PROJECT DESIGN DOCUMENT FORM
FOR SMALL-SCALE CDM PROJECT ACTIVITIES (F-CDM-SSC-PDD)
Version 04.1

PROJECT DESIGN DOCUMENT (PDD)

Title of the project activity	5.10 MW Wind Power Project by Shyam Metalics & Energy Limited in Maharashtra, India
Version number of the PDD	01
Completion date of the PDD	21/05/2012
Project participant(s)	Shyam Metalics & Energy Limited
Host Party(ies)	India
Sectoral scope(s) and selected methodology(ies)	Sectoral Scope : 01 Selected Methodology : AMS I.D (Version17)
Estimated amount of annual average GHG emission reductions	8088 tCO_2/year

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The proposed CDM project activity is a bundled wind power project in the state of Maharashtra, comprising six Wind Turbine Generators (WTGs), with a cumulative capacity of 5.10 MW. The proposed project activity is installation of six units of 850 kW wind turbine generators.

The purpose of the proposed project is to generate 8488 MWh of average electricity per annum, using the kinetic energy of wind, thus resulting in zero emissions during electricity production. The power generated will be supplied to the state electricity board and will replace the equal amount of power which would have been generated by fossil fuel-intensive thermal power plants.

Pre-project scenario: No Project Activity

The proposed project activity is a **green field** project, which means no power generation facility existed at the project site in the pre-project scenario. Hence, absence of any project activity is a befitting pre-project scenario at project site.

Baseline scenario:

The electricity produced by the project activity will be supplied to state electricity board, which lies in NEWNE regional grid, as prescribed by Central Electricity Authority (CEA), country's apex power sector planning body, under the federal Government of India. In the absence of the project activity, same amount of electricity would have been delivered into the grid by the existing and proposed fossil fuel-fired power plants. The current project activity, therefore, precludes the emission of greenhouse gases (GHGs) that would have resulted in the absence of this renewable energy-based power project activity. Hence, NEWNE regional grid has been considered for baseline emission calculations for the proposed project activity.

Evidently, the pre-project scenario is same as the baseline scenario.

Estimated amount of emission reductions over the chosen crediting period:

This project activity will lead to an annual average GHG emission reduction of 8088 tCO_2e and a total of 80880 tCO_2e during a fixed crediting period of 10 years (as chosen by PP).

Project activity's contribution towards sustainable development

The Ministry of Environment and Forests (MoEF), Government of India**,** has stipulated four important indicators of sustainable development[1], which a proposed CDM project activity should conform with, in order to be considered as a valid CDM activity that contributes to the ultimate objective of the Convention. These indicators are social well-being, economic well-being, environmental well-being and technological well-being.

The proposed project activity seeks to comply with these stipulations in the following manner:

[1] http://www.cdmindia.in/approval_process.php

Social well-being:

- The project activity will generate many direct and indirect employment opportunities.
- It will lead to the development of an otherwise under-developed area, with the development of infrastructural in the areas around the project.
- Employment generation, infrastructure development around the project activity area and increase in the energy availability of the region will also improve the living standard of the local population.

Environmental well being:

- Since the project uses renewable wind energy for power generation, it does not lead to any harmful emissions into the environment.
- The project will help avoid further depletion of the already over-exploited, limited non-renewable sources like coal, oil, gas etc.
- As wind power projects produce no end products in the form of solid waste (ash etc.), they address the problem of solid waste disposal encountered by most other sources of power.

Economical well-being:

- It leads to creation of business opportunities for local stakeholders such as equipment manufacturers, suppliers, contractors and other vendors.
- Increased availability of power in the region will attract more investment in the region.

Technological well being

- The generation of electricity by the project activity will improve availability of electricity to the state grid and also it will provide more opportunities for industries to invest in such cleaner technologies. Success of such projects shall be an example for other industries to invest in such technologies and further strengthen the energy security of the country.
- The technology selected for the power project, which is based on the conversion of kinetic energy of wind into electrical energy, is environmentally safe and sound. The project activity would promote the use of such technology.

Hence, the proposed project activity is in line with the sustainable development criteria laid down by the MoEF.

A.2. Location of project activity

A.2.1. Host Party(ies)

The host party to the project activity is India.

A.2.2. Region/State/Province etc.

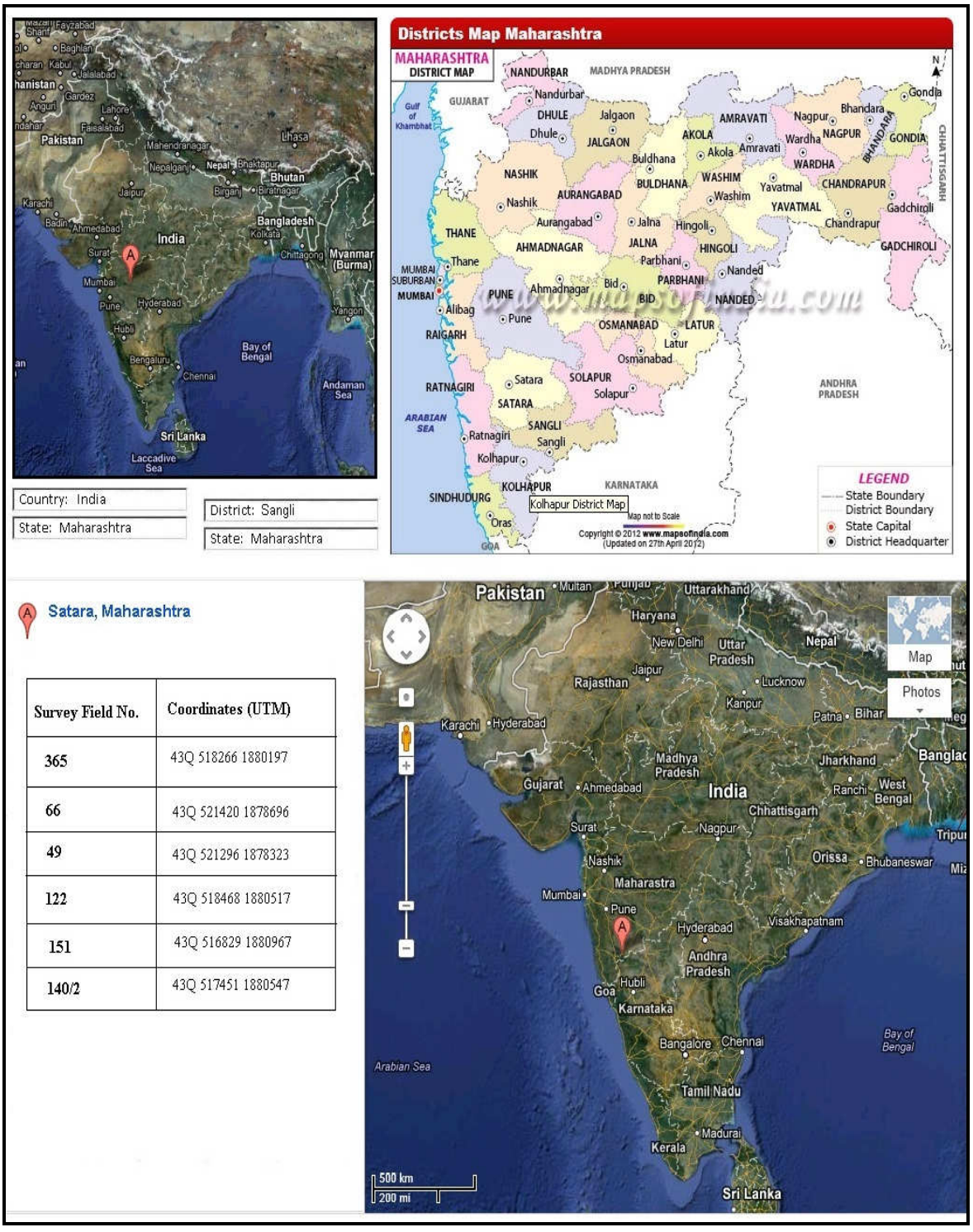
The project activity is located in the state of Maharashtra

A.2.3. City/Town/Community etc.

The project activity is located in district Sangli, state of Maharashtra, India.

A.2.4. Physical/ Geographical location

Owner	WTG Capacity (MW)	Label	Survey Field No.	Village	Coordinates (UTM)
Shyam Metalics & Energy Limited	0.850	GJN 47	19	Malal	43Q 524403 1881356
	0.850	GJ 09 N1	122	Rampur	43Q 518468 1880517
	0.850	GJ 41	12	Malal	43Q 523576 1880951
	0.850	GJ 43N	14	Malal	43Q 523577 1881287
	0.850	GJN 5	151	Rampur	43Q 516829 1880967
	0.850	GJN 7	150	Rampur	43Q 517019 1880658



Survey Field No.	Coordinates (UTM)
365	43Q 518266 1880197
66	43Q 521420 1878696
49	43Q 521296 1878323
122	43Q 518468 1880517
151	43Q 516829 1880967
140/2	43Q 517451 1880547

A.3. Technologies and/or measures

The proposed project activity is combination of freshly-installed WTGs with an aggregate capacity of 5.1 MW. The proposed project activity is using technically and commercially proven wind turbines from

Gamesa Wind Turbines Pvt Ltd. The applied technology is considered to be one of the most environmental friendly and safe technologies available as the operation of the wind turbine does not emit any GHGs or any other harmful gases unlike the operation of conventional power plants. The proposed project shall use the kinetic energy in wind to drive the wind turbine blades which generates electricity.

All the installations are new and not involved in any technological transfer. The power will be generated at voltage of 690 V, which will be stepped up to 33 kV at transformers located in a small yard adjacent to each WTG, before being fed into 220 kV substations, which are the grid interconnection points. Meter readings for billing purposes are noted at these substations with the help of two energy meters--main meter and check meter-- installed therein.

List of the facilities, systems and equipment that will be installed and/or modified by the project activity have been tabulated below:

<table>
<tr><th colspan="2">Facility 1 to 2: 6 WTGs</th></tr>
<tr><th>Systems/Equipments</th><th>Description</th></tr>
<tr><td>WTGs</td><td>
<table>
<tr><td>Project site</td><td>365</td><td>66</td><td>49</td><td>122</td><td>151</td><td>140/2</td></tr>
<tr><td>Existing and forecasted capacity</td><td>0.85 MW</td><td>0.85 MW</td><td>0.85 MW</td><td>0.85 MW</td><td>0.85 MW</td><td>0.85 MW</td></tr>
<tr><td>Make</td><td>Gamesa</td><td>Gamesa</td><td>Gamesa</td><td>Gamesa</td><td>Gamesa</td><td>Gamesa</td></tr>
<tr><td>Model No.</td><td>G58</td><td>G58</td><td>G58</td><td>G58</td><td>G58</td><td>G58</td></tr>
<tr><td>Expected life</td><td>20 years</td><td>20 years</td><td>20 years</td><td>20 years</td><td>20 years</td><td>20 years</td></tr>
</table>
These WTGs will cumulatively generate 8488 MWh of electricity at 690 V voltage.
</td></tr>
<tr><td>Control panel</td><td>Gross electricity generated by each WTG is measured instantaneously at the individual control panel installed below it. Gross generation will, therefore, be monitored by the project owners' representative, which is Gamesa, through these meters.</td></tr>
<tr><td>Transformer yard</td><td>The transformer will step up the generation to a 33 kV for delivery into the NEWNE regional grid through 220 kV substations, which are grid interconnection points for the project activity.</td></tr>
<tr><th colspan="2">Facility 2: 220 kV Substations</th></tr>
<tr><td>Main meter and check meter</td><td>The gross electricity generated by each WTG will be transmitted into the 220 kV substation. Main and check meters, which are capable of measuring both export and import energy units, are installed in these substations. Net electricity export by the project activity will be monitored at these metering points.</td></tr>
</table>

According to Appendix B of the Simplified Modalities and Procedures (M&P) for small-scale CDM project activities, the project activity falls under:

Type I **:** Renewable Energy Projects

Category D **:** Electricity Generation for a System

Proposed Project is a wind power project that utilizes the wind energy for electricity generation which is a renewable form of energy. Project activity includes operation of six wind mills of 850KW, (procured from Gamesa Wind Turbines Pvt Ltd. The operational life time of the project activity is 20 years as specified by the technology supplier. The technology is a clean and safe technology since there are no GHG emissions associated with the electricity generation.The generated electricity is stepped up to 11 kV for transmission to the pooling sub-station. The electricity is further stepped up to 66KV at pooling sub-station which then gets into the grid through the DISCOM substation.

A.4. Parties and project participants

Party involved (host) indicates a 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 (host)	Shyam Metalics & Energy Limited	No

A.5. Public funding of project activity

Project developers declare that there is no public funding or other official development assistance (ODA) from any of the Annex-I parties. Projects developer's declaration regarding the same will be submitted to the DOE.

A.6. Debundling for project activity

According to Paragraph I.A of 'Guidelines on assessment of de-bundling for SSC project activities, Version 03', EB54, Annex 13[2],

"A proposed small-scale project activity shall be deemed to be a debundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:
(a) With the same project participants;
(b) In the same project category and technology/measure; and
(c) Registered within the previous 2 years; and
(d) Whose project boundary is within 1 km of the project boundary of the proposed small- scale activity at the closest point."

None of the above applies to the proposed project activity and the project participant has not registered any another project. Therefore the proposed project is not a debundled component of a larger CDM project activity. Projects developer's declaration regarding the same will be submitted to the DOE.

[2] http://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC_guid17.pdf

SECTION B. Application of selected approved baseline and monitoring methodology
B.1. Reference of methodology

Methodology : AMS-I.D. "Grid connected renewable electricity generation" (Version 17)[3]

Tool : "Tool to calculate the emission factor for an electricity system" (Version 02.2.1)[4]

B.2. Project activity eligibility

Scope 01-Energy Industries (Renewable/non-renewable sources).

Approved small-scale baseline methodology AMS-I.D, version 17: "Grid connected renewable electricity generation."

The project activity generates power through a renewable source of energy (sun) and supplies it to the power to the regional grid. This electricity would, otherwise, have been generated through fossil fuel sources connected to NEWNE grid. The project activity meets the applicability conditions of the selected methodology.

Choice of selected methodology has been justified by showing that the project activity meets each applicability conditions of the selected methodology in table below:

Applicability conditions of AMS-I.D. (Version 17)	**Eligibility of project under consideration**
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.	The project activity is a renewable energy (i.e. wind energy) based power generation that supplies electricity to NEWNE regional grid. Hence, this criterion is applicable to the project activity.
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 in Table 2.	The following is one of the illustrative situations (S.No 1 in the table) mentioned in the table where methodology AMS-1.D is applicable: "Project supplies electricity to a national/regional grid" The project activity supplies electricity generated to the NEWNE regional grid.

[3] http://cdm.unfccc.int/UserManagement/FileStorage/V9LRSXKP24Q7YT6HZDUBO3C0ING8AJ
[4] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.2.1.pdf

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 activity involves installation of a new wind power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield Plant). Hence, the criterion is applicable to the project activity.
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/m2; • The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m^2.	The project activity is a renewable wind energy based power project and not a hydro power plant. Hence, the criterion is not applicable to the project activity.
5. If the unit added has both renewable and non-renewable components (e.g., a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	The project activity uses renewable wind energy for generation of electricity. Non-renewable components like fossil fuels are not used for electricity generation. Capacity of the project is 5.1 MW which is less than the SSC eligibility limit of 15 MW. There would be no capacity addition to any bundled project activity during the crediting period and thus the capacity of the entire unit shall not exceed the limit of 15 MW.
6. Combined heat and power (co-generation) systems are not eligible under this category.	The project activity is a renewable wind energy based power project and not a COGEN project. Hence, the criterion 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	The project activity is a green field project and proposed capacity of this bundled project is of 5.1 MW.

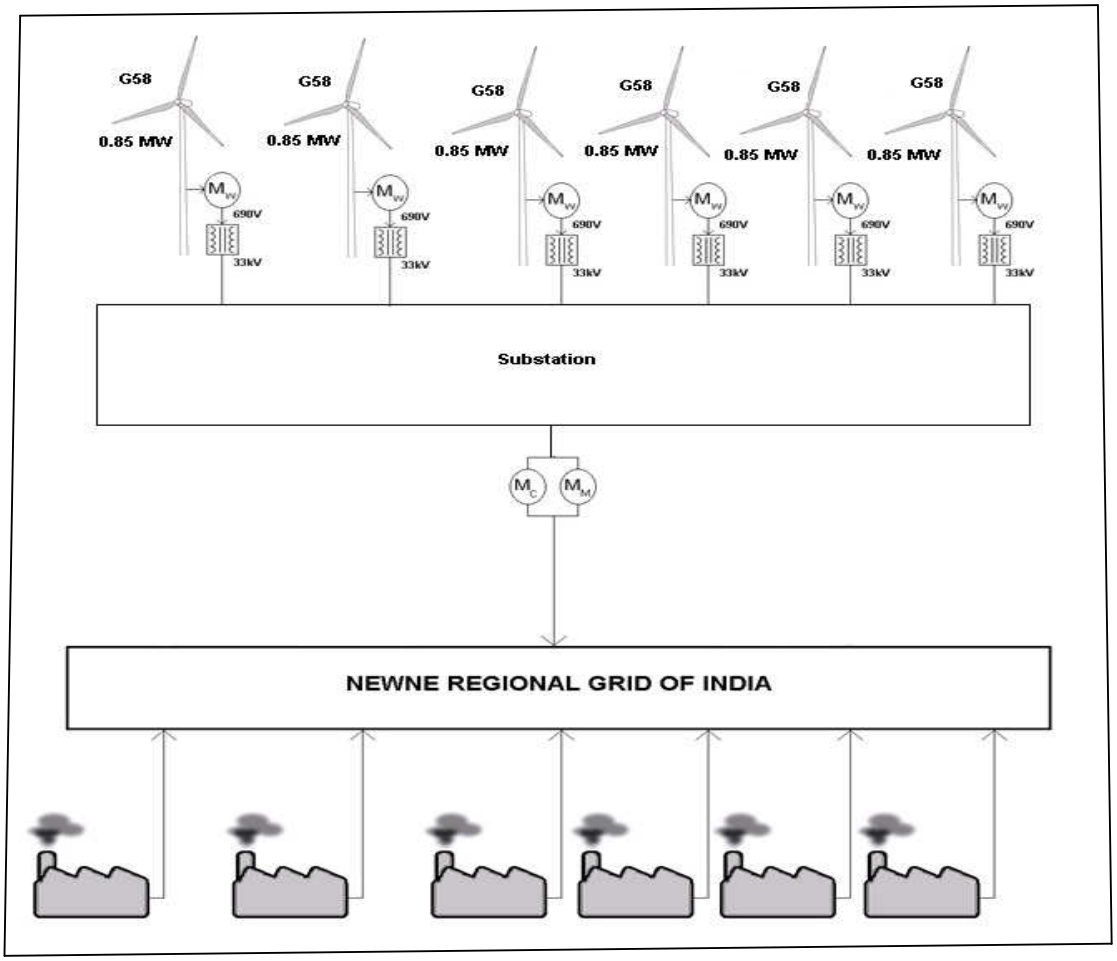
physically distinct from the existing units.	
8. In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the modified or retrofitted unit shall not exceed the limit of 15 MW	The project is a green field project. Hence, it does not replace an existing project activity. Hence, this criterion is not applicable to the project activity.

The project activity qualifies as **Type I,** during every year of the crediting period in accordance with the applicable provisions for project activity eligibility in the Project Standard, paragraph 81 i.e. "Renewable energy project activities with a maximum output capacity of 15 MW (or an appropriate equivalent)"

B.3. Project boundary

Project boundary has been ascertained using Paragraph 9 of AMS-I.D. Version 17, EB 61 *'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 thus include six Wind Turbine Generator, Step up Transformers, Metering Arrangement (Main/Check Meter), Substation and NEWNE grid.



B.4. Establishment and description of baseline scenario

Project activity supplies electricity to the fossil fuel intensive, NEWNE regional grid of India. Thus, inline with Paragraph 10 of AMS-I.D. (Version 17*), the baseline emissions would be the displaced power from the grid* i.e. clean electricity delivered to the grid by project activity which would have otherwise been generated by the operation of grid-connected power plants and by the addition of new fossil fuel based generation sources into the grid.

Paragraph 11 of AMS-I.D. (Version 17) calculates baseline emissions as:

$$\mathbf{BE_y = EG_{BL,y} \times EF_{CO2,grid,.y.}} \quad .....(A)$$

Where,

BE_y = Baseline Emissions in year y; t CO_2

$EG_{BL,y}$ = Quantity of net electricity supplied to the grid from project activity in year y (MWh)

$EF_{CO2,grid,.y}$ = CO_2 emission factor of the grid in year y; t CO_2/MWh

Accordingly, the emission factor of the grid will be used to estimate emission reductions. As per paragraphgraph 12 of AMS-I.D. (Version 17), PP has chosen option (a) and used the combined margin (CM) approach to calculate emission factor, as official data is available for operating margin (OM) and build margin (BM) values, whereas no such data exists in the public domain to support choice of option (b). Hence,

$$\mathbf{EF_{CO2,grid,.y} = EF_{NEWNE,CM,y}} \quad .....(B)$$

This data is published by Central Electricity Authority (CEA) (a statutory body constituted under Electricity Act and having its office attached to Ministry of Power, Government of India) on their website (www.cea.nic.in). "Baseline Carbon Dioxide Emission Database Version 7.0" is the latest available data and is, therefore, being used in calculation of the baseline emissions.

DATA USED

Simple Operating Margin (tCO_2/MWh) for NEWNE regional grid of India		
2008-09	2009-10	2010-11
1.0066	0.9777	0.9707

Build Margin (tCO_2/MWh) for NEWNE regional grid of India		
2008-09	2009-10	2010-11
0.6755	0.8123	0.8588

Parameters	Description	Source
$EF_{NEWNE,OM,y}$	Operating margin CO_2 emission factor for the project electricity system in year *y*	Calculated as per "*Tool to calculate the emission factor for an electricity system (Version 02.2.1)*" using data from Central Electricity Authority of India's (CEA) "*Baseline Carbon Dioxide Emission Database Version 7.0*" [5]
$EF_{NEWNE,BM,y}$	Build margin CO_2 emission factor for the project electricity system in year *y*	
$EF_{NEWNE,CM,y}$	Combined margin CO_2 emission factor for the project electricity system in year *y*	
Variables	**Description**	**Source**
$EG_{facility,y}$	Quantity of net electricity supplied by the candidate project activity to the grid in year *y*	Estimated generation based on rated capacity of the project activity and the applicable PLF. During the crediting period, records of actual net electricity supply to the grid will be used.

B.5. Demonstration of additionality

Additionality:

In accordance with paragraph 28 of the simplified modalities and procedures for small-scale clean development mechanism project activities[6], a simplified baseline and monitoring methodology listed in Appendix B may be used if project participants can demonstrate that the project activity would otherwise not be implemented due to the existence of one or more barrier(s) listed in attachment A of Appendix B of the simplified modalities and procedures for small-scale CDM project activities, Version 08, Annex 24, EB 63[7]. Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities has listed the following barriers:

- Investment barrier:
- Technological barrier:
- Barrier due to prevailing practice:
- Other barriers

While the project proponent was aware of various barriers associated to project implementation, it realized that the financial barrier was of particular importance, given the high level of investments involved in the implementation of wind power projects. It is also evident from company's records of discussion[8] that financial barrier was a significant issue, which promoted its Board to count on carbon revenue streams that would help make the proposed project activity economically attractive.

The project proponent has, therefore, found it befitting to choose investment barrier as the means to ascertain the additionality of the project.

[5] http://cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm
[6] http://cdm.unfccc.int/Reference/catalogue/document?doc_id=000001696
[7] https://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC_guid05.pdf
[8] Extracts of Board Resolution

Investment barrier

As per paragraph 19 of Annex 5, EB 62, " *If the proposed baseline scenario leaves the project participant no other choice than to make an investment to supply the same (or substitute) products or services, a benchmark analysis is not appropriate and an investment comparison analysis shall be used. If the alternative to the project activity is the supply of electricity from a grid this is not to be considered an investment and a benchmark approach is considered appropriate."*

Also the guideline says that *"The purpose of an investment analysis in the context of the CDM is to determine whether the project is less financially attractive than at least one alternative in which the project participants could have invested. In cases where the alternative requires investment anyhow and baseline emissions are based on that alternative, the only means of determining that the project activity is less financially attractive than at least one alternative is to conduct an investment comparison analysis. The benchmark approach is therefore suited to circumstances where the baseline does not require investment or is outside the direct control of the project developer, i.e. cases where the choice of the developer is to invest or not to invest*".

In the proposed project activity, the baseline scenario is the generation of equivalent amount of electricity from the grid connected power plants, owing to which, it is outside the direct control of the project proponent. Hence, the benchmark analysis approach has been adopted.

Benchmark estimation

The benchmark of the project activity has been established in accordance with "Guidance on the Assessment of Investment Analysis" Version 05, Annex 5, EB 62[9]. According to paragraphgraph 12 of these guidelines, *"Required/expected returns on equity are appropriate benchmarks for an equity IRR."*

Given the fact that the proposed project activity is solely financed by equity, the cost of equity could be calculated in accordance with paragraph 15, which states that, *"If the benchmark is based on parameters that are standard in the market, the cost of equity should be determined either by: (a) selecting the values provided in Appendix A; or by (b) calculating the cost of equity using best financial practices, based on data sources which can be clearly validated by the DOE, while properly justifying all underlying factors"*

The project proponent has calculated the cost of equity on the basis of option (a), by selecting the values provided in Appendix A. The proposed project activity falls under Group 1 category, mentioned in paragraph 5 of this Appendix. The default cost of equity (real) for Indian Group I projects is 11.75%. However, as per paragraph 7 of the Appendix A *"In situations where an investment analysis is carried out in nominal terms, project participants can convert the real term values provided in the table below to nominal values by adding the inflation rate. The inflation rate shall be obtained from the inflation forecast of the central bank of the host country for the duration of the crediting period."*

For this purpose, a 10-year inflation forecast of 6.3%[10] by the Reserve Bank of India (RBI), the country's central bank, has been used. The benchmark, therefore, works out to be 18.79[11]%.

IRR as financial indicator

In benchmark analysis approach, a metric measuring annual return of the project is compared against the benchmark. The project is recommended for implementation only when these returns exceed the benchmark. The project proponent have used post-tax equity IRR as the financial indicator, which will be compared with the estimated benchmark to assess the financial additionality of the project activity, as it is

[9] https://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf
[10] http://rbi.org.in/scripts/PublicationsView.aspx?id=11399. The forecast is based on the macro-economic statistics for July-September of 2009.
[11] Calculated as per Fisher's equation available at http://en.wikipedia.org/wiki/Fisher_equation

widely used by bankers as well as investors for the financial analysis of their projects.

The assumptions for calculating the equity IRR have been tabulated below:

Parameters	Assumptions
Installed capacity (MW)	5.10
Net annual generation (MWh)	8488
Power Tariff (per KWh)	5.37
GBI benefit Rs. / kWh	0.50
Net tariff in Rs. / kWh	5.87
O&M cost of WTG for 2nd year	0.88
O&M cost of substation for 1st year	0.17
% escalation per annum on O & M Charges	5.0%
MAT	20%
Corporate income tax	32.445%
Tax holiday / years	10

Based on the above assumptions, the equity IRR of the project activity turns out to be **9.20%,** which is lower than the estimated benchmark of **18.79%.**

Sensitivity Analysis

It is a prudent business practice to assess the sensitivity of the financial indicator to the variations in major parameters of the project. Therefore, in accordance with paragraphs 20 and 21 of Annex 5, EB 62, the sensitivity of the equity IRR with respect to the variations in electricity generation, project cost, O&M cost and tariff has been assessed. These important variables are either only increased decreased, but not both, as the initial objective of this sensitivity analysis is to determine in which scenarios the project activity would pass the benchmark or become more favourable than the alternative. The following effects of sensitivity on the equity IRR were observed:

Owner	Project Cost		Generation		O&M cost		Tariff	
	+10%	-10%	+10%	-10%	+10%	-10%	+10%	-10%
Shyam Metalics & Energy Limited	7.48%	11.30%	11.12%	7.26%	9.15%	9.25%	11.06%	7.32%

It is evident from the above analysis that the even a 10% increase or decrease in these important parameters does not allow the IRR to cross the benchmark returns in the absence of CDM benefits. This implies that the financial returns are not sensitive to these variables. Clearly, the slated benchmark cannot be achieved without the help of CDM revenues, a fact that precludes the possibility of any gainful execution of this project without carbon revenues. Hence, the project is financially additional.

Serious consideration of CDM:

The project participants had considered CDM benefits during conceptualization of the project activity and

had duly informed the Designated National Authority (DNA) i.e., Ministry of Environment & Forests, Government of India and UNFCCC regarding the same. Thus, they have complied with the requirements of "Guidelines to the Demonstration and Assessment of Prior Consideration of the CDM" Version 04, Annex 13, EB 62[12].

Furthermore, a chronology of parallel serious CDM actions has been constructed below:

Date	Project Implementation	CDM Implementation	Proof of action
25 July 2011	Date of investment decision making		Board resolution
26 December 2011	Purchase orders	Start date of Project activity	Copies of Purchase orders
06 March 2012		Intimation to DNA and UNFCCC	Mail communications
15 May 2012	Local Stake Holders Meeting		LSM Newspaper advertisement and other Documents

B.6. Emission reductions
B.6.1. Explanation of methodological choices

As per paragraph 23 of AMS-I.D. (Version 17), emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad ...(C)$$

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

Calculation of BE_y

As illustrated in section B.4, calculation of baseline emissions i.e. BE_y, necessitates calculation of grid emission factor ($EF_{CO2, grid, y}$), which is being presented below.

Tool to calculate the emission factor for an electricity system (Version 02.2.1), has been used to determine the CO_2 emission factor for displacement of electricity generated by power plants in an electricity system, by calculating the combined margin emission factor (CM) of that electricity system. As per the tool, PP has applied the following six steps:

Step 1: Identify the relevant electricity systems.

Indian electricity system comprises of two regional electricity grids i.e. NEWNE regional grid and Southern regional grid. Notably, regional grid represents the largest electricity system where power plants can be dispatched without significant constraints and, thus, forms the project electricity system for

[12] http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid04.pdf

a project activity delivering electricity into it. Since even the current project activity is connected to the NEWNE regional grid of India, it, therefore, can be identified as the project electricity system.

Additionally, some amount of power exchange invariably takes place between these regional grids, while a small exchange also occurs with few neighbouring countries like Bhutan & Nepal. All these grids, therefore, form a connected electricity system.

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

Project Participant has chosen Option I i.e. only including grid power plants in the calculation of operating margin and build margin emission factor, since data for the same is available from Central Electricity Authority which is an official source. No official data is available publicly for off grid power plants.

Step 3: Select a method to determine the operating margin (OM), $EF_{NEWNE, OM, y}$

PP has chosen Option (a) i.e. simple OM, to determine the operating margin. Other available options in the tool were ruled out considering the fact that data required to calculate simple adjusted OM or dispatch data analysis is not available publically. As per the tool, low cost/must run resources typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. Data for the same, as published by Central Electricity Authority, has been presented below which illustrates that low cost/must run resources constitute less than 50% of total NEWNE regional grid generation, hence, the average OM method could not have been used.

Share of Must-Run (Hydro/Nuclear) (% of Net Generation)			
	2008-09	2009-10	2010-11
NEWNE	17.4%	15.9%	17.6%

PP has chosen *ex ante* option, thus, no monitoring and recalculation of the emissions factor during the crediting period is required. PP has considered a data vintage of 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation.

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

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units. Central Electricity Authority's database of carbon dioxide emission for the power sector in India is based on detailed authenticated information obtained from all operating power stations in the country. This database provides information about the combined margin emission factors of all the regional electricity grids in India.

The Combined Margin calculation in the CEA database is based on option A (Based on the net electricity generation and a CO_2 emission factor of each power unit) and calculated ex ante using the guidelines provided by the UNFCCC in the "Tool to calculate the emission factor for an electricity system, Version 2.1.1".

Hence, PP has taken OM from CEA's "CO_2 Baseline Database for the Indian Power Sector" Version 7.0, January 2012. Key assumptions and rationale can be found in user guide of the database.

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

In line with the steps laid in "Tool to calculate the emission factor for an electricity system, Version 2.1.1", CEA database calculates the build margin as the average emissions intensity of the 20% most recent capacity additions in the grid based on net generation. The build margin emission factor has been calculated ex-ante based on the most recent information available on units already built for sample group 'm' at the time of CDM-PDD submission to the DOE for validation. This option does not require monitoring the emission factor during the crediting period.

Hence, PP has taken BM from CEA's "CO_2 Baseline Database for the Indian Power Sector" Version 7.0, January 2012. Key assumptions and rationale can be found in user guide of the database.

Step 6: Calculate the combined margin (CM) emissions factor ($EF_{grid, CM, y}$)

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 2.2.1)', allows to weigh the operating margin and Build margin at 75% and 25%, respectively**.**

$$EF_{NEWNE,CM,y} = (EF_{NEWNE,OM,y} \times w_{OM}) + (EF_{NEWNE,BM,y} \times w_{BM})$$

$$= (EF_{NEWNE,OM,y} \times 75\%) + (EF_{NEWNE,BM,y} \times 25\%)$$

Electronic spreadsheet showing calculation of all these parameters is being submitted separately and the final values are presented below:

Parameter	Value
Operating Margin : $EF_{NEWNE,OM,y}$	0.9842
Build Margin : $EF_{NEWNE,BM,y}$	0.8588
Combined Margin : $EF_{NEWNE,CM,y}$	0.9529

Calculation of PE_y

Project under discussion is renewable energy based project activity, thus, does not involves project emissions. Hence, in line with paragraph 20 of AMS-I.D. (Version 17):

Project emissions in year y, $\mathbf{PE_y = 0}$ t CO_2 *.....(D)*

Calculation of LE_y

Project activity is installation of new wind turbine generators and does not involve transfer of any kind of generating equipment from another activity. Hence, in line with paragraph 21 of AMS-I.D. (Version 17):

Leakage emissions in year y, $\mathbf{LE_y = 0}$ t CO_2 *.....(E)*

Calculation of Emission Reductions

$ER_y = BE_y - PE_y - LE_y$ *….. from (C)*

$ER_y = (EG_{BL,y} \times EF_{CO2,grid,y}) - PE_y - LE_y$ *….. from (A) & (B)*

$\mathbf{ER_y = EG_{BL,y} \times EF_{NEWNE,CM,y}}$ *….. from (D) & (E)*

B.6.2. Data and parameters fixed ex ante

Data / Parameter	$EF_{NEWNE, OM, y}$
Unit	tCO_2/MWh
Description	Operating margin CO_2 emission factor for the project electricity system in year *y*
Source of data	CEA's "*Baseline Carbon Dioxide Emission Database Version 7.0* "
Value(s) applied	0.9842
Choice of data or Measurement methods and procedures	Calculated in line with "*Tool to calculate the emission factor for an electricity system (Version 02.2.1)*" using data from Central Electricity Authority of India's (CEA) "*Baseline Carbon Dioxide Emission Database Version 7.0*". Justified in section B.6.1
Purpose of data	Calculation of baseline emissions
Additional comment	The value is fixed ex-ante

Data / Parameter	$EF_{NEWNE, BM, y}$
Unit	tCO_2/MWh
Description	Build margin CO_2 emission factor for the project electricity system in year *y*
Source of data	CEA's "*Baseline Carbon Dioxide Emission Database Version 7.0* "
Value(s) applied	0.8588
Choice of data or Measurement methods and procedures	Calculated in line with "*Tool to calculate the emission factor for an electricity system (Version 02.2.1)*" using data from Central Electricity Authority of India's (CEA) "*Baseline Carbon Dioxide Emission Database Version 7.0*". Justified in section B.6.1
Purpose of data	Calculation of baseline emissions
Additional comment	The value is fixed ex-ante

Data / Parameter	$EF_{NEWNE, CM, y}$
Unit	tCO_2/MWh
Description	Combined margin CO_2 emission factor for the project electricity system in year *y*
Source of data	CEA's "*Baseline Carbon Dioxide Emission Database Version 7.0* "
Value(s) applied	0.9529
Choice of data or Measurement methods and procedures	Calculated in line with "*Tool to calculate the emission factor for an electricity system (Version 02.2.1)*" using data from Central Electricity Authority of India's (CEA) "*Baseline Carbon Dioxide Emission Database Version 7.0*". Justified in section B.6.1
Purpose of data	Calculation of baseline emissions
Additional comment	The value is fixed ex-ante

B.6.3. Ex-ante calculation of emission reductions

Emission reductions, as explained in section B.6.1, can be calculated as:

$ER_y = EG_{BL,y} \times EF_{NEWNE,CM,y}$

Calculation of $EG_{BL,y}$

$EG_{BL,y}$ is sum of net electricity generation of all the six WTGs, part of this project activity. Net generation for each WTG has been calculated as,

(Capacity × Plant Load Factor × machine availability × Operation hours per year)

The results for the same have been tabulated below:

Capacity (MW)	Plant load factor (%)	Operation hours per year	Machine Availability	Net electricity supplied to grid (MWh)
6 * 0.85	20%	8760	95%	8488

Hence, $EG_{BL,y}$ = 8488 MWh/year

As the project activity is the installation of a new grid-connected renewable power plant at a site where no renewable power plant was operated prior to the implementation of the project activity, then $EG_{facility,y}$, and the above formula can be expressed as:

$ER_y = EG_{facility,y} \times EF_{NEWNE,CM,y}$

$= 8488 \times 0.9529$

$= 8088\ tCO_2e/year$

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

Year	Baseline emissions (tCO_2 e)	Project emissions (tCO_2 e)	Leakage (tCO_2 e)	Emission reductions (tCO_2 e)
2012	8088	0	0	8088
2013	8088	0	0	8088
2014	8088	0	0	8088
2015	8088	0	0	8088
2016	8088	0	0	8088
2017	8088	0	0	8088
2018	8088	0	0	8088
2019	8088	0	0	8088
2020	8088	0	0	8088
2021	8088	0	0	8088
Total	80880	0	0	80880
Total number of crediting years	10			
Annual average over the crediting period	8088	0	0	8088

B.7. Monitoring plan
B.7.1. Data and parameters to be monitored

Data / Parameter	$EG_{BL, y}$
Unit	MWh/year
Description	Quantity of net electricity supplied to the grid by project activity in year *y*
Source of data	Monthly joint meter reading (JMR) at pooling substation
Value(s) applied	8488
Measurement methods and procedures	Net electricity delivered to the grid by the project activity in a given month = Export – Import The values of the net electricity delivered to the grid by the project activity is aggregated annually to get the value of net electricity delivered to the Grid ($EG_{BL, y}$,KWh) by the project activity per annum. The value of net electricity delivered to the Grid ($EG_{BL, y}$) by the project activity per annum is converted to MWh before the calculation of emission reductions (ex ante determined in tCO2/MWh unit). For measuring the energy exported and imported by the project activity at the interconnection point, one set of main meter (part of interconnection facility) and check meter will be provided. Apart from hourly meter reading, monthly joint meter readings at the interconnection point will be noted by the designated officials of the company and DISCOM. The joint meter readings will be recorded and signed by the authorized representative of both the parties. Calibration procedure – National Test House or equivalent – Third party testing Accuracy of the measurement - ±0.2% Responsible person for measurement – DISCOM shall be responsible for the calibration of the meters.
Monitoring frequency	Monitoring : Continuous Measurement : Hourly Recording : Monthly
QA/QC procedures	Accuracy class of metering equipment Calibration frequency Data Archiving : All data collected as part of monitoring would be archived electronically and kept for at least two years after the end of the last crediting period.
Purpose of data	Calculation of baseline emissions
Additional comment	

B.7.2. Sampling plan

This section is not applicable to the project activity.

B.7.3. Other elements of monitoring plan

The monitoring plan is developed in accordance with the modalities and procedures for small-scale CDM project activities as the proposed project activity is a grid-connected small hydroelectric project being implemented in Gujarat state. The monitoring plan, which will be implemented and taken care by the project proponent, describes the monitoring organization, parameters to be monitored, monitoring practices, quality assurance, quality control procedures, data storage and archiving.

Monitoring Organisation

The Project will be managed by a Project Manager, who is a full time General Manager, further to be assisted by a Manager (Operations), in-charge of all technical aspects. The Manager (Operations) who will be responsible for the operational activity of the hydro project will have under him one Asst. Manager.

The monitoring agenda would be delegated to a competent person identified for the purpose. The identified person will be the in charge of GHG monitoring activities and prepare necessary audit reports for review by the management.

The identified person in charge will be assisted by a team of experienced personnel in disciplines such as mechanical and electrical with experience in plant operation, measurements and management. The primary responsibility of the team is to collect, measure, monitor, record and reports the information on various data items to the person in charge and the General Manager, in accordance with the applicable standards. Periodic calibration of various instruments used in the monitoring of the data and record keeping of the same also will be the responsibility of the team.

The responsibility of storage and archiving of information in good condition also lies with the designated person in charge. The person in charge will undertake periodic verifications and onsite inspections to ensure the quality of the data collected by the team.

Monitoring plan –Maharashtra

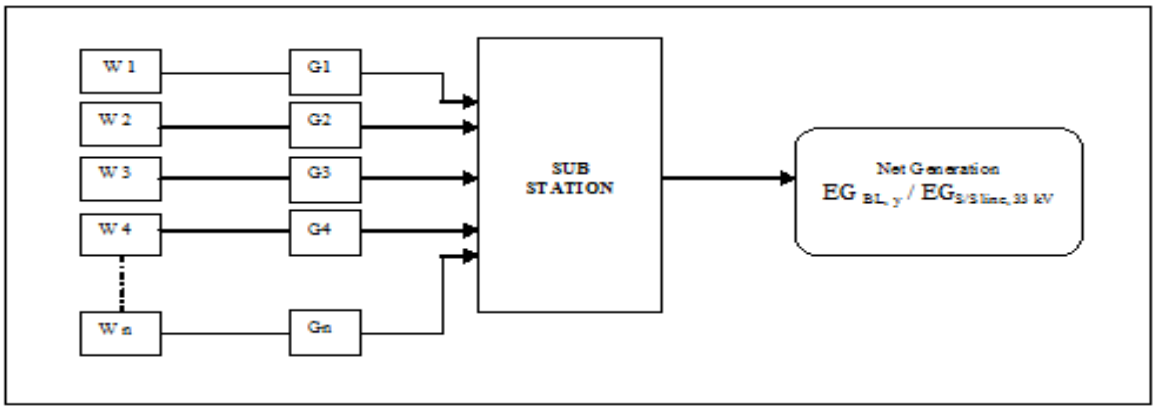
For the project activity in order to establish creditable emission reduction, it has to record the actual electricity supplied by the project proponent through clean source of Energy i.e. Wind which would displace the equivalent units of electricity produced by Fossil fuel based power plants.

Metering:
The monitoring of the generated electricity through Wind Turbine Generator is carried out in two folds:

- Primary monitoring done by MSEDCL on monthly basis at the delivery point (Tri-vector meters installed at the substation).

- Secondary monitoring carried out through Supervisory control and data acquisition system (SCADA) installed at Wind turbine generator controller on daily basis.

The billing is done apportionally on monthly basis by Maharashtra state electricity board at 33 KV sub station end.



In the figure above, it is shown that the substation is connected to n numbers of Wind Turbine Generators. The main meter connected at the substation displays the collective generation reading of all WTG's denoted as $EG_{S/S\ line,\ 33\ kV}$.

Here, G1 + G2 + G3 + G4 +.....+ Gn is the actual gross generation and is denoted as $\sum_{k=1}^{n}(G_k)$.The values for G1, G2,.....Gn will be measured at respective WTGs controller meter reading.

Where, G1 = Generation by WTG 1
G2 = Generation by WTG 2
⋮
Gn = Generation by WTG n

Due to Line losses / Transmission losses (NTL), the net generation value received at substation end is always less than the actual gross generation. Therefore, $EGS_{S/S\ line,\ 33\ kV} < \sum_{k=1}^{n}(G_k)$

Where, NTL = ITL1 + ITL2 + ITL3 + ITL4 + ... + ITLn = $\sum_{k=1}^{n}(G_k)$ - $EG_{S/S\ line,\ 33\ kV}$
From above equation of NTL, calculation for Transmissions losses by Individual WTG can be calculated as follows: $ITL_k = NTL * G_k / \sum_{k=1}^{n}(G_k)$

Therefore net generation from Individual WTG is calculated as: $EG_{individual,\ 33\ kV} = G_k - ITL_k$, where k denoted the number of WTG

i.e. $EG_{WTG1,\ 33\ kV} = G_{WTG1} - ITL_{WTG1}$
$EG_{WTG2,\ 33\ kV} = G_{WTG2} - ITL_{WTG2}$
⋮
$EG_{WTGn,\ 33\ kV} = G_{WTGn} - ITL_{WTGn}$

The proposed project activity requires evacuation facilities for sale to grid which maintained by the state power utility (MSEDCL).

- The electricity generation measurements are required by the utility and the investors to assess electricity sales revenue

- The primary recording of the electricity fed to the state utility grid will be carried out jointly at the incoming feeder of the state power utility (MSEDCL).

- The joint measurement will be carried out once in a month in presence of both parties (the developer's representative and officials of the state power utility). Both parties will sign the recorded reading.

Date Uncertainty:

In the event when verification period dates and billing cycle of WTGs in the Project Activity do not coincide:

Each WTG is equipped with the Integrated Electronic Tri-vector Meter which are connected to Central Monitoring System (CMS). The system continuously monitors the generation from each WTG. A daily consolidated report of the generation data is generated in the form of 'Daily Performance Report' and recorded in Electronic as well as Printed form. In the event when the individual verification period dates and billing cycle dates (or dated of B-Form) of the various WTGs in the project activity do not coincide, the following procedure would be adopted to estimate the Net Power Supplied to the Grid during the specified period/or days where there is a mismatch.

X	Sum of generation during partial days of the month recorded at panel meter (kWh)
Y	Total generation during the month recorded at panel meter (kWh/month)
Z = X / Y	Generation during partial days (kWh)
B	Energy export as per B-Form during the month (kWh/month)
(B*Z)	Partial days exported as per B-Form considered for emission reduction calculation (kWh)

Data Archiving:

The metering equipments will be maintained in accordance with electricity standards and will have the capability of recording daily and monthly readings. Records of joint meter reading will be maintained at site and a copy will be kept with the PP. Necessary records of calibration will be maintained by both MSEDCL and project proponents.

QA/QC Procedure:

- The main & check meters shall be tested for accuracy, with a portable standard meter, by the MSEDCL'S testing division at the cost of seller. The MSEDCL shall carry out the calibration, periodical testing, sealing & maintenance of meters in the presence of authorized representative(s) of seller shall sign on the result thereof.
- The frequency of meter testing shall be done annually. All meters will be tested only at the metering point. The MSEDCL will provide a copy of the test reports to the seller.
- If during testing, both the main & check meters are found with in the permissible limits of error i.e. 0.5%, the energy computation will be as per the main meter. If during test, any of the main meter is found to be with in permissible limits of error but the corresponding check meter is beyond the permissible limit, energy computation will be as per the main meter. The check meter shall be calibrated immediately.
- If during the tests, the main meter is found to be beyond permissible limits of error, but the corresponding check meter is found to be with in the permissible limits of error, then the energy computation for the month to-date & time of such test check shall be in accordance with check

meter. The main meter shall be calibrated immediately & the energy for the period thereafter shall be as per the calibrated main meter.

- If during any of the monthly meter readings, the variation between the main meter & check meter is more than 0.5%, all the meters shall be retested & calibrated immediately by MSEDCL, at the seller's cost.
- The correction required as per result of testing will be applied to generation & consumption of energy for the period from last meter reading to the time of such test checks. Energy from the period there after shall be in accordance with calibrated main meter.

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

The Start Date of the Project Activity is the earliest date when a financial commitment for the Project Activity has been made. Thereby, the Date of Purchase Order of the WTGs raised by the Project Participants to the Technology Supplier determines the Project Start Date. Hence, project start date is **26/12/2011**

C.1.2. Expected operational lifetime of project activity

20 years and 0 months

C.2. Crediting period of project activity

C.2.1. Type of crediting period

Fixed crediting period of 10 years has been chosen.

C.2.2. Start date of crediting period

01/12/2012 or the effective date of submission of project activity for RFR to UNFCCC, whichever is later.

C.2.3. Length of crediting period

10 years 0 Months

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

As per the of Ministry of Environment and Forests (MoEF), Government of India, under the Environment Impact Assessment Notification vide S.O. 1533 dated 14th September, 2006[13] has listed a set of activities in Schedule I of the notification which for setting up new projects or modernization/expansion will require environmental clearance & will have to conduct an Environmental Impact Assessment (EIA) studies. As per the notification EIA need not to be conducted for the projects of capacity less than 25 MW. Since the capacity of the project is 1 MW, the project activity doesn't call for EIA study.

No significant environmental impacts considered due to implementation of project activity by the host party.

[13] http://hspcb.gov.in/EIA%202006.pdf

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

The meeting of the local stakeholders was held at Jath Wind Park, District Sangli, Maharashtra (INDIA) on 15/05/2012, thereby providing the stakeholders with a platform to express their opinions and concerns about the proposed project activity.

Public Newspaper Advertisements was published in Free Press Journal (English) and Navshakti (Marathi) in Local Newspapers on 05/05/2012 inviting the stakeholders. The advertisements were addressed to the stakeholders identified for the meeting, which included all interested Employees (Wind Farm, Technology Provider), Community members, Suppliers, Environment Regulators, NGOs, Local citizens (Village Panchayat People, Local People living near and around the project area). Some of the identified stakeholders were invited personally as well.

The meeting was attended by 26 persons including local villagers, representative of Bharat Foods and employees of Gamesa.

Common Agenda of the Meeting		
Sr.	**Activity**	**Person(s) Responsible/Participating Entity**
1	Welcome Address and Introduction	Project Participant Representative
2	Introduction to the phenomenon of Global Warming and Climate Change	Project Participant Representative
3	Project Description and the associated benefits	Mr. AB Arun Prasad, Gamesa (Technology Provider)
4	Introduction to CDM and the associated benefits	CDM Consultant Representative
5	Interactive Session with the Stakeholders	Technology Provider / CDM Consultant Representative / Local Stakeholders
6	Vote of Thanks	Project Participant Representative
7	Signing of the Attendance Sheet	Local Stakeholders
8	Articulation of the Comment Sheet by the concerned Stakeholders	Local Stakeholders

Local language was used for the presentation, sharing and responding to the queries. The summary of the meeting was recorded, copy of which will be made available to the Designated Operating Entity during Validation Process.

E.2. Summary of comments received

The stakeholders asked questions regarding contribution of wind energy in mitigating climate change and myths associated with wind energy. The concerned persons made replies in local language. Questions and comment raised by the stakeholders are as follows:

Question 1 (Mr.Prakash Deshmukh): How does the wind farm help climate change?

Answer: Wind power is a clean, renewable source of electricity. It produces no greenhouse gas emissions for generating the electricity. Hence wind power projects reduce the GHG emissions that cause of climate change.

Question 2 (Mr.Ghagare Sandip): Is it true that wind mills move away rain clouds?

Answer: The clouds are much higher than the height of the wind mill and it is highly unlikely that it would cause the problem.

Comment 1(Mr.Sachin Vayadande): The local people got some employment due to wind power projects.

The villagers appreciated the management of the company for investing in pollution free renewable wind energy technologies for power generation. They accepted that such initiatives not only generating emissions free electricity but also developed some basic infrastructure like roads etc. and new employment opportunities for local communities.

E.3. Report on consideration of comments received

No adverse comments were received. Only minor queries were raised which were satisfactorily answered

SECTION F. Approval and authorization

Letter of approval from the Host Party involved in the project activity is not available at the time of submitting the PDD to the validating DOE.

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Appendix 1: Contact information of project participants

Organization	Shyam Metalics & Energy Limited
Street/P.O. Box	82, Topsia Road, 7 Floor
Building	Trinity Tower
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State/Region	West Bengal
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Country	India
Telephone	033 40113000
Fax	033 22852212
E-mail	lbc@shyamgroup.com
Website	
Contact person	Sanjay Kumar Agarwal
Title	Director
Salutation	Mr.
Last name	Agarwal
Middle name	Kumar
First name	Sanjay
Department	
Mobile	
Direct fax	
Direct tel.	
Personal e-mail	sanjay@shyamgroup.com

Appendix 2: Affirmation regarding public funding

The project does not involve any public funding from Parties included in Annex 1 of the United Nations Framework Convention on Climate Change (UNFCCC).

Appendix 3: Applicability of selected methodology

Applicability of selected methodology has been adequately illustrated in section B.

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

Ex ante emission reductions have been calculated in section B.6.3 and all the necessary data, measurements results and data sources have been mentioned. No further information is available.

Appendix 5: Further background information on monitoring plan

Monitoring plan has been adequately explained in section B.7. No further information is required to presented here

Appendix 6: Summary of post registration changes

NA

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History of the document

Version	Date	Nature of revision
04.1	11 April 2012	Editorial revision to change history box by adding EB meeting and annex numbers in the Date column.
04.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the project design document form for small-scale CDM project activities" (EB 66, Annex 9).
03	EB 28, Annex 34 15 December 2006	• 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	EB 20, Annex 14 08 July 2005	• 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	EB 07, Annex 05 21 January 2003	Initial adoption.
Decision Class: Regulatory **Document Type:** Form **Business Function:** Registration		