point 2: (i) As per IT act, for a domestic company the rate of income tax is 30% of the total income (ii) There is a surcharge @ 10% on such income tax, this sums to 33%. (iii) There is a Education Cess @ 2% of income tax and surcharge, this sums to 33.66%. (iv) Further additional surcharge (i.e. Secondary & Higher Education Cess is 1% of such aggregate amount of income tax and surcharge, this sums to 33.99%. (Refer pages 31 & 35 of V.G.Mehta's Income tax Ready Reckoner, Assessment year 2009- 10)

Step 5:

Sensitivity Analysis with & without CDM revenues are as follows:

Parameter	Sr. No.	Change % Over base value	Value (Without CDM Benefit)	Value (With CDM Benefit)	Benchmark RBI Prime Lending Rate
Change in PLF	1	10%	11.43%	12.90%	**12.25% (Benchmark Prime lending Rate) RBI 2008** (http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/86591.pdf)
	2	5%	10.60%	12.05%	
	3	**Normal**	**9.74%**	**11.20%**	
	4	-5%	8.85%	10.32%	
	5	-10%	7.95%	9.38%	
Change in Power rate	6	10%	11.43%	12.77%	
	7	5%	10.60%	11.98%	
	8	**Normal**	**9.74%**	**11.20%**	

	9	-5%	8.85%	10.36%	
	10	-10%	7.95%	9.54%	
O&M cost	11	10%	9.57%	11.04%	
	12	5%	9.66%	11.12%	
	13	**Normal**	**9.74%**	**11.20%**	
	14	-5%	9.82%	11.28%	
	15	-10%	9.91%	11.35%	
Project Cost	16	10%	8.31%	9.76%	
	17	5%	9.00%	10.44%	
	18	**Normal**	**9.74%**	**11.20%**	
	19	-5%	10.53%	11.99%	
	20	-10%	11.39%	12.88%	

The above table reflects the IRR with & without CDM revenues for Normal Generation Guarantee, 5 % increase in Generation, 10% increase in Generation, 5% decrease in generation & 10% decrease in generation. The sensitivity analysis was done for Generation Guarantee, Project Cost, O&M cost & Tariff rate values as it remains the important parameters impacting financials of the project. Analyzing the above sensitivity chart the IRR of the project is below the desired benchmark without CDM revenues. The IRR is attractive only after considering the CDM revenues.

Sensitivity Analysis:

i) Variation in Generation Levels (PLF)

	IRR (Without CDM)%	**IRR (With CDM)%**	**Benchmark**
5% increased generation	11.43%	12.90%	12.25%
10% increased generation	10.60%	12.05%	
Base Case	**9.74%**	**11.20%**	
5% reduced generation	8.85%	10.32%	
10% reduced generation	7.95%	9.38%	

Each of the Enercon WTGs of 0.8 MW capacity implemented by the project proponents is expected to generate 1699.44 MWh per annum and each of the Suzlon WTGs of 1.5 MW capacity implemented by the project proponents is expected to generate 3599.046 MWh per annum but due to variable nature of wind it may result in lower utilization and consequently lesser generation. The following table demonstrates the sensitivity of IRR to the change in the generation levels for M/s D.J.Malpani.

ii) Variation in Tariff (Power Rate)

	IRR (Without CDM)%	**IRR (With CDM)%**	**Benchmark**
5% increased tariff	11.43%	12.77%	12.25%
10% increased tariff	10.60%	11.98%	
Base Case	**9.74%**	**11.20%**	
5% reduced tariff	8.85%	10.36%	
10% reduced tariff	7.95%	9.54%	

As per the GERC (Gujarat Electricity Regulatory Commission) order dated 11th August 2006, GUVNL (Gujarat Urja Vikas Nigam Limited) shall pay a fixed rate of Rs 3.37/- per kWh. The project proponent has entered into a PPA with Gujarat Energy Development Agency (GEDA) for the sale of electricity. The tariff offered by the Gujarat Energy Development Agency (GEDA) is fixed for the first twenty years of the project activity and hence is not expected to vary & project proponent have entered into a PPA with Karnataka Power Transmission Company Limited (KPTCL) for the sale of electricity. The tariff offered by the Karnataka Power Transmission Company Limited (KPTCL) is fixed for the first ten years of the project activity and hence is not expected to vary. The escalation

of 20% of the tariff rate from 11th year onwards is truly on assumption basis, which is considered on higher side.

iii) Increment in Capital Cost Keeping Generation Constant (Project Cost)

	IRR (Without CDM)%	IRR (With CDM)%	Benchmark
5% increase in Capital Cost	8.31%	9.76%	12.25%
10% increase in Capital Cost	9.00%	10.44%	
Base Case	**9.74%**	**11.20%**	
5% reduced in Capital Cost	10.53%	11.99%	
10% reduced in Capital Cost	11.39%	12.88%	

The above sensitivity analysis of the capital cost reflects that the IRR is below the benchmark even with 5% to 10% variation.

iv) Variation in O&M cost

	IRR (Without CDM)%	IRR (With CDM)%	Benchmark
5% increase in O & M Cost	9.57%	11.04%	12.25%
10% increase in O & M Cost	9.66%	11.12%	
Base Case	**9.74%**	**11.20%**	
5% reduction in O & M Cost	9.82%	11.28%	
10% reduction in O & M Cost	9.91%	11.35%	

Karnataka (Davengere)
The cost of O&M for the installation of the wind mills have been fixed as per the agreement between the M/s D.J.Malpani and the Technology supplier for a period of 6 years with 5% escalation every year. So the probability of decrease in the O&M cost from 7th onwards is unlikely.

Gujarat (Jamnagar)
The cost of O&M for the installation of the wind mills have been fixed as per the agreement between the M/s D.J.Malpani and the Technology supplier till 10th Year of the operation with 5% escalation every year. So the probability of decrease in the O&M cost is unlikely to occur.

In the Indian power sector, the common practice is investing in only medium or large scale fossil fuel fired power projects. Generation of power through a small wind project of 6.2 MW Bundled Wind Power Project is not a common practice. This can be seen from the published statistics in respect of installations of wind projects in India in the Southern region and NEWNE region as well as in the state of Karnataka and Gujarat[7] vis-à-vis the total installed capacity (of power generation) as on 28.02.2009 published by Ministry of Power. The All-India[8] installed power generation capacity in MW as on 28.02.2009 published by Ministry of Power was 147716 MW comprising of 93475 MW thermal, 36878 MW hydro, 4120 MW nuclear and 13242 MW of Renewable energy sources (RES) comprising solar, wind, geothermal, biomass & tidal energy. The most prominent energy generation mediums in India are solar energy, wind energy & biomass energy. (RES) share approximately is 9 % of the total in India.

B.6. Emission reductions

B.6.1. Explanation of methodological choices

[7] http://www.cea.nic.in/power_sec_reports/Executive_Summary/2009_02/27-33.pdf Page-2

[8] http://www.cea.nic.in/power_sec_reports/Executive_Summary/2009_02/8.pdf

Applied Methodology: AMS - I.D, version 18, EB 81

Baseline emissions:

The baseline emission calculation for the project activity is attributable to the CO_2 Emission that could have been produced by the fossil fuel based power plants in absence of the proposed project activity. Therefore the amount electricity supplied to the INDIAN grid will be multiplied by the grid emission factor to calculate the baseline emissions reduced by the proposed project activity.

$$BE_y = EG_{PJ,y} x\ EF_{grid,y}$$

Where,

BE_y	=	Baseline emissions in year y (t CO_2)
$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh)
$EF_{grid,y}$	=	Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO_2/MWh)

The methodology provides following approaches for emission factor calculations:

(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 "Tool to calculate the emission factor for an electricity system".*

OR

(b) *The weighted average emissions (in t CO_2/MWh) of the current generation mix. The data of the year in which project generation occurs must be used.*

Option (a) has been considered to calculate the grid emission factor as per the 'Tool to calculate the emission factor for an electricity system[9]' since data is available from an official source.

CO_2 Baseline Database for the Indian Power Sector, Version 11.0, April 2016[10], published by Central Electricity Authority (CEA), Government of India has been used for the calculation of emission reduction.

As per the "Tool to calculate the emission factor for an electricity system" Version 05.0, EB 87, Annex 9[11], the following steps have been followed.

STEP 1: Identify the relevant electricity systems;
STEP 2: Choose whether to include off-grid power plants in the project electricity system (optional);
STEP 3: Select a method to determine the operating margin (OM);
STEP 4: Calculate the operating margin emission factor according to the selected method;
STEP 5: Calculate the build margin (BM) emission factor;
STEP 6: Calculate the combined margin (CM) emission factor.

STEP 1: Identify the relevant electricity power systems

[9] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v5.0.pdf

[10] http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf

[11] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v5.0.pdf

The tool defines that "*for determining the electricity emission factors, identify the relevant electricity system. Similarly, identify any connected electricity systems".* It also states that *"If the DNA of the host country has published a delineation of the project electricity system and connected electricity systems, these delineations should be used".* Keeping this into consideration, the Central Electricity Authority (CEA), Government of India has divided the Indian Power Sector into five regional grids viz. Northern, Eastern, Western, North-eastern and Southern.

However since Since August 2006, however, all regional grids except the Southern Grid had been integrated and were operating in synchronous mode, i.e. at same frequency. Consequently, the Northern, Eastern, Western and North-Eastern grids were treated as a single grid named as NEWNE grid from FY 2007-08 onwards for the purpose of this CO2 Baseline Database. As of 31 December 2013, the Southern grid has also been synchronised with the NEWNE grid, hence forming one unified Indian Grid. Since the project supplies electricity to the Indian grid, emissions generated due to the electricity generated by the Indian grid as per CM calculations will serve as the baseline for this project.

Table: Geographical Scope of Indian Electricity 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	Tamilnadu
Jammu & Kashmir	Sikkim	Madhya Pradesh	Mizoram	Puducherry
Punjab	Andaman & Nicobar	Maharashtra	Nagaland	Lakshadweep
Rajasthan		Goa	Tripura	
Uttar Pradesh				
Uttarakhand				

STEP 2: Choose whether to include off-grid power plants in the project electricity system (optional)

Project participants have the option of choosing between the following two options to calculate the operating margin and build margin emission factor:

Option I: Only grid power plants are included in the calculation.
Option II: Both grid power plants and off-grid power plants are included in the calculation.

The Project Participant has chosen only grid power plants in the calculation.

STEP 3: Select a method to determine the operating margin (OM) method

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods, which are described under Step 4:

(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch data analysis OM, or

(d) Average OM.

The data required to calculate simple adjusted OM or Dispatch data analysis is not possible due to lack of availability of this activity data to the project developers.The choice of other two options for calculating the operating margin emission factor depends on thegeneration of electricity from low cost/must run sources. In the context of the methodology low cost/mustrun resources typically include hydro, geothermal, wind, low cost biomass, nuclear and wind and solar generation.

Share of Must-Run (Hydro/Nuclear) (% of Net Generation)

	2010-11	2011-12	2012-13	2013-14	2014-15
India	18.4%	19.6%	16.9%	18.6%	16.8%

Data Source: Central Electricity Authority (CEA) database Version 11, April'2016

The above data clearly shows that the percentage of total grid generation by low cost/must run plants (on the basis of average of five most recent years) for the INDIAN grid is less than 50% of the total generation. Thus the average emission rate method cannot be applied, as low cost/must run resources constitute less than 50% of total grid generation.

The "Simple operating margin" has been calculated as per the weighted average emissions (in tCO_2/MWh) of all generating sources serving the system, excluding hydro, geo-thermal, wind, low-cost biomass, nuclear and wind and solar generation;

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

- **Ex-ante option:** If the ex-ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required.

Or

- **Ex-post option:** If the ex-post option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring.

PP has chosen ex-ante option for the calculation of OM with 3 years generation weighted average of the most recent years available at the time of submission of CDM-PDD to the DOE for validation.

OM determined at validation stage will be the same throughout the crediting period. There will be no requirement to monitor & recalculate the emission factor during the crediting period.

STEP 4: Calculate the operating margin emission factor according to the selected method

The operating margin emission factor has been calculated using a 3 year data vintage:

Net Generation in Operating Margin (GWh) (excl. Imports)			
	2012-13	2013-14	2014-15
INDIAN Grid	6,97,187	7,21,632	8,08,417

Simple Operating Margin (tCO_2/MWh) (incl. Imports)			
	2012-13	2013-14	2014-15
INDIAN Grid	0.99	1.00	0.99

Weighted Generation Operating Margin	
INDIAN Grid	**0.9941**

STEP 5: Calculate the build margin emission factor ($EF_{BM,y}$)

Option 1 as described above is chosen to calculate the build margin emission factor for the project activity. BM is calculated ex-ante based on the most recent information available at the time of submission of PDD and is fixed for the entire crediting period.

Build Margin (tCO_2/MWh) (not adjusted for imports)	
	2014-15
INDIAN Grid	**0.9285**

(With sample group constituting most recent capacity additions to the grid comprising 20% of the system generation)

STEP 6: Calculate the combined margin (CM) emissions factor

Combined Margin – The combined margin is the weighted average of the simple operating Margin and the build margin. In particular, for intermittent and non- dispatchable generation types such as wind and solar photovoltaic, the Tool to calculate the emission factor for an electricity system[12], Version 05.0.0, EB 87, Annex 9, allows to weigh the operating margin and Build margin at 75% and 25%, respectively**.**

The baseline emission factor is calculated using the combined margin approach as described in the following steps:

Calculation of Baseline Emission Factor EF_y

The baseline emission factor **EF_y**is calculated as the weighted average of the Operating Margin emission factor **($EF_{OM,y}$)** and the Build Margin emission factor **($EF_{BM,y}$)**:

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

Where,

w_{OM}	75% weight of operating margin emissions factor (%)
w_{BM}	25% weight of build margin emissions factor (%)
$EF_{OM,y}$	calculated as described in Steps 3&4 above (tCO_2/MWh)
$EF_{BM,y}$	calculated as described in Steps 5 above (tCO_2/MWh)

Baseline Emission factor (INDIAN Grid) = 0.75*0.9941+ 0.25*0.9285
= 0.9777 tCO_2/MWh

Project Emissions: For most renewable power generation projects activities PE_y =0. As per applied methodology only emission associated with the fossil fuel combustion, emission from

[12] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v5.0.pdf

operation of geo-thermal power plants due to release of non-condensable gases, emission from water reservoir of Hydro should be accounted for the project emission. Since the project activity is a wind power project,

Hence PE_y= 0

Leakage Emissions: No Leakage emissions are considered. The main emission potentially giving rise to leakage in the context of electrical sector projects is emission arising due to activities arising such as power plant construction and upstream emission from fossil fuel use (e.g. extraction, processing, and transport). These emission sources are neglected.

Hence, LE_y= 0

Emission reduction (ER_y): The project activity mainly reduces carbon dioxide through substitution of grid electricity generation with fossil fuel fired power plant by renewable electricity. The emission reduction ER_y by the project activity during a given year y is the difference between Baseline emission and Project emission & Leakage emission.

$$ER_y = BE_y - PE_y - LE_y$$

Where,
ER_y = Emission Reduction in tCO_2/year
BE_y = Baseline emission in tCO_2/year
PE_y = Project emissions in tCO_2/year
LE_y = Leakage Emissions in tCO_2/year

B.6.2. Data and parameters fixed ex ante

Data/Parameter	$EF_{grid,OM,y}$
Unit	tCO_2/MWh
Description	Operating Margin CO_2 emission factor in year y
Source of data	Calculated from CEA database, Version 11, April 2016[13]
Value(s) applied	0.9941
Choice of dataorMeasurement methods and procedures	Calculated as per "Tool to calculate the emission factor for an electricity system, version 05.0.0" as 3-year generation weighted average using data for the years2012-2013, 2013-2014 & 2014-2015. The data are obtained from "CO_2 Baseline Database for Indian Power Sector" version 11.0, published by the Central Electricity Authority, Ministry of Power,Government of India.
Purpose of data	For the calculation of the Baseline Emission
Additional comment	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	$EF_{grid,BM,y}$
Unit	tCO_2/MWh
Description	Build Margin CO_2 emission factor in year y
Source of data	Calculated from CEA database, Version 11, April 2016[14]
Value(s) applied	0.9285

[13] http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf

[14] http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf

Choice of data or Measurement methods and procedures	Calculated as per "Tool to calculate the emission factor for an electricity system, version 05.0.0"BM is calculated ex-ante based on the most recent information available at the time of submission of PDD and is fixed for the entire crediting period. The data are obtained from "CO_2 Baseline Database for Indian Power Sector" version 11.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of data	For the calculation of the Baseline Emission
Additional comment	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	$EF_{grid,y}$
Unit	tCO_2/MWh
Description	Combined Margin CO_2 emission factor in year y
Source of data	Calculated from CEA database, Version 11, April 2016[15]
Value(s) applied	0.9777
Choice of data or Measurement methods and procedures	The combined margin emissions factor is calculated as follows: $EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}$ Where: $EF_{grid,BM,y}$= Build margin CO_2 emission factor in year *y* (tCO_2/MWh) $EF_{grid,OM,y}$= Operating margin CO_2 emission factor in year *y* (tCO_2/MWh) W_{OM} = Weighting of operating margin emissions factor (%) = 75% W_{BM}= Weighting of build margin emissions factor (%) = 25%
Purpose of data	For the calculation of the Baseline Emission
Additional comment	This parameter is fixed ex-ante for the entire crediting period.

B.6.3. Ex ante calculation of emission reductions

Formula used to calculate the net emission reduction for the project activity is

$ER_y = BE_y - PE_y - LE_y$

Where,
ER_y = Emission Reduction in tCO_2/year
BE_y = Baseline emission in tCO_2/year
PE_y = Project emissions in tCO_2/year
LE_y = Leakage Emissions in tCO_2/year

Baseline Emission (BE_Y)

The baseline emissions are the product of electrical energy baseline $EG_{PJ,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by an emission factor.

$BE_Y = EG_{PJ,y} * EF_{grid,y}$

Where,
$EG_{PJ,y}$ = Total quantity of net electricity delivered to the INDIAN grid

Project	Capac	PLF	Machin	Grid	Trans	Grid	Gener	Baseline	Baseline

[15] http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf

Sites' Name	ity (MW)	(%)	e Availability correction factor	Availability Correction factor	mission Loss		ated Power (MWh) p.a	Emission Factor (tCO_2/MWh)	emissions (tCO_2/ year)
Davangere, Karnataka	3	27.39 %	5.00	5.00	3.00	INDIAN	6,301	0.9777	6,160
Jamnagar, Gujarat	3.2	24.25 %	5.00	5.00	3.00	INDIAN	5,951	0.9777	5,818
Total	**6.2**						**12,252**		**11,978**

$EF_{grid,y}$ = Baseline emission factor
= 0.9777 tCO_2/MWh

BE_y = 12,252 * 0.9777
= 11,978

As per Section B.6.1:
$PE_y = LE_y = 0$
Thus,
$ER_y = BE_y - PE_y - LE_y$
$ER_y = BE_y - 0 - 0$
$ER_y = BE_y$

Therefore,
$ER_y = BE_y = 11,978$

B.6.4. Summary of ex ante estimates of emission reductions

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
Year 1	11,978	0	0	11,978
Year 2	11,978	0	0	11,978
Year 3	11,978	0	0	11,978
Year 4	11,978	0	0	11,978
Year 5	11,978	0	0	11,978
Year 6	11,978	0	0	11,978
Year 7	11,978	0	0	11,978
Total	83,846	0	0	83,846
Total number of crediting years	7			
Annual average over the crediting period	11,978	0	0	11,978

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

For Davangere, Karnataka

Data / Parameter	$EG_{Net\ Exported}$[16]
Unit	MWh
Description	Net electricity supplied to the grid by the project activity
Source of data	Credit report Sheets. (KPTCL/ BESCOM Form B2[17])/ Invoice (whichever is conservative).
Value(s) applied	5,841MWh/yr
Measurement methods and procedures	Net Electricity supplied to the grid is in kWh. However for the calculation purpose Net electricity supplied is converted in MWh. The Net electricity supplied to the grid by the project activity will be calculated as a difference of electricity exported to the grid, electricity imported from the grid and the transmission losses obtained from credit reports provided by KPTCL/BESCOM as per below equation: ($EG_{Net\ Exported} = EG_{Exported} - EG_{Import} - EG_{Transmission\ Losses}$)
Monitoring frequency	Monthly
QA/QC procedures	Calibration of all the meters (meter at the 33 kV metering yard and at the 220 kV substation meter) will be undertaken and faulty meters will be duly replaced immediately. The KPTCL meter will be calibrated as per the KPTCL requirement. Net electricity supplied to the grid as mentioned in Form B will be cross-checked with the invoices raised by the PP for the project activity. Whichever is the conservative value will be considered for emission reduction calculation during verification of the project activity.
Purpose of data	To determine Baseline Emissions
Additional comment	The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

Data / Parameter	$EG_{Exported}$[18]
Unit	MWh
Description	Electricity exported by the WTGs of the project activity
Source of data	Credit report Sheets. (KPTCL/ BESCOM Form B)
Value(s) applied	-
Measurement methods and procedures	Monitoring: Trivector meters (main and check meter at 33 kV metering yard) will be used for monitoring of electricity exported by WTGs of the project activity. The meters are of 0.2s accuracy class. Electricity exported is in kWh. However for the calculation purpose electricity exported is converted in MWh. Data Type: Measured Frequency: Continuously measured & monthly recording Archiving Policy: Paper & Electronic Calibration Frequency: Quarterly as per PPA.

[16] The symbols $EG_{Net\ Exported}$ and E_{Gy} belongs to the same parameter that is Net Electricity supplied to grid by the project activity. In the registered PDD, symbol E_{Gy} has been invariably used in other sections (Refer B.4, B.6.1 and B.6.3) for the baseline emission estimation.

[17] Form B consists of a set of documents which is issued by KPTCL/BESCOM which consists of data such as the import and export of electricity by group of WTGs of the project activity at a site at 33 kV metering point, export and import of electricity at the 33/220 kV KPTCL sub-station from all the WTGs (PP and non PP) connected to the substation, Transmission losses and its calculation (i.e. calculation of percentage line losses for a month) done by BESCOM.

[18] In case of apportioning of electricity for any month (When billing cycle and crediting period years or monitoring period not matches) as per the procedures provided under “Apportioning Procedure” of monitoring plan (B.7.2), EG Exported (i.e Sum of G for each group of WTGs of the project activity) and G for any month are same only .

Monitoring frequency	Monthly
QA/QC procedures	The meters used for the monitoring of this parameter shall be calibrated on quarterly basis as per PPA.
Purpose of data	To determine Baseline Emissions
Additional comment	The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

Data / Parameter	EG_{import}
Unit	MWh
Description	Electricity imported from the grid by the WTGs of the project activity.
Source of data	Credit report Sheets. (KPTCL/ BESCOM Form B)
Value(s) applied	-
Measurement methods and procedures	Monitoring: Trivector meters (main and check meter at 33 kV metering point) will be used for monitoring of electricity exported by WTGs of the project activity. The meters are of 0.2s accuracy class. Electricity exported is in kWh. However for the calculation purpose electricity exported is converted in MWh. Data Type: Measured Frequency: Continuously measured & monthly recording Archiving Policy: Paper & Electronic Calibration Frequency: Quarterly as per PPA
Monitoring frequency	Monthly
QA/QC procedures	The meters used for the monitoring of this parameter shall be calibrated on quarterly basis as per PPA.
Purpose of data	To determine Baseline Emissions
Additional comment	The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

Data / Parameter	$EG_{Transmission\ Losses}$
Unit	MWh
Description	Electricity Losses in Transmission
Source of data	Credit report Sheets. (KPTCL/ BESCOM Form B)
Value(s) applied	-

Measurement methods and procedures	Monitoring: This is a calculated parameter, based on the measurement results of the meters installed at 33 kV metering point and 220 kV sub-station. Bi- directional Trivector meters (main and check meter at 33 kV metering point and 220 kV sub-station (SS)) will be used for monitoring of electricity. The meters will be of 0.2s accuracy class **Calculation Procedure EG $_{Transmission\ Losses}$** Z= % of line losses X= Total exported electricity from all the metering points connected to the sub – station (as measured at 33 kV metering point of all the WTGs (PP + non PP) connected to the SS) hence X= X1+ X2+X3+.....Xn Y= Total exported electricity as measured at Sub – Station Bulk meter (i.e main and check meter at 220 kV SS). Z= [(X-Y)/X]*100 $EG_{Transmission\ Losses} = Z^* EG_{Exported}$ Electricity Loss in Transmission is in kWh. However for the calculation purpose electricity loss in transmission is converted in MWh. Data Type: Measured/Calculated Frequency: Monthly Archiving Policy: Paper & Electronic
Monitoring frequency	Monthly recording
QA/QC procedures	The meters used for the monitoring of this parameter is calibrated on quarterly basis as per PPA.
Purpose of data	Calculation of baseline emissions
Additional comment	The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

Data / Parameter	$EG_{Controller}$
Unit	MWh
Description	Electricity generated at Controller (MCS) [19]
Source of data	Daily Power generation report
Value(s) applied	-
Measurement methods and procedures	Monitoring: Monitored through inbuilt control panel meters of the WTGs. The data is continuously measured at each WTG by inbuilt control panel meter and recorded at CMS. Data Type: Measured Frequency: Continuously measured and daily recording Archiving Policy: Electronic
Monitoring frequency	Continuously measured & daily recording
QA/QC procedures	Please refer to detailed description under “Description of calibration of WTG Controller” in Section B.7.3 for the calibration of the WTG controller meter.
Purpose of data	Calculation of baseline emissions

[19] This parameter shall only be used when it is required to apportion the electricity in a particular month. This is required as billing cycle and crediting period years or monitoring period may not match

Additional comment	This value will only be used for deriving the apportioning ratio. The data will be archived in electronic form up to two years after the completion of crediting period or last issuance whichever is later.

Jamnagar, Gujarat

Data / Parameter	EG_Y
Unit	MWh
Description	Net electricity supplied to the grid by the project activity
Source of data	Share Certificate[20] issued by GETCO /GEDA /SLDC (State Load Dispatch Centre)/ Authorized representative
Value(s) applied	5,392 MWh/yr
Measurement methods and procedures	The share certificate having the net electricity supplied to grid by the WTGs of SRPL wind farm is made on the basis of monitored electricity through meters at the sending end of the 220 kV substation and at the meters installed at the 33 kV metering yard as per PPA / updated procedure by GUVNL. The accuracy class of the substation meters is 0.2s and the accuracy class of yard meters ranging between 0.2s/0.5s
Monitoring frequency	Monthly
QA/QC procedures	Calibration of all the meters (meters at the 33 kV metering yard and at the sending end of the 220 kV substation) will be done once in three years. (Net electricity supplied to grid indicated in share certificate will be crosschecked with the invoices raised by PP).
Purpose of data	To determine Baseline Emissions
Additional comment	The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

B.7.2. Sampling plan

Since no sampling is involved, this section is not relevant for the project activity.

B.7.3. Other elements of monitoring plan

The project activity is in accordance with approved small scale methodology AMS I.D, and therefore, can use the monitoring methodology for type I.D of 'Appendix B of the simplified M&P for small-scale CDM project activities-Version 18, - Grid connected renewable electricity generation.
This approved monitoring methodology requires monitoring of the following:

- ✓ Net Electricity supplied by the project activity to the grid

In order to monitor the mitigation of GHG due to the project activity, the Net Electricity supplied by the project activity to the grid needs to be monitored. The net energy supplied by the project activity to the grid multiplied by grid emission factor for regional grid, would result in the baseline emission for the project activity.

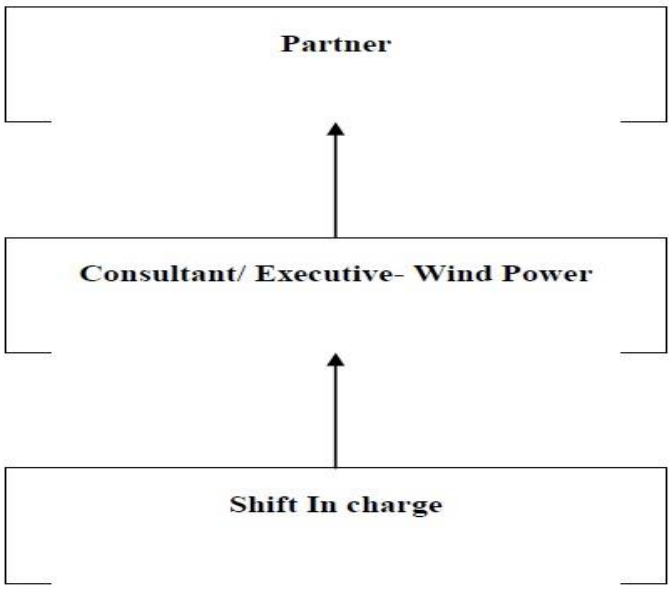
Since the emission factor (combined margin) of the grid is fixed for the crediting period, the monitoring of grid emission factor is not required.

Davangere (Karnataka)

[20] Share certificate contains the information about the monthly net electricity supplied to grid by the WTGs of project activity which is issued by GETCO/ GEDA/ SLDC (State Load Dispatch Centre)/ Authorized representative.

The Project is operated and managed by M/s. Suzlon Energy Limited/ Its Group Companies/Contractor specifically appointed by Suzlon. The operational and management structure implemented by the project participant in order to monitor emission reductions has been provided below.

Net electricity supplied by the project activity to grid is the most important parameter required for the financial reporting and sustainability of the project and monitored with due care by both the parties (O&M Contractor (PP's representative and representative of KTPCL). For emission reductions project proponents proposes the following structure:



Roles and responsibilities:

Partner: In the project management structure Partner is responsible for the overall project performance. The Partner will review the monthly net electricity supplied and annual emission reduction calculations.
Operation and maintenance of wind generators will be done by Suzlon Energy Limited/Its Group Companies/Contractor specifically appointed by Suzlon.

Consultant/ Executive- Wind Power: Consultant/ Executive- Wind power is assisting to Partner for completing the task discussed above. He is responsible for the electricity generations at the individual wind turbine installations. He will report to Partner for any abnormality.
Shift In-charge: Shift in charge is responsible for recording the electricity meter reading from the KPTCL meter. He will be the person of Suzlon Energy Limited/It"s Group Companies/Contractor specifically appointed by Suzlon.
Record Handling: OEM contractors (i.e Suzlon Energy Limited/It"s Group Companies/Contractor specifically appointed by Suzlon) are responsible for daily records with all the related parameters. The relevant records are submitted to Consultant/ Executive- Wind Power on monthly basis. The Consultant/ Executive- Wind Power has final responsibility for record keeping.

The O&M personnel are qualified engineers and are trained by Suzlon for operating and ensuring best performance of the WTGs. 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 KPTCL/BESCOM.

1. **Metering:** The Delivered Electricity shall be metered by the Parties at the high voltage side of the step up transformer installed at the Receiving Station (main and check meter at 220 kV substation). The electricity exported and imported by the WTGs of the Project activity shall be metered by the Parties at the high voltage side of the step up transformer installed at the Project Site (main and check meter at 33 kV metering yard). The WTGs of a single

customer (M/s. D. J. Malpani in this case) at a particular site are connected to a 33 kV metering yard (having the main and check meter) which in turn connects to the shared main KPTCL meter (main and check meter) at the 220 kV substation maintained by Suzlon Power Infrastructure Limited. Data monitoring takes place at the 33 kV metering yard, 220 kV sub-station and at the WTG inbuilt controller meter. The emission reduction calculations are done on the basis of the KPTCL Main meter reading (At 33 kV metering yard and 220 kV sub-station).

2. **Metering Equipment:** Metering equipment shall be electronic trivector meters of accuracy class 0.2s required for the Project (both main and check meters at 33 kV metering yard and 220 kV sub-station). The metering equipment shall be maintained in accordance with electricity standards. Such equipment shall have the capability of recording monthly readings.
3. **Meter Readings:** The monthly meter readings (both main and check meters) at the Project Site and the Receiving Station shall be taken simultaneously and jointly by the Parties every month. The recorded metering data shall be downloaded through meter recording instrument by KPTCL officer as and when required.
4. **Inspection of Energy Meters**: All the main and check energy meters used for the monitoring under the project activity shall be of 0.2s accuracy class. Each meter shall be jointly inspected and sealed on behalf of the Parties and shall not be interfered with by either Party except in the presence of the other Party or its accredited representatives.

Data Adjustments and Uncertainties:

5. **Meter Test Checking:** All the main and check meters shall be tested for accuracy. The meters (at the 33 kV metering yard and at the 220 kV substation) shall be deemed to be working satisfactorily if the errors are within specifications for meters of 0.2s accuracy class. As per the PPA Article 7 Sub-clause 7.5 , the monitoring by the main meters (at the 33 kV metering yard and at the 220 kV sub-station) alone will hold good for the purpose of billing as long as the error in the main meter is within the permissible limits.

   a. If during the tests, the main meter is found to be within the permissible limit of error and the corresponding check meter is beyond the permissible limits, then billing will be as per the main meter as usual. The check meter shall, however, be calibrated immediately.
   b. If during the tests, the main meter is found to be beyond permissible limits of error, but the corresponding check meter is found to be within permissible limits of error, then the billing for the month upto the date and time of such test shall be as per the check meter. There will be a revision in the bills for the period from the previous calibration test upto the current test based on the readings of the check meter. The main meter shall be calibrated immediately and billing for the period thereafter till the next monthly meter reading shall be as per the calibrated main meter.
   c. If during the tests, both the main meters and the corresponding check meters are found to be beyond the permissible limits of error, both the meters shall be immediately calibrated and the correction applied to the reading registered by the main meter to arrive at the correct reading of electricity supplied for billing purposes for the period from the last month's meter reading upto the current test. Billing for the period thereafter till the next monthly meter reading shall be as per the calibrated main meter.
   d. If during any of the monthly meter readings, the variation between the main meter and the check meter is more than that permissible for meters of 0.2s accuracy class, all the meters shall be re-tested and calibrated immediately

Description of calibration of WTG Controller: The controller used for the WTG is SCS Controller is a micro-processor based intelligent controller which has been specially designed for control of wind turbines. It uses a Woodward Multi function Relay that has three current inputs from CT and three direct voltage inputs (690 Volts). The analog values of current / voltage is converted into digital signal internally using A/D Converters at very high sampling rate. A software program reads these values and displays instantaneous parameters such as voltage, current, power factor, kVAh, kVArh and kWh. These instantaneous values are then time integrated and displayed / stored.

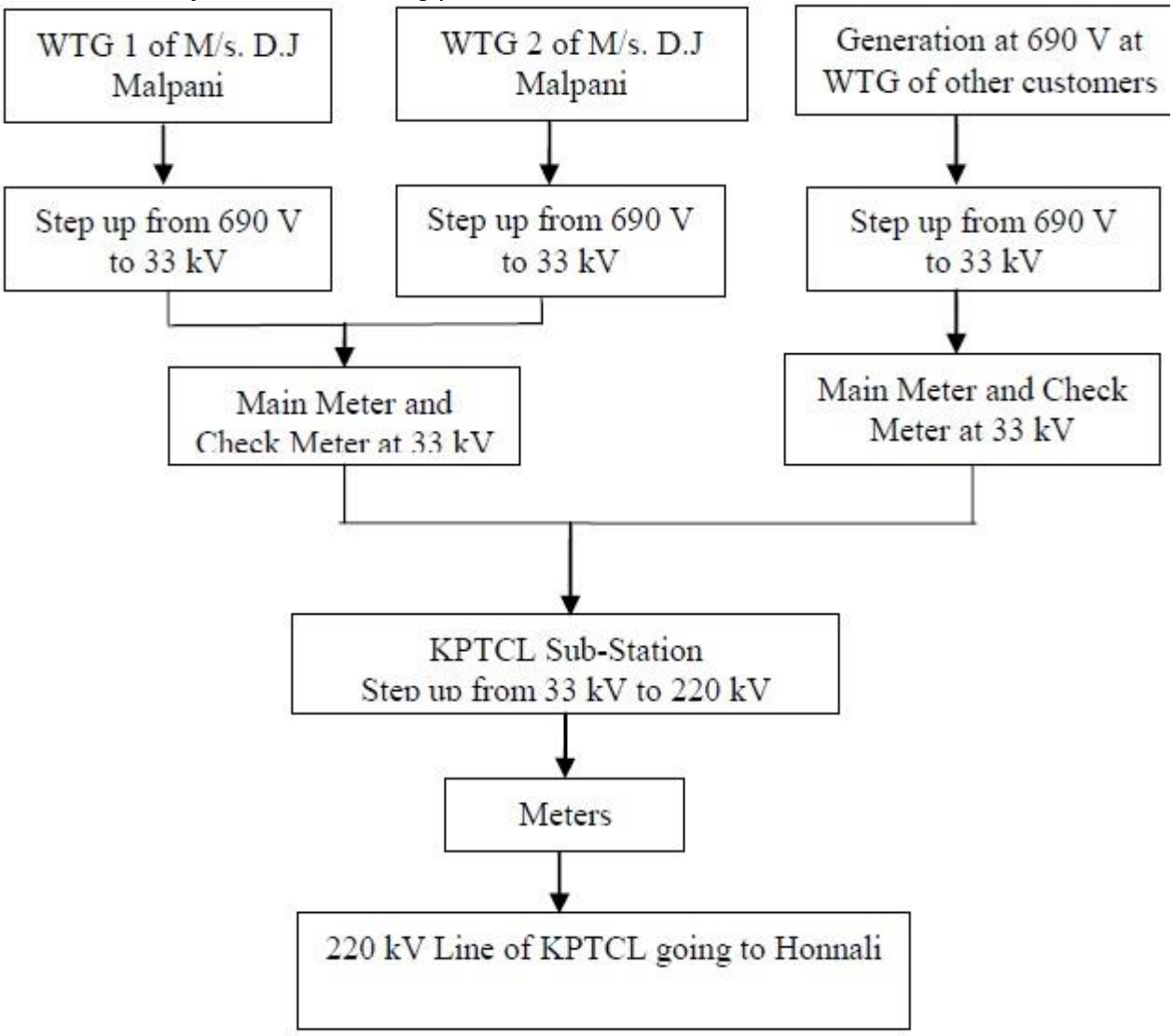
Woodward relay is having no display and needs special protocol to view energy readings as this relay is communicating digital signal through special communication protocol. Moreover, turbine cannot run without this relay hence it cannot be removed for calibration, hence, it is not possible to calibrate[21].

6. **Records:** Suzlon Energy Limited/It's Group Companies/Contractor specifically appointed by Suzlon will maintain an accurate record at the project site of:

i. Daily generation reading
ii. Any unusual conditions found during operation/inspections
iii. All the records will be preserved for 2 years beyond the crediting period.

7. The billing will be on monthly basis. The BESCOM will be billed by M/s. D. J. Malpani based on statement given by BESCOM at the end of each month for the net electricity supplied by the WTGs of the project activity.

The electrical layout and monitoring points of the WTGs is as follows:



Every month, the KPTCL/BESCOM designated official shall arrive at the site and record the readings of meters (both main and check meters) placed at the 220 kV side of 33/220 kV Sub-Station and as well as at the individual customer metering point (i.e main and check meter at 33 kV metering yard).

[21] As per letter provided by the technology supplier the inbuilt control panel meters cannot be calibrated.

M/s. D. J. Malpani (Consultant/ Executive- Wind Power) will be keeping the daily/ monthly data generated from all the WTGs provided by Suzlon and KPTCL.

Apportioning Procedure for Karnataka:
The following apportioning procedure will be followed, if the monitoring period date of the project activity falls in – between the billing cycles of KPTCL/BESCOM:

Partial days generation of the month at controller by the WTGs of the project activity (kWh): X
Total generation at controller (kWh) for the same month by the WTGs of the project activity: Y kWh
% Generation for partial days of generation (%): Z= (X/Y) *100
Electricity export [22] to the grid by the WTGs of the project activity as per credit report (KPTCL/BESCOM from B) for the month: G kWh Electricity export to the grid by the WTGs of the project activity for the partial days: (G*Z/100).

Form B, which contains the electricity data, is certified by the Site-in-Charge (O&M contractor) of SEL and also by the Asst. Executive Engineer of KPTCL/BESCOM. The monthly Net Electricity supplied shall be obtained from Form B and the same shall be used in monitoring report during verification. Head Consultant/ Executive- Wind Power of M/s D.J. Malpani will be responsible for keeping the copies of Form B sent to M/s D.J. Malpani from KPTCL.

Jamnagar (Gujarat)

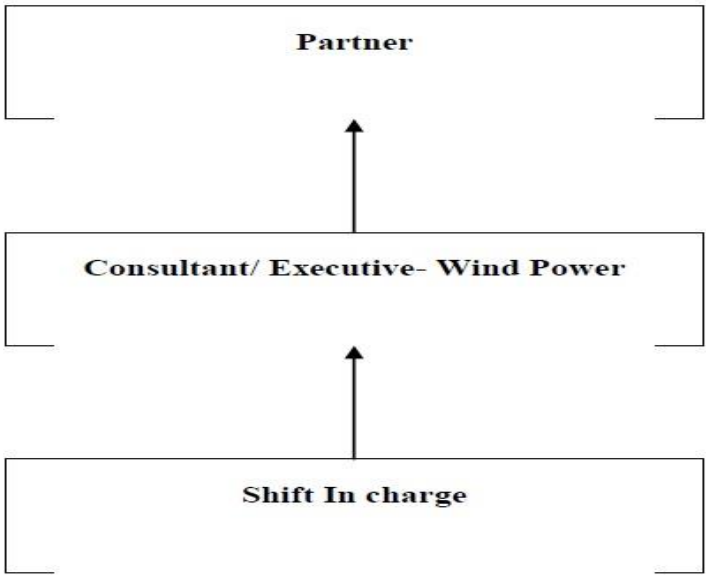
The Project is operated and managed by M/s. Enercon India Limited/ Its Group Companies/Contractor specifically appointed by Enercon. The operational and management structure implemented by the project participant in order to monitor emission reductions by the project activity has been provided below.

Net electricity supplied by the project activity to grid is the most important parameter required for the financial reporting and sustainability of the project and monitored with due care by both the parties (O&M Contractor (PP's representative) and representative of GETCO/ GEDA/ SLDC/ Authorized representative).

The authority and responsibility of project management as well as registration, monitoring, measurement and reporting lies with M/s. D. J. Malpani and it has formulated a Project Team to ensure proper and continuous monitoring of the performance of turbines and generation of power. The same has been outlined as follow:

[22] $EG_{Net\ Exported} = EG_{Exported} - EG_{import} - EG_{Transmission\ Losses}$

For the apportioning of electricity supplied for any month only apportioning of $EG_{Exported}$ shall be done and import, transmission losses shall be deducted (Without apportioning taking reading for the full month) from the $EG_{Exported}$ .This is a conservative approach.



Roles and responsibilities:

Partner: In the project management structure Partner is responsible for the overall project performance. The Partner will review the monthly net electricity supplied and annual emission reduction calculations.
Operation and maintenance of wind generators will be done by Enercon India Limited/Its Group Companies/Contractor specifically appointed by Enercon.

Consultant/ Executive- Wind Power: Consultant/ Executive- Wind power is assisting to Partner for completing the task discussed above. He is responsible for the electricity generations at the individual wind turbine installations. He will report to Partner for any abnormality.

Shift In-charge: Shift in charge is responsible for recording the electricity meter reading from the GETCO meter. He will be the person of Enercon India Limited/It‟s Group Companies/Contractor specifically appointed by Enercon.

Record Handling: OEM contractors (i.e Enercon India Limited/It‟s Group Companies/Contractor specifically appointed by Enercon) are responsible for daily records with all the related parameters. The relevant records are submitted to Consultant/ Executive- Wind Power on monthly basis. The Consultant/ Executive- Wind Power has final responsibility for record keeping.

The O&M personnel are qualified engineers and are trained by Enercon for operating and ensuring best performance of the WTGs. 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 GUVNL.

Description of calibration of WTG Controller:
The controller used for the WTG is SCS Controller is a micro-processor based intelligent controller which has been specially designed for control of wind turbines. It uses a Woodward Multi function Relay that has three current inputs from CT and three direct voltage inputs (690 Volts). The analog values of current / voltage is converted into digital signal internally using A/D Converters at very high sampling rate. A software program reads these values and displays instantaneous parameters such as voltage, current, power factor, kVAh, kVArh and kWh. These instantaneous values are then time integrated and displayed / stored. Woodward relay is having no display and needs

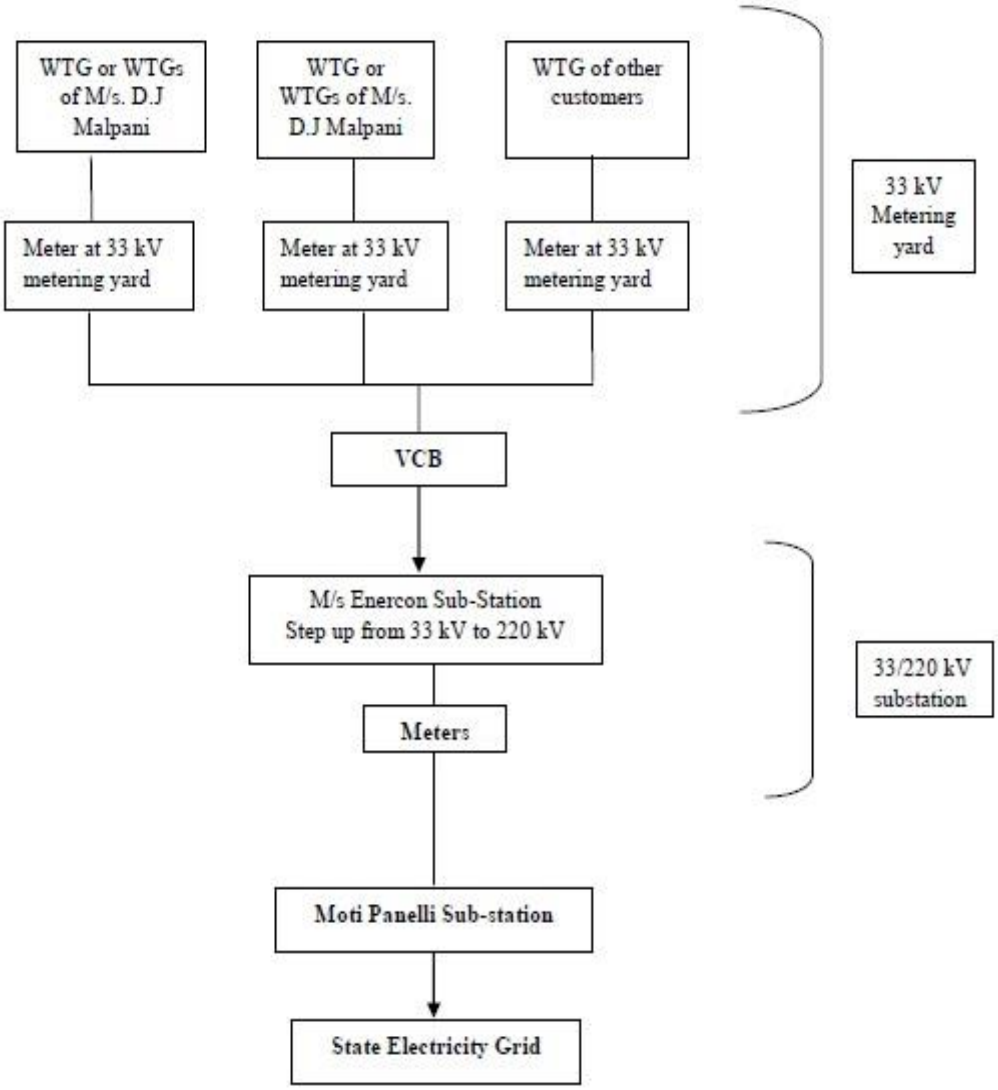
special protocol to view energy readings as this relay is communicating digital signal through special communication protocol. Moreover, turbine cannot run without this relay hence it cannot be removed for calibration, hence, it is not possible to calibrate[23].

Records: Enercon India Limited/It's Group Companies/Contractor specifically appointed by Enercon will maintain an accurate record at the project site of:

i. Daily generation reading
ii. Any unusual conditions found during operation/inspections
iii. All the records will be preserved for 2 years beyond the crediting period.

The billing will be on monthly basis. Enercon/ M/s. D. J. Malpani shall raise invoice and submit to GUVNL for payment based on share certificate provided by GETCO/GEDA/SLDC Authorized representative.

The electrical layout and monitoring points of the WTGs is as follows:



The

GETCO authorities shall arrive at the site every month and record the readings of meters (PP + non PP) placed at the 220 kV Sub-Station and as well as at the 33 kV metering point. Keeping in view, the net electricity generation supplied to Grid for every particular customer will be computed on ***GETCO/GEDA/SLDC/ Authorized representative Report***

[23] As per letter provided by the technology supplier the inbuilt control panel meters cannot be calibrated

(Consultant/Executive- Wind Power) will be keeping the daily / monthly data generated from all the WTGs provided by Enercon and ***GETCO/ GEDA/ SLDC (State Load Dispatch Centre) /Authorized representative***.

Data Adjustments and Uncertainties In case of monitoring meter failure or errors, the [GETCO/GEDA/SLDC] officials would immediately replace the meter with a calibrated meter. The meter installed at the 220 kV and 33 kV point are calibrated once in three years. In case of any failure in the meter installed at 33 kV metering yard the electricity generation data of the WTG controller will be used. In case of any failure of the meters at the 220 kV sub-station the electricity supplied data of the reference meters at 220 kV sub-station will be used.

Apportioning Procedure for Gujarat:

The following generation apportioning procedure will be followed, if the crediting period date of the project activity falls in – between the billing cycles of GETCO / GEDA/ SLDC (State Load Dispatch Centre) /Authorized representative:

Partial days generation of the project activity WTGs at 33 kV metering yard of a Month (kWh): X[24]

Total generation of the project activity WTGs at 33 kV metering yard (kWh) for the same month: Y[25](kWh/month)

% Generation for partial days of generation (%): Z= (X/Y) *100

Electricity supplied to grid by the WTGs of the project activity as per share certificate (GETCO/ GEDA/ SLDC (State Load Dispatch Centre) /Authorized representative for the same month: G[26](kWh/month)

Electricity supplied to grid by the WTGs of the project activity for the partial days: (G*Z/100).

The GETCO/ GEDA (Gujarat Electricity generation Authority) /SLDC (State Load Dispatch Centre)/ ***Authorized representative*** Report is forwarded to Executive Engineer of GETCO and is certified thereof. Copies of this document are forwarded to the Load Dispatch Center of Gujarat Electricity Distribution Authority (GETCO) and M/s D.J. Malpani. The monthly Net Electricity supplied shall be obtained from the share certificate and the same shall be used in monitoring report and during verification. Consultant/ Executive- Wind Power of M/s. D.J. Malpani will be responsible for keeping the copies of share certificate sent to M/s. D.J. Malpani from GETCO/GEDA/SLDC/Authorized representative.

Internal audits & Performance review (For Gujarat and Karnataka):

The records are regularly audited and checked by the M/s. D. J. Malpani Representative. The M/s. D. J. Malpani Representative shall do the internal audit on yearly basis will crosscheck the emissions reductions estimated in PDD with respect to actual emissions reduction. For any deviation from the actual emission reduction values and reported values corrective action will be

[24] The monitoring of X is done at GETCO meters (Meters of the project WTGs) installed at 33 kV metering yard

[25] The value of Y is obtained from the monthly readings of the GETCO meters (Meters of the project WTGs) installed at 33 kV metering yard. The monitoring of the parameter X and Y is done for the same meters but for different period.

[26] The value of G is for the month where billing cycle date does not match with the monitoring period dates (start and/or end date). Both the parameter EGy and G are the net electricity supplied to the grid by the WTGs of the project activity. EGy is the net electricity supplied to the grid for the year/monitoring period. The apportioning procedure will only be used when the billing cycle and monitoring period dates does not match.

suggested by M/s. D. J. Malpani representative to calculate the conservative emission reduction. All corrective actions will be recorded and maintained.

B.8. Date of completion of application of methodology and standardized baseline and contact information of responsible persons/ entities

Date of completion: 27/04/2017 is the date of completion of study on application of the selected methodology. Further, the standardized baseline is not applicable for this project activity.

Name of the responsible person/entity:
Manish Dabkara
manish@enkingint.org
EKI Energy Services Ltd is the entity responsible for the application of the selected methodology This Entity is not the project participants for this project activity as indicated in Appendix 1 below.

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

31/12/2008 (Date of Purchase order)

C.1.2. Expected operational lifetime of project activity

20 Years

C.2. Crediting period of project activity

C.2.1. Type of crediting period

The project proponent intends to apply for a Renewable Crediting Period.

C.2.2. Start date of crediting period

10 November 2017 (Start Date for the second crediting period)

C.2.3. Length of crediting period

7 Years

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

According to Indian regulation, the implementation of the wind park does not require an environmental impact assessment. The Ministry of Environment and Forests (MoEF), Government of India notification dated September 14, 2006 regarding the requirement of Environment Impact Assessment (EIA) studies as per the Environment Protection Rule, 1986 (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii) MINISTRY OF ENVIRONMENT AND FORESTS) states that any project developer in India needs to file an application to the Ministry of Environment and Forests (including a public hearing and an EIA) in case the proposed industry or project is listed in a predefined list. Wind parks are not included in this list and thus an EIA is not required. The project activity has no significant impact on the environment. However, certain foreseen impacts due to the project activity are discussed below: Also, in the redefined EIA notification i.e. S.O. 1533[27], dated 14th September 2006, Ministry of Environment & Forests (MoEF), Govt. of India, the wind projects are not included in the list of projects that has to get Prior

[27] Page No: 10, S. O. 1533, Ministry of Environment & Forests (MoEF), Govt. of India, http://envfor.nic.in/legis/eia/so1533.pdf

Environmental Clearance (EC) either from State or Central Govt. authorities and hence no EIA study was conducted.

The project does not fall under the purview of the Environmental Impact Assessment (EIA) notification of the Ministry of Environment and Forest, Government of India. However due weightage has been given to environmental aspects.

During construction

Impact on air

Movement of construction material during construction will have some impact on the air. As the transportation is quite less for the project activity, the impacts will be negligible.

Impact on water

Not much water discharge takes place during construction. However, proper sanitary arrangements will be provided by project proponents.

Impact on Land use

The land on which the project activity takes place is largely unproductive. Prior to the project activity, most of the land had no beneficial use. The project proponents had bought the land for a worthwhile application and obtained necessary approvals for installation of windmills. No dislocation of people is involved in the course of the project activity.

The magnitude of the impacts during the construction phase is negligible and exists for a temporary period of time till the end of construction phase. Therefore, it would not affect the environment considerably. The impacts on the environment due to construction activities of wind turbines are negligible.

Operation and Maintenance Phase

Suzlon/Enercon maintains highest level of safety standards. Systematic and scientific maintenance of all equipments has been undertaken to ensure the best safety standards.

Impact on air

Wind energy plants are known to contribute to zero atmospheric pollution as no fuel combustion is involved during any stage of the operation.

Impact on water

There is absolutely no effluent discharge during operation of wind turbine generators.

Impact on ecology

There are no known migratory birds/endangered species in the region of project activity. Therefore no harm on the ecological environment is envisaged.

Socio-Economic Impacts

There is no inconvenience to the local community due to the transmission lines. The project activity helps up-liftment of skilled and unskilled manpower in the region. The project will be providing employment opportunities not only during the construction phase, but also during its operational lifetime. The project activity improves employment rate and livelihood of local populace in the vicinity of the project. Moreover, the project generates eco-friendly, GHG free power which contributes to sustainable development of the region.

Conclusion

The net impact under environmental pollution category would be positive as all necessary abatement measures would be adopted and periodically monitored. The project activity does not have any major adverse impacts on environment during its construction or operational phase. The human interest parameters would show positive impacts due to increased job opportunities at the facility as well as other ancillary units coming up.

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

The stakeholders identified for the project activity were as under:

1) Gram Sarpanch
2) Contractors

3) Enercon employees
4) Local villagers
5) President (Sarpanch)
6) Members of Panchayat
7) Farmers

The identified stakeholders were invited by sending one to one invitation letters. The stakeholder consultation meeting was held on 7th April, 2009 at Jamnagar (Gujarat), India & Kudurekonda, Taluka Honnali, Davangere District on 12th January 2009. The minutes of the meeting will be provided to the DOE during validation.

E.2. Summary of comments received

The local people are direct beneficiaries of the project. The construction and continuous operation of the mill constitutes local manpower. The project does not require any major displacement of any local population. Also, the installation of transmission lines would not create any inconvenience to the local population. In summing up, the project activity has received complete support from the local populace. The Government of India, through Ministry of New and Renewable Energy (MNRE), has been promoting energy conservation, demand side management and renewable energy projects including wind, small hydro and bio-mass power.
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 environment-friendly initiatives.

E.3. Report on consideration of comments received

M/s. D. J. Malpani has taken care of all the conditions stipulated in the relevant clearances and no adverse comment has been raised. In summing up, the project has not received any negative or discouraging feedback from the stakeholders concerned. All the stakeholders have appreciated and encouraged the project proponent for taking up this project activity.
In view of various direct and indirect benefits (social, economic, and environmental), all the stakeholders have supported the project activity. The documents supporting the stakeholder consultation will be submitted to the DOE.

SECTION F. Approval and authorization

The Letter of Approval from the Host Country has been submitted to the DOE.

Appendix 1. Contact information of project participants and responsible persons/ entities

Project participant and/or responsible person/ entity	☒ Project participant ☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	M/s D. J. Malpani
Street/P.O. Box	Kasara Dumala, Sangamner
Building	Malpani Estate
City	Ahmednagar
State/Region	Maharashtra
Postcode	422605
Country	India
Telephone	+91 2425 225035
Fax	+91 2425 225261
E-mail	nilesh@djmalpani.com
Website	www.malpani.com
Contact person	Mr. Prafulla Premchand Khinvasara
Title	Head- Wind Power Projects
Salutation	Mr.
Last name	Khinvasara
Middle name	Premchand
First name	Prafulla
Department	Renewable Power Projects
Mobile	+91 9822322145
Direct fax	+91 2425 225003
Direct tel.	+91 2425 225011 (Extension 215)
Personal e-mail	prafulla@malpani.com

Project participant and/or responsible person/ entity	☐ Project participant ☒ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	EKI Energy Services Limited
Street/P.O. Box	Office No 201, Plot No 48, Scheme 78, Part 2, Vijay Nagar
Building	Enking Embassy
City	Indore
State/Region	Madhya Pradesh
Postcode	452010
Country	India
Telephone	+91-0731-4289086

Fax	+91-0731-4289086
E-mail	manish@enkingint.org
Website	www.enkingint.org
Contact person	Manish Dabkara
Title	CEO
Salutation	Mr.
Last name	Dabkara
Middle name	-
First name	Manish
Department	CDM Services Dept.
Mobile	+91-9907534900
Direct fax	+91-0731-4289086
Direct tel.	+91-0731-4289086
Personal e-mail	manish@enkingint.org

Appendix 2. Affirmation regarding public funding

No public funding for this project activity including any funding from ANNEX 1 countries. Thus project participant hereby confirms that no diversion of Official Development Assistance is caused die to the project activity.

Appendix 3. Applicability of methodology and standardized baseline

Details on applicability of selected methodology have been provided in Section B.2 of this PDD

Appendix 4. Further background information on ex ante calculation of emission reductions

Please refer Section B.6.1 of the PDD.

Appendix 5. Further background information on monitoring plan

Please refer section B.7.1 and B.7.2 for information on monitoring.

Appendix 6. Summary of post registration changes

Not applicable

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Document information

Version	*Date*	*Description*
08.0	22 July 2016	EB 90, Annex 2 Revision to include provisions related to automatically additional project activities.
07.0	15 April 2016	Revision to ensure consistency with the “Standard: Applicability of sectoral scopes” (CDM-EB88-A04-STAN) (version 01.0).

Version	*Date*	*Description*
06.0	9 March 2015	Revisions to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Editorial improvement.
05.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the project design document form for small-scale CDM project activities (these instructions supersede the "Guidelines for completing the project design document form for small-scale CDM project activities" (Version 01.1)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from *F-CDM-SSC-PDD* to *CDM-SSC-PDD-FORM*; • Editorial improvement.
04.1	11 April 2012	Editorial revision to change history box by adding EB meeting and annex numbers in the Date column.
04.0	13 March 2012	EB 66, Annex 9 Revision required to ensure consistency with the “Guidelines for completing the project design document form for small-scale CDM project activities”
03.0	15 December 2006	EB 28, Annex 34 • The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.
02.0	08 July 2005	EB 20, Annex 14 • The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
01.0	21 January 2003	EB 07, Annex 05 Initial adoption.

Decision Class: Regulatory
Document Type: Form
Business Function: Registration
Keywords: project design document, SSC project activities