Project design document form
(Version 11.0)

BASIC INFORMATION	
Title of the project activity	Wind Power Project in Madhya Pradesh by EnvironmentFirst-214
Scale of the project activity	☐ Large-scale ☒ Small-scale
Version number of the PDD	04
Completion date of the PDD	03/11/2019
Project participants	M/s EnvironmentFirst Energy Services (P) Limited
Host Party	India
Applied methodologies and standardized baselines	Methodology : AMS.ID Version 18 Type : I – Renewable Energy Project (Small Scale) Category: D Grid Connected Renewable
Sectoral scopes linked to the applied methodologies	Sectoral Scope:01
Estimated amount of annual average GHG emission reductions	5,047 tCO2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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The project activity is the installation of 2 Wind Turbine Generators (WTGs) of capacity 1.5 MW each in district Mandsaur and Shajapur of Madhya Pradesh (India). The total installed capacity of the project is 3 MW. The project activity harnesses the potential of wind energy as a clean fuel to generate electrical energy. The project activity is displacing the NEWNE Grid electricity and is supposed to generate 5,167 MWh of electricity annually. The estimated annual emission reduction by the project activity is 5,047 tCO2e whereas the estimated emission reduction for renewable crediting period of 7 years is 35,329 tCO2e.

M/s Medicell is the project owner of the project activity whereas M/s Environment first Energy Services (P) Limited (hereinafter referred as EnvironmentFirst) is the project participant for the project activity.

Project boundary includes Wind power generation system and all power plants connected physically to the local grid to which the proposed project supplies renewable electricity to avoid GHG emissions. The project is located in the state of Madhya Pradesh hence falls under the purview NEWNE grid of the Indian Electricity system.

The project is a renewable energy project with maximum output capacity of 3 MW which is well below the specified limits of 15 MW of maximum output capacity and will remain of maximum output capacity of 3 MW during the whole crediting period. Also the project activity sells electricity to regional grid. Hence it qualifies for the Type-I as per Appendix B of the simplified modalities and procedures for small-scale project activities. There is no more than one component in the project activity indicates the small-scale or microscale project type for each component separately.

Purpose of the project activity:

The main purpose of the project activity is to generate electrical energy through sustainable means using Wind power resources, to sale the generated output to concerned grids, which is NEWNE Grid in this case and to contribute to climate change mitigation efforts.

Pre-project Scenario:

In pre project scenario the project activity was not there to generate electricity at the site and in the absence of the project activity, the equivalent amount of 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 in to the NEWNE Grid, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system”.

Baseline scenario:

The baseline scenario for the project activity is identical to the scenario existing prior to the implementation of the project activity.

Contribution of project activity to sustainable development:
The project participant believes that the project activity has contributed to the sustainable development as discussed below according to the indicators stipulated by Ministry of Environment

and Forests, Govt. of India for sustainable development in its interim approval guidelines for host country approval eligibility criteria for Clean Development Mechanism (CDM) projects[1]:

I. Social wellbeing:

- The proposed project would lead to generation of business opportunities and employment in the region thereby contributing towards social upliftment through direct and indirect benefits.
- The project activity in its execution will lead to development of infrastructure in the region and at the same time promote business in the region through the improvement in electricity generation capacity of the grid.

II. Economic wellbeing:

- The project will generate electricity utilizing renewable source like Wind, thus will enhance the contribution of renewable based power generation in the region and will also help in reducing the demand - supply gap of the respective grid.
- The project activity involves substantial amount of investment, thus will contribute to generation of direct and indirect employment opportunities

III. Environmental wellbeing:

- The project activity employs Wind power for generation of electricity thereby displacing fossil fuels which are being rapidly consumed to meet the growing demand of electricity in the country thus contributing towards reduction in GHG emissions.
- Wind power projects generate no end products in the form of solid waste (ash etc.) compared to alternative modes of power generation (e.g. coal based on which the Indian grid is primarily dependent). Hence the project activity is a cleaner source of power generation and is encouraging greener practice of power generation.
- The Wind power project indirectly is contributing towards conservation of non–renewable resources which are under the constant threat of depletion due to excessive and rapid growth of energy demand. The growing threat of global warming which is a key concern is also addressed due to renewable energy use thereby mitigating climate change.

IV. Technological wellbeing:

The project activity uses Wind Turbine Generation technology for grid connected power generation thereby demonstrating the viability of Wind based renewable energy generation in the region, which is fed into the nearest sub-station (part of the NEWNE Grid), thus increasing energy availability under the service area of the substation. Hence the project leads to technological well-being.

The proposed CDM project activity is not a CPA that has been excluded from a registered CDM PoA as a result of erroneous inclusion of CPAs.

A.2. Location of project activity

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Madhya Pradesh, India

Investor's Name	Capacity	Village	District	Taluka	Latitude	Longitude
M/s Medicell	1.5 MW	Gharoda	Mandsaur	Mandsaur	23° 53' 15" N	74° 58' 26" E
M/s Medicell	1.5 MW	Mahuriya	Sahjapur	Agar	23° 47' 29" N	76° 07' 19" E

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

A.3. Technologies/measures

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Type I: Renewable Energy Projects

Category-D: Grid Connected renewable electricity generation

Reference (Version 18/EB 81, Annex 24) Sectoral Scope 1

As project activity involves the installation of Suzlon make two WTGs (S82) having capacity 1.5 MW each. The installation will have a 25 years design life. Technical specifications of WTGs are tabulated below:

Operating data	
Rated Power	1,500 kW
Cut-in wind speed	4 m/s
Rated wind speed	12m/s
Cut-off wind speed	20m/s
Survival wind speed	52.5m/sec
Rotor	
Type	3 Blades, Upwind / Horizontal axis
Diameter	82m
Rotational speed at	15.6 to 16.3 rpm rated power
Rotor blade material	Epoxy bonded fiber glass
Swept area	5,281 m2
Power regulation	Active pitch regulation
Gear Box	
Type	One planetary stage and two helical stages
Ratio	1:95.24 (Hansen) & 1:95:1601 (Winergy)
Nominal load	1,650 kW
Type of cooling	Forced oil cooling lubrication system
Generator	
Type	Induction generator with slip rings, variable rotor resistances via Suzlon Flexi Slip System
Speed at rated power	1,511 rpm (with rotor short circuited)
Rated power	1,500 kW
Rated voltage	690 V AC (phase to phase)
Frequency	50 Hz
Insulation	Class H
Enclosure	IP 54 / IP 23 (slip ring unit)
Cooling system	Air cooled (IC 616)
Tower	
Type	Tubular tower with welded steel plates
Tower height	76.1m
Hub height	76.8m (including foundation)
Breaking System	
Aerodynamic braking	3 Independent systems with blade pitching
Mechanical braking	Hydraulic disc brake activated by hydraulic pressure
YAW System	
Type	Electric asynchronous motor, electric motor brake (spring applied); 5 - stage planetary gear box with output pinion
Bearing	Polyamide slide bearing with gear ring & automatic greasing
Protection	Cable twist sensor, proximity sensor
Pitch System	
Type	3 independent blade pitch control with battery backup for each Blade
Operating range	0° to 90°
Resolution	0.1° to 8 ° per sec
Controller	
- Park slave	- Power output control / limitation
- Reactive power control	- Grid measurement
- Weather measurement	- Time synchronization
- Statistics	
Wind Class	III a
Certification & standards	TC-GL-003B-2010, Rev. 1
Quality system	ISO 9001:2008

The Wind technology is well proved and tested in Host Country India also it is environmentally safe and sound. Further, the technology being employed is indigenous and there is no know how/technology transfer associated with the project activity.

A.4. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (host party)	EnvironmentFirst Energy Services (P) Limited (Private entity)	No

A.5. Public funding of project activity

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No ODA from Annex I countries is involved in the identified project activity.

A.6. History of project activity

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1. The PP hereby Confirms that:
   (a) The proposed CDM project activity is neither registered as a CDM project activity nor included as a component project activity (CPA) in a registered CDM programme of activities (PoA); and
   (b) The proposed CDM project activity is not a project activity that has been deregistered.

2. The PP would like to Declare that:
   (a) The proposed CDM project activity was not a CPA that has been excluded from a registered CDM PoA;
   (b) The project is not "A registered CDM project activity or a CPA under a registered CDM PoA whose crediting period has or has not expired (hereinafter referred to as former project) exists in the same geographical location as the proposed CDM project activity".

3. Since the declaration on 2(a) or 2(b) above is negative thus no further demonstration required.

A.7. Debundling

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As per Methodological tool: Assessment of de-bundling for small-scale project activities version 04.0 - EB 83, Annex 13, Para 9, '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.

The project participant hereby confirms that they have not registered any small scale CDM activity or applied to register another small scale CDM project activity within 1 km of the project boundary, in the same project category and technology/measure in previous 2 years.

SECTION B. Application of methodologies and standardized baselines

B.1. Reference to methodologies and standardized baselines

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Type I – Renewable energy projects
Category D – Electricity Generation for a System
Sectoral Scope: 1 Energy Industries (renewable-/non-renewable sources)[2]

Title: AMS I.D, Grid Connected Renewable Electricity Generation, Version 18, EB81[3]

Reference: The reference has been taken from the list of the small-scale CDM project activity categories contained in 'Indicative simple baseline and monitoring methodologies for small-scale CDM project activities- Version 17, 17/06/2011.

The methodology also refers to latest approved versions of,
"Tool to calculate the emission factor for an electricity system, version 07.0[4]"
"Tool to calculate project or leakage CO2 emission from fossil fuel combustion", version 03[5]

B.2. Applicability of methodologies and standardized baselines

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Type I – Renewable energy projects
Category D – Electricity Generation for a System
Sectoral Scope: 1 Energy Industries (renewable-/non-renewable sources)

The project is a renewable energy project with maximum output capacity of 3 MW which is well below the specified limits of 15 MW of maximum output capacity and will remain of maximum output capacity of 3 MW during the whole crediting period. Also the project activity sells electricity to regional grid. Hence it qualifies for the mentioned type and category as per Appendix B of the simplified modalities and procedures for small-scale project activities.

Justification for the choice has been provided in the table as per requirements set in para 2-11 in the methodology AMS-I.D. Version-18.

AMS-I.D. Version-18, Para no.	Applicability Criterion (with para number reference)	Project Case
2	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 project activity is the Renewable Energy Project i.e. Wind Power Project that supply electricity to the electricity grids i.e. NEWNE Grid. Hence option (a) is applicable.
3	Illustration of respective situations under which each of the methodology (i.e. "AMS-I.D.: Grid connected renewable electricity generation", "AMS-I.F.: Renewable electricity generation for captive use and mini-grid" and "AMS-I.A.: Electricity generation by the user) applies is	The proposed project activity supplies electricity to NEWNE grid. Hence, "AMS-I.D.:Grid connected renewable electricity generation", applies as included in appendix[6] of the methodology.

[2] http://cdm.unfccc.int/DOE/scopelst.pdf

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

[4] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf

[5] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v3.pdf

[6]

	included in the appendix.	
4	This methodology is applicable to project activities that: (a) Install a Greenfield plant; (b) Involve a capacity addition in (an) existing plant(s); (c) Involve a retrofit of (an) existing plant(s); (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s).	The proposed project is installation of a new Wind based electricity generation plant at a site where no renewable energy power plant was in operation (Greenfield plant) by the Project Investors. Hence, option (a) is applicable to the project activity.
5	Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: (a) The project activity is implemented in an existing reservoir with no change in the volume of reservoir; (b) 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; (c) The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m2.	The Project activity is power generation from Wind energy source. Hence, this criterion is not applicable to the project activity.
6	If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	The project activity is a 3 MW electric power generation project using Wind as the source of energy. Unit does not co-fires fossil fuels, since Wind is the only source of power. Thus the proposed project activity has only renewable component and any non-renewable component is not applied, and the capacity of the entire unit shall not exceed the limit of 15 MW.
7	Combined heat and power (co-generation) systems are not eligible under this category.	The proposed project activity is a 3 MW electricity generation project wherein the generation is solely based on Wind energy. There are no combined heat and

	Project type	AMS-I.A	AMS-I.D	AMS-I.F
1	Project supplies electricity to a national/regional grid		√	
2	Project displaces grid electricity consumption (e.g. grid import) and/or captive fossil fuel electricity generation at the user end (excess electricity may be supplied to a grid)			√
3	Project supplies electricity to an identified consumer facility via national/regional grid (through a contractual arrangement such as wheeling)		√	
4	Project supplies electricity to a mini grid[6] system where in the baseline all generators use exclusively fuel oil and/or diesel fuel			√
5	Project supplies electricity to household users (included in the project boundary) located in off grid areas	√		

		power (co-generation) systems involved in the project. Thus, this criterion is not applicable to the project activity
8	In the case of project activities that involve the capacity 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.	The proposed project activity involves installation of new Wind. It does not involve any capacity addition at an existing renewable power generation facility. Thus, this criterion is not applicable to the project activity.
9	In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted, rehabilitated or replacement power plant/unit shall not exceed the limit of 15 MW.	The entire Wind project is a Green field project activity and this project is not the enhancement or up gradation project. Hence, this criterion is not applicable to the proposed activity.
10	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 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.	The proposed project activity is not a case of landfill gas, waste gas, wastewater treatment and agro-industries projects, nor is recovering methane. Rather, it is a Wind energy project, produces electricity and being feed into southern grid. Hence, this criterion is not applicable to the proposed activity.
11	In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.	The proposed project activity does not use biomass; rather it uses Wind energy as a source. Hence this criterion is not applicable to the proposed project activity.

Applicability conditions of "Tool to calculate the emission factor for an electricity system", - Version 07.0	
This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	This condition is applicable. OM, BM and CM are estimated using the tool under section B.6.1 for calculating baseline emissions.
Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, two sub-options under the step 2 of the tool are available to the project participants, i.e. option II a and option II b. If option II a is chosen, the conditions specified in "Appendix 1: Procedures related to off-grid power generation" should be met. Namely, the total capacity of off-grid Procedures related to off-grid	Since the project activity is grid connected, this condition is applicable and the emission factor has been calculated accordingly.

[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".

power generation" should power plants (in MW) should be at least 10 per cent of the total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.	
In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	The project activity is located in India, a non-Annex I country. Therefore, this criterion is not applicable for the project activity.
Under this tool, the value applied to the CO2 emission factor of biofuels is zero.	The project activity is a grid connected wind power project/ unit and does not involve emission from biofuels. Therefore, this criterion is not applicable for the project activity.

The project activities consist to a total capacity of 3 MW which is less than threshold limit of 15 MW and envisage supplying electricity to the NEWNE regional grid. The project activity will remain under the threshold limit of small scale project activity throughout the crediting period and technical lifetime, thus project category 'D- Grid connected renewable electricity generation' has been chosen for the project activity.

B.3. Project boundary, sources and greenhouse gases (GHGs)

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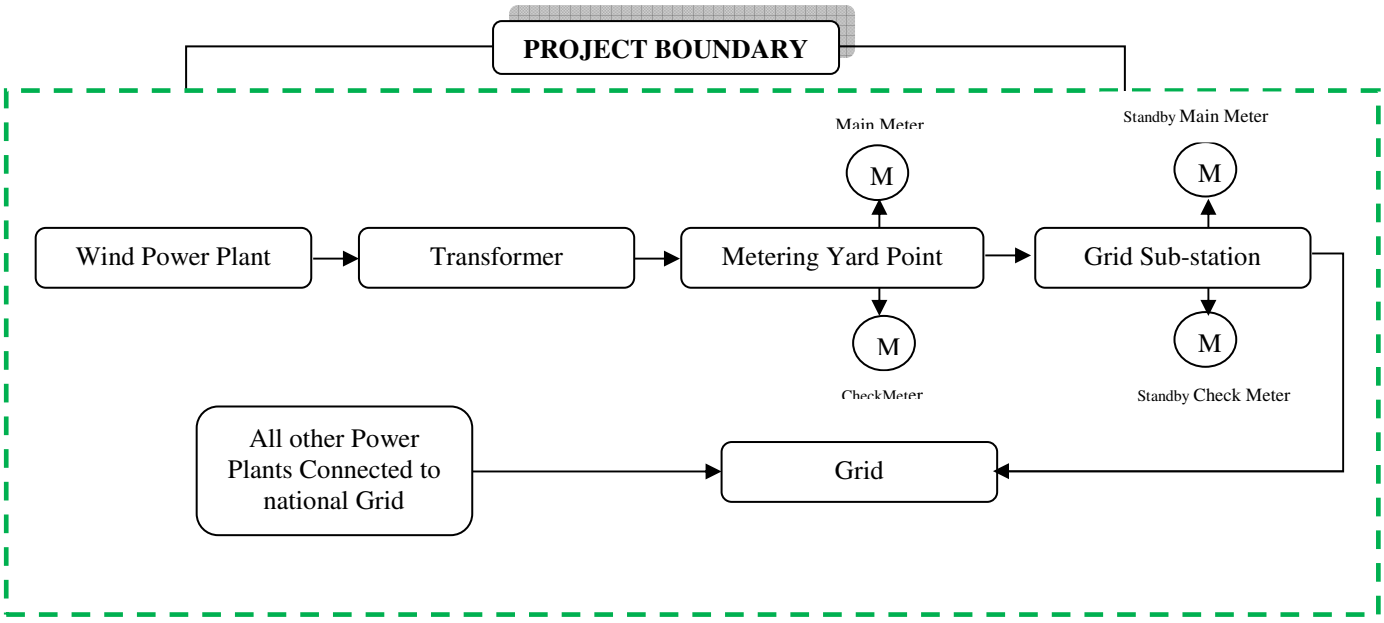
Project boundary has been ascertained using para 18 of AMS I.D. – *"The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to"*.

Accordingly, the project boundary, it includes Wind power generation system and all power plants connected physically to the local grid to which the proposed project supplies renewable electricity to avoid GHG emissions. The proposed project is located in the state of Madhya Pradesh hence falls under the purview NEWNE grid of the Indian Electricity system.

The following diagram explains the project boundary for the proposed project activity.



	Source	GHG	Included?	Justification/Explanation
Baseline	Source 1	CO_2	Yes	Major emission sources
		CH_4	No	Excluded for simplification. This is conservative
		N_2O	No	Excluded for simplification. This is conservative
Project activity	Source 1	CO_2	No	The proposed project activity uses Wind as the sole source of energy. Thus, there is no generation of CO_2.
		CH_4	No	The proposed project activity uses Wind as the sole source of energy. Thus, there is no generation of CH_4
		N_2O	No	The proposed project activity uses Wind as the sole source of energy. Thus, there is no generation of N_2O.

B.4. Establishment and description of baseline scenario

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Description of Baseline:

As per para 19 of the methodology AMS I D Version 18; *"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 will evacuate power to the NEWNE grid & completely comply with the para 19 of AMS I D Version18.

As per para 23 of the methodology AMS I D Version 18, *the Emission Factor can be calculated in a transparent and conservative manner as follows:*

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

Option (a) mentioned above is selected for baseline calculation.

As per para 22 of the methodology AMS I D Version 18, *Baseline emissions include only CO2 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:*

$BE_y = EG_{PJ,y} \times EF_{grid,y}$ Equation (1)

Parameters	1) Baseline emissions in year y (t CO2); BE_y 2) 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); $EG_{PJ,y}$ 3) 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); $EF_{grid,y}$

Mathematical Relations	$BE_y = EG_{PJ,y} X EF_{grid,y}$ $ER_y = BE_y – PE_y – LE_y$ $ER_y = BE_y – 0 – 0$ (as, $PE_y = LE_y = 0$) $ER_y = BE_y$
Data sources	$EG_{PJ,y}$: Monitored (Monthly Joint meter readings) $EF_{grid,y}$: CO2 Baseline Database for the Indian Power Sector, Version 10, Published on 16th Dec'14
Weblink	http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver10.pdf

B.5. Demonstration of additionality

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The project additionality is demonstrated as accordance to " Guidelines on demonstration of additionality of small scale project activities" version 12 **.**

The project is a small scale project activity so the project additionality is In line with above guidance, the PPs have applied "Investment Analysis tool" version 09.0 to demonstrate the additionality of the project.

Investment Analysis

Post tax equity IRR is identified as the most suitable financial indicator. Since the project gets revenue from the sale of electricity project, hence cannot apply simple cost analysis; furthermore investment comparison analysis cannot be applied as the alternative to the project activity is the electricity generated by new and existing grid connected power plants.

Following assumptions have been taken:

Details of the project		Source	Link
State where the project is situated	**Madhya Pradesh**	**As Per Offer Letter**	**Not Applicable**
No. of machine	**1**	**As Per Offer Letter**	**Not Applicable**
Capacity /machine (MW)	**1.50**	**As Per Offer Letter**	**Not Applicable**
Total Capacity (MW)	**1.50**	**Calculated Value**	**Not Applicable**
Expected Date of Commissioning	**31-Mar-14**	**Assumed as per Management Discussion at the Time of Investment Decisio**	**Not Applicable**

Details of the project		Source	Link
		n with WTG Manufacturer	
Life of the plant (Yrs.)	25	As per WTG manufacturer specifications	Not Applicable
Generation and sale of electricity			
Effective PLF (%)	17.42%	As per Third Party Report in accordance to EB 48 Annex 11	Not Applicable
Annual generation (kWh)	22,88,988	Calculated Value	Not Applicable
Tariff rate for the 1st year (Rs/kWh)	5.92	As Per Tariff Order	-
Increase in tariff till 13th yr. (Rs/kWh)	0.15	As Per Tariff Order	-
Tariff Rate after 13th year (Rs/kWh)	2.40	Calculated Value (Estimated as per tariff calculation sheet)	Not Applicable
Deration during 10th year (%)	5%	As per TERI report, Pg 19	http://terienvis.nic.in/windenergy.pdf
			-
Operation and maintenance cost and Insurance			
O & M Expenses (INR Mn.)	2.08	As Per Offer Letter	Not Applicable
Escalation in the operational expenses (%)	5.00%	As Per Offer Letter	Not Applicable
O & M free for (Yr.)	1.00	As Per Offer Letter	Not Applicable
Insurance (INR Mn.)	0.15	As per TAC order 2001,	http://iib.gov.in/IRDA/tac/tariffs/AIFT2001.pdf

Details of the project		Source	Link
		Sheet No. 31	
Financial parameters			
TOTAL COST (INR Mn.)	99.50	As Per Offer Letter	Not Applicable
Loan Amount (INR Mn.)	-	Equity Financed	Not Applicable
Equity Investment (INR Mn.)	99.50		Not Applicable
Book Depreciation (Straight Line Method)			
Land Cost (INR Mn.)	2.99	As Per Management Decision	Not Applicable
Gross Depreciable Value (INR Mn.)	96.52	Calculated Value	Not Applicable
Salvage value (%)	5%	As Per Order	
Salvage value (INR Mn.)	4.83	Calculated Value	Not Applicable
Net Depreciable Value (INR Mn.)	91.69	Calculated Value	Not Applicable
Residual Value (INR Mn.) (Land Cost + Salvage Value of Plant & Machinery)	7.81	Calculated Value	Not Applicable
IT Depreciation (WDV Method)			
Depreciation rate	80.00%	As Per Income Tax Act	http://law.incometaxindia.gov.in/DIT/File_opener.aspx?page=NOTF&schT=&csId=be3b024a-e9a5-44c4-85a3-aeb5811e88d1&NtN=67&yr=2005&sec=&sch=&title=Taxmann%20-%20Direct%20Tax%20Laws
Income Tax			
Financial Year	FY 2014-15		
Income tax rate (%)	30.00%	As per finance act 2013	http://indiabudget.nic.in/ub2013-14/fb/bill91.pdf
MAT (%)	0.00%	As it is Partnership firm	
Service Tax (%)	12.00%	As per finance act 2013	http://indiabudget.nic.in/ub2013-14/bs/bs.pdf

Details of the project		Source	Link
Surcharge (%)	**5.00%**	**As per finance act 2013**	http://indiabudget.nic.in/ub2013-14/fb/bill91.pdf
Education cess (%)	**3.00%**	**As per finance act 2013**	http://indiabudget.nic.in/ub2013-14/fb/bill2.pdf
Final Tax rates			
Income tax rate (%)	**32.45%**	**Calculated Value**	**Not Applicable**
MAT (%)	**0.00%**	**Calculated Value**	**Not Applicable**
Service Tax (%)	**12.36%**	**Calculated Value**	**Not Applicable**

Investment Assessment Period	**25**	Years	Not Applicable

Appropriateness of benchmark and Estimation:

The benchmark of the project activity has been established in accordance with "Guidance on the Assessment of Investment Analysis" Version 09,. According to guidelines, in cases where a benchmark approach is used for financial evaluation of the project, the applied benchmark shall be appropriate to the type of IRR calculated. Weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR and Required/expected returns on equity (Cost of Equity) are appropriate benchmarks for equity IRR.

In this project activity, PP has considered post tax project IRR as the financial indicator to demonstrate the additionality. Therefore, ROE has been considered as the benchmark to compare with post tax equity IRR and Post Tax equity IRR has been chosen as the financial indicator of the project.

Average cost of equity financing (Ke) 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." In the context of above, project investor have used option (a) "Default Value" for deciding benchmark for this project activity- accepting the fact that the same has been defined by UNFCCC CDM-EB itself, so suitable, credible & appropriate to consider. Methodology deployed for arriving at a suitable value of Benchmark using Default Value has been described below:

- As the proposed project activity generates power utilising wind energy, Group 1 as per para 5 of Appendix of "Investment Analysis" tool has been identified as a suitable category.

- The investment analysis has been carried out in Nominal terms and thus the after tax Default value as given in Para 8 of Appendix of "Investment Analysis" tool has been adjusted by adding suitable inflation rate taken from Reserve Bank of India (Central Bank, India) for the duration of crediting period.
- Project Investor has calculated Benchmark based on WPI median inflation rate for 10 years which was the latest data available during decision making. The WPI inflation rate used for WTG 1 (Refer Table Below) is 5.60%.The Project Participant have the option of choosing from CPI-IW Inflation or WPI Inflation with mean value for both as 5.90% and 5.60% (Table A.7., Annual average percentage change over the next ten years[8]) respectively. Therefore, being conservative mean value of WPI inflation is taken for WTG1.
- The WPI inflation rate used for WTG 2 (Refer Table Below) is 6.00%.The Project Participant have the option of choosing from CPI-IW Inflation or WPI Inflation with mean value for both as 6.20% and 6.00% (Table A.7., Annual average percentage change over the next ten years[9]) respectively.
- Required Return on Equity, (As per Page 320 of Corporate Finance, Second Edition of Aswath Damodaran)

K_e = ((1+ Default Value in real terms)*(1+Inflation Rate))-1

WTG	Capacity	Village	District	Default Value in real terms	Inflation Rate	Benchmark (ROE)
1	1.5 MW	Gharoda	Mandsaur	11.75%	5.60[10]	((1+11.75%)*(1+5.60%))-1 = 18.01%
2	1.5 MW	Mahuriya	Sahjapur	11.75%	6.00[11]	((1+11.75%)*(1+6.00%))-1 = 18.46.%

As per guidance , the period of assessment should not be limited to the proposed crediting period of the CDM project activity. Both project IRR and equity IRR calculations shall as a preference reflect the period of expected operation of the underlying project activity (technical lifetime), or . if a shorter period is chosen include the fair value of the project activity assets at the end of the assessment
period. In general a minimum period of 10 years and a maximum of 20 years will be appropriate.

In accordance with above guideline an assessment period of 20 years (which is the technical life time of the project activity) has been used.

The project proponent has worked out investment analysis for both projects for a period of 20 years and the results are tabulated as below.

WTG	Benchmark	Equity IRR without CDM benefits
1	18.01%	8.58%
2	18.46%	9.24%

As we can see from the table mentioned above the IRR for both projects without CDM revenue is much lower against a benchmark of **18.01% and 18.46%.**

Sensitivity Analysis

As per guidance 27 of "Investment Analysis" tool "Only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be

[8] https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/01SPA281013.PDF

[9] https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/17SPF280312.pdf

[10] https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/01SPA281013.PDF

[11] https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/17SPF280312.pdf

subjected to reasonable variation". In accordance with above guideline the variables viz. Project Cost, PLF and Electricity Tariff are included in the sensitivity analysis, also as per the guidance a variable which constitute less than 20% of project cost and has a material impact on the analysis has to be included as variable in the sensitivity analysis. In accordance to that O&M has been considered as the variable having material impact on the analysis and hence considered under sensitivity analysis among aforementioned variables. A sensitivity analysis has been conducted for the project activity considering a decrease / increase in electricity generation and project cost by 10%.

Sensitivity Analysis for Project activity

Sensitivity Analysis for WTG1				
Variable	**-10%**	**Normal**	**10%**	**Variation required to reach benchmark**
PLF	**7.64%**	**8.58%**	**10.87%**	**44.31%**
O&M	**9.50%**	**8.58%**	**9.13%**	**-448.80%**
Project Cost	**10.85%**	**8.58%**	**7.99%**	**-33.12%**
Tariff Rate	**8.14%**	**8.58%**	**10.48%**	**56.00%**

Sensitivity Analysis for WTG 2				
Variation %	**-10%**	**Normal**	**10%**	**Variation required to reach benchmark**
PLF	**6.89%**	**9.24%**	**10.14%**	**71.00%**
O&M	**8.92%**	**9.24%**	**8.23%**	**-408.00%**
Project Cost	**9.95%**	**9.24%**	**7.40%**	**-46.40%**
Tariff Rate	**6.89%**	**9.24%**	**10.14%**	**71.00%**

In view of the above it is concluded that CDM project activity is unlikely to be the most financially attractive proposition without availing CDM benefits. Thus it is well established that the proposed project activity is additional.

Demonstration of prior consideration of the clean development mechanism as per the "CDM Project Standard for PA", Version 02.0[12]

Project activity complies with para 27 of the CDM Project Standard, Version 05.0, and project participants has informed the host Party's designated national authority (DNA) i.e.; National CDM Authority (NCDMA) under Ministry of Environment & Forest (MoEF) and the secretariat of their intention to seek CDM status in accordance with the Project Cycles procedure.

B.6. Estimation of emission reductions

B.6.1. Explanation of methodological choices

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As the proposed activity is 3 MW(< 15MW) capacity renewable energy project wherein the electricity generated is being sold to regional grid NEWNE and Southern, thus procedures to calculate project emissions, baseline emissions, leakage emissions and emission reductions as per Approved SSC CDM methodology AMS-I.D are applicable.

[12] https://cdm.unfccc.int/filestorage/e/x/t/extfile-20181221092046529-Reg_stan04v02.pdf/Reg_stan04v02.pdf?t=U2V8cG5zZTRvfDBvsvPMgyfnjNX3gdZG7-ZW_

Baseline Estimation:
Baseline methodology for project category *I.D* has been detailed in paragraphs 19-41 of the approved small scale methodology *AMS I.D*. (Version 18, EB 81) Paragraph 23 of the approved methodology applies to this project activity, which states that:

The Emission Factor shall be calculated in a transparent and conservative manner as follows:

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

The PP has chosen to adopt option a) mentioned above to calculate the Emission Factor.

As per "Tool to calculate the emission factor for an electricity system" (Version 07.0,)" under the head Applicability point 2.2 , para 3 *"This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity, i.e. where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects)."*

As the proposed project activity substitutes grid electricity so the concerned Tool is applicable.

"Tool to calculate the emission factor for an electricity system" (Version 07.0) by using the following six steps:

Step 1: Identify the relevant electricity systems
Central Electricity Authority of India (CEA), Ministry of Power, Government of India (Host Country) has given the delineations of the project electricity system and the connected electricity system in India. As per CEA, the Indian power system is divided into two independent regional grids, namely NEWNE & Southern[13]. Each grid covers several States.

Geographical Scope of two regional grids:

NEWNE				Southern
Northern	**Eastern**	**Western**	**North-Eastern**	**Southern**
Chandigarh	Bihar	Chhattisgarh	Arunachal Pradesh	Andhra Pradesh
Delhi	Jharkhand	Gujarat	Assam	Karnataka
Haryana	Orissa	Daman & Diu	Manipur	Kerala
Himachal Pradesh	West Bengal	Dadra & Nagar Haveli	Meghalaya	Tamil Nadu
Jammu & Kashmir	Sikkim	Madhya Pradesh	Mizoram	Pondicherry
Punjab	Andaman-Nicobar	**Maharashtra**	Nagaland	Lakshadweep
Rajasthan		Goa	Tripura	
Utter Pradesh				
Uttaranchal				

For the purpose of calculating the emission reductions achieved by any CDM project, the "Tool to calculate the emission factor for an electricity system" (Version 07.0,) requires that the "project

[13] http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver10.pdf

electricity system is defined by the spatial extent of the power plants that can be dispatched without significant transmission constraints". This implies that the grid emission factors could be most appropriately calculated at the level of the two regional grids. As per the delineation given by CEA, MP state falls into the NEWNE Regional Grid.

As all the WTGs in the project activity are installed in the state of MP therefore Project Participant has chosen NEWNE Regional Grid 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*.

Project Participant has chosen option I to calculate operating margin and build margin emission factor.

Step 3: Select a method to determine the operating margin (OM)
The calculation of the operating margin emission factor (EFgrid,OM,y) is based on one of the following methods, which are described under Step 4:

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

"CO_2 Baseline Database for Indian Power Sector" Version 10, published by Central Electricity Authority (hereafter CEA Database) has been referred for the values of OM. As per the *"Tool to calculate the emission factor for an electricity system"* (Version 07.0), any of the four methods can be used, however, as per para 34 of the Tool, *the simple OM method can only be used if the low-cost/must run resources constitute less than 50% of the total grid generation in: 1) average of the five most recent years, or 2) based on long term averages for hydroelectricity production.*
Operating Margin has been calculated using the Simple OM method as the low-cost/must run resources constitute less than 50% of the total grid generation of the NEWNE and Southern Grid in average of the five most recent years (average value being 17.50%),as clearly depicted from the below table:

Share of Must-Run (Hydro/Nuclear) (% of Net Generation)					
Year	2009-10	2010-11	2011-12	2012-13	2013-14
NEWNE	15.9%	17.6%	19.0%	17.2%	18.0%
SOUTHERN	20.6%	20.9%	21.5%	15.8%	21.0%

Further, as per para 36 of the referred tool; *For the simple OM method, emission factors can be calculated using either of the two following data vintages:*

Ex ante option - *If the ex ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use 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. For off-grid power plants, use a single calendar year within the five most recent calendar years prior to the time of submission of the CDM-PDD for validation;*

Ex post option - *If the ex post option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required to calculate the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year y-1 may be used. If the data is usually only available 18 months after the end of year y, the emission factor of the year proceeding the previous year y-2 may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting periods.*

Project Participant has chosen ex ante option and as this is a grid power plant, project participant uses 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. The emission factor determined at validation stage will be the same throughout the crediting period.

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

Simple OM has been calculated using "Tool to calculate the emission factor for an electricity system" (Version 07.0). Project Participant has opted for option A and used data provided by CEA, Version 10, Published on 06th Dec'14. Net electricity generation and absolute CO_2 emission of all generating power plants serving the system, not including low-cost/ must–run power plants, calculated from CEA database and CO_2 emission per unit net electricity generation (tCO_2/ MWh) estimated for year 2011-12, 2012-13 and 2013-14. 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.

Please refer Baseline emission sheet for detail simple OM emission factor calculation.

Net Generation in Operating Margin (GWH) (incl. Imports)[14]

	2011-12	2012-13	2013-14
Net Generation in Operating Margin (MWh) NEWNE	5080,04,381	5469,41,372	5692,15,756

Simple Operating Margin (t CO_2/MWh) (incl. Imports)[15]

	2011-12	2012-13	2013-14
Simple Operating Margin (tCO2/ MWh) (inc. imports) NEWNE	0.9699	0.9919	0.9953

Operating Margin Emission Factor,

$$EF_{grid,OMsimple,y} = \frac{\sum_m EG_{m,y} * EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

$EF_{grid,OM,y}$ **=** 0.9862[16] (NEWNE) / 0.9885 (Southern)

[14] *Data Source: Central Electricity Authority (CEA) database Version 10,* Published on 06th Dec'14

[15] *Data Source: Central Electricity Authority (CEA) database Version 10,* Published on 06th Dec'14

[16] Refer Emission Reduction Spreadsheet for detail calculation

$EF_{grid,OMsimple,y}$ = 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),sourced from CO_2 Baseline Database for the Indian Power Sector, CEA, Version 10.

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

Determination of $EF_{EL,m,y}$

The emission factor of each power unit *m* should be determined as follows*:*

Option A1. If for a power unit m data on fuel consumption and electricity generation is available, the emission factor($EF_{EL,m,y}$) should be determined as follows:

$$EF_{EL,m,y} = \frac{\sum_i FC_{i,m,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_{m,y}}$$

Where:
$EF_{EL,m,y}$ = CO_2 emission factor of power unit *m* in year y (tco_2/MWh)
$FC_{i,m,y}$ = Amount of fossil fuel type *i* consumed by power unit m in year *y*(Mass or volume unit)

$NCV_{i,y}$ = Net calorific value(energy content) of fossil fuel type *i* in year *y*(GJ/mass or volume unit)

$EF_{CO2,i,y}$ = CO_2 emission factor of fossil fuel type *i* in year *y* (tCO_2/GJ)
$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year *y* (MWh)

m = All power units serving the grid in year *y* except low-cost/must-run power units
i = All fossil fuel types combusted in power unit *m* in year *y*.
y = The relevant year as per the data vintage chosen in Step 3

As per the methodology, AMS-I.D. Version 18, calculations must be based on data from an official source (where available) and made publicly available. The Central Electricity Authority (CEA) of India has published the official database on emission factors for all regional grids in India, in order to facilitate CDM project and offer consistent data for all project developers. Application of this officially published database represents the most accurate approach, hence has been applied for the project activity. In line with this, the simple OM emission factor is calculated based on the generation power plants serving the system, not including low-cost/must run power plants/units, as sourced from CO_2 Baseline Database for the Indian Power Sector, Version 10, CEA, Published on 06th Dec'14.

Step 5: Calculate the build margin (BM) emission factor

Vintage of data is based on option 1 of step 4. (Refer *"Tool to calculate the emission factor for an electricity system".* BM Emission Factor calculation has been done *ex-ante* and hence BM Emission Factor value will remain fixed and need not be monitored during the crediting period.

The Build Margin emission factor is the generation weighted average emission factor (tCO_2/MWh) of all power units *m* during the most recent year *y* for which electricity generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} * EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

$EF_{grid,BM,y}$ = 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),sourced from CO_2 Baseline Database for the Indian Power Sector, CEA, Version 10.

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

YEAR	2013-14
Build Margin NWENE (tCO_2/MWh)	0.9495

BM values have been taken from CO_2 Baseline Database for the Indian Power Sector, Version 10, Published on 06th Dec'14. CO_2 Baseline Database for the Indian Power Sector is published by Central Electricity Authority, Ministry of Power; Govt. of India.

Step 6: Calculate the combined margin emissions factor

The emission factor for grid electricity or Grid Emission Coefficient (also referred as CO_2 Emission factor) is calculated as the weighted average of the operating margin emission factor ($EF_{grid,OM,y}$) and the build margin emission factor ($EF_{grid,BM,y}$), where the weights W_{OM} and W_{BM} for Wind projects, by default, are W_{OM} = 0.75 & W_{BM} = 0.25. $EF_{grid,CMy}$ is calculated as below and are expressed in tCO_2/MWh.

The combined margin emissions factor is calculated as follows:

$$EF_{grid,CMy} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}$$

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 (%)

Emission Factor NEWNE Grid (Combined Margin) calculations are as below:-

Particulars	Details	Source
Operating Margin (tCO_2/MWh)	0.9862	CEA[17]
Built Margin (tCO_2/MWh)	0.9495	CEA

[17] Source: CO_2 Baseline Database for the Indian Power Sector, CEA, Version 10, Published on 06th Dec'14

Combined Margin (tCO_2/MWh)	=(0.75*0.9862)+(0.25*0.9495) = 0.9770

As per para 19 of the methodology AMS I D Version 18,
"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 will evacuate power to the NEWNE Regional Grid & completely comply with the para 19 of AMS I D Ver18.

And, as per para 22 of the methodology AMS I D Version 18,
The baseline emissions BE_y are the product of electrical energy baseline $EG_{PJ,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor $EF_{grid,y}$.

$BE_y = EG_{PJ,y}$ X $EF_{grid,y}$

Also, If the project activity is the installation of a greenfield power plant, then:

$EG_{PJ,y} = EG_{PJ,facility,y}$

Where:

BE_y	Baseline Emissions in year *y* (t CO_2)
$EG_{PJ,y}$	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh)
$EF_{grid,y}$	Combined margin 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)
	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh)

And referring para 43 of AMS I D Version 18, Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$

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)

As per para 39 of AMS I D Version 18, For most renewable energy project activities, PE_y = 0. The proposed project activity is a Wind power project wherein the electricity generation takes place solely by utilisation of Wind Energy and no emission of any sort takes place. Thus Project Emission, PE_y is considered to be zero.

As the energy generating equipment is not transferred from another activity but has been commissioned for the first time for the proposed project activity, thus leakage emissions are considered to be zero.

Thus,

$$ER_y = BE_y$$

Or, Emission reductions in year *y* (t CO_2/y) = Baseline Emissions in year *y* (t CO_2/y)

In case of the project activity, Grid emission factor has been fixed ex-ante.

B.6.2. Data and parameters fixed ex ante

Data/Parameter	$EF_{grid,y}$
Data unit	tCO_2/MWh
Description	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)
Source of data	CO_2 Baseline Database for the Indian Power Sector, Version 10, CEA, Published on 06th Dec'14.
Value(s) applied	0.9770 (NEWNE)
Choice of data or measurement methods and procedures	The Combined Margin Emission Factor has been calculated as a weighted sum of Operating Margin emission factor and Build Margin emission factor taking the weightage value as 0.75 and 0.25 respectively as per the "Tool to calculate the emission factor for an electricity system" and on the basis of the data available at the time of PDD submission from the publicly available official database on emission factors for all regional grids in India.
Purpose of data	Calculation of baseline emission.
Additional comment	This value is fixed ex-ante.

Data / Parameter	EF_{OM}
Unit	tCO_2/MWh
Description	Operating margin CO_2 emission factor in year y (tCO_2/MWh)
Source of data	CO_2 Baseline Database for the Indian Power Sector, Version 10, CEA, Published on 06th Dec'14.
Value(s) applied	0.9862 (NEWNE)
Choice of data or Measurement methods and procedures	The data has been sourced from the Central Electricity Authority (CEA) Carbon Dioxide database. The link to the database is provided below: http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver10.pdf
Purpose of data	Calculation of baseline emission.
Additional comment	This value is fixed ex-ante.

Data / Parameter	EF_{BM}
Unit	tCO_2/MWh
Description	Build margin CO_2 emission factor in year y (tCO_2/MWh)
Source of data	CO_2 Baseline Database for the Indian Power Sector, Version 10, CEA, Published on 06th Dec'14.
Value(s) applied	0.9495 (NEWNE)
Choice of data or Measurement methods and procedures	The data has been sourced from the Central Electricity Authority (CEA) Carbon Dioxide database. The link to the database is provided below: http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver10.pdf
Purpose of data	Calculation of baseline emission.
Additional comment	This value is fixed ex-ante.

B.6.3. Ex ante calculation of emission reductions

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The relevant equation & calculations had been mentioned at Section B.6.1 of this PDD, thus kindly refer the same.

Emission reductions are calculated as follows:

$ER_y = BE_y – PE_y – LE_y$
Where:

ER_y	Emission reductions in year *y* (tCO_2/y)
BE_y	Baseline Emissions in year *y* (tCO_2/y)
PE_y	Project emissions in year *y* (tCO_2/y)
LE_y	Leakage emissions in year *y* (tCO_2/y)

as per Section B.6.1; $PE_y = LE_y = 0$
Thus, $ER_y = BE_y – PE_y – LE_y$
Or, $ER_y = BE_y – 0 – 0$ (as, $PE_y = LE_y = 0$)

Or, $ER_y = BE_y$

Also,

Baseline Emissions in year 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)) X (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)

$BE_y = EG_{PJ,y} X EF_{grid,y}$

$EG_{PJ,y}$ = Plant capacity(MW) x Plant Load Factor X 24X 365

$EF_{grid,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid, BM,y} * W_{BM}$

Thus, BE_y = Generation (MWh/annum) x Emission Factor (tCO_2/ MWh)

The detailed calculation for the same is as:-

Parameter	**Unit**	WTG1	WTG2
Capacity	MW	1.5	1.5
PLF	%	18.82%	20.50%
Operating Hours	Hours	8760	8760
Generation	MWh	2472.9	2693.7
Grid		NEWNE	NEWNE
Emission Factor	tCO2/ MWh	0.9770	0.9770
Baseline Emission		**2416**	**2631**

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	5,047	0	0	5,047
Year 2	5,047	0	0	5,047
Year 3	5,047	0	0	5,047
Year 4	5,047	0	0	5,047
Year 5	5,047	0	0	5,047
Year 6	5,047	0	0	5,047
Year 7	5,047	0	0	5,047
Total	35,329	0	0	35,329
Total number of crediting years	7			
Annual average over the crediting period	5,047	0	0	5,047

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data/Parameter	$EG_{PJ,facility,y}$
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	Electricity meter(s)
Value(s) applied	5167 (The value applied is an estimate of the data/parameter that will be monitored during the crediting period, but is used for the purpose of calculating estimated emission reductions in section B.6 above)
Measurement methods and procedures	The Energy Meters are installed at the site for individual investors, so a loss has already been accumulated here. The net electricity supplied to the grid by the project activity will be calculated from the difference of the net energy exported to the grid and the net energy imported from the grid as measured by the bi-directional main energy meter at the grid inter-connection point. A check meter will also be installed as a backup at this point. The meters will be of accuracy class 0.2s. The monitoring will be on a continuous basis and monthly recording will be undertaken. The log-books will be maintained at the project site for this purpose.
Monitoring frequency	Continuous measurement and at least monthly recording
QA/QC procedures	The calibration of all the meters will be undertaken once in three year in accordance with the General Guidelines to SSC CDM Methodologies. The meter readings will also be cross checked with records for sold electricity (invoices).
Purpose of data	Calculation of Baseline Emission
Additional comment	The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

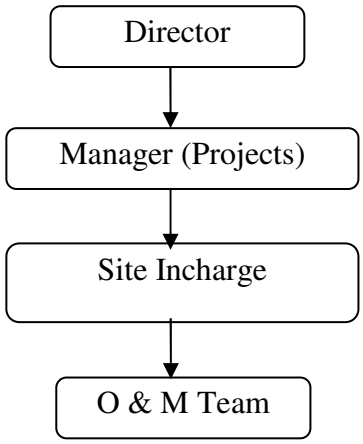
B.7.2. Sampling plan

>>
This section is not applicable to the project activity, therefore left blank intentionally.

B.7.3. Other elements of monitoring plan

>>
In Monitoring &Verification protocol, the objective is to have clear, credible and accurate monitoring, evaluation and verification procedures. This involves recording, data collection, 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.

The project participant proposes following arrangements in order to carry out metering and O & M activities:



SECTION C. Start date, crediting period type and duration

C.1. Start date of project activity

>>
09/01/2014, being the earliest date of Purchase Order released by M/s Medicell.

C.2. Expected operational lifetime of project activity

>>
25 Years 00 Months (as per Technical specifications of the plant)

C.3. Crediting period of project activity

C.3.1. Type of crediting period

>>
Renewable crediting period seven years renewable up to two more times to have total three crediting period of 21 years. This is the first crediting period.

C.3.2. Start date of crediting period

>>
21/02/2019, or the Date of submission of complete request for registration by the DOE whichever is later.

C.3.3. Duration of crediting period

>>
07Years 00Months

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>>
The project activity does not fall under the purview of Environmental Impact Assessment. As per the Schedule 1 of the EIA notification dated 14 September 2006[18], given by the Ministry of Environment and Forests (Government of India) under the Environment (Protection) Act 1986, EIA is not a regulatory requirement in India for Wind energy projects.

Thus the project activity doesn't fall under the list of activities requiring EIA. The project activity will not create any negative environmental impacts, as the Wind Turbine Generator are installed for generation of power using Wind which is a clean source of energy.

D.2. Environmental impact assessment

>>
As per the notification from MoEF dated September 14, 2006 and its amendment notification S.O.-3067(E) dated 1/12/2009, the list of project activities which require prior environmental clearance is stipulated. This does not include the proposed project activity type as it involves wind power generation. Hence the proposed project activity does not require any Environmental impact analysis. Project activity has no significant emissions. Hence no environmental impact analysis was conducted.

SECTION E. Local stakeholder consultation

E.1. Modalities for local stakeholder consultation

>>
The followings are the local stakeholders for the project activity:
- Local community
- Local village administration
- Technology suppliers
- Local vendors

All the stakeholders have been invited through submission of the invitation letter (delivered in hand) on dated 25th September 2014 and the meeting was convened on dated 15th October 2014.

In the introductory speech; the representatives of CDM consultant. welcomed the gathering and informed the stakeholders about the project activity; project's associated benefits with respect to CO2 emission reductions and explained the purpose of conducting the stakeholder meeting in order to gather the views and comments of the local stakeholders on the project activity. Subsequent to the introductory speech, comments were received from the stakeholders.

The Minutes of meeting with commenting sheet from LSH, invitation letter reception copy has been submitted to the DOE.

E.2. Summary of comments received

>>

[18] http://envfor.nic.in/legis/eia/eia-2006.htm

Stakeholders had no objections from installations of Wind Turbine Generator and they openly admitted that Wind power projects helped them by:

- Additional revenue generated through land / lease to outsiders like contractors & their employees.
- Job opportunities for day -to - day maintenance and security of panels.
- Developments of roads.

No any adverse impact on rains, agriculture.

E.3. Consideration of comments received

>>

The stakeholders have given positive feedback and thus no measures were required to be taken.

SECTION F. Approval and authorization

>>

Letter of approval from the Host Part involved in the project activity, has been issued on 24th May 2017, and the same has been submitted to the validating DOE.

Appendix 1. Contact information of project participants

Organization name	Environmentfirst Energy Services (P) Limited
Country	India
Address	405A, Prakrati Corporate; 18/2 Y N Road (Near Malwa Mill Square), Indore (M.P)-452001
Telephone	0731-6007860, +91 9584594493
Fax	-
E-mail	abhishekmazumdar@environmentfirst.in, abhi02.upes@gmail.com
Website	www.environmentfirst.in
Contact person	Abhishek Kumar

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 methodologies and standardized baselines

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.

Appendix 6. Summary report of comments received from local stakeholders

Local stakeholders' comment has been adequately explained in section E.

Appendix 7. Summary of post-registration changes

Not Applicable, hence left blank intentionally.

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Document information

Version	*Date*	*Description*
11.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN); • Make editorial improvements.
10.1	28 June 2017	Revision to make editorial improvement.
10.0	7 June 2017	Revision to: • Improve consistency with the "CDM project standard for project activities" and with the PoA-DD and CPA-DD forms; • Make editorial improvement.
09.0	24 May 2017	Revision to: • Ensure consistency with the "CDM project standard for project activities" (CDM-EB93-A04-STAN) (version 01.0); • Incorporate the "Project design document form for small-scale CDM project activities" (CDM-SSC-PDD-FORM); • Make editorial improvement.
08.0	22 July 2016	EB 90, Annex 1 Revision to include provisions related to automatically additional project activities.
07.0	15 April 2016	Revision to ensure consistency with the "Standard: Applicability of sectoral scopes" (CDM-EB88-A04-STAN) (version 01.0).
06.0	9 March 2015	Revision to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Make editorial improvement.
05.0	25 June 2014	Revision to: • Include the Attachment: Instructions for filling out the project design document form for CDM project activities (these instructions supersede the "Guidelines for completing the project design document form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from F-CDM-PDD to CDM-PDD-FORM; • Make editorial improvement.
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b.

Version	*Date*	*Description*
04.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the project design document form for CDM project activities" (EB 66, Annex 8).
03.0	26 July 2006	EB 25, Annex 15
02.0	14 June 2004	EB 14, Annex 06b
01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.

Decision Class: Regulatory
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Keywords: project activities, project design document