Project design document form for small-scaleCDM project activities

(Version 08.0)

PROJECT DESIGN DOCUMENT (PDD)	
Title of the project activity	13.75 MW wind power project in Davangere, Karnataka, India
Version number of the PDD	03
Completion date of the PDD	27/04/2017
Project participant(s)	Sargam Retails Private Limited (SRPL)
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	27,922tCO2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The project activity is an initiative by Sargam Retails Private Limited (SRPL), towards cleanelectricity generation using wind energy resources in the state of Karnataka. SRPL is engaged in Tradingand Marketing Packaged Tea & Tobacco.

The project activity leads to the installation of 10 Wind Turbine Generators (WTGs) of total generating
capacity of 13.75 MW (5 nos of Suzlon make S 82 WTGs each having generating capacity of 1500 kW &5 nos of Suzlon make S 64 WTGs each having generating capacity of 1250 kW). There locations is in Davangere district of Karnataka state of India.

The main purpose of the project activity is to generate electrical energy through sustainable means usingwind power resources, to utilize the generated output for supply to Karnataka Power TransmissionCompany Limited (KPTCL) and to contribute to climate change mitigation efforts. This renewableenergy produced will partially contribute to the electricity provided by the KPTCL.

The project is utilizing wind energy for generating electricity which otherwise would have beengenerated through alternate fuels (most likely - fossil fuel) based power plants thus, contributing toreduction in specific emissions (emissions of pollutant) including GHG emissions. Being a renewable
resource, using wind energy to generate electricity contributes to resource conservation. SRPL will bedeveloping this project keeping in consideration the funding available under the Clean DevelopmentMechanism (CDM) of the United Nations Framework Convention on Climate Change. The projectactivity is also responsible for sustainable economic growth and conservation of environment through useof wind as a renewable source. The Project activity would generate 13.75 MW of electricity withefficient utilization of the available wind energy through adoption of the latest, efficient and moderntechnology. The generated electricity will displace equivalent electricity (generated from fossil sources)that may have been supplied to KPTCL.

The estimate of annual average and total GHG emission reductions for the chosen crediting period is 27,922 t CO2e per year and 195,454 t CO2e for 7 years of crediting period.

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 labour 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 786 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, 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 basedgenerating 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

A.2.3. City/Town/Community etc.

Davangere

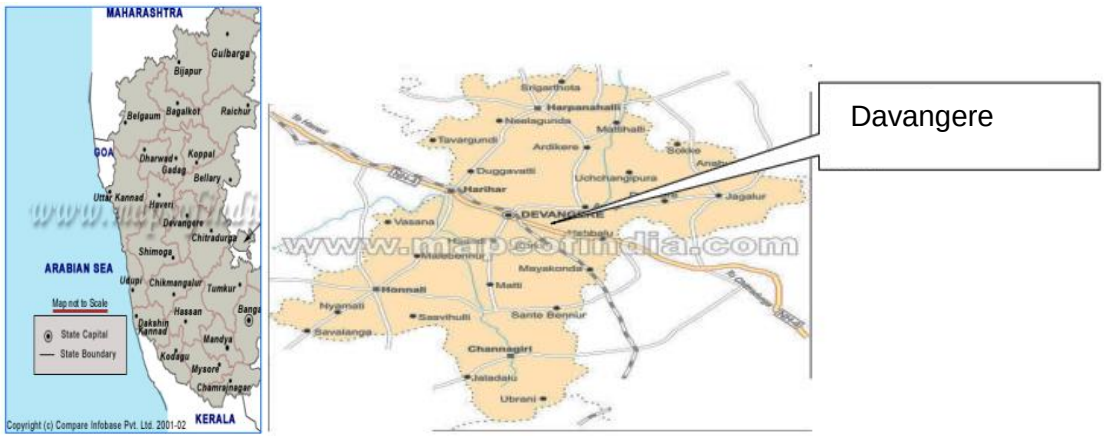
A.2.4. Physical/Geographical location

The project activity is located at Davengere in the state of Karnataka.
Location Details of M/s Sargam Retails

Capacity	Location No.	R.S. No.	Village	Taluka	District
1.5 MW	K-543	111	Yaraganal	Honnali	Davangere
1.5 MW	K-544	111	Yaraganal	Honnali	Davangere
1.5 MW	K-549	28	Kudurekonda	Honnali	Davangere
1.5 MW	K-550	28	Kudurekonda	Honnali	Davangere
1.5 MW	K-551	28	Kudurekonda	Honnali	Davangere
1.25 M	W K-538	111	Yaraganal	Honnali	Davangere
1.25 M	W K-539	111	Yaraganal	Honnali	Davangere
1.25 M	W K-540	111	Yaraganal	Honnali	Davangere
1.25 M	W K-541	111	Yaraganal	Honnali	Davangere
1.25 M	W K-542	111	Yaraganal	Honnali	Davangere

Geographical location of the Project site:

WEG	Capacity (MW)	Taluka	District	Latitude (N)	Longitude (E)
K-543	1.5 MW	Honnali	Davangere	14°09'17.4"	75°30'11.9"
K-544	1.5 MW	Honnali	Davangere	14°09'10.4"	75°30'17.6"
K-549	1.5 MW	Honnali	Davangere	14°09'03.2"	75°30'23.1"
K-550	1.5 MW	Honnali	Davangere	14°08'57.2"	75°30'29.9"
K-551	1.5 MW	Honnali	Davangere	14°08'51.2"	75°30'36.7"
K-538	1.25 MW	Honnali	Davangere	14°08'45.3'	75°30'43.7"
K-539	1.25 MW	Honnali	Davangere	14°08'39.5"	75°30'50.9"
K-540	1.25 MW	Honnali	Davangere	14°08'13.3"	75°31'32.4"
K-541	1.25 MW	Honnali	Davangere	14°08'07.4"	75°31'38.8"
K-542	1.25 MW	Honnali	Davangere	14°07'59.5"	75°31'44.1"



A.3. Technologies and/or measures

The project activity compiles with the applicability criteria of the small scale CDM project activitycategory. The capacity of the proposed project is 13.75 MW, which is less than the maximum qualifyingcapacity of 15 MW, the project activity has been considered as a small scale CDM project activity andUNFCCC indicative simplified modalities and procedures are applied. The project activity utilizes thewind potential for power generation and exports the generated electricity to the grid. According to smallscale CDM modalities the project activity falls under the following category:
Sectoral Scope: 1 Energy industries (renewable / non-renewable sources)

Type I: *Renewable Energy Projects* and Category D: '*Grid connected renewable electricity generation'*(Version 18).

As per the provisions specified, the projects that come under the purview of AMS.I.D (Version 18.0)
"*comprise of renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind,geothermal and renewable biomass, that supply electricity to and/or displace electricity from anelectricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit".*

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

For the project activity, SRPL has placed the purchase order to procure Wind Turbine Generators(WTGs) from M/S Suzlon Energy Limited (SEL) and it's associate companies for supply of 5 nos S 821500 kW capacity and 5 nos S 64 1250 kW capacity.

PLF (Plant Load Factor) = [Guaranteed generation/WTG (Lacs unit) - estimation x 10^5/InstalledCapacity(MW) x103x24x365] * 100.

PLF = [(36 x 5 + 26 x 5) x 105/13.75 x 103 x 24 x 365] * 100 = 25.74%.

PLF for 1.25 MW WTG:
PLF =[(26 x 5) x 105/6.25 x 103 x 24 x 365] * 100 = 23.74%.
PLF for 1. 5 MW WTG:
PLF =[36 x 5) x 105/7.5 x 103 x 24 x 365] * 100 = 27.39%.

Technical Specifications of the WTGs:

S 82 1.5 MW 50 Hz[1]:-

Rated Power	1,500 kW
Rotor diameter	82 m
Swept area	5,281 m2
No. of blades	3
Cut in wind speed	4 m/s

[1] http://www.suzlon.com/pdf/product/Suzlon-S82-product-brochure.pdf

Cut out wind Speed	20 m/s
Rotor Speed	20.3 rpm
Regulation	Pitch
Hub Height	78.5 m
Generator Type	Class 'H'
Insulation	Asynchronous

S 64 1.25 MW 50Hz:-

Rated Power	1,250 kW
Rotor diameter	64 m
Swept area	3,217 m2
No. of blades	3
Cut in wind speed	3.5 m/s
Cut out wind Speed	25 m/s
Rotor Speed	20.3 rpm
Regulation	Pitch
Hub Height	74.5 m
Generator Type	Class 'H'
Insulation	Asynchronous

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	Sargam Retails Private Limited (SRPL)	No

A.5. Public funding of project activity

There is no public funding involved in the project activity. The project activity has been developed onthe 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 debundledcomponent of a large project activity if there is a registered small-scale activity or an application toregister 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 registeredwithin the two years in the same project category and technology whose project boundary is within 1kmof the project boundary of the proposed small scale activity. Thus the project is not adebundledcomponent 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[2]

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

Methodology : AMS-I.DGrid Connected Renewable Electricity Generation (Version 18)[3]
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.

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 13.75 MW which will less than the maximum qualifying capacity of 15 MW for a small scale CDM project activity under Type-I of the small scale methodologies. Theinstalled 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.Dand applicability of methodology AMS-I.D are discussed below:

<table>
<tr><th>Applicability Criterion</th><th>Project Case</th></tr>
<tr><td>1. This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass:
(a) Supplying electricity to a national or a regional grid.
(b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.</td><td>The project activity is a Renewable Energy Project i.e. Wind Power Project which falls under applicability criteria option 1(a) i.e., "Supplying electricity to a national or a regional grid". Hence the project activity meets the given applicability criterion.</td></tr>
<tr><td>2. Illustration of respective situations under which each of the methodology (i.e. AMS-I.D, AMS-I.F and AMS-I.A) applies is included below
<table>
<tr><th></th><th>Project type</th><th>AMS-I.A</th><th>AMS-I.D</th><th>AMS-I.F</th></tr>
<tr><td>1</td><td>Project supplies electricity to a national/regional grid</td><td></td><td>√</td><td></td></tr>
<tr><td>2</td><td>Project displaces grid electricity consumption (e.g. grid import) and/or captive fossil fuel electricity generation at the user end (excess electricity may be</td><td></td><td></td><td>√</td></tr>
</table></td><td>The 1st option of Table 2 of AMS I.D. Version 18, EB 61 is applicable (please refer footnote).</td></tr>
</table>

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

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

	supplied to a grid)				
3	Project supplies electricity to an identified consumer facility via national/regional grid (through a contractual arrangement such as wheeling)		√		
4	Project supplies electricity to a mini gridsystem where in the baseline all generators use exclusively fuel oil and/or diesel fuel			√	
5	Project supplies electricity to household users (included in the project boundary) located in off grid areas	√			

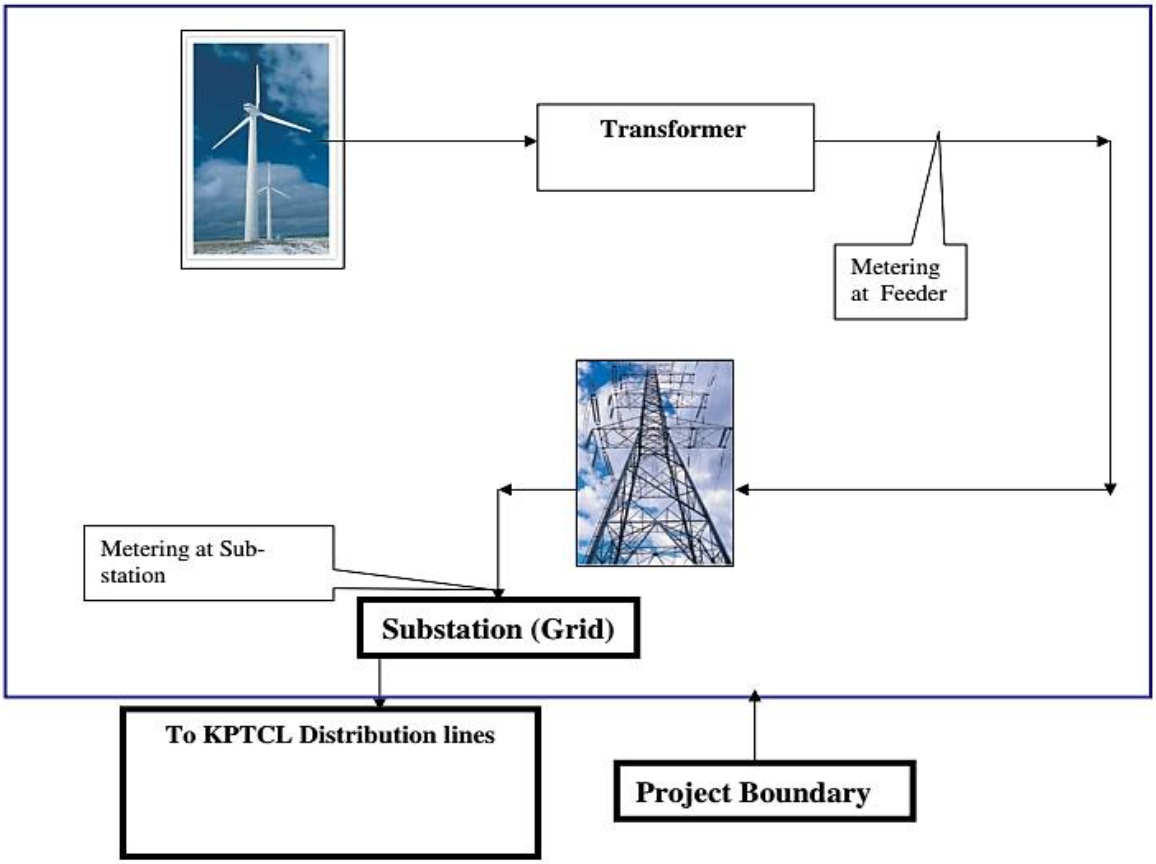
3. This methodology is applicable to project activities that (a) install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s).	The project is installation of new wind based electricity generation plants (not addition to existing system). Option (a) is applicable.
4. Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: • The project activity is implemented in an existing reservoir with no change in the volume of reservoir; • The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m^2; • The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m^2.	The project is wind power project and thus the criterion is not applicable to this project activity.
5. If the new unit has both renewable and non-renewable components (e.g., a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	The project activity is a 13.75 MW wind electricity generation. Unit does not co-fire fossil fuels. Hence the criterion is not applicable to the project activity.
6. Combined heat and power (co-generation) systems are not eligible under this category.	The Project activity is a renewable wind energy project and is not a combined heat and power system. Hence the criteria is not applicable to the project activity

7. In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.	The project activity is Greenfield and there is no existing power generation facility at the site. Hence the criteria is not applicable to the project activity
8. In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.	Not applicable, the wind project is a Green field project activity and this project is not the enhancement or up gradation project.
9. In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects,recovered methane emissions are eligible under a relevant Type III category. If therecovered methane is used for electricity generation for supply to a grid then thebaseline for the electricity component shall be in accordance with procedure prescribedunder this methodology. If the recovered methane is used for heat generation orcogeneration other applicable Type-I methodologies such as "AMS-I.C.: Thermal energyproduction with or without electricity" shall be explored.	The Project activity is a renewable wind power project and is not a landfill gas, waste gas, wastewater treatment and agro-industries projects or recovered methane emissions project.Hence the criteria is not applicable to the project activity
10. In case biomass is sourced from dedicated plantations, the applicability criteria in thetool "Project emissions from cultivation of biomass" shall apply.	The Project activity is a renewable wind power project and is not a biomass project.Hence the criteria is not applicable to the 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.



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 aninvestment 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.

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

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

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 board of SRPL resolved to setup the project considering CDM funds and the consultant was appointed immediately. Board of directors of SRPL on 10th September 2008 passed the resolution stating that the monetary benefits from CDM will only make the project viable. Accordingly PP sent enquiries to various consultants on 3rd October 2008. The appointed consultant issued its proposal for the wind power project on 6th October 2008 which is before theplacement of Purchase Order i.e.; start date of project activity. Following this, the PP and consultantwere engaged in constant communication and negotiations during the period of 16th October – 21stOctober 2008 and evidences for the same have been submitted to DOE. PP raised the PO for WTGs on14th October, 2008. The CDM consultant was finally appointed on 12th November 2008 after deliberatenegotiations. This was then followed by UNFCCC intimation on 09th December 2008. In turn UNFCCacknowledged the receipt of intimation on the same day i.e. 9th December 2008. The stakeholder meetingwas conducted on 10th December, 2008. DOE was appointed on 5th January 2009. The project was openfor global stakeholder comments during the period 5th February, 2009 – 6th March, 2009. Thereafter,MoEF presentation was held on 3rd March, 2009. Following this, DOE conducted site visit on 14th March,2009. The entire chronology of the events for securing CDM status for the project is presented below.

Events	Date
Proposal from the Suzlon	06-09-08
Board Decision for implementation of the project	10-09-08
Enquiry with various consultants	03-10-08
Proposal by consultant appointed	06-10-08
PP negotiation with consultant	16/10/2008 – 21/10/2008
P.O of WTG's	14-10-08
Appointment of CDM Consultant	12-11-08
UNFCCC intimation	09-12-08
UNFCCC acknowledgement to intimation	09-12-08
Stakeholder meeting	10-12-08
Appointing DOE	05-01-09
Web Hosting of the PDD	05/02/2009 – 06/03/2009
MOEF Presentation	03-03-09
DOE visit to site	14/03/2009 – 15/03/2009
HCA Granted	29-09-09

The installed capacity of the project is 13.75 MW, which is less than the limiting capacity of 15 MW andis thus eligible to use small-scale simplified methodologies. Further, the project activity is generation ofelectricity for a grid system using wind energy. Hence, the type and category of the project activitymatches with I.D. as specified in Appendix B of the indicative simplified baseline and monitoringmethodologies for small-scale CDM project activities.

Referring to attachment A to appendix B document of “indicative simplified baseline and monitoringmethodologies for selected small scale CDM project activity categories”, project participantsare required to provide a qualitative explanation to show that the project activity would not haveoccurred anyway, at least one of the listed elements should be identified in concrete terms to show thatthe activity is either beyond the regulatory and policy requirement or improves compliance to therequirement by removing barrier(s); The guidance provided herein has been used to establish projectadditionality. Investment analysis has been considered to justify the project additionality. Technologicalbarrier 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 13.75 MW of wind power in Davangere which will besupplied to KPTCL. Thus, Benchmark analysis is selected to depict the investment barrier. Thebenchmark 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 [6]12.25 % (2008) corresponding to the period. TheIRR for the project is coming around 9.20 % which is below the returns expected of 12.25 % for thisproject. However the Benchmark Prime Lending Rate for the month of August 2008 was ranging from12.75 – 14.00 % (Link: (http://rbi.org.in/scripts/WSSView.aspx?Id=12696). However PP has taken aconservative approach in taking the benchmark for the proposed wind power project at thetime offinancial 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 theinvestment to the project with respect to standardized benchmarks. Total investment in this projectactivity is INR 786 million to install 13.75 MW capacities wind turbines in Davangere, Karnataka.
According to CEA (Central Electricity Authority) 2003 a study was conducted to compare theinstallation cost & the cost involved in generation of power from various fuels were analysed and adetailed report was submitted on February 2004. The final conclusion is the capital cost of setting upwind power project is the most expensive. Table [7] below shows the capital cost[8] of various power plantsusing various type of fuel as per the estimation of the committee & PLF.(Report of expert committee onfuels for power generation).

Source of power generation	Capital Cost/MW (Rs in Crore)	Average PLF (%)
Wind	**5.6**	**22% - 26%**
Domestic Coal	4.0	75% - 90%
Imported Coal	4.0	75% - 90%
Lignite	4.2	75% - 90%
LNG	2.7	75% -90%
Naphtha	2.7	75% -90%
Gas	2.7	75% -90%
Diesel	3.5	75% -90%

The table above proofs that the wind power project are not financially attractive projects.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 conventionalgeneration methods (thermal, hydro, etc.), the establishment costs are higher for WTGs. To add to thesituation, the PLFs obtained by WTGs are very low as compared to thermal plants. The investment in thisproject is as high as INR 786 million, while the alternative would have been to invest in thermal energyhaving higher returns. Thus the project proponents took a risk by investing in wind power. The PLFassumed in the investment analysis for the project activity is 25.74% (based on equipment supplier's(Suzlon) generation estimation as referred in the Purchase orders).

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

[7] Link:http://cdm.unfccc.int/UserManagement/FileStorage/ZBEFC58QMKTB9WHAKCPOOQGCZAXZT7 (Report of Expert Committee on fuels for power generation Page No 11

[8] Calculated on the actual basis (Total Cost/Total Capacity; 77.4 Crore/13.75 MW = 5.6 Crore / MW)

PLF (Plant Load Factor) = [Guaranteed generation/WTG (Lacs unit) - estimation x 105/InstalledCapacity(MW) x103x24x365] * 100.
PLF =[(36 x 5 + 26 x 5) x 105/13.75 x 103 x 24 x 365] * 100 = 25.74%.

PLF for 1.25 MW WTG:
PLF =[(26 x 5) x 105/6.25 x 103 x 24 x 365] * 100 = 23.74%.
PLF for 1. 5 MW WTG:
PLF =[36 x 5) x 105/7.5 x 103 x 24 x 365] * 100 = 27.39%.

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%.
(Link: http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/86591.pdf).
Benchmark during the period of financial decision in august 2008 was in the range of 12.75% – 14.00%(Link: http://rbi.org.in/scripts/WSSView.aspx?Id=12696).
However PP has taken a conservative approach in taking the benchmark for the proposed wind powerproject 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 4:

Investment Analysis				Source
Project Details:	Karnataka	Karnataka	TOTAL	
Size of the Project(MW)	7.50	6.25	13.75	Capacity finalized in Board Resolution dated 10th September 2008
Location of the Project	Kudurekonda, Dist.: Davangere, in the state of Karnataka (INDIA)			
No of WTGs	5	5	10	Capacity finalized in Board Resolution dated 10th September 2008
Project Cost:				
Wind Mill, Overhead Line etc , (Rs. Lakhs)	4475.00	3220.00	7695	Proposal by Suzlon dated 6th September 2008
Land (Rs. Lakhs)	90.00	75.00	165	Proposal by Suzlon dated 6th September 2008
Total Cost(Rs. Lakhs)	4565.00	3295.00	7860	
Recurring Cost:				
Operation and Maintenance Cost (Rs. Lakhs) - Per windmill (First year free)	14.50	11.50	26.00	Proposal by Suzlon dated 6th September 2008
Escalation in Operation and Maintenance cost(%)	5.00%	5.00%	5.00%	Proposal by Suzlon dated 6th September 2009
Insurance (Fire/Burglary/Breakdown + Service Tax)	0.0028	0.0028	0.0028	Bajaj Allianz policy dated 22nd April 2008 for SRPL Maharshtra Wind Mill
Annual Depreciation as per companies act(%)	5.28%	5.28%	5.28%	As per Company act (http://www.mca.gov.in/Ministry/actsbills/pdf/Companies_Act_1956_Part_2.pdf) page 77
Rate of Depreciation as per Income tax Act(%) - 1st Year	50.00%	50.00%	50.00%	Refer Point No 1
Rate of Depreciation as per I tax Act(%) - 2nd Year onwards	80.00%	80.00%	80.00%	

Project Financials:				
Equity (Rs. Lakhs)	1205.00	875.00	2090.00	Letter from Bank of Maharashtra dated 8th September 2008
Debt (Rs. Lakhs)	3360.00	2420.00	5770.00	Letter from Bank of Maharashtra dated 8th September 2008
Loan Duration (Years) including Moratarium Period	6.50	6.50	6.50	Letter from Bank of Maharashtra dated 8th September 2008
Moratorium (Months)	6	6	6	Letter from Bank of Maharashtra dated 8th September 2008
Interest(%)	11.75%	11.75%	11.75%	Letter from Bank of Maharashtra dated 8th September 2008
Tariff Details:				
Tariff (Rs./KWh)				
1st Year	3.40	3.40	3.40	KERC Order dated 18-01-2005
2nd Year	3.40	3.40	3.40	KERC Order dated 18-01-2005
3rd Year	3.40	3.40	3.40	KERC Order dated 18-01-2005
4th Year	3.40	3.40	3.40	KERC Order dated 18-01-2005
5th Year	3.40	3.40	3.40	KERC Order dated 18-01-2005
6th Year	3.40	3.40	3.40	KERC Order dated 18-01-2005
7th Year	3.40	3.40	3.40	KERC Order dated 18-01-2005
8th Year	3.40	3.40	3.40	KERC Order dated 18-01-2005
9th Year	3.40	3.40	3.40	KERC Order dated 18-01-2005
10th Year	3.40	3.40	3.40	KERC Order dated 18-01-2005
11th Year	4.08	4.08	4.08	Assumed with 20% escalation
12th Year	4.08	4.08	4.08	Assumed with 20% escalation
13th Year	4.08	4.08	4.08	Assumed with 20% escalation
14th Year	4.08	4.08	4.08	Assumed with 20% escalation
15th Year	4.08	4.08	4.08	Assumed with 20% escalation
16th Year	4.08	4.08	4.08	Assumed with 20% escalation
17th Year	4.08	4.08	4.08	Assumed with 20% escalation
18th Year	4.08	4.08	4.08	Assumed with 20% escalation
19th Year	4.08	4.08	4.08	Assumed with 20% escalation
20th Year	4.08	4.08	4.08	Assumed with 20% escalation
Tax Components:				
MAT(%)	11.33%	11.33%	11.33%	Refer Point No 2
Corporate Tax(%) / (Tax Shield Rate)	33.99%	33.99%	33.99%	Refer Point No 3
CDM Components:				
CER Price (in Euros)	15.00	15.00	15.00	
Emission Factor	0.927	0.927	0.927	
Euro-Rupee Conversion Factor	68.00	68.00	68.00	
Generation:				
Generation/WTG (Lac Units) - Estimation at 100% Grid at Controller	36.00	26.00		Proposal by Suzlon dated 6th September 2008

Grid Avaliability Correction Factor	5.00%	5.00%		Proposal by Suzlon dated 6th September 2008
Transmission Loss percentage from controller to metering point	3.00%	3.00%		Proposal by Suzlon dated 6th September 2008
Generation/WTG (Lac Units) - Net billable/WTG (Lac units)	33.17	23.96		
Indirect Expenses:				
Admin salary (6 months for Year 0) (Rs. Lakhs)			6.00	Company inter office communication 7th September 2008
Escalation in Admin salary every year			10.00%	Company inter office communication 7th September 2008
Consultants and Validators fee (For Year 1 only) (Rs. Lakhs)			15.00	
Processing fees for Term Loan(For year 0 only) as % of loan amount			1.00%	Bank of Maharashtra 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%. 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 assets will be allowed at 50%. (Refer pages 110 & 112 of V.G.Mehta's Income tax Ready Reckoner, Assessment year 2009- 10).

Point 2: (i) As per Section 115JB of IT act the minimum tax on book profit is 10%. (ii) There is a surcharge of 10% on such income tax, this sum to 11%. (iii) There is an Education Cess @ 2% of income tax and surcharge, this sum to 11.22%. (iv)Further additional surcharge (i.e. Secondary & Higher Education Cess is 1% of such aggregate amount of income tax and surcharge, this sums to 11.33%. (Refer pages 130,31 & 35 of V.G.Mehta's Income tax Ready Reckoner, Assessment year 2009- 10).

Point 3: (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:

Parameter	Sr. No.	Change % Over base value	Value (Without CDM Benefit)	Value (With CDM Benefit)	Benchmark RBI Prime Lending Rate
Change in PLF	1	5%	10.12%	13.50%	12.25 % (Benchmark Prime Lending Rate) RBI 2008 (http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/86591.pdf)
	2	10%	11.01%	14.43%	
	3	**Normal**	**9.20%**	**12.61%**	
	4	-5%	8.26%	11.62%	
	5	-10%	7.35%	10.67%	
Change in Power rate	6	5%	10.12%	13.35%	
	7	10%	11.01%	14.14%	
	8	**Normal**	**9.20%**	**12.61%**	
	9	-5%	8.26%	11.78%	
	10	-10%	7.35%	11.01%	
O&M cost	11	5%	9.04%	12.47%	
	12	10%	8.87%	12.33%	
	13	**Normal**	**9.20%**	**12.61%**	

	14	-5%	9.37%	12.75%	
	15	-10%	9.53%	12.88%	
Project Cost	16	5%	8.48%	11.82%	
	17	10%	7.80%	11.14%	
	18	**Normal**	**9.20%**	**12.61%**	
	19	-5%	9.98%	13.39%	
	20	-10%	10.83%	14.33%	

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 ingeneration. 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. Analysingthe 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	10.12%	13.50%	12.25%
10% increased generation	11.01%	14.43%	
Base Case	**9.20%**	**12.61%**	
5% reduced generation	8.26%	11.62%	
10% reduced generation	7.35%	10.67%	

Each of the Suzlon WTGs of 1.5 MW capacity implemented by the project proponents is expected togenerate 3119.436 MWh per annum and that by the 1.25 MW WTG of Suzlon is expected to be 2999.205MWh units per annum. But due to variable nature of wind it may result in lower utilization andconsequently lesser generation. The following table demonstrates the sensitivity of IRR to the change inthe generation levels for Sargam Retails Pvt Ltd.

ii) *Variation in Tariff (Power Rate)*

	IRR (Without CDM)%	IRR (With CDM)%	Benchmark
5% increased generation	10.12%	13.35%	12.25%
10% increased generation	11.01%	14.14%	
Base Case	**9.20%**	**12.61%**	
5% reduced generation	8.26%	11.78%	
10% reduced generation	7.35%	11.01%	

The project proponents 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 CompanyLimited (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 isconsidered on higher side.

iii) *Variation in Capital Cost (Project Cost)*

	IRR (Without CDM)%	IRR (With CDM)%	Benchmark
5% increased generation	8.48%	11.82%	12.25%
10% increased generation	7.80%	11.14%	
Base Case	**9.20%**	**12.61%**	
5% reduced generation	9.98%	13.39%	
10% reduced generation	10.83%	14.33%	

The above sensitivity analysis of the capital cost reflects that the IRR is below the benchmark even with5% to 10% variation.

iv) *Variation in O&M cost*

	IRR (Without CDM)%	IRR (With CDM)%	Benchmark
5% increased generation	9.04%	12.47%	12.25%
10% increased generation	8.87%	12.33%	
Base Case	**9.20%**	**12.61%**	
5% reduced generation	9.37%	12.75%	
10% reduced generation	9.53%	12.88%	

The cost of O&M for the installation of the wind mills have been fixed as per the agreement between the Sargam Retails Pvt. Ltd. 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.

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 13.75 MW 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 as well as in the state of Karnataka vis-à-vis the total installed capacity (of power generation)[9]. The All-India installed power generation capacity in MW as on 31.10.2008 published by Ministry of Power was 146753 MW comprising of 92892 MW thermal, 36498 MW hydro, 4120 MW nuclear and 13242 MW of Renewable energy sources (RES) comprising solar, wind, geothermal, tidal,& biomass energy. The most prominent energy generation mediums in India are solar energy, wind energy & biomass energy. The % of wind power generation in India is 6.5%[10].

B.6. Emission reductions

B.6.1. Explanation of methodological choices

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.

$$BE_y = EG_{facility,y} \times EF_{grid,CM,y}$$

Where,

BE_y	=	Baseline Emissions in year y; tCO_2
$EG_{facility,y}$	=	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y(MWh)
$EF_{grid,CM,y}$	=	CO_2 emission factor of the grid in year y; tCO_2/MWh

The methodology provides following approaches for emission factor calculations:

[9] http://www.cea.nic.in/power_sec_reports/Executive_Summary/index_Executive_Summary.html (Page 7)

[10] http://www.windpowerindia.com/statstate.html

(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' since data is available from an official source.

CO2 Baseline Database for the Indian Power Sector, Version 11, April 2016, 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, 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

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 2007-08 as the four regional grids except the Southern grid has been synchronized, they are now being considered as one and named as NEWNE grid. 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: Grid Classification

Indian Grid				
Northern	**Eastern**	**Western**	**North-Eastern**	**Southern**
Chandigarh	Bihar	Chhattisgarh	Arunachal Pradesh	Kerala
Delhi	Jharkhand	Gujarat	Assam	**Karnataka**
Haryana	Orissa	Daman & Diu	Manipur	Tamil Nadu
Himachal Pradesh	West Bengal	Dadar & Nagar Haveli	Meghalaya	Andhra Pradesh
Jammu & Kashmir	Sikkim	Madhya Pradesh	Mizoram	Telengana
Punjab	Andaman &	Maharashtra	Nagaland	Puducherry

	Nicobar			
Rajasthan		Goa	Tripura	Lakshadweep
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 solar generation.

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

	2010-11	2011-12	2012-13	2013-14	2014-15
Indian Grid	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 fivemost recent years) for the Indiangridis 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 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, Version 05.0.0allows 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 $EF_{CM,y}$

The baseline emission factor $EF_{CM,y}$ 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 for wind energy projects
w_{BM}	25% weight for wind energy projects
$EF_{OM,y}$	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 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 as per methodology.

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	$EF_{OM,y}$
Unit	tCO2/MWh
Description	Operating Margin emission factor for Indian grid
Source of data	Calculated from CEA database, Version 11, April 2016
Value(s) applied	0.9941 tCO2/MWh

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" as 3-year generation weighted average using data for the years 2012-2013, 2013-2014 & 2014-2015. The data are obtained from "CO2 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 data will be archived for 2 years beyond the crediting period

Data / Parameter	$EF_{BM,y}$
Unit	tCO2/MWh
Description	Build Margin emission factor for Indian grid
Source of data	Calculated from CEA database, Version 11, April 2016
Value(s) applied	0.9285 tCO2/MWh
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" for the year 2014-2015. The data is obtained from "CO2 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 data will be archived for 2 years beyond the crediting period.

Data / Parameter	**$EF_{CM,y}$**
Unit	tCO2/MWh
Description	Combined Margin CO2 emission factor for Indian grid
Source of data	Calculated from CEA database, Version 11, April 2016
Value(s) applied	0.9777 tCO2/MWh
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". The data is obtained from "CO2 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 data will be archived for 2 years beyond the 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 $EG_{facility,y}$expressed in MWh of electricity produced by the renewable generating unit multiplied by an emission factor.

$BE_Y = EG_{facility,y} * EF_{CM,y}$

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

Net electricity supplied to the grid by the project activity
= ((7.5MW (capacity) X 27.39% (CUF) X 8760 (running hours) X 5% (Grid availability correction factor 5%)) X 3% (Transmission losses))+ ((6.25 MW (capacity) X 23.74% (CUF) X 8760 (running hours) X 5% (Grid availability correction factor 5%)) X 3% (Transmission losses))

= 28,560MWh

Baseline emissions
= 28,560MWh X 0.9777 tCO2/ MWh
= 27,922 tCO2

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	27,922	0	0	27,922
Year 2	27,922	0	0	27,922
Year 3	27,922	0	0	27,922
Year 4	27,922	0	0	27,922
Year 5	27,922	0	0	27,922
Year 6	27,922	0	0	27,922
Year 7	27,922	0	0	27,922
Total	195,454	0	0	195,454
Total number of crediting years	7			
Annual average over the crediting period	27,922	0	0	27,922

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data / Parameter	$EG_{Net\ Exported}$[11]
Unit	MWh
Description	Net electricity supplied to the grid by the project activity
Source of data	Credit report Sheets. (KPTCL/ BESCOM Form B2[12])/ Invoice (whichever is conservative).
Value(s) applied	28560MWh/yr

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

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

Measurement methods and procedures	The net electricity supplied by the set of WTGs of the project activity is calculated by following formula: Net electricity supplied to the grid by the project activity i.e. $EG_{Net\ Exported}$ = Net electricity supplied to the grid by the set 1 (5* 1.25 MW) WTGs { $EG_{NetExported}$ for set 1 WTGs} + Net electricity supplied to the grid by the set 2 (5* 1.5 MW) WTGs { $EG_{Net\ Exported}$ for set 2 WTGs} 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: ($EG_{Net\ Exported}$ (calculated separately for both sets of WTGs of PP) = $EG_{Exported}$- EG_{Import}- $EG_{Transmission\ Losses}$).
Monitoring frequency	Monthly
QA/QC procedures	Net electricity supplied to the grid as mentioned in Form B will be cross-checked with the invoices[13] 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	$EG_{Exported}$[14]
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: Bi-directional Trivector meters (main and check meter at 33 kV metering point) will be used for monitoring of electricity exported byWTGs 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 Meter Test checking/Calibration Frequency: Quarterly as per article 7.5 of the PPA.
Monitoring frequency	Monthly
QA/QC procedures	The meters used for the monitoring of this parameter shall be tested/ calibrated on quarterly basis as per article 7.5 of the 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.

[13] The values of Export, import and transmission losses can be cross checked from the invoice. However as per theprovision of the State utility an increase of 115% has to be applied on the import value for billing purpose. Thisresults in a higher import value than that in the credit note thus resulting in a lesser value of the net electricitysupplied to the grid in the invoice.

[14] In case of apportioning of electricity for any month (When billing cycle and crediting period years ormonitoring period not matches) as per the procedures provided under “Apportioning Procedure” of monitoring plan (B.7.3), EG Exported (i.e Sum of G for each group of WTGs of the project activity) and G forany month are same only .

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: Bi-directional Trivector meters (main and check meter at 33 kV metering point) will be used for monitoring of electricity exported byWTGs of the project activity. The meters are of 0.2s accuracy class. Electricity imported 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 Meter Test checking/Calibration Frequency: Quarterly as per article 7.5 of the PPA.
Monitoring frequency	Monthly
QA/QC procedures	The meters used for the monitoring of this parameter shall be tested/ calibrated on quarterly basis as per article 7.5 of the 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
QA/QC procedures	-
Purpose of data	To determine Baseline Emissions

Additional comment	This % transmission loss calculation as explained above is done by the state utility based on measured parameters and transparently provided in the FORM B. However, PP has no control over this calculation. Nonetheless, this calculation is transparently mentioned in the FORM B and can be verified any time during the verification. 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) [15]
Source of data	Daily Power generation report
Value(s) applied	-
Measurement methods and procedures	Monitoring: Monitored through inbuilt control panelmeters of the WTGs. The data is continuously measured at each WTG by inbuilt control panelmeter and recorded at CMS. Data Type: Measured Frequency: Continuously measured and dailyrecording Archiving Policy: Electronic
Monitoring frequency	Monthly
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	To determine Baseline Emissions
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.

B.7.2. Sampling plan

Not Applicable

B.7.3. Other elements of monitoring plan

The project activity is in accordance with approved small scale methodology AMS-I.D, and therefore, canuse the monitoring methodology for type I.D of 'Appendix B of the simplified M&P for small-scale CDM project activities-Version 18.0, - Grid connected renewable electricity generation.

This approved monitoring methodology requires monitoring of the following:

✓ Net Electricity supplied by the project activity to the grid

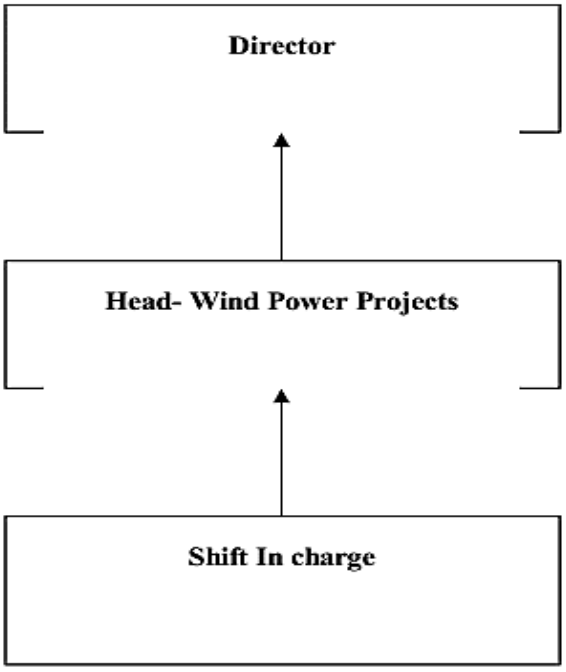
In order to monitor the mitigation of GHG due to the project activity, the Net electricity supplied by theproject activity to the grid needs to be monitored. The net electricity supplied to grid by the project activitymultiplied by grid emission factor for regional grid, would form the baseline for the project activity.

Since the emission factor (combined margin) of the grid is fixed for the crediting period, the monitoring ofgrid emission factor is not required. The sole parameter for monitoring is the net electricity supplied to thegrid.

The Project is operated and managed by M/s Suzlon Energy Limited/ Its Group Companies/Contractorspecifically appointed by Suzlon. The operational and management structure will be implemented by theproject participant in order to monitor emission reductions by the project activity:

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

Net electricity supplied by the project activity is the most important parameter required forthe financialreporting and sustainability of the project and monitored with due care by both the parties (O&MContractor (PP's representative and representative of KPTCL). For emission reductions project proponentsproposes the following structure.



Roles and responsibilities:

Director: In the project management structure Director is responsible for the overall project performance.The Director will review the monthly Net electricity supplied and annual emission reduction calculations.Operation and maintenance of WTGs of the project activity will be done by Suzlon Energy Limited/It'sGroup Companies/Contractor specifically appointed by Suzlon.

Head- Wind Power Projects: Head- Wind Power Projects is assisting to director for completing the taskdiscussed above. He is responsible for the electricity generations at the individual wind turbine
installations. He will report to Director for any abnormality.

Shift In-charge: Shift in charge is responsible for recording the electricity meter reading from the KPTCLmeter. He will be the person of Suzlon Energy Limited/It's Group Companies/Contractor specificallyappointed 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. Therelevant records are submitted to Head- Wind Power Projects on monthly basis. The Head-Wind Powerproject has final responsibility for record keeping.The O&M personnel are qualified engineers and are trained by Suzlon for operating and ensuring bestperformance of the WTGs. The general conditions set out for metering, recording, meter readings, meterinspections, 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 thestep 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 bemetered by the Parties at the high voltage side of the step up transformer installed at the ProjectSite (main and check meter at 33 kV metering point). The WTGs of a single customer (SRPL inthis case) at a particular site are connected to a 33 kV metering point (having the main and checkmeter) which in turn connects to a bulk meter (main and check meter) at the 220 kV substationmaintained by Suzlon Power Infrastructure Limited. Data monitoring takes place at the 33 kVmetering point, 220 kV sub-station and at the WTG inbuilt controller meter.. The emissionreduction

calculations are done on the basis of net electricity supplied to the grid by the projectactivity as explained later in this section under heading “Procedure of monitoring of net electricitysupplied to the grid by the project activity”.

2. **Metering Equipment:** Metering equipment shall be electronic bi-directional trivector meters of accuracy class 0.2s required for the Project (both main and check meters at 33 kV metering point and 220 kV sub-station). The metering equipment shall be maintained in accordance with electricity standards. Such equipment shall have the capability of recording a month’s reading andmeasure both import and export simultaneously.
3. **Meter Readings:** The monthly meter readings (both main and check meters) at the Project Site andthe 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 theother Party or its accredited representatives.

Data Adjustments and Uncertainties:

5. **Meter Test Checking:** All the main and check meters shall be tested for accuracy. as per requirement with reference to a portable standard meter which shall be of an accuracy class of 0.1%. The portable standard meters shall be owned by the Corporation at its own cost and expense and tested and certified at least once every year or as per requirement against an accepted laboratory standard meter in accordance with electricity standards. The meters shall be deemed to be working satisfactorily if the errors are within specifications for meters of 0.2% accuracy class. As per the PPA Article 7 Sub-clause 7.5, the consumption registered by the main meters alone will hold well for the purpose of billing as long as the error in the main meter is within the permissible limits.

    a) If during the quarterly 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 quarterly tests, the main meter is found to be beyond permissible limits oferror, 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 checkmeter. There will be a revision in the bills for the period from the previous calibration testup to the current test based on the readings of the check meter. The main meter shall becalibrated immediately and billing for the period thereafter till the next monthly meterreading shall be as per the calibrated main meter.
    c) If during the quarterly 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 0.2% accuracy class, all the meters shall be re-tested and calibrated immediately.

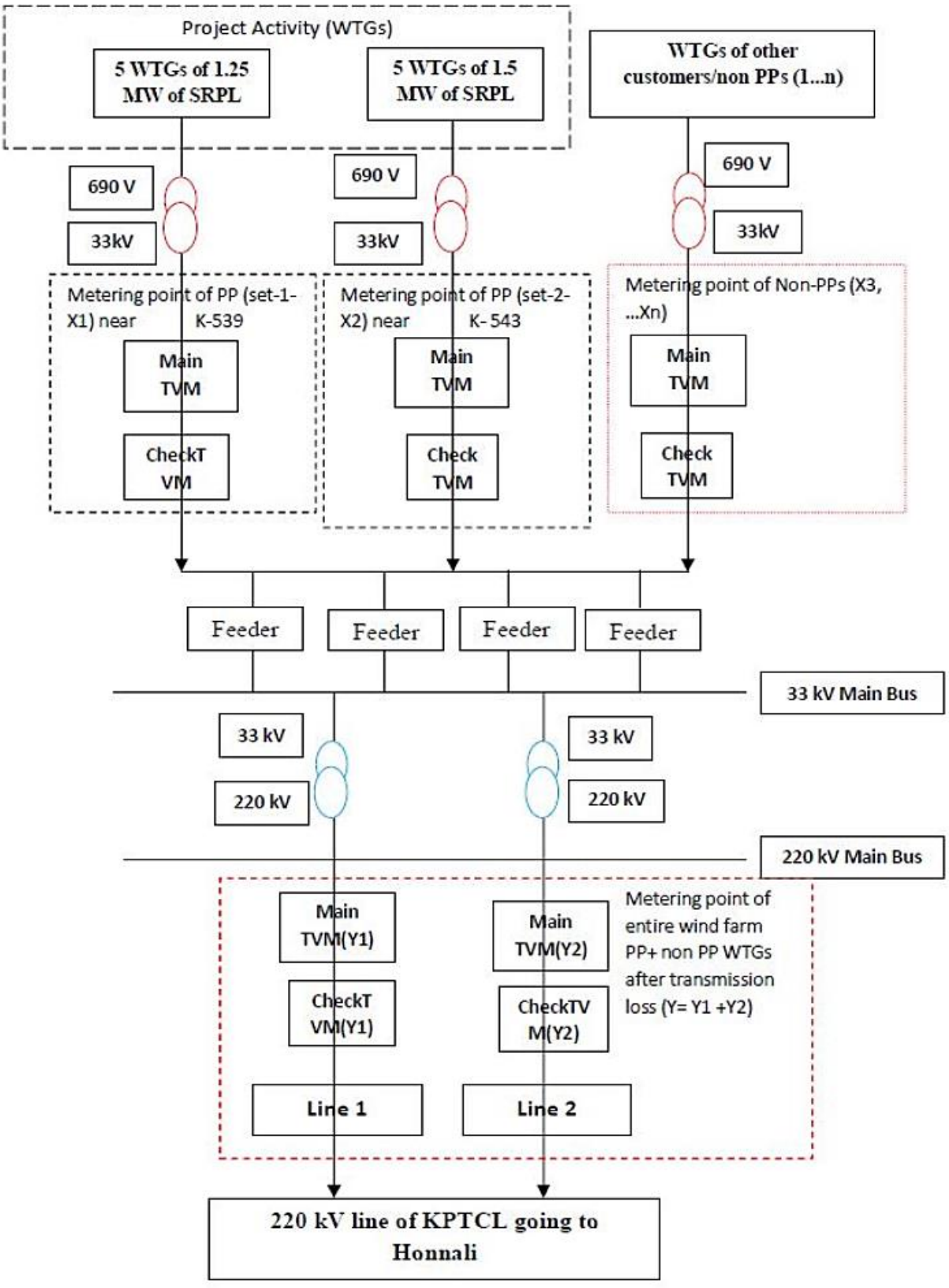
Description of calibration of WTG Controller:

The controller used for the WTG is SCS Controller is a micro-processor based intelligent controller whichhas been specially designed for control of wind turbines. It uses a Woodward Multi function Relay thathas 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. Asoftware 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 thisrelay is communicating digital signal through special communication protocol. Moreover, turbine cannotrun without this relay hence it cannot be removed for calibration, hence, it is not possible to calibrate[16].Incase of any problem related to the panel meter, the WTG will automatically get shut down and the meterwill be replaced by a new meter immediately.

6. **Records:** Suzlon Energy Limited/It's Group Companies/Contractor specifically appointed by Suzlon will maintain an accurate operating record at the wind farm site of:
    a. Daily generation reading
    b. Any unusual conditions found during operation/inspections
    c. 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 Sargam Retails pvt Ltd based on statement given by BESCOM at the end of each month for the net electricity supplied by theWTGs of the project activity.

Schematic Diagram of whole monitoring activity, including the physical meter locations andconnections to the project activity has been provided below:

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


Project Activity (WTGs)
5 WTGs of 1.25 MW of SRPL
5 WTGs of 1.5 MW of SRPL
WTGs of other customers/non PPs (1...n)
690 V
33kV
690 V
33kV
690 V
33kV
Metering point of PP (set-1-X1) near K-539
Main TVM
CheckTVM
Metering point of PP (set-2-X2) near K-543
Main TVM
Check TVM
Metering point of Non-PPs (X3, ...Xn)
Main TVM
Check TVM
Feeder
Feeder
Feeder
Feeder
33 kV Main Bus
33 kV
220 kV
33 kV
220 kV
220 kV Main Bus
Main TVM(Y1)
CheckTVM(Y1)
Main TVM(Y2)
CheckTVM(Y2)
Metering point of entire wind farm PP+ non PP WTGs after transmission loss (Y= Y1 +Y2)
Line 1
Line 2
220 kV line of KPTCL going to Honnali

Legends at 33 kV side:

	Step-up transformer for Step up from 690 V to 33 kV
Main TVM	Main Meter (Bi-directional Trivector Meter- TVM) at 33 kV side.
Check TVM	Check Meter (Bi-directional Trivector Meter- TVM) at 33 kV side

Legends at 220 kV side:

	Step-up transformer for Step up from 33 kV to 220 kV
Main TVM	Main Meter (Bi-directional Trivector Meter- TVM) at 220 kV side on Line 1 and Line 2
Check TVM	Check Meter (Bi-directional Trivector Meter- TVM) at 220 kV side on Line 1 and Line 2

The monitoring/calculation of net electricity supplied to the grid by the project activity is as per PPA,which is further explained below:

Electricity from each WTG of the project activity is generated at 690 V which is further step- up to 33 kVvoltage level through a step up transformer installed at each WTG yard. There are a total 10 WTGs in theproject activity which are in two sets (as far as monitoring of net electricity supplied is concerned) first setconstitutes five WTGs of 1.25 MW (5 X 1.25 MW) and second set constitutes of five WTGs of 1. 5 MW(5 X 1.5 MW). Each set of 5 X 1.25 MW and 5 X 1.5 MW has one metering set at 33 kV. The 33 kVmetering points monitors the generation of import and export for the individual WTG or a set of WTGs(PP + non-PP) connected to it. The feeders of 33 kV metering point are further connected to 220 kV stepup transformer at substation; on the high voltage side of these step-up transformers, another set of bulkmeters, both main and check, are installed. These bulk meters are not exclusive to project WTGs, butinstead are also connected to WTGs belonging to other project developers.

In order to obtain the net electricity supplied by the WTGs, meter readings are taken at two sides that isone at the 33 kV side and the other at 220 kV side. The electricity export (without transmission losses) andimport by the WTGs (individual or set of WTGs at the wind farm site) of the customers (PP and non PP) ismeasured by taking the main and check meter readings at 33 kV side. Further to this, the main and checkmeter readings (also known as Bulk meter readings) are taken at Line 1 and Line 2 of the 220 kV side.
Both these readings are used to compute the transmission loss % as below:

Total Export Meter readings @ 33 kV side for all customers – X (= X1+ X2+….XN)

Bulk meter readings @ 220 kV side (Total Export after transmission loss) for all customers – Y (=Y1+Y2)

Transmission Losses %[17] (Z) = {(X – Y)/X}*100

This value of Z (%) is multiplied with the export meter reading of the set of WTGs of PP (i.e. set 1 and set2) obtained at 33 kV side to calculate the transmission losses incurred by the PP. The import of electricityas measured at 33kV metering point is not subjected to any treatment of transmission loss by the stateutility during the FORM B preparation.
The net electricity supplied by the set of WTGs of the project activity is calculated by following formula:Net electricity supplied to the grid by the project activity = Electricity export by the WTGs of the projectactivity (measured at 33 kV metering point for set 1 and set 2) - import from grid (measured at 33 kVmetering point for set 1 and set 2) - (transmission loss % calculated by state utility * export as measured at33 kV metering point for set 1 and set 2).

The Electricity export by the WTGs of the project activity, import from grid and the transmission loss onexport will be crosschecked with the invoice raised by the PP to the state utility. Based on this invoice stateutility makes the payment to the PP. This is based on the PPA signed between the PP and state utility andthis invoice is a commercial document, a credible and authentic document. The Net electricity supplied tothe grid by the project activity, however differs in the invoice and JMR/Form B as explained below:

The value of net electricity supplied to the grid by the project activity in the invoice is lesser than that in thecredit note/Form B provided by BESCOM. This difference in the value is due to a higher import valueobtained after applying an increase of 115% on the import value of the credit note for billing purpose.

As per Article 5.5 of the PPA, “The Company shall be permitted to use 10% of the installed capacity forstart-up, after inspection by the concerned officers of the BESCOM and 105% of such energy provided bythe BESCOM for start-up purposes shall be deducted from the energy pumped into the grid by thecompany for determining the amount to be paid by the BESCOM to the company”. However as per theKERC order[18], the state utility has instructed all the WTG owners to raise an invoice after deducting 115%of the energy supplied by BESCOM to the PP. This results in higher value of import than that provided inthe credit note.

Hence conservatively the lower value of net electricity supplied to the grid (between invoices/ JMR/FormB) will be used for emission reduction calculation.

SRPL (Head- Wind Power Projects & Director) will be keeping the daily / monthly data generated from allthe WTGs provided by Suzlon and KPTCL.

Internal audits & Performance review:
The records are regularly reviewed and checked by the SRPL representatives based upon the daily powergeneration reports and credit report sheets (KPTCL/BESCOM Form B). The SRPL representatives shalldo the internal audit on yearly basis and will crosscheck the emissions reductions estimated in the PDDwith respect to actual emissions reduction. For any deviation from the actual emission reduction values andreported values corrective action will be suggested by SRPL representatives to calculate the conservativeemission reduction.

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

[17]It is worth to mention here that transmission loss calculation (as contained in the FORM B) by the state utility contains loss % for both main and check meters, however the percentage which is corresponding to main meter shall be considered as reading for the export and import (as per PPA article 7.5). This is evident from the provided Form B for the month of February 2012. Please also refer to the description under heading “meter test checking”.

[18]www.elecon.com/aed/pdf/wheeling&banking.pdf

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 [19] to the grid by the WTGs of the project activity as per credit report (KPTCL/BESCOMfrom 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 SELand also by the Asst. Executive Engineer of KPTCL/BESCOM. The monthly Net Electricity supplied shallbe derived from Form B and the same shall be used in monitoring report during verification. Head – Windpower projects of SRPL will be responsible for keeping the copies of Form B sent to SRPL from KPTCL.

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

14/10/2008 (Date of 1st Purchase order)

C.1.2. Expected operational lifetime of project activity

20-25 Years (as per supplier)

C.2. Crediting period of project activity

C.2.1. Type of crediting period

Renewable crediting period

C.2.2. Start date of crediting period

7 January 2018 (Day immediately after the expiration of the first crediting period)

C.2.3. Length of crediting period

7 Years

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

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

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

According to Indian regulation, the implementation of the wind park does not require an environmentalimpact assessment. The Ministry of Environment and Forests (MoEF), Government of India notificationdated September 14, 2006 regarding the requirement of Environment Impact Assessment (EIA) studies asper the Environment Protection Rule, 1986 (Published in the Gazette of India, Extraordinary, Part-II, andSection 3, Sub-section (ii) MINISTRY OF ENVIRONMENT AND FORESTS) states that any projectdeveloper in India needs to file an application to the Ministry of Environment and Forests (including apublic hearing and an EIA) in case the proposed industry or project is listed in a predefined list. Windparks are not included in this list and thus an EIA is not required. The project activity has no significantimpact on the environment. However, certain foreseen impacts due to the project activity are discussedbelow: Also, in the redefined EIA notification i.e. S.O. 153312, dated 14th September 2006, Ministry ofEnvironment & Forests (MoEF), Govt. of India, the wind projects are not included in the list of projectsthat has to get Prior Environmental Clearance (EC) either from State or Central Govt. authorities andhence no EIA study was conducted.
The project does not fall under the purview of the Environmental Impact Assessment (EIA) notificationof the Ministry of Environment and Forest, Government of India. However due weightage has been givento environmental aspects.

During construction

Impact on air

Movement of construction material during construction will have some impact on the air. As thetransportation 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 beprovided 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 isinvolved 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 environmentconsiderably. The impacts on the environment due to construction activities of wind turbines arenegligible

Operation and Maintenance Phase

Suzlon maintains highest level of safety standards. Systematic and scientific maintenance of allequipments 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 noharm 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 providingemployment 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 theproject. Moreover, the project generates eco-friendly, GHG free power which contributes to sustainabledevelopment 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 otherancillary units coming up.

As discussed above, the project activity would not have any adverse environmental impacts. The projectactivity does not fall under the purview of the Environmental Impact Assessment (EIA) notification ofthe Ministry of Environment and Forest, Government of India. Hence EIA is not required to beundertaken by the host party.

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) Contract employees
3) Suzlon employees
4) Vendors
5) Local people

The identified stakeholders were invited by sending one to one invitation letters. The stakeholderconsultation meeting was held on 10th December, 2008 at wind mill site of (SRPL) situated at Davangere(District). The minutes of the meeting will be provided to the DOE during validation.

E.2. Summary of comments received

SRPL has received all necessary approvals / clearances / permissions from various local bodies which represent the local stakeholders.

The local people are direct beneficiaries of the project. The construction and continuous operation of the wind 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 Agenda for the meeting was:
Item:

- Introduction of members
- Introduction and presentation of the details of the project activity
- Concept of CDM

- Invite members to give comments/ views on the project activity
- Open House/ Discussion
- Vote of Thanks

Minutes of the Meeting: (Kudurekonda/ Israpura) 10th December 2008

- Mr. Prafulla Khinvasara (Head – Wind Power Projects, SRPL) opened the meeting with welcome address to the audience.
- Mr. Vinay Nisal (Regional Sales Manager, SRPL) – briefed the audience about SRPL as a company and its operations. He also touched upon the level of importance environment within SRPL
- Mr. Shivaji Lalage (Asst. Sales Manager, SRPL) gave an introductory presentation on Climate Change issues covering topics like Kyoto Protocol,
- Greenhouse Gas Effect, and Clean Development Mechanism (CDM) by SRPL.
- The attendees walked through the construction site. Mr Kaushik Patel (Asst. Manager – Marketing, Suzlon Energy Limited) explained them the concepts of wind mill erection and its functioning & its environmental benefits.
- After the site visit the session was opened for discussions and comments. All stakeholders highly appreciated the project taken up by SRPL and requested the company to continue taking steps in area of environment and energy.
- Mr Prafulla Khinvasara (Head – Wind Power Projects, SRPL) concluded the meeting with Vote of thanks.

The following table summarises all the question /comments raised during the stakeholder's meeting and SRPL's response in each case:

Sr. No.	Name	Question/Comments	Project Proponent Response
1	Mr. Gajanan B. Patil (Junior Engineer)	What are the benefits of wind power project?	Mr. Khinvasara explained clean & green way of power generation and utilizing the renewable resources effectively rather consuming the fossil fuel. He further explained the concept of Sustainability.
2	Chandrakant Hase (Sales Executive)	What is CDM?	• A scope for industrialized (Annex 1) countries with a greenhouse gas reduction commitment to invest in emission reducing projects in a developing (non-Annex I) country. • A Central body (UNFCCC) issues one Certified Emission Reduction (CER) to a project when it saves one tonne of CO2 equivalent • Financially attractive to both parties as developed countries achieve emission reduction at a lower cost while developing country gets money by selling the CERs and also gets cleaner technology
4	S. Gopinath (Junior Engineer)	Gave Mr Khinvasara, word ofappreciation for the project and concluded that the project will contribute to the improvement of the local environment.	
5	V. H. Shahajan (President, Gram Panchayat)	How does this project benefit local people?	The project has employed several local peoples both contractual & permanent

6	Mr. P. Rengaswamy (Dy. Manager)	Gave his word of appreciation for the project	
7	Mr. D. V. Shanker (Field Asst.)	Quantum of GHG emission reductions that will be taking place?	Mr. Khinvasara briefed about GHG emissions and its accounting.
8	Mr. Puriya Naik (Member, Gram Panchayat)	Gave his word of appreciation for the project	

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 Governmentof India, through Ministry of Environment and Forests (MoEF) is encouraging project participants to takeup such environment-friendly initiatives.

E.3. Report on consideration of comments received

SRPL has taken care of all the conditions stipulated in the relevant clearances and no adverse commenthas been raised. In summing up, the project has not received any negative or discouraging feedback fromthe stakeholders concerned. All the stakeholders have appreciated and encouraged the project proponentfor taking up this project activity.
In view of various direct and indirect benefits (social, economical, and environmental), all thestakeholders have supported the project activity. The documents supporting the stakeholder consultationwill be submitted to the DOE.

SECTION F. Approval and authorization

The host country approval having reference number 4/ 4/2009-CCC dated 29/09/2009 is submitted to DOE during registration of project activity.

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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	Sargam Retails Pvt. Limited
Street/P.O. Box	Indira Gandhi Marg
Building	Malpani House,
City	Sangamner
State/Region	Maharashtra
Postcode	422605
Country	India
Telephone	+91 2425 225011
Fax	+91 2425 225003
E-mail	prafulla@malpani.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	Head- Wind 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
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State/Region	Madhya Pradesh
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Telephone	+91-0731-4289086
Fax	+91-0731-4289086

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Website	www.enkingint.org
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Salutation	Mr.
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Middle name	-
First name	Manish
Department	CDM Services Dept.
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Personal e-mail	manish@enkingint.org

Appendix 2. Affirmation regarding public funding

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

Appendix 3. Applicability of methodology and standardized baseline

Please refer section B of the PDD for the same.

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.7.3 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.

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