Project design document form for small-scale CDM project activities

(Version 05.0)

Complete this form in accordance with the Attachment "Instructions for filling out the project design document form for small-scale CDM project activities" at the end of this form.

PROJECT DESIGN DOCUMENT (PDD)	
Title of the project activity	Wind Power Project by M/s Sispara Renewable Power Private Limited in Maharashtra, India
Version number of the PDD	01
Completion date of the PDD	14/03/2015
Project participant(s)	Sispara Wind Energy Private Limited
Host Party	India
Sectoral scope and selected methodology(ies), and where applicable, selected standardized baseline(s)	Sectoral Scope: I Energy Industries (renewable/non-renewable sources) Methodology: AMS-I.D. "Grid connected renewable electricity generation" --- Version 18.0.0, 28th Nov 2014.
Estimated amount of annual average GHG emission reductions	22,548 tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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The proposed project activity is a Greenfield wind power project undertaken by Sispara Wind Energy Private Limited. The purpose of the project activity is to generate clean electricity through the renewable source (wind) of energy and export the net electricity to the regional grid. The project activity is expected to generate about 23,126 MWh of electricity per annum, which will be exported to the Maharashtra State Electricity Transmission Company Limited (MAHATRANSCO), which falls under the Northern, Eastern, Western and North-Eastern regional grids (NEWNE) grid of India. The spatial extent of the project boundary is the NEWNE grid.

The project activity involves the installation of 12 MW wind power project at district Satara of Maharashtra state, India. The technology being employed in the project activity will comprise 8 Wind Energy Convertors (WECs) of 1.5 MW capacities each supplied by Regen Powertech Private Limited. The project activity intends to generate power with zero GHG (Green House Gases) emitting Wind Energy Converters (WECs). The main GHG that is prevented from being emitted into atmosphere is CO_2.

Baseline scenario:

The project activity is the installation of a new grid-connected renewable power plant. Therefore, the baseline scenario is identified according to the applicable methodology:

"The baseline scenario is that 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."

The proposed project activity is a Greenfield project; therefore the pre-project scenario and the baseline scenario for the project are the same.

Reduction of Green House Gas (GHG) emissions due to project activity

It is estimated that the project will contribute to GHG emission reduction of about 22,548 $tCO_{2\,e}$ annually and 225,480 tCO_2 over 10 years of crediting period. The project activity will replace equivalent amount of electricity in the national electricity grid which is pre-dominantly sourced from fossil fuel based power plants[1].

[1] Government of India, Ministry of Power, Central Electricity Authority (CEA), CO_2Baseline Database for the Indian Power Sector, version 9.

Since the project activity generates electricity through sustainable means, it will not cause any negative impact on the environment and there by contribute to the global climate change mitigation efforts.

View of Project Participants on contribution of Project Activity to sustainable development

Ministry of Environment and Forests, Government of India has stipulated economic, social, environment and technological well-being as the four indicators of sustainable development[2]. The project contributes to sustainable development using the following ways:

1. ***Social well-being:***
   - The project activity is contributing towards alleviation of poverty and uplifting their socio-economic lifestyle by generating employment opportunities to the villagers of the surrounding area during construction & operation phase.
   - The project activity will lead to the development of supporting infrastructure such as road network etc., in the project location, the access to which is also provided to the local population.
   - The project activity will lead to alleviation of poverty by establishing direct and indirect benefits through employment generation and improved economic activities by strengthening of local grid of the state electricity utility.
   - The project activity has also led to the development of non-conventional renewable energy technology for production of power.
   - The project activity leads to diversification of the national energy supply, which is dominated by conventional fuel based generating units. Also, it contributes toward national energy security.

2. ***Environmental well-being:***
   - Project activity is promoting an environment friendly and clean energy technology.
   - Project activity helps in reduction of the consumption of fossil fuels in the grid connected fossil fuel based power plants.
   - It helps in prevention of emission of GHGs (mainly CO2) and other pollutants like SOx and NOx in the atmosphere.

3. ***Economic wellbeing:***
   - The use of a renewable energy source reduces the nation's dependence on imported fossil fuels and associated price variation thereby leading to increased energy security.

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

- The generated electricity will be fed into the NEWNE grid through local grid, thereby improving the grid frequency and availability of electricity to the local consumers (villagers & sub-urban habitants) which will provide new opportunities for industries and economic activities to be setup in the area thereby resulting in greater local employment, ultimately leading to overall development.
- Economic well-being is appraised due to the generation of direct and indirect employment for the implementation and the management of the project.

4. ***Technological well-being:***

- Increased interest in wind energy projects will further push R&D efforts by technology providers to develop more efficient and better machinery in future.

A.2. Location of project activity

A.2.1. Host Party

>>
India

A.2.2. Region/State/Province etc.

>>
Maharashtra State

A.2.3. City/Town/Community etc.

>>
Puklewadi & Chilarewadi, Satara District

A.2.4. Physical/Geographical location

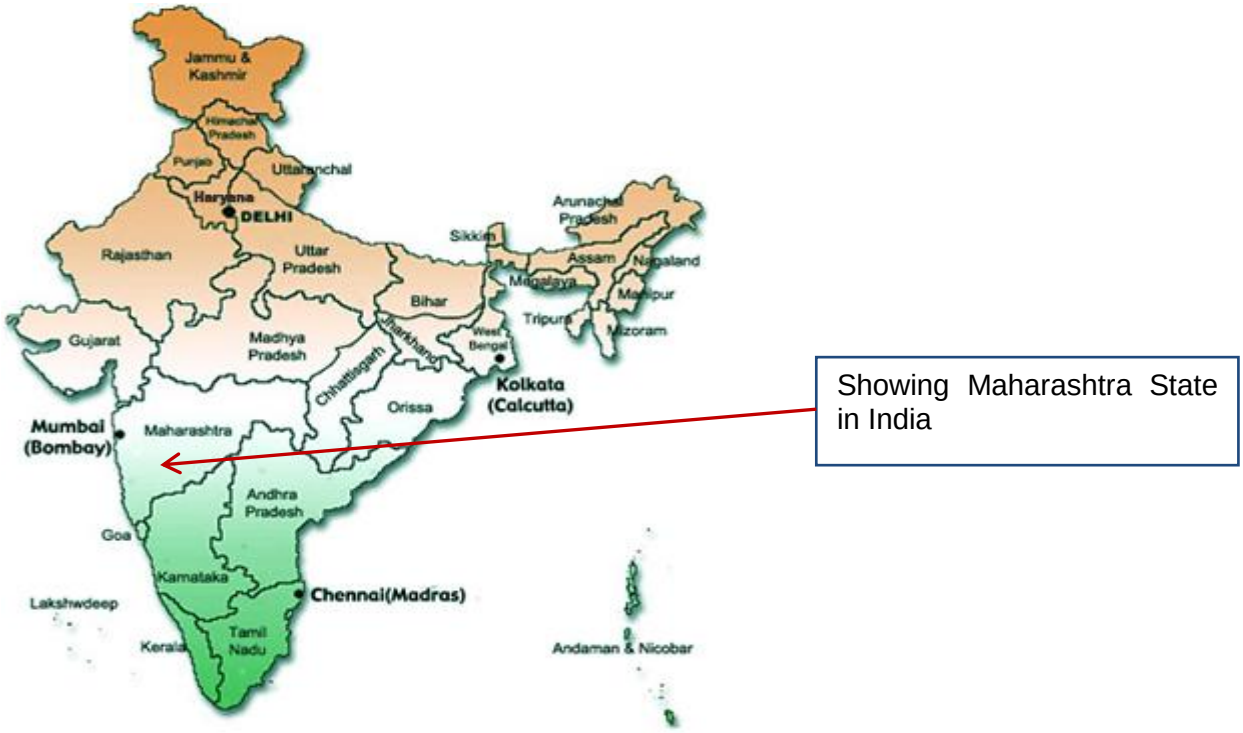
>>
The project activity is located in the Puklewadi & Chilarewadi villages, Satara District, Maharashtra State, India.

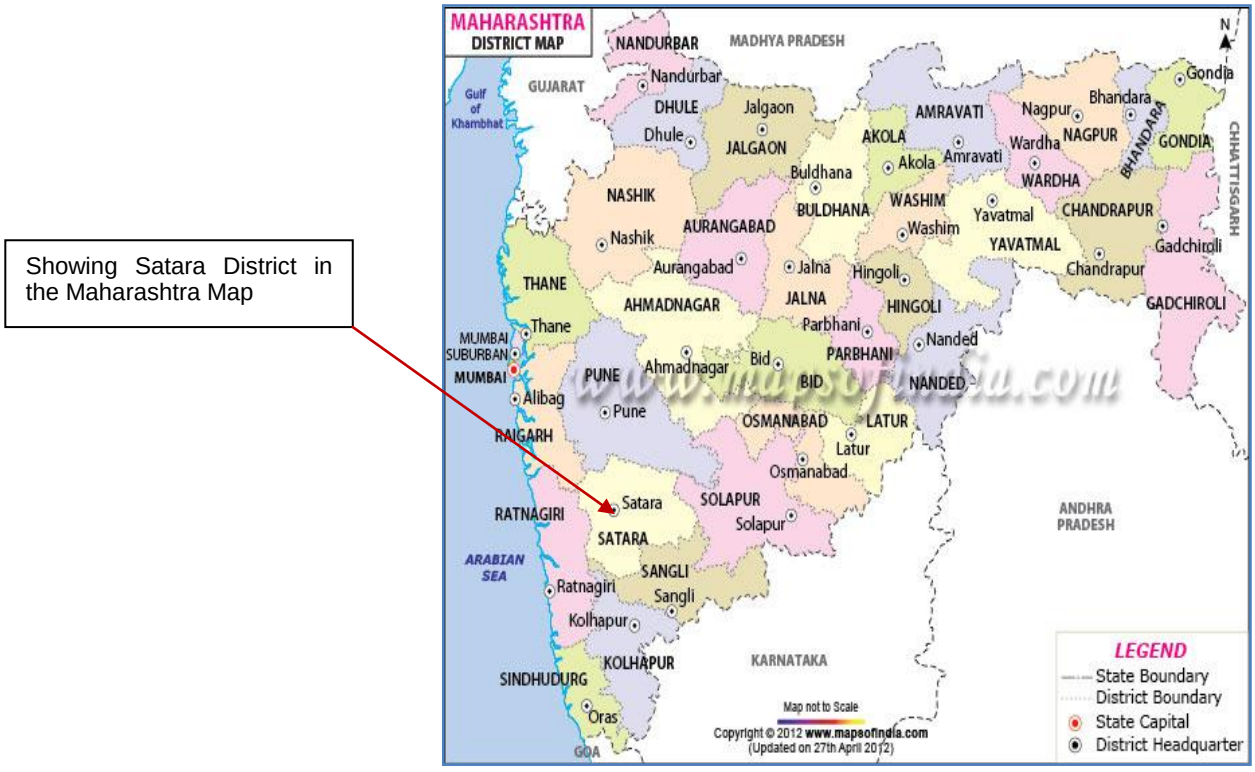
The proposed Geo-coordinates of the proposed project activity are provided below:

Latitude : 17° 31' 19.42" N

Longitude : 74° 40' 51.27" E

Figure 1: Location map showing project site





A.3. Technologies and/or measures

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The key technical parameters[3] of WECs are given below:

No. of WTGs[4]	**8**
MODEL	**V82-1.5 MW**
OPERATING DATA	
Rated power	1500 kW
Cut-in wind speed	3 m/s
Rated wind speed	Approx. 12.5 m/s
Cut-off wind speed	22 m/s
Extreme Gust Speed	52.5 m/s
ROTOR	
Type	3 Blades, Direct Drive Horizontal Axis Wind Turbine with variable Rotor Speed
Diameter	82 m
GEARBOX	
Type	Gearless
GENERATOR	
Type	Synchronous, Variable Speed
Rated Voltage	690 V
Rated power	1500 kW
TOWER	
Type	Steel tubular, 4 sections
Tower height	85 m
BRAKING SYSTEM	
Main Brake system	Individual blade pitch control for each blade
CONTROL SYSTEM	
SCADA	Remote Monitoring & Control
Average Lifetime	20 years

No transfer of technology is involved in the project activity from Annex-1 countries.

Baseline scenario is the continuation of current practice. Hence, the baseline scenario and the scenario existing prior to the implementation of the project activity both are the same.

Installation and operation of the wind power project does not pose any environmental hazards. The technology is environmentally safe and sound.

[3] http://www.regenpowertech.com/21/technical-data.

[4] Arrangement of project activity & monitoring points is detailed in the Project Boundary diagram under section B.3

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 (host)	Sispara Renewable Power Private Limited in Maharashtra, India. (Private entity)	No

A.5. Public funding of project activity

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No public funding is available for the proposed project activity.

A.6. Debundling for project activity

>>

As per the “guidelines on assessment of debundling for SSC project activities” version 3.0.0,

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:

- with the same project participants
- in the same category and technology/measure; and
- registered within the previous 2 years
- whose project boundary is within 1 km of project boundary of the proposed small scale project activity at the closest point

The project participant does not have any registered CDM project activity in the same region in the same category and technology whose project boundary is within 1 km of the proposed small scale project activity at the closest point.

Thus, the project activity is not a de-bundled component of a large scale project activity[5].

[5]PP will submit undertaking confirming the project activityis not a de-bundled component of a 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

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Title: AMS-I.D."Grid connected renewable electricity generation", version 18.0.0[6]

Reference: Appendix B of the Simplified Modalities and Procedures for small-scale project activities.

The following tools and guidelines are used in this document:

1. Tool to calculate the emission factor for an electricity system – Version 04.0.0
2. Guidelines on the Assessment of Investment Analysis – Version 05.0
3. Guidelines on the demonstration of additionality of small-scale project activities – Version 9.0.0

B.2. Project activity eligibility

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In accordance with the project standard version 5, the proposed project activity falls under Type I & category D. - Grid connected renewable electricity generation and this will be applicable every year of the crediting period.

The applicability of the selected methodology has been justified below:

Sl. No	Technology /Measure as per AMS-I.D, version 18	Measure of project activity
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; or (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	The proposed project activity is a Greenfield wind power plant. The project activity will supply electricity to the state grid of Maharashtra, which forms a part of the NEWNE regional grid. Thus, project activity fulfills the "Option a".
2.	As per Appendix table 1 of AMS.I D version 18 is applicable for following project types: a) Project supplies electricity to a national/regional grid b) Project supplies electricity to an identified consumer facility via national/regional grid (through a contractual arrangement such as wheeling)	The project activity is a Wind energy generation unit. The generated energy is supplied to MSTCL grid, which is a part of NEWNE regional grid which is dominated by fossil fuel based power generating sources. The project activity therefore meets this applicability requirement (b) & (a) both.
3.	This methodology is applicable to project activities that (a) install a Greenfield plant); (b)	This project activity is a green field project.

[6] http://cdm.unfccc.int/methodologies/DB/RSCTZ8SKT4F7N1CFDXCSA7BDQ7FU1X

Sl. No	Technology /Measure as per AMS-I.D, version 18	Measure of project activity
	involve a capacity addition in (an) existing plant(s); (c) involve a retrofit of (an) existing plant(s); or (d) Involve a rehabilitation of (an) existing plants(s)/unit(s); or (e) involve a replacement of (an) existing plant (s).	
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.	This is a wind power generation project, hence not applicable.
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.	There is no non-renewable component in this project activity and the total installed capacity of the project activity is 12 MW which is less than the eligibility limit of 15 MW for a small scale CDM project activity. Hence, the project activity meets this applicability criterion.
6.	Combined heat and power (co-generation) systems are not eligible under this category.	The project activity is wind power generation. Hence, this applicability requirement is not relevant.
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[7] from the existing units.	This is not relevant to the project activity as it does not involve any addition of renewable energy generation units. The project is a Green field power activity.
8.	In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted, rehabilitated or replacement unit shall not exceed the limit of 15 MW.	Not applicable as project is Green filed activity.
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 the recovered methane is used for electricity generation for supply to a grid then the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology. If the recovered	This is not relevant to the project activity since the project activity a small wind power project.

[7] Physically distinct units are those that are capable of generating electricity without the operation of existing units, and that do not directly affect the mechanical, thermal, or electrical characteristics of the existing facility. For example, the addition of a steam turbine to an existing combustion turbine to create a combined cycle unit would not be considered "physically distinct".

Sl. No	Technology /Measure as per AMS-I.D, version 18	Measure of project activity
	methane is used for heat generation or cogeneration other applicable Type-I methodologies such as "AMS-I.C.: Thermal energy production with or without electricity" shall be explored.	
10.	In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.	This is not relevant to the project activity since the project activity a small wind power project.

The above comparison confirms that the chosen methodology is applicable for this project activity**.** The project participant hereby confirms that the capacity of the project activity will not exceed 15 MW during the entire crediting period.

B.3. Project boundary

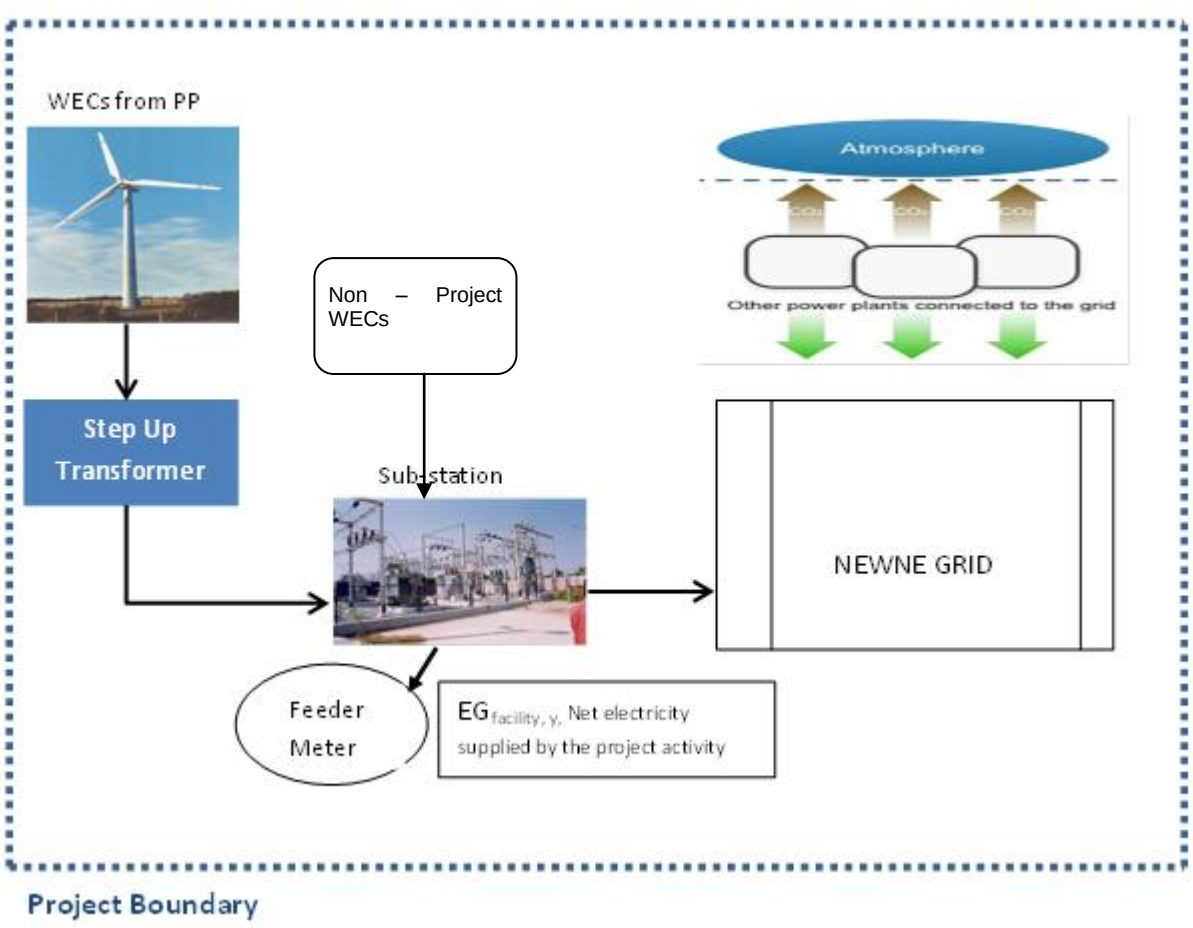
As per Paragraph 9 of the small-scale baseline methodology AMS-I.D., version 18: Grid connected renewable electricity generation - "The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to."

The significant anthropogenic emissions attributable to the project activity are listed in the table below.

Table 1 Emissions sources included in or excluded from the project boundary

	Source	Gas	Included?	Justification / Explanation
Baseline	Grid electricity generation	**CO_2**	**Yes**	**Main emission source.**
		CH_4	No	Excluded for simplification. This is negligible.
		N_2O	No	Excluded for simplification. This is negligible.
Project Activity	Electricity generation from Wind Turbine Generators.	CO_2	No	The project activity does not emit any CO_2 emissions
		CH_4	No	No methane generation is expected to be emitted.
		N_2O	No	No nitrous oxide generation is expected to be emitted.

Therefore, the project boundary for the proposed project activity is:



B.4. Establishment and description of baseline scenario

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In accordance with the project standard Para 41, the baseline scenario for the proposed project activity is established as per the paragraph 10 of the applicable methodology; “the baseline scenario is the electricity delivered to the grid by the project activity that would have been generated by the operation of the grid connected power plants and by the addition of new generation sources into the grid.” In the proposed project activity the generated electricity would be supplied to the NEWNE grid that in the absence of the project activity would have been generated by the operation of the grid connected power plants and by the addition of new generation sources.

The wind power plant is located in the state of Maharashtra and connected to NEWNE grid.

As per AMS-I.D., (Version 18), paragraph 22, Baseline emissions include only CO_2 emissions from electricity generation in power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants.

The baseline emissions are to be calculated as follows:

$$BE_y = EG_{PJ,y} * EF_{grid,y} \quad (1)$$

Where:

BE_y : Baseline Emissions in year y; t CO_2

$EG_{PJ,y}$: Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh)

$EF_{grid,y}$: Combined margin CO2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO2/MWh)

Determination of baseline emission & combined margin emission factor has been provided in section B.6.1 of this PDD.

Data / Parameter used to determine the baseline scenario

Variable	**Data Source**
$EG_{BL,y}$ = Quantity of Net Electricity exported by the project WTGs to the grid during the year y. (MWh/yr)	Calculated (Refer B.7.1)
Parameter	**Data Source**
$EF_{OM,y}$ = Operating Margin Emission Factor for NEWNE grid in year y (tCO_2/MWh)	Baseline Carbon Dioxide Emission Database Version 9.0, (Dated: 27thJanuary 2014) from the Central Electricity Authority, Government of India website http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm
$EF_{BM,y}$ = Build Margin Emission Factor for NEWNE grid in year y (tCO_2/MWh)	Baseline Carbon Dioxide Emission Database Version 9.0 (Dated: 27thJanuary 2014) from the Central Electricity Authority Government of India website http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm
$EF_{CM,y}$ = Combined Margin Emission Factor for NEWNE Grid in year y (tCO_2/MWh)	Calculated as the weighted average of the operating margin and build margin.Baseline Carbon Dioxide Emission Database Version 9.0 (Dated; 27thJanuary 2014) from the Central Electricity Authority website http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

B.5. Demonstration of additionality

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The Para 10 of the applied methodology AMS-I.D version 18, prescribes the baseline scenario for the project activity, as explained in section B.4.

National policies and circumstances relevant to the baseline[8]:

1) "Baseline CO_2 database" Version 09 – Central Electricity Authority

2) Maharashatra Electricity Regulatory Commission (MERC Order March 2013)

3) Electricity Act 2003

The Electricity Act, 2003 provides an enabling framework for accelerated and more efficient development of the power sector. The Act seeks to encourage competition with appropriate regulatory intervention. Competition is expected to yield efficiency gains and in turn result in availability of quality supply of electricity to consumers at competitive rates.

The Section 3 (1) of the Electricity Act 2003 requires the Central Government to formulate, inter alia, the National Electricity Policy in consultation with Central Electricity Authority (CEA) and State Governments. The provision is quoted below:

"The Central Government shall, from time to time, 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".

Further, as per section 5.2.12 of the National Electricity Plan:
Even with full development of the feasible hydro potential in the country, coal would necessarily continue to remain the primary fuel for meeting future electricity demand.

The National Electricity Plan also emphasizes the use of other fossil fuel like gas, LNG, Lignite, other imported fossil fuels in meeting the future electricity need. It further emphasize on the Renovation and Modernization (R&M) of the low performing thermal power stations in the country. This will enable to achieve improved PLF of the thermal power plant.

In the absence of this project activity, electricity would have been generated from the present fossil fuel mix in the NEWNE grid. The NEWNE grid is dominated by fossil fuel fired power plants and thus this project reduce the anthropogenic emissions of greenhouse gases (GHGs) in to the atmosphere associated with the equivalent amount of electricity generation. Wind power

[8] http://www.powermin.nic.in/JSP_SERVLETS/internal.jsp

development in India has been promoted since July 1995 (Source: http://www.mnre.gov.in/schemes/grid-connected/solar-thermal-2/) but there are no national or local laws or regulations that mandate this investment i.e. setting up of wind power projects. Setting up of wind power projects is a voluntary activity.

Prior consideration of CDM

As per Project Standard version 5 para 27, project activities with start date after 02 August 2008, the project participant must inform a Host Party (India) designated national authority (DNA) i.e. Ministry of Environment & Forest, Government of India and the UNFCCC secretariat in writing of the commencement of the project activity. The Project Participant (PP) has notified the UNFCCC and also the Ministry of Environment & Forest, Government of India on 04/12/2014[9] about the project activity initiative which is within 6 months after the project start date and hence qualifies the CDM prior consideration criteria of intimating within a period of six months before or after the start date of the project activity.

Additionality

The latest guideline for additionality i.e. Guidelines on the demonstration of additionality of small-scale project activities version 09.0.0 approved by CDM Executive Board is used to demonstrate project Additionality.

Investment Barrier

Simple cost analysis is not applicable as the project activity sells electricity to the Utility and obtains economic benefits in the form of electricity tariffs.

The alternative to the project activity is continuation of current situation i.e. no project activity, in that case equivalent amount of electricity would have been produced by the grid electricity system. This option will not require capital investment. Hence investment comparison analysis cannot be applied.

The Project Participant proposes to use **Option III – Benchmark Analysis** and the financial indicator that are identified as the *post-tax* equity IRR.

Appropriateness of financial indicator

Equity IRR is a widely accepted financial metric used by many corporations and financial institutions for investment decision-making and is a long-established benchmark for investment decisions in the Indian power sector. Hence equity IRR is chosen as the appropriate financial indicator for carrying out the investment analysis.

[9] http://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html and the notification to NCDMA correspondence has been submitted to DOE.

Appropriateness of Benchmark

As per guidance 12 of Guidelines on the assessment of investment analysis, "Required/expected returns on equity are appropriate benchmarks for an equity IRR". Therefore, the project proponent participant has chosen Cost of Equity as the benchmark to compare the equity IRR.

As per guidance 15 of Guidelines on the assessment of investment analysis, "*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 participant has chosen option (a) to estimate the cost of equity.

Calculation of Benchmark

The default values for the approximate expected return on equity for different project types and host countries are provided in the appendix to "Guidelines on the assessment of investment analysis", Version 5.This value is obtained by looking at the respective value for India corresponding to Group 1 (Energy Industries).

The default value for the expected return on equity (in real terms): 11.75%

As per Para 7 of the appendix to "Guidelines on the assessment of investment analysis", Version 5 "*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."*

According to the Reserve Bank of India's Survey of Professional Forecasters: Results of 30th Round (Q2:2014-15) dated 30th Sep 2014[10], WPI based inflation is expected to be 5 per cent over the next ten years.

Cost of equity = Expected return on equity (in real terms) + Inflation rate

=11.75%+ 5.0%

= 16.75%

[10]http://rbi.org.in/scripts/PublicationsView.aspx?id=16049

Therefore, the benchmark is in line with “Guidelines on the assessment of investment analysis”, Version 5 works out to be 16.75%.

The post-tax equity IRR has been calculated, the details are referred in the IRR spread sheet. The post-tax equity IRR for the Project without CDM revenues is 6.95% which is less than the benchmark 16.75%.

Sensitivity Analysis

As per the Guidance to investment analysis Version 05.0 para 20 “Only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation (all parameters varied need not necessarily be subjected to both negative and positive variations of the same magnitude), and the results of this variation should be presented in the PDD and be reproducible in the associated spreadsheets”

The critical parameters to which the project activity is sensitive are mentioned below:

- Capital Cost
- Plant Load Factor
- O&M cost
- Tariff

Rest all other parameters have less than 20% impact on the project revenues/project expenses, so their impact on equity IRR is very insignificant and hence these parameters have not been considered for sensitivity analysis. The details sensitivity analysis has been presented in the IRR sheet.

The sensitivity analysis clearly shows that even with a 10% variation in key parameters, the project is not able to generate sufficient returns. Also, the break even points with benchmark are received at a very high sensitivity which are the most optimistic scenarios. Thus, it can therefore be concluded that the project is financially not viable without CDM benefits.

The above additionality discussions show that the project activity is not financially attractive; hence the project activity is additional.

B.6. Emission reductions

B.6.1. Explanation of methodological choices

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According to the para 23 of AMS-I.D. (version 18), the Emission Reductions for the project activity will be calculated using the following formula:

$$ER_y = BE_y - PE_y - LE_y \quad \text{.....(2)}$$

Where,

ER_y = Emission Reductions during the year y in tCO_{2e}
BE_y = Baseline Emissions during the year y in tCO_{2e}
PE_y = Project Emissions during the year y in tCO_{2e}
LE_y = Leakage Emissions during the year y in tCO_{2e}

Calculation of Baseline Emissions

As per para 22 of AMS-I.D. (version 18), baseline emissions (BE_y in tCO_{2e}) are the product of electrical energy baseline $EG_{BL,\ y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor ($EF_{CO2,grid,\ y}$).

$$BE_y = EG_{PJ,y} * EF_{grid,y} \quad \text{.....(3)}$$

Where,

BE_y = Baseline Emissions in year y (tCO2)

As per para 26 of AMS-I D ver 18,

$EG_{PJ,y}$ = $EG_{PJ,facility,y}$ = Quantity of net electricity supplied by the project plant/unit to the grid in year y (MWh).

(The net electricity export to the grid is the difference between the quantities of the grid electricity export and the import.)

$EF_{grid,\ y}$= CO2 emission factor of the grid in year *y* (t CO2/MWh)

(Baseline emission factor for the grid (considering Combined Margin approach). NEWNE regional grid has been considered for this project activity.)

A. Calculation of CO_2 emission factor of grid

According to AMS-I.D Version 18, the baseline emissions are the product of electrical energy baseline $EG_{BL,\ y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor which can be calculated in a transparent and conservative manner as:

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the 'Tool to calculate the emission factor for an electricity system'

OR

(b) The weighted average emissions (in kg CO2e/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

The project participants have chosen the combined margin approach to calculate the emission coefficient for the grid. According to the tool to calculate emission factor for an electricity system the baseline emission coefficient (Version 04.0.0) will be determined using the following steps:

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. Identifying the relevant electricity systems

The tool specifies that for determining the electricity emission factors, relevant project electricity system and connected electricity systems needs to be identified.

The Indian electricity system is divided into two grids, the Integrated Northern, Eastern, Western and North-Eastern regional grids (NEWNE) and the Southern Grid. The NEWNE grid includes the state of Maharashtra, where the project activity is located.

Each state in the regional grid meets its own demand with its own generation facilities and also with allocation from power plants owned by the central sector. Depending on the demand and generation, there are electricity exports and imports between states in the regional grid. The volume of the net transfers between the regions in India is relatively small and electricity is largely produced and consumed within the same states. Consequently, it is appropriate to assume that the impacts of the project activity will be confined to the regional grid in which it is located. Hence for the purpose of estimation of the baseline emission factor, the NEWNE grid has been chosen as the relevant electricity system.

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

Project participants may choose 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 opted for Option I and hence chosen only grid power plants in the calculation.

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

According to the tool the calculation of the operating margin emission factor is based on one of the following methods:

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

Any of the four methods can be used, however, the simple OM method (option a) can only be used if low cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.

The Share of Low Cost / Must-Run (% of Net Generation) in the generation profile of the different grids in India in the last five years is as follows:

	Share of Must-Run (Hydro/Nuclear) (% of Net Generation)				
	2008-09	2009-10	2010-11	2011-12	2012-13
NEWNE	17.4%	15.9%	17.6%	19.2%	17.4%
South	22.8%	20.6%	21.0%	21.0%	15.2%
India	18.7%	17.1%	18.4%	19.6%	16.9%

Source: CO_2 Baseline Database for the Indian Power Sector, Central Electricity Authority (Version 9.0)

The above data clearly shows that the percentage of total grid generation by low cost/must run plants (on the basis of average of five most recent years) for the NEWNE regional grid is less than 50 % of the total generation.

As per tool to calculate emission factor for an electricity system (Version 04.0.0), The simple OM method (option a) can only be used if low-cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production. Since the low cost/must run resources constitute less than 50% of total grid generation as seen from the average of five most recent years, the Simple OM method can be used to calculate the Operating Margin Emission factor.

The project participants choose an ex-ante option for calculation of the Simple OM with a 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, without requirement to monitor and recalculate the emissions factor during the crediting period.

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 CO2emissions per unit net electricity generation (tCO2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units.

The simple OM may be calculated:

Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit; or

Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

The Central Electricity Authority, Ministry of Power, Government of India has published a database of Carbon Dioxide Emission from the power sector in India based on detailed authenticated information obtained from all operating power stations in the country. This database i.e. The CO2 Baseline Database provides information about the Combined Margin Emission Factors of all the regional electricity grids in India. The Combined Margin in the CEA database is calculated ex ante using the guidelines provided by the UNFCCC in the "Tool to calculate the emission factor for an electricity system, Version 04.0.0". We have, therefore, used the Combined Margin data published in the CEA database, for calculating the Baseline Emission Factor.

As per 'Tool to calculate the emission factor for an electricity system', Option A ("Based on the net electricity generation and a CO_2 emission factor of each power unit")is used to calculate simple OM emission factor. Where Option A is used, the simple OM emission factor is calculated based on the electricity generation of each power unit and an emission factor for each power unit, as follows:

$$\mathbf{EF_{grid,OMsimple,y} = \Sigma\ (EG_{m,y} \times EF_{EL,m,y}) / \Sigma EG_{m,y}}$$

Where:

$EF_{grid,OMsimple,y}$	Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$	CO_2 emission factor of power unit m in year y (tCO_2/MWh)
m	All power units serving the grid in year y except low-cost / must-run power units
y	the relevant year as per the data vintage chosen in STEP 3

The CO_2 emission factor ($EF_{EL,m,y}$) data for simple OM, available under the CEA database[11] (Version 6.0) for the last three years is as follows.

[11] http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

CO_2 emission factor for simple OM (tCO_2/MWh) (incl. Imports)			
Grid	**2010-11**	**2011-12**	**2012-13**
NEWNE	0.9710	0.9691	0.9914
South	0.9421	0.9602	0.9972
India	0.9641	0.9664	0.9915

The net electricity generation ($EG_{m,y}$) data, available under the CEA database[12] (Version 9.0), of all generating power plants (not including low-cost / must-run power plants / units) for the last three year is as follows:

Net Electricity Generation for Simple OM (MWh) (incl. Imports)			
Grid	**2010-11**	**2011-12**	**2012-13**
NEWNE	476,986,721	502,300,381	539,385,372

Thus, as can be seen from the above tables, the 3 years generation-weighted OM average for the most recent three years available at the time of PDD for validation, i.e. 2010-11, 2011-12 and 2012-13 for NEWNE grid is:

The ex-ante OM value obtained is 0.9776[13] tCO2/MWh.

STEP 5. Calculate the build margin emission factor

The project participants have chosen Option I, i.e. fixing build margin emission factor 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.

The build margin emissions factor is the generation-weighted average emission factor of all power units m during the most recent year y for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = (\Sigma\ EG_{m,y} \times EF_{EL,m,}) / \Sigma\ EG_{m,y}$$

Where:

$EF_{grid,BM,y}$ - Build margin CO_2 emission factor in year y (tCO_2/MWh)

$EG_{m,y}$ - Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)

$EF_{EL,m,y}$ - CO_2 emission factor of power unit m in year y (tCO_2/MWh)

[12] http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

[13] Refer ER sheet for detail calculation.

m - Power units included in the build margin

y - Most recent historical year for which power generation data is available

The CO_2 emission factor of each power unit m ($EF_{EL,m,y}$) is determined as per the procedures given in step 4 (a) for the simple OM, using options A1B1 using for *y* the most recent historical year for which power generation data is available, and using for *m* the power units included in the build margin.

The build margin emission factor ($\mathbf{EF_{grid,BM,y}}$) for the year 2012-13 (most recent year) for NEWNE grid is 0.9673 tCO_2/MWh.

STEP 6. Calculate the combined margin emissions factor

The emission factor EFy of the grid is represented as a combination of the Operating Margin (OM) and the Build Margin (BM). Considering the emission factors for these two margins as EFgridOM,y and EFgridBM,y, then the EFy is given by:

$$\mathbf{EF_{grid,CM,y} = EF_{grid,OM,y} * w_{OM} + EF_{grid,BM,y} * w_{BM}}$$

Where:

$EF_{grid, BM, y}$ - Build margin CO_2 emission factor in year y (tCO_2/MWh)

$EF_{grid, OM, y}$ - Operating margin CO_2 emission factor in year y (tCO_2/MWh)

w_{OM} - Weighting of operating margin emissions factor

w_{BM} - Weighting of build margin emissions factor (where $w_{OM} + w_{BM} = 1$).

The "Tool to calculate the emission factor for an electricity system" requires that for intermittent sources for power generation like windas in the case of proposed CDM project activity the following weights to be used for calculating the emission factor for Combined Margin.

$W_{OM} = 0.75$

$W_{BM} = 0.25$

Using the values of emission factors for OM and BM for NEWNE grid, provided in the CEA official database and as computed above; and the weights provided above, the value of the emission factor for the combined margin has been determined to be:

= 0.9776* 0.75 + 0.9673 * 0.25 tCO2/MWh

= 0.9750 tCO2/MWh

Project Emissions:

The project activity uses wind energy to generate electricity and hence the emissions from the project activity are taken as NIL (as per AMS-I.D Version 18 para 39, 40).

PEy = 0

Leakage:

Since no equipment is transferred from another project activity or that any existing equipment is transferred to another activity, leakage (as per AMS-I.D Version 18 para 42) is taken as zero.

LEy = 0

B.6.2. Data and parameters fixed ex ante

Data / Parameter	$EF_{gridOM,y}$
Unit	tCO_2/MWh
Description	Operating Margin Emission Factor for NEWNE Grid
Source of data	"CO_2 Baseline Database for Indian Power Sector" published by the Central Electricity Authority, Ministry of Power, Government of India.Version 9.0 dated January 2014 The "CO2 Baseline Database for Indian Power Sector" is available at http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm
Value(s) applied	0.9776
Choice of data or Measurement methods and procedures	The "CO2 Baseline Database for the Indian Power Sector", User Guide, Version 9.0 dated January 2014, released by the Central Electricity Authority, Ministry of Power, Government of India, is the official database for statistics on the power sector in India in the various grids. It has been specially created to meet the data requirements for emission factors for the CDM project activities in the country. Operating Margin Emission Factor has been calculated by the Central Electricity Authority using the simple OM approach in accordance with "Tool to calculate emission factor for an electricity system". The "CO2 Baseline Database for Indian Power Sector" is available at http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm (Refer version 9 dated January 2014)
Purpose of data	Calculation of baseline emissions
Additional comment	Operating margin emission factor is fixed ex-ante throughout the crediting period.

Data / Parameter	$EF_{gridBM,y}$
Unit	tCO2/MWh
Description	Build Margin Emission Factor for NEWNE Grid
Source of data	"CO2 Baseline Database for Indian Power Sector" published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO2 Baseline Database for Indian Power Sector" is available at http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm
Value(s) applied	0.9673

Choice of data or Measurement methods and procedures	The "CO_2 Baseline Database for the Indian Power Sector", User Guide, Version 9.0 dated January 2014, released by the Central Electricity Authority, Ministry of Power, Government of India, is the official database for statistics on the power sector in India in the various grids. It has been specially created to meet the data requirements for emission factors for the CDM project activities in the country. The database is used in accordance with the requirements in the applicable methodology stated as, "Calculations must be based on data from an official source and made publicly available" Build Margin Emission Factor has been calculated by the Central Electricity Authority in accordance with "Tool to calculate emission factor for an electricity system". The "CO2 Baseline Database for Indian Power Sector" is available at http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm (Refer version 9 dated January 2014)
Purpose of data	Calculation of baseline emissions
Additional comment	Build margin emission factor is fixed ex-ante throughout the crediting period.

Data / Parameter	$EF_{gridCM,y}$
Unit	tCO_2/MWh
Description	Combined Margin Emission Factor for NEWNE Grid
Source of data	Computed using the following formula $EF_{CO2,grid,y} = WOM * EF_{grid,OM,y} + WBM * EF_{grid,BM,y}$ $EF_{CO2,grid,y} = 0.75 * 0.9776 + 0.25 * 0.9673 = 0.9750$ Combined margin CO2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system – Version 04.0.0"
Value(s) applied	0.9750
Choice of data or Measurement methods and procedures	This is in accordance with the latest version of the applicable methodology, AMS-I.D Version 18 – Grid Connected Renewable Electricity Generation, and the "Tool to calculate the Emission Factor for an Electricity System, Version 04.0.0"
Purpose of data	Calculation of baseline emissions
Additional comment	Combined margin emission factor is fixed ex-ante throughout the crediting period.

B.6.3. Ex ante calculation of emission reductions

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Ex-ante calculation of emission reductions is equal to ex-ante calculation of baseline emissions as project emissions and leakages are taken as per prescribed para of AMS-I.D Version 18.

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

$EG_{BL,y}$ = Capacity * PLF * Generating Hour (in a year)**…….. (3)**

= 12 MW (Capacity) x 22% (PLF) x 8,760 (hours) MWh

= 23,126 MWh

$EF_{CO2,grid,y}$ (Baseline emission factor(combined margin) as calculated in Section B.6.1.)

= 0.9750tCO2/MWh

ER_y = $EG_{BL,y}$* $EF_{CO2,grid,y}$**…….. (2)**

= 23,126 MWh x 0.9750 tCO_{2e}/MWh

= 22,548 tCO_{2e}

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	22,548	0	0	22,548
Year 2	22,548	0	0	22,548
Year 3	22,548	0	0	22,548
Year 4	22,548	0	0	22,548
Year 5	22,548	0	0	22,548
Year 6	22,548	0	0	22,548
Year 7	22,548	0	0	22,548
Year 8	22,548	0	0	22,548
Year 9	22,548	0	0	22,548
Year 10	22,548	0	0	22,548
Total	225,480	0	0	225,480
Total number of crediting years	10			
Annual average over the crediting period	22,548	0	0	22,548

*Begins from the start date of crediting period and each year extends for 12 months.

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data / Parameter	$EG_{BL,y} = EG_{facility, y}$
Unit	MWh/year
Description	Quantity of Net Electricity exported by the project WTGs to the grid during the year y.
Source of data	Calculated
Value(s) applied	23,126
Measurement methods and procedures	Delivered/Net electricity supplied to the Maharashtra State Electricity Distribution Co. Ltd. (MSEDCL) will be calculated based on the difference between measured values of "export" and "import" electricity at the Main/Check meter installed at the respective feeders. $EG_{facility,y} = \sum_{i=1}^{N} (EG_{export,i,y} - EG_{import,i,y})$ Note: In cases where other (non-project) WTGs connected to the same feeder, appropriate apportioning mechanism specified in PDD section B.7.3 shall be applied. Also for cases when the start/end dates of monitoring period do not match with the start/end dates of Joint Meter Reading Sheets / Generation reports issued by MSEDCL, appropriate apportioning mechanism specified in PDD section B.7.3 shall be applied.
Monitoring frequency	Not Applicable
QA/QC procedures	The quantity of net electricity supplied canbe cross-verified from the invoices raised to MSEDCL by the project participant. As this is a calculated parameter, no other QA/QC procedures would be required.
Purpose of data	Used to calculate baseline emissions
Additional comment	Data will be archived for crediting period plus two years after the end of Crediting period

Data / Parameter	$E_{exp,i,y}$
Unit	MWh/year
Description	Quantity of electricity exported by the Project WTGs connected to the feeder i to the grid during the year y.
Source of data	Joint Meter Reading Sheets and generation report issued by Maharashtra State Electricity Distribution Co. Ltd. (MSEDCL) In cases where other (non-project) WTGs connected to the same feeder, appropriate apportioning mechanism specified in PDD section B.7.3 shall be applied. Also for cases when the start/end dates of monitoring period do not match with the start/end dates of Joint Meter Reading Sheets / Generation reports issued by MSEDCL, appropriate apportioning mechanism specified in PDD section B.7.3 shall be applied.
Value(s) applied	23,126
Measurement methods and procedures	Quantity of electricity export would be measured by energy meter (Main & Check meter at each feeder) and the meter reading at the metering point shall be undertaken jointly by the representatives of project participant (i.e. O&M provider) and MSEDCL official. Data Recording: Electronic/ Paper Energy Meter accuracy Class: 0.2s
Monitoring frequency	Continuous measurement and monthly recording
QA/QC procedures	The energy meters will be calibrated once in three years or as per the Power Purchase Agreement (PPA) with the MSEDCL. The main and check meters shall be calibrated and maintained by the state utility as per their own schedule but at least once in 3 years. The frequency of testing and calibration is not within the direct control of the Project Participant.
Purpose of data	Used to calculate baseline emissions
Additional comment	Data will be archived for crediting period plus two years after the end of Crediting period

Data / Parameter	$E_{imp,i,y}$
Unit	MWh/year
Description	Quantity Electricity imported by the Project WTGs connected to the feeder i from the grid during the year y.
Source of data	Joint Meter Reading Sheets and generation report issued by Maharashtra State Electricity Distribution Co. Ltd. (MSEDCL) In cases where other (non-project) WTGs connected to the same feeder, appropriate apportioning mechanism specified in PDD section B.7.3 shall be applied. Also for cases when the start/end dates of monitoring period do not match with the start/end dates of Joint Meter Reading Sheets / Generation reports issued by MSEDCL, appropriate apportioning mechanism specified in PDD section B.7.3 shall be applied.
Value(s) applied	0 (Will be monitored and taken on actuals)[14]
Measurement methods and procedures	Quantity of electricity imported would be measured by energy meter (Main & Check meter at each feeder) and the meter reading at the metering point shall be undertaken jointly by the representatives of project participant (i.e. O&M provider) and MSEDCL official. Data Recording: Electronic/ Paper Energy Meter accuracy Class: 0.2s
Monitoring frequency	Continuous measurement and monthly recording
QA/QC procedures	The energy meters will be calibrated once in three years or as per the Power Purchase Agreement (PPA) with the MSEDCL. The main and check meters shall be calibrated and maintained by the state utility as per their own schedule but at least once in 3 years. The frequency of testing and calibration is not within the direct control of the Project Participant.
Purpose of data	Used to calculate baseline emissions
Additional comment	Data will be archived for crediting period plus two years after the end of Crediting period

[14] The value is considered to be zero for simplicity of ex-ante emission reduction calculations, and it can't be predicted at the time of validation. However, during the crediting period the actual export and import to/from the grid will be monitored and considered for the calculation of emission reduction.

Data / Parameter	$EG_{All\_controller,i,y}$
Unit	MWh
Description	Sum of Electricity generation measured by controllers of project and non - project WTGs connected to feeder i during period y
Source of data	Controllers meter readings of individual WTGs monitored at the Central Monitoring Station (CMS)
Value(s) applied	-
Measurement methods and procedures	This parameter would be used for calculation of $EG_{facility,y}$ in cases where there are other (non-project) WTGs connected to the same feeder and also in cases when the start/end dates of monitoring period do not match with the start/end dates of Joint Meter Reading Sheets / Generation reports issued by MSEDCL. This parameter is the sum of electricity generated by WTGs connected to a particular feeder and will be measured by the inbuilt controller meters (also called LCS meters) located in each WTGs on a continuous basis. The readings will be recorded at the Central Monitoring Station (CMS) on a daily basis. O&M contactor will have the responsibility of monitoring this parameter. This value will be used in an appropriate apportioning formula specified in PDD section B.7.3
Monitoring frequency	Continuous measurement and monthly recording
QA/QC procedures	The LCS meters do not require calibration as the energy readings of electricity generated at the LCS meter is cross verified by the energy calculated by inverting system installed in the WTGs. In case there is any mismatch in the energy values recorded by the LCS meter and the energy values calculated by the inverting system; the machine will stop working and generate the error report. The project participant does not have any control over the LCS meter readings of other project developers and therefore the values certified by the MSEDCL will be directly used for the purpose of calculating the electricity exports to the grid.
Purpose of data	Used to calculate baseline emissions
Additional comment	Data will be archived for crediting period plus two years after the end of Crediting period.

Data / Parameter	$EG_{WTGcontroller,i,y}$
Unit	MWh
Description	Sum of Electricity generation measured by controllers of all the project WTGs that are connected to feeder i during period y
Source of data	Controllers meter readings of project activity WTGs monitored at the Central Monitoring Station (CMS)
Value(s) applied	-
Measurement methods and procedures	This parameter would be used for calculation of $EG_{facility,y}$ in cases where there are other (non-project) WTGs connected to the same feeder and also in cases when the start/end dates of monitoring period do not match with the start/end dates of Joint Meter Reading Sheets / Generation reports issued by MSEDCL. This parameter is the sum of electricity generated by project WTGs connected to a particular feeder i and will be measured by the inbuilt controller meters (also called LCS meters) located in each WTGs on a continuous basis. The readings will be recorded at the Central Monitoring Station (CMS) on a daily basis. O&M contactor will have the responsibility of monitoring this parameter. This value will be used in an appropriate apportioning formula specified in PDD section B.7.3
Monitoring frequency	Continuous measurement and monthly recording
QA/QC procedures	The LCS meters do not require calibration as the energy readings of electricity generated at the LCS meter is cross verified by the energy calculated by inverting system installed in the WTGs. In case there is any mismatch in the energy values recorded by the LCS meter and the energy values calculated by the inverting system; the machine will stop working and generate the error report. The project participant does not have any control over the LCS meter readings of other project developers and therefore the values certified by the MSEDCL will be directly used for the purpose of calculating the electricity exports to the grid.
Purpose of data	Used to calculate baseline emissions
Additional comment	Data will be archived for crediting period plus two years after the end of Crediting period

B.7.2. Sampling plan

>>
Not applicable

B.7.3. Other elements of monitoring plan

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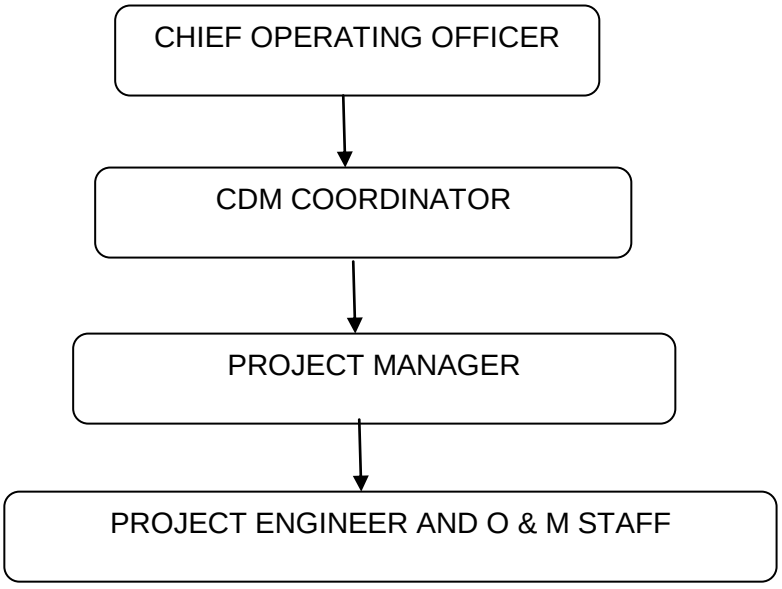
Approved monitoring methodology AMS-I.D (Version 18.0) Sectoral Scope: 1, “Grid connected renewable electricity generation”, by CDM - Meth Panel is proposed to be used to monitor the emission reductions.

As the emission reductions from the project are determined by the number of units exported to the grid it is mandatory to have a monitoring system in place and ensure that the project activity produces and supplies the rated power at the stipulated norms. The sole objective of having monitoring system is to have a constant watch on the net electricity exported to the grid for the estimation of emission reductions.

The project participant will enter into agreement with the WEC- Supplier (i.e. Regen Powertech) for the operation and maintenance (O&M) of WECs. The WEC supplier has dedicated and technically well-equipped O&M team for day to day Operation and maintenance of each WEC. O&M provider will provide a monthly report, which includes generation data, major breakdown events and machine availability to the project participant. Project Manager is responsible for recording of monthly Joint Meter Readings of export and import, Monthly power export and import data will be sent regularly to CDM coordinator of Sispara Renewable Power Private Limited in Maharashtra, India.

The organisational structure of this CDM project activity is as follows.



O&M staff of the technology supplier will be responsible for day-to-day operation of the machines and maintenance of data on monthly generation, special events etc. The CDM coordinator will be responsible for assessment of emission reduction achieved every year and documentation of the same.

Meter readings will be taken jointly at the appointed date by PP's representative, ReGen Powertech official and Discom officials. The metering equipment at the sub-station (consisting of the Main Meter and the Check Meter) is of 0.2% accuracy class. The metering equipment is duly approved, tested and sealed by MSEDCL and is in control of Discom only. The meter readings are jointly certified by representatives of the State Grid/Discom and Regen Powertech Limited. However, it is the readings of the Main meter that is considered for billing & emission reduction purpose. After the main meter readings are checked and cleared by Discom authorities, the JMR readings (credit notes) are forwarded to the Circle office of the Discom.

Evaluation and verification procedures: This involves recording, data collection of all wind turbines, metering of electricity generated at substation, on daily basis as well as on monthly basis. The general conditions for metering, recording, meter readings, meter inspections, Test & Checking and communication shall be as per the Power Purchase Agreement with the state utility.

Procedure for apportioning of electricity:

1. In case the start/end dates of monitoring period do not match with the start/end dates of Joint Meter Reading Sheets / Generation reports issued by Maharashtra State Electricity Distribution Co. Ltd. (MSEDCL), following apportioning procedure will be applied for the first and the last monitoring period within a particular crediting period:

   Apportioning will be carried out based on ratio of generation data recorded using LCS installed at the WTG. The emission reductions of that particular period (between the start/end date of monitoring period and the end/start of the billing period) will be calculated based on percentage generation of that particular period at WTG using LCS data multiplied with the total units generated in the month as per the Joint Meter Reading Sheets / Generation report issued by Maharashtra State Electricity Distribution Co. Ltd. (MSEDCL). The calculation formula has been furnished below:

   Generation from all project WTGs for the period y1= $EG_{WTG\_controller,y1}$
   Generation from all project WTGs for the period y2= $EG_{WTG\_controller,y2}$

   Net energy supplied used for calculation of emission reduction for the monitoring period y1
   i.e.
   $$EG_{facility,y1} = \sum_{i=1}^{N} ((EG_{export,i,y2} - EG_{import,i,y2}) * (EG_{WTG\_controller,i,y1} / EG_{WTG\_controller,i,y2}))$$
   Where:
   y1 = No. of days within a billing period up to which generation is considered for emission reduction calculation

y2 = No. of days in the billing period

N = No. of feeders to which project WTGs are connected to.

2. In case if there are project and non-project WTGs connected to a particular feeder i, the quantity of net electricity supplied by project WTGs to the grid connected to that particular feeder will be calculated based on the formula specified below:

   Total generation from all project WTG(s) connected to the feeder i in period y = $EG_{WTG\_controller,i,y}$
   Total generation from all project and non -project WTGs connected to the feeder i in period y = $EG_{All\_controller,i,y}$

   Quantity of electricity exported by all (project and non- project) WTGs connected to feeder i to the grid in period y= $EG_{exp,i,y}$

   Quantity of electricity imported by all (project and non- project) WTGs connected to feeder i to the grid in period y = $EG_{imp\ i,y}$

   Net electricity supplied by the project WTGs connected to feeder i to the grid in period y

   .

$$EG_{facility,y1} = \sum_{i=1}^{N} ((EG_{exp,i,y} - EG_{imp,i,y}) * (EG_{WTG\_controller,i,y} / EG_{All\_controller,i,y}))$$

   Where:
   N = No. of feeders to which project WTGs are connected to.

3. In cases where both scenarios mentioned above exist at the same time (i.e. both project and non-project WTGs connected to the same feeder(s) and the start/end date of the monitoring periods do not match with those of the JMR readings), firstly the apportioning as per point # 2 above will be applied for the billing period y2 to estimate the Net electricity supplied by the project WTGs connected to feeder i to the grid in period y2. Then this value would replace ($EG_{exp,y2}$ - $EG_{imp,y2}$) in the formula specified in point # 1 to arrive at the Net energy export used for calculation of emission reduction for the monitoring period y1.

Emergency Preparedness:

In case of failure of the main meter, it would be replaced immediately and the meter would be sent for testing and generation reading would be sourced from the check meter. If both main and check meters fail, they would be sent for testing and during testing of the meters, one of the following two scenarios would occur and the generation values would be taken as per the scenarios:

Scenario 1

Failure of the meters such that the generation values are not affected and can be retrieved using alternative methods (e.g., failure of the display of the meter) - If such a scenario is observed during the testing of the meters, the generation values would be taken as recorded and no correction would be applied.

Scenario 2

Failure of the meters which affects the generation values and the readings recorded by the meters are deemed to be faulty - If such a scenario is observed during testing of the meters and the exact date of the failure can be determined, then the emission reductions would be calculated by applying an error factor (as per "GUIDELINES FOR ASSESSING COMPLIANCE WITH THE CALIBRATION FREQUENCY REQUIREMENTS" version 1) to the generation values from the determined date of failure of the meters till the date of meter replacement.

If the exact date of the failure cannot be determined, then the emission reductions would be calculated by applying an error factor (as per "GUIDELINES FOR ASSESSING COMPLIANCE WITH THE CALIBRATION FREQUENCY REQUIREMENTS" version 1) to the generation values from the date of last calibration of the meter till the date of meter replacement.

B.7.4. Date of completion of application of methodology and standardized baseline and contact information of responsible persons/ entities

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Date of completion of application of methodology:
14/03/2015

Contact information of responsible persons/ entities:

For "Sispara Renewable Power Private Limited in Maharashtra, India"
Deepjyoti Borah
C/o Hive Of Boradinco Services, India.
(The Person/entity is not a project participant in this Project)

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

>>
22/09/2014[15] (Date of work order signed with the technology provider).

C.1.2. Expected operational lifetime of project activity

>>
20 Years[16], 00 months

C.2. Crediting period of project activity

C.2.1. Type of crediting period

>>
Fixed

C.2.2. Start date of crediting period

>>
01/06/2015 (or the date of submission of PDD for request for registration)

C.2.3. Length of crediting period

>>
10 years and 00 months

[15] Start date definition stipulated under "Glossary of CDM terms", the starting date of a CDM project activity is "the earliest date at which either the implementation or construction or real action of a CDM project activity or CPA begins".

[16] As per technology provider specification – Appendix 1.3 of Regen Powertech.

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

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As per the Schedule 1 of the EIA notification[17] 2012, given by the Ministry of Environment and Forests under the Environment (Protection) Act 1986, the proposed project doesn't fall under the list of activities requiring EIA and therefore need not conduct Environmental Impact Assessment (EIA) studies.

The project will not involve any negative environmental impacts, as the plant is installed for generation of power using wind energy which is a clean source of energy, thus no EIA study was required.

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

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The stakeholders identified for the project activity are as follows:

1. Local villagers
2. Local Gram Panchayat Members/ local govt. bodies/schools etc
3. Employees of M/s Sispara Renewable Power Private Limited in Maharashtra, India

All the stakeholders have been invited through the News Paper advertisement; Dated: 15/01/2015. The documentary evidence towards the same would be submitted to the DOE during validation. Project participant has requested all the stakeholders to attend the meeting on 20/12/2014 to provide their comments on the project activity and have gathered the comments detailed in below section.

In the meeting, the stakeholders were briefed about the project activity in the local language and were informed as to how power is generated using wind energy. They were then informed about global warming and its causes and the effects. Subsequently, they were introduced to the concept of CDM and how it is helping the world in mitigating Green House Gas emissions. The stakeholders were then invited to provide their comments on how the project activity had affected their lives and about their expectations from the project activity.

The opinion of the institutional stakeholder is reflected in the form of approvals and clearances granted for the project activity. The project promoters have sought and obtained the necessary regulatory clearances for setting up of the project activity.

[17] http://envfor.nic.in/legis/eia/so1533.pdf

E.2. Summary of comments received

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The local villagers and the contractors expressed their happiness with the setting up of the power project in their village as it had resulted in generation of business opportunities for the local people. They were also happy because by setting up of wind power plant, the quality of power supply would also improve and would also help in improvement in agricultural activities.

E.3. Report on consideration of comments received

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No negative comments were received from any of the stakeholders which mandated an action on the part of the project promoters.

SECTION F. Approval and authorization

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The Host Country approval (HCA) is not available at the time of submitting this PDD to the validating DOE.

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

Project participant and/or responsible person/ entity	☒ Project participant ☒ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	Sispara Renewable Power Private Limited in Maharashtra, India
Street/P.O. Box	Road No. 12, Banjara Hills,
Building	#8-2-684/2/A, NSL ICON
City	Hyderabad
State/Region	Andhra Pradesh
Postcode	500 034
Country	India
Telephone	+91 40 3051 4444
Fax	+91 40 3051 4220
E-mail	rajnikant.a@nslpower.com
Website	
Contact person	
Title	DGM
Salutation	Mr
Last name	Akella
Middle name	
First name	Rajnikant
Department	Power Division
Mobile	NA
Direct fax	+91 40 3051 4220
Direct tel.	+91 40 3051 4444
Personal e-mail	rajnikant.a@nslpower.com

Appendix 2. Affirmation regarding public funding

There is no public funding from Annex 1 countries and no diversion of Official Development Assistance (ODA) involved in the project activity.

Appendix 3. Applicability of methodology and standardized baseline

Please refer to section B.2

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

Baseline information

Please refer to section B.6

Appendix 5. Further background information on monitoring plan

Please refer to section B.7.3

Appendix 6. Summary of post registration changes

Not applicable

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Document information

Version	*Date*	*Description*
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 **Error! Reference source not found.**; • Change the reference number from *F-CDM-SSC-PDD* to *CDM-PDD-SSC-FORM*; • Editorial improvement.
04.1	11 April 2012	Editorial revision to change history box by adding EB meeting and annex numbers in the Date column.
04.0	13 March 2012	EB 66, Annex 9 Revision required to ensure consistency with the “Guidelines for completing the project design document form for small-scale CDM project activities”
03.0	15 December 2006	EB 28, Annex 34 • The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.
02.0	08 July 2005	EB 20, Annex 14 • The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
01.0	21 January 2003	EB 07, Annex 05 Initial adoption.

Decision Class: Regulatory
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