Project design document form

(Version 11.0)

BASIC INFORMATION	
Title of the project activity	Grid Connected Wind Power Project by M/s. D. J. Malpani at Ratan Ka Bas (RKB), Rajasthan
Scale of the project activity	☐ Large-scale ☒ Small-scale
Version number of the PDD	Document Version: 06
Completion date of the PDD	23/09/2019
Project participants	D. J. Malpani
Host Party	India
Applied methodologies and standardized baselines	AMS- I.D "Grid connected renewable electricity generation (Version- 18)
Sectoral scopes	1: Energy Industries (renewable - /non renewable sources)
Estimated amount of annual average GHG emission reductions	7514 tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The project activity is grid-connected wind power generation located at Ratan Ka Bas (RKB), District- Jodhpur, State - Rajasthan in India. M/s. D. J. Malpani is the owner and developer of the project activity. The total capacity of the project activity is 4.5 MW (3 WTGs × 1.50 MW). The project activity employs Wind Turbine Generators (WTGs) of Class S-82 manufactured by M/s. Suzlon Energy Limited. The project activity will supply the generated electricity to INDIAN Grid of India.

The electricity generated by renewable technology (wind) installed as part of the project activity will be supplied to the regional grid, there by displacing the consumption of electricity from the regional grid electricity distribution system. As of 31 December 2013, the Southern grid has also been synchronised with the NEWNE grid, hence forming one unified Indian Grid. Thus for this Project activity Indian Grid is applicable. The electricity generation is the result of the utilization of kinetic energy in wind to drive the wind turbine blades to generate electricity without emitting any form of GHG in atmosphere. Thus the operation of the wind power project is considered as environmentally safe.

In the absence of the project activity, the electricity supplied 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 Indian grid.

The project activity is estimated to generate 8022 MWh of electricity annually; thus reducing GHGs to the tune of 7514 tCO_2e / annum for the entire crediting period of 7 years.

The project activity falls under the following Sectoral scope and Project Type:

Sectoral Scope : 01 - Energy industries (renewable / non-renewable sources)
Project Type : I - Renewable Energy Projects
Project Scale : Small Scale

The project activity will contribute to sustainable development in various ways. These will be as follows:

Social well-being:
Social well-being focuses on the reflections of the project activity on the neighbouring community. The project promoter envisages following social benefits:

- Improved standard of living
- Availability of infrastructure like electricity, roads, medical facilities etc.
- Reduce migration from rural to urban area for the sake of employment
- Awareness about the global issues, their solutions & role of India in the same
- Awareness among local people regarding wind power & its effect on rain and ground water level.

It will thus be responsible in bringing social well-being in the region.

Environmental well-being:

The project activity is a clean source of power generation. The environmental aspects in consideration are as follows:

- In comparison to other sources of power generation prevailing in the country, wind power is the cleanest technology**.**

- As compared to other power plants, less amount of land is required for a single wind turbo-generator.
- Wind power is renewable. It can be used continuously, whenever available. There is no danger of depletion of the raw material used for power generation.
- Wind power is a naturally available source of energy. There is no processing required to make it available for power generation.

Thus, wind power technology goes hand-in-hand with the environmental well-being of the region**.**

Technological well-being:
The power generation technology used in this project activity is provided by M/s. Suzlon Energy Limited. The technological well-being envisaged by the project promoter is as follows:

- It will boost the use of such technology by other project developers.
- Successful implementation and operation of this project will give necessary impetus in implementation of similar technology in the region.
- The project activity will lead to transfer of environmentally safe and sound technologies that are comparable to best practices in order to assist in upgradation of the technological base in the local region.

Economic well-being:

Economic well being refers to additional investment consistent with the needs of the local community. The project in due course of time will draw additional investment to the region. In general, the project activity envisages following economic benefits:

- Employment opportunities
- Market facilities for local products
- Industrial development
- Improvement of a rural economy
- Flow of goods and services

Although the realization of the above benefits would take a longer time needlessly, the economic development of the region would be attributed to the project operation. The project will contribute to the sustainable development of the region during its entire operational life.

A.2. Location of project activity

Host Party: India
Region/State/Province: Rajasthan
Site: Ratan Ka Bas (RKB)
District: Jodhpur

The proposed project activity is located at Ratan Ka Bas, Taluka: Balesar, District: Jodhpur, State: Rajasthan in India. The details are given below:

Sr. No.	Location No.	Capacity, MW	Technology	Village	Latitude	Longitude
1.	RKB- 027	1.5	S-82, Suzlon	Belwa Ranaji	N 26° 29’ 12.7”	E 72° 30’ 56.1”
2.	RKB- 124	1.5	S-82, Suzlon	Bastwa	N 26° 32 10.5”	E 72° 34’ 44.4”
3.	RKB- 125	1.5	S-82, Suzlon	Bhalu Kalan	N 26° 31’ 39.9”	E 72° 31’ 00.3”

Figure 1. Project activity on Map

A.3. Technologies/measures

Project Type : Type I – Renewable Energy Projects
Sectoral Scope : 01 - Energy industries (renewable / non-renewable sources)
Project Category : AMS I.D. – Grid connected renewable electricity generation, Version- 18 [1]

Technology/Measure:

The wind power technology is considered as one of the most environmental friendly technologies available. The operation of the wind turbine does not emit any harmful GHGs or any other harmful gases like conventional power plants during their operation. The electricity generation is the result of the utilization of kinetic energy in wind to drive the wind turbine blades to generate electricity. Thus the operation of the wind power project is considered as environmentally safe. In the absence of the project activity, the electricity supplied to the grid by the project activity would have otherwise

[1] https://cdm.unfccc.int/UserManagement/FileStorage/2P7FS6ZQAR84LG3NMKYUH50WI9ODBC

been generated by the operation of grid-connected power plants and by the addition of new generation sources into the Indian grid.

Technical specifications for Class S-82[2]:

1.	**Main Data**	
	Turbine type	Horizontal axis turbine
	Rated Power	1500 kW
	Rotor Diameter	82 m
	Hub height (including foundation)	Approximately 78.5 m
	Rotational Speed	15.6 to 18.4 rpm
2.	**Rotor**	
	Number of rotor blades	3
	Rotor Orientation	Upwind
	Material	Epoxy bonded fiber glass
3.	**Gear Box**	
	Type of Gear Box housing	One planetary stage / Two helical stages
	Ratio	1: 95.09
	Type of cooling	Forced oil cooling lubrication system
4.	**Generator System**	
	Generator type	Single speed induction generator with slip rings, variable rotor resistance via Suzlon Flexi slip system
	Rated power	1500 kW
	Speed at rated power	1511 rpm
	Rated voltage	690 V AC (phase to phase)
	Frequency	50 Hz
	Insulation Class	Class H
5.	**Tower**	
	Tower type	Tubular tower (corrosion proof painting on inner and outer surface) with welded steel plates
	Tower Height	76 m
6.	**Operational Parameters**	
	Cut-in wind speed	4 m/s
	Rated wind speed	14 m/s
	Cut-off wind speed	20 m/s
	Survival wind speed	52.5 m/s

The expected operation lifetime of this project is 20 years, the project is more than 8 years of age while applying for the second crediting period. The line diagram of the equipments is illustrated in the section **¡Error! No se encuentra el origen de la referencia.**. The project technology is indigenous & no technology transfer is involved.

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)	D. J. Malpani (Private Entity)	No

A.5. Public funding of project activity

The project activity is not availing any public funding. Kindly refer Annex 2.

[2] Suzlon S-82 Brochure - http://www.suzlon.com/pdf/S82%20product%20brochure.pdf

A.6. History of project activity

The project activity has already commissioned. The registration date of the project activity under CDM mechanism is 15/06/2012. Currently, the project is applying for Renewal of Crediting Period.

Also, the Project Participant declares that

a) This CDM project activity was not a CPA that has been excluded from a registered CDM PoA;

b) This CDM Project activity having a valid crediting period.

A.7. Debundling

As per "*Guidelines on Assessment of Debundling for SSC Project Activities*" (Version- 03, EB- 54, Annex- 13)[3]:

Debundling is defined as the fragmentation of a large project activity into smaller parts. A small-scale project activity that is part of a large project activity is not eligible to use the simplified modalities and procedures for small-scale CDM project activities. The full project activity or any component of the full project activity shall follow the regular CDM modalities and procedures.

This wind power project activity is a separate project activity having installed capacity of 4.5 MW (1.50 MW × 3 Nos.) and is not a debundled component of any large scale project activity.

Further, as per the guidelines,

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 project category and technology/measure; and*
– *Registered within the previous 2 years; and*
– *Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point*

This small-scale project activity cannot be deemed to be a debundled component of a large project activity as there is no registered[4] small-scale CDM project activity or an application to register another small-scale CDM project activity:

– With the same project participant;
– In the same project category and technology/measure; and
– Registered within the previous 2 years; and
– Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

It therefore satisfies all conditions listed in *'Guidelines on Assessment of Debundling for SSC Project Activities'* (Version- 03, EB- 54, Annex- 13) regarding debundling. Thus, project proponent hereby confirms that the project activity is not a debundled component of another larger project activity.

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

[4] PP has two CDM registered projects (UNFCCC Ref. Nos.1778 & 3742). Nevertheless, these projects do not fulfil above debundling criteria

SECTION B. Application of methodologies and standardized baselines

B.1. References to methodologies and standardized baselines

Title : Grid-connected electricity generation from renewable sources
Reference : The project activity meets the eligibility criteria of small scale project as it is less than 15 MW
Methodology : Grid-connected electricity generation from renewable sources AMS-I.D (Version 18.0)[5]
Sectoral Scope : 01 Energy industries (renewable / non-renewable sources)

Tools referred with above methodology and applicable for project activity are:

- Tool to calculate the emission factor for an electricity system[6] - Version 07.0 (EB 100, Annex 04)

B.2. Applicability of methodologies and standardized baselines

The project activity involves generation of grid connected electricity from renewable wind energy. The project activity has an installed capacity of 4.5 MW which will remain within the maximum qualifying capacity of 15 MW for a small scale CDM project activity under Type-I of the small scale methodologies. The installed capacity will not increase throughout and even after the crediting period therefore the project activity will remain within the limit of small scale in each year of the crediting period. The project status is corresponding to the methodology AMS-I.D and applicability of methodology AMS-I.D are discussed below

<table>
<tr><th>Applicability Criterion</th><th>Project Case</th></tr>
<tr><td>1. This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass:
(a) Supplying electricity to a national or a regional grid.
(b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.</td><td>The project activity is a Renewable Energy Project i.e. Wind Power Project which falls under applicability criteria option 4(a) i.e., “Install a Greenfield plant;”. Hence the project activity meets the given applicability criterion.</td></tr>
<tr><td>2. Illustration of respective situations under which each of the methodology (i.e. AMS-I.D, AMS-I.F and AMS-I.A) applies is included below:

<table>
<tr><th></th><th>Project type</th><th>AMS-I.A</th><th>AMS-I.D</th><th>AMS-I.F</th></tr>
<tr><td>1</td><td>Project supplies electricity to a national/regional grid</td><td></td><td>√</td><td></td></tr>
<tr><td>2</td><td>Project displaces grid electricity consumption (e.g. grid import) and/or captive fossil fuel electricity generation</td><td></td><td></td><td>√</td></tr>
</table>
</td><td>The 1st and 3rd option of Table of AMS I.D. Version 18, are applicable.</td></tr>
</table>

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

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

Applicability Criterion					Project Case
	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 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	√			
3. This methodology is applicable to project activities that (a) install a Greenfield plant; (b) involve a capacity addition; (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 project is installation of new wind based electricity generation plants (not addition to existing system). Option (a) is applicable.
4. Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: • The project activity is implemented in an existing reservoir with no change in the volume of reservoir; • The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m^2; • The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m^2.					The project is wind power project and thus the criterion is not applicable to this project activity.
5. If the new unit has both renewable and non-renewable components (e.g., a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit					The project activity is 4.5 MW wind electricity generation. Unit does not co-fire fossil fuels. Hence the criterion is not applicable to the project activity.

Applicability Criterion	Project Case
of 15 MW.	
6. Combined heat and power (co-generation) systems are not eligible under this category.	The Project activity is a renewable wind energy project and is not a combined heat and power system. Hence the criteria is not applicable to the project activity
7. In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.	The project activity is Greenfield and there is no existing power generation facility at the site. Hence the criteria is not applicable to the project activity
8. In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.	Not applicable, the wind project is a Green field project activity and this project is not the enhancement or up gradation project.
9. In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If 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 Project activity is a renewable wind power project and is not a landfill gas, waste gas, waste water treatment and agro-industries projects or recovered methane emissions project. Hence the criteria is not applicable to the project activity
10. In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.	The Project activity is a renewable wind power project and is not a biomass project. Hence the criterion is not applicable to the project activity.

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

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

The project activity is located in the State of Rajasthan and is supplying generated electricity to the Indian Grid of India. The project boundary consists of project activity, evacuation facility, common metering point and connectivity to the Indian Grid. The schematic diagram of project boundary is as follows:

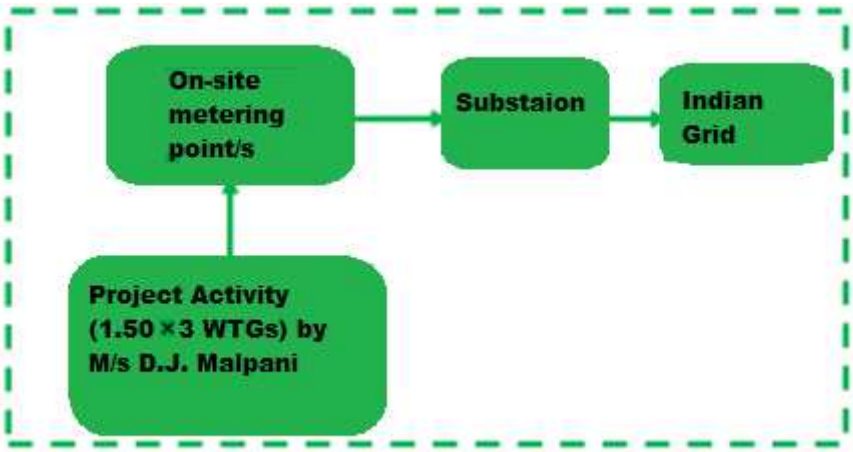

Figure 02: Project Boundary

Source		GHG	Included?	Justification/Explanation
Baseline	Grid connected electricity generation	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
Project activity	Greenfield Solar PV Power Project Activity.	CO_2	No	No CO_2 emissions are emitted from the project
		CH_4	No	Project activity does not emit CH_4
		N_2O	No	Project activity does not emit N_2O

B.4. Establishment and description of baseline scenario

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

This tool provides a stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period, as per the modalities and procedures of the clean development mechanism of Project Standard version 2, para 286.

The tool stipulates the following steps to be carried out.

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

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

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

Step 1.2: Assess the impact of circumstances

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

crediting period is still valid for the project. Therefore, the assessment of the changes in market characteristics is not required for the renewal of the project's crediting period under CDM.

Nevertheless, there is an impressive growth attained by the Indian Power Sector within the recent years, the installed capacity has grown from mere 1,713 MW in 1950 to 360456 MW as on Dec, 2018, consisting of 227644.34 MW Thermal, 80632.8 MW RES and 6,780MW Nuclear. Sector-wise details of installed capacity are shown in Table provided below. However, it is evident from Table[7] below that the installed capacity is predominantly coal based and therefore, is a major source of carbon dioxide emissions in India. Hence, there exists scope for reducing the CO_2 emissions in the country by increased use of renewable energy sources. Furthermore, project participant has considered the latest available CO_2 Baseline Database (CEA database, version 14) at the time of requesting renewal of the crediting period for establishing the baseline emission factor, which itself considered all the new circumstances. Hence, the new circumstances do not have an impact on the baseline emission.

Table 1: Sector- wise installed capacity (MW) as on Dec, 2018 (CEA Database version 14)

Sector	Thermal					Nuclear	Hydro	RES	Grand Total
	Coal	Lignite	Gas	Diesel	Total				
State	64736.50	1290.00	7118.71	363.93	73509.13	0.00	26958.50	2349.98	102817.16
Private	74733.00	1830.00	10580.60	273.70	87417.30	0.00	3394.00	76650.52	167461.82
Central	56340.00	3140.00	7237.91	0.00	66717.91	6780.00	15046.72	1632.30	90176.93
All India	195809.5	6260.00	24937.22	637.63	227644.34	6780.00	45399.22	80632.80	360456.37

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

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

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

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

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

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

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

In line with the paragraph 284 of the project standard version 2, the impact of new relevant national and/or sectoral policies and circumstances on the baseline taking into account relevant EB guidance with regard to renewal of the crediting period at the time of requesting renewal of crediting period; and the correctness of the application of an approved baseline methodology for

[7] http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf

the determination of the continued validity of the baseline or its update, and the estimation of emission reductions for the applicable crediting period

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

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

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

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

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

The approved consolidated baseline methodology, AMS I.D. (Version 18), has been used to determine the baseline and the estimation of emission reductions for the applicable crediting period. As referred in the methodology “If the project activity is the installation of a Greenfield power plant, the baseline scenario is electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system”.

As per the approved consolidated Methodology AMS-1.D (Version 18.0) “If the project activity is the installation of a Greenfield power plant, the baseline scenario is electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system”.

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

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

The combined margin ($EF_{grid, CM,y}$) is the result of a weighted average of two emission factor pertaining to the electricity system: the operating margin (OM) and build margin (BM).

Calculations for this combined margin must be based on data from an official source (where available) and made publically available. The CEA database version 14 is the latest available data at the time of PD submission to DOE for validation, hence same is considered for emission factor calculations.

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

Parameter	Value	Nomenclature	Source
$EF_{grid,CM,y}$	0.9368 tCO_2/MWh	Combined margin CO_2 emission factor for the project electricity system in year y	Calculated as the weighted average of the operating margin (0.75) & build margin (0.25) values, sourced from Baseline CO_2 Emission Database, Version 14.0, Dec 2018 published by Central Electricity Authority (CEA), Government of India
$EF_{grid,OM,y}$	0.9610 tCO_2/MWh	Operating margin CO_2 emission factor for the project electricity system in year y	Calculated as the last 3 year (2015-16, 2016-17, 2017-18) generation-weighted average, sourced from Baseline CO_2 Emission Database, Version 14.0, Dec 2018 published by Central Electricity Authority (CEA), Government of India
$EF_{grid,BM,y}$	0.8644 tCO_2/MWh	Build margin CO_2 emission factor for the project electricity system in year y	Baseline CO_2 Emission Database, Version 14.0[8], May 2018 published by Central Electricity Authority (CEA), Government of India

B.5. Demonstration of additionality

The additionality of this wind power project is demonstrated by using the Investment barrier (option a) in accordance with *Attachment A of Appendix B (Version 08, EB 63, Annex 24) & Guidelines on the Assessment of Investment Analysis (Version- 5, EB- 62, Annex- 5).*

(a) Investment barrier: a financially more viable alternative to the project activity would have led to higher emissions;

The project proponent is required to determine that the project activity is not:

• The most economically or financially attractive; or
• Economically or financially feasible, without the revenue from the sale of certified emission reductions (CERs).

As per paragraph 19 of *"Guidelines on the Assessment of Investment Analysis" (Version: 5, EB: 62, Annex: 5) - If the alternative to the project activity is the supply of electricity from a grid this is not to be considered an investment and a benchmark approach is considered appropriate. Hence, project promoter has considered Benchmark analysis to prove the additionality of the project.*

PP has considered post tax project IRR as suitable financial indicator for the project.

Suitability of benchmark:

[8] http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf

The 'Guidelines on the Assessment of Investment Analysis' (Paragraph- 12, Version- 5, EB- 62, Annex- 5) states that - Local commercial lending rates or weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR, hence PP has selected Prime Lending Rate (PLR) applicable at the time of project conceptualization stage. PP has considered PLR of Bank of Baroda[9] as bench mark of the project. PP took decision to invest in wind project on 06/08/2011, during this period PLR of the Bank of Baroda was 15.00[10]%, which has been considered as benchmark of the project.

Calculation and comparison of financial indicators

PP has calculated project IRR of the project for entire life cycle. Key financial assumptions are as under:

Sr. No.	Particulars	Unit	Value	Reference
1.	Capacity	kW	1500	Proposal from Supplier
2.	Machines	No	03	Proposal from Supplier
3.	Total Capacity	kW	4500	Proposal from Supplier
4.	Total estimated generation for project activity	Million kWh	9.24	Proposal from Supplier
5.	Total generation after losses	Million kWh	8.50	Calculated from Proposal
6.	Total conservative generation considering 4% addition of losses as per RERC Tariff order dt. 09.03.2007, Page 14 para 28	Million kWh	8.84	Proposal from Supplier
7.	PLF considering conservative generation as 8.84 Million kWh	%	22.43[11]	Proposal from Supplier
8.	Deration in 6th, 10th, 14th and 18th year	%	1.25	Rajasthan Electricity Regulatory Commission order September 2006
9.	Tariff Rate	INR/kWh	4.22	Rajasthan Electricity Regulatory Commission Tariff order dt. 03.06.2011, page 1
10.	O & M Cost per WTG	INR in Million	1.70	Proposal from Supplier
11.	O & M	INR in Million	5.10	Proposal from Supplier
12.	Service Tax (at 10.30%)	INR in Million	0.53	Service Tax Rule
13.	O & M including Service tax	INR in Million	5.63	Calculated
14.	Escalation in O & M Exp.	%	5.00	Proposal from Supplier
15.	O & M Free For	years	1st Year	Proposal from Supplier
16.	Insurance	INR in Million	0.42	Sheet no. 31 under Risk code 70 , Rate code 05 of http://iib.gov.in/IRDA/tac/tariffs/AIFT

[9] Bank of Baroda is a regular lender to the PP.

[10] http://banking.contify.com/story/bank-of-baroda-raises-base-rate-bplr-by-50-bps-each-2011-07-30

[11] The PLF value arrived by the 3rd party PLF report is 20.35% whereas the PLF offered by Suzlon is 21.56%. So, PP has considered PLF value of 21.56% plus 4% losses as per RERC Tariff order dt. 09.03.2007, Page 14 paragraph

				2001.pdf
17.	Cost of WTG	INR in Million	280.42	Proposal from Supplier
18.	Promoters contribution	INR in Million	280.42	100% Equity
19.	Depreciation as per Companies Act	%	5	Section 205, can be referred at http://www.indiankanoon.org/doc/1422372/
20.	Income Tax	%	30.90	Section 143, Income Tax Act 1961

The Project IRR value for the project activity has been calculated for the life time of the project. The post-tax Project IRR without CDM benefits comes to 9.03%, which is lower than the benchmark rate of 15%[12].

Thus, we can conclude that successful CDM registration of this project activity is important to make it financially attractive.

Sensitivity analysis

The *"Guidelines on the Assessment of Investment Analysis" (Version- 5, EB- 62, Annex- 5, paragraph 20),* states that 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.

The different parameters that affect the viability of a wind power project as per above clause are mentioned below –

Parameters	Comments
Annual Generation	This is the most important and critical parameter for any Power Project & hence viability of the project will be affected by any fluctuation in this parameter. Sensitivity analysis has therefore been carried out for it.
Project Cost	This is other important and critical parameter for any Power Project & hence viability of the project will be affected by any fluctuation in this parameter. Sensitivity analysis has therefore been carried out for it.
O & M Cost	This does not add to 20% of either total project cost or total project revenues, even then sensitivity analysis is conducted out to show the effect on viability of the project
Tariff	As the tariff structure for the Rajasthan is fixed for a period of 20 years, it is unlikely that the tariff would changed during the project operation

Outcome of Sensitivity analysis:

Sensitivity Analysis based on Annual Generation, Project Cost and O & M Cost			
Variation by….	**-10%**	**0**	**10%**
Annual Generation	7.01%	9.03%	10.92%
Project Cost.	10.74%	9.03%	7.58%
O & M Cost	9.41%	9.03%	8.65%
Tariff	7.01%	9.03%	10.92%

From the above table it seems that if the generation increased by 10%, project cost decreased by 10%, O & M decreased by 10% and tariff rate is increased by 10%, the financial indicator will not

[12] The PLF value arrived by the 3rd party PLF report is 20.35% whereas the PLF offered by Suzlon is 21.56%. So, PP has considered PLF value of 21.56% plus 4% losses as per RERC Tariff order dt. 09.03.2007, Page 14 paragraph 28 (i.e. conservative PLF of 22.43%) for IRR working & PLF of 20.35% for baseline calculations as a conservative approach.

cross the benchmark selected by the PP. The project activity is clearly unattractive in absence of CDM income. Hence the project activity is additional.

The successful registration of the project as CDM project is imperative in order to make it financially more attractive**.**

Prior CDM Consideration:

As per paragraph 02 of the *Guidelines On The Demonstration And Assessment Of Prior Consideration Of The CDM (Version: 04, EB: 62, Annex: 13),* the PP has intimated to both UNFCCC & DNA on 26/08/2011 regarding intentions to seek CDM benefits for the project activity. The start date of the project activity is considered as 11/08/2011 (Purchase Order date of Wind Turbine Generators).The intimation is within six months of the project start date.

B.6. Estimation of emission reductions

B.6.1. Explanation of methodological choices

As per the approved consolidated Methodology AMS - I.D, version 18:

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired 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:

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

Where:
BE_y = Baseline emissions in year y (t CO_2/yr)

$EG_{BL,y}$ = 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/yr)

$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO_2/MWh)

As per methodology, combined grid emission factor as per the "Tool to calculate the emission factor for an electricity system" version 07 is calculated as below.

CO_2 Baseline Database for the Indian Power Sector, Version 14, December 2018[13] published by Central Electricity Authority (CEA), Government of India has been used for the calculation of emission reduction.

As per Methodological tool: Tool to calculate the emission factor for an electricity system (Version 07.0, EB 100, Annex 4), following six steps have been followed:

(a) **Step 1:** Identify the relevant electricity systems;

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

(c) **Step 3:** Select a method to determine the operating margin (OM);

[13] http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf

(d) **Step 4:** Calculate the operating margin emission factor according to the selected method;

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

(f) **Step 6:** Calculate the combined margin (CM) emission factor.

Step 1: Identify the relevant electricity systems

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

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

Table: Geographical Scope of Indian Electricity Grid

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

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

Project participants 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 chosen only grid power plants in the calculation.

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

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

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

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

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

	2013-14	2014-15	2015-16	2016-17	2017-18
India	18.6%	16.8%	15.1%	14.6%	14.3%

Data Source: Central Electricity Authority (CEA) database Version 14, Dec 2018[14]

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

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units.

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

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

OR

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

PP has chosen ex-ante option for calculation of Simple OM emission factor using a 3-year generation-weighted average, based on the most recent data available at the time of submission of the PD to the DOE for validation.

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

Step 4: Calculate the operating margin emission factor ($EF_{grid,OMSimple,y}$) according to the selected method

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

[14] http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf

Net Generation in Operating Margin (GWh) (incl. Imports)			
	2015-16	**2016-17**	**2017-18**
INDIAN Grid	871,753	916,278	960,693

Simple Operating Margin (tCO_2/MWh) (incl. Imports)			
	2015-16	**2016-17**	**2017-18**
INDIAN Grid	0.9655	0.9636	0.9543

Weighted Generation Operating Margin	
INDIAN Grid	**0.9610**

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

As per Methodological tool: "Tool to calculate the emission factor for an electricity system" (Version 07.0, EB 100, Annex 4) para 72:

In terms of vintage of data, project participants can choose between one of the following two options:

(a) **Option 1 -** for the first crediting period, calculate the 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 PD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

(b) **Option 2 -** For the first crediting period, the build margin emission factor shall be updated annually, ex post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex ante, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.
Option 1 as described above is chosen by PP to calculate the build margin emission factor for the project activity. BM is calculated ex-ante based on the most recent information available at the time of submission of PD and is fixed for the entire crediting period.

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

Build Margin (tCO_2/MWh) (not adjusted for imports)	
	2017-18
INDIAN Grid	**0.8644**

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

As per Methodological tool: "Tool to calculate the emission factor for an electricity system" (Version 07.0, EB 100, Annex 4) para 81:

The calculation of the combined margin (CM) emission factor ($EF_{grid,CM,y}$) is based on one of the following methods:

(a) Weighted average CM; or
(b) Simplified CM.

PP has chosen option (a) i.e weighted average CM to calculate the combined margin emission factor for the project activity.
The combined margin emissions factor is calculated as follows:

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

Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (t CO_2/MWh)
$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year y (t CO_2/MWh)
W_{OM} = Weighting of operating margin emissions factor (per cent)
W_{BM} = Weighting of build margin emissions factor (per cent)

The following default values should be used for WOM and WBM:

Wind and solar power generation project activities: W_{OM} = 0.75 and W_{BM} = 0.25 (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods. Since project activity is of wind power generation, the above weightage has been considered for OM and BM.

Therefore, $EF_{grid,CM,y}$ = 0.9610 * 0.75 + 0.8644 * 0.25
= 0.9368 tCO_2/MWh

Baseline emission factor (EF_y):

The baseline emission factor is calculated using the combined margin approach as described in Step 6 above:

Therefore, $EF_y = EF_{grid,CM,y}$ = 0.9368 tCO_2/MWh.

BE_y = 8,022 x 0.9368 = 7514 tCO_2 during a given year y.

B.6.2. Data and parameters fixed ex ante

Data/Parameter	$EF_{grid, OM, y}$
Data unit	tCO_2/MWh
Description	Operating margin CO_2 emission factor for Indian grid.
Source of data	Calculated from CEA database, Version 14, Dec 2018[15]
Value(s) applied	0.9610
Choice of data or measurement methods and procedures	Calculated as per "Tool to calculate the emission factor for an electricity system, version 07" as 3-year generation weighted average using data for the years 2015-16, 2016-17 & 2017-18. The data are obtained from "CO2 Baseline Database for Indian Power Sector" version 14, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of data	For the calculation of the Baseline Emission
Additional comment	The calculation is done as ex ante.

[15] http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf

Data/Parameter	$EF_{grid, BM, y}$
Data unit	tCO_2/MWh
Description	Build margin CO_2 emission factor for Indian grid.
Source of data	Calculated from CEA database, Version 14, Dec 2018[16]
Value(s) applied	0.8644
Choice of data or measurement methods and procedures	Calculated as per "Tool to calculate the emission factor for an electricity system, version 07" as per the latest data available for the most recent year 2017-18. The data is obtained from "CO2 Baseline Database for Indian Power Sector" version 14, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of data	For the calculation of the Baseline Emission
Additional comment	The calculation is done as ex ante.

Data/Parameter	$EF_{CO2,grid,y}$
Data unit	tCO_2 / MWh
Description	Combined margin CO2 emission factor for Indian grid.
Source of data	Calculated from CEA database, Version 14, Dec 2018[17]
Value(s) applied	0.9368
Choice of data or measurement methods and procedures	The combined margin emissions factor is calculated as follows: $EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid, BM,y} * W_{BM}$ Where: $EF_{grid,BM,y}$= Build margin CO_2 emission factor in year y (tCO_2/MWh) $EF_{grid,OM,y}$= Operating margin CO_2 emission factor in year y (tCO_2/MWh) W_{OM} = Weighting of operating margin emissions factor (%) = 75% W_{BM}= Weighting of build margin emissions factor (%) = 25%
Purpose of data	For the calculation of the Baseline Emission
Additional comment	The calculation is done as ex ante.

B.6.3. Ex ante calculation of emission reductions

The Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh) is calculated using the following parameters:

Sr. No.	Project Parameters	Details
1.	Location	Ratan Ka Bas, Jodhpur, Rajasthan
2.	Grid	INDIAN Grid
3.	Capacity per WTG	1.50 MW
4.	Total no. of WTGs	3
5.	Total Capacity	4.50 MW
6.	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y[18]	8022 MWh

[16] http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf

[17] http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf

Baseline Emissions (BEy), tCO_2:

$BE_y = EG_{BL,y} \times EF_{CO2,grid,y}$
$= 8022 \times 0.9368$
$= 7514\ tCO2$

The project emissions (PEy) & leakage emissions (LEy) are zero as explained in Section B.6.1. Thus,

$ER_y = BE_y$
$= 7514\ tCO_2$

Thus, the project activity is estimated to achieve emission reductions of 7514 tCO2e per annum over the entire crediting period of 7 years.

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 8	7,514	0	0	7,514
Year 9	7,514	0	0	7,514
Year 10	7,514	0	0	7,514
Year 11	7,514	0	0	7,514
Year 12	7,514	0	0	7,514
Year 13	7,514	0	0	7,514
Year 14	7,514	0	0	7,514
Total	52,598			52,598
Total number of crediting years	7			
Annual average over the crediting period	7,514			7,514

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data/Parameter	$EG_{BL,y}$
Data unit	MWh/y
Description	*Quantity of net electricity supplied to the grid in year y*
Source of data	Monthly Break up of net export units reports
Value(s) applied	8022
Measurement methods and procedures	**Metering at 33 kV/220 kV level:** The electricity generated by the project activity WTG/s is evacuated to the pooling station at 33 kV/220 kV level. The project activity WTG/s along with other WTGs, are connected to the feeder-wise metering point/s, where each metering point consists of both main & check meters. These energy meters (type: tri-vector) are having accuracy class of 0.2s.

[18] As per 3rd party PLF report. The PLF value arrived by the 3rd party PLF report is 20.35% whereas the PLF offered by Suzlon is 21.56%. So, PP has considered PLF value of 21.56% plus 4% losses as per RERC Tariff order dt. 09.03.2007, Page 14 paragraph 28 (i.e. conservative PLF of 22.43%) for IRR working & PLF of 20.35% (8022 MWh) for baseline calculations as a conservative approach.

	The joint meter reading is taken on monthly basis at these metering point/s by the representatives of PP & State Utility, which records parameters like export, import. The electricity (export and import) for the connected WTG/s is apportioned on monthly basis by the State Utility at 33 kV/220 kV level on the basis of generation ratio at the applicable metering point (ratio of controller reading of connected WTG to the controller reading for all WTGs connected to the applicable metering point) and the electricity (export, import etc) recorded by the energy meters at 33 kV/220 kV GSS on monthly basis. It will give export kWh & import kWh for connected WTG. The net export obtained at 33 kV/220 kV level for any given month for the connected WTG is then obtained by: Net Export = Export kWh – Import kWh All these metering points are further connected to the common delivery point at the 220 kV level. **Metering at 220 kV level:** The common metering point at 220 kV GSS concurrently records total electricity (total export and total import) receiving from all connected metering points. The common metering point consists of both main & check meters. These energy meters (type: tri-vector) are having accuracy class of 0.2s. The monthly JMR is taken by the representative of PP & State Utility. Billing of the energy will be done based on the energy break up available at the metering at 220 kV level. **Transmission loss:** The total transmission loss occurred during export of the electricity between the 33/220 kV level pooling station & 220 kV level common delivery point is calculated as the difference between total aggregated reading of exports for all metering points at 33/220 kV level and the total reading of exports for same metering points recorded at the 220 kV level. Similarly, transmission loss occurred during import of the electricity is also calculated. The PP/WTG wise transmission loss during export & import is calculated by multiplying the values of arrived transmission loss for export & import for wind farm with the Generation Ratio at common delivery point (ratio of electricity generated by installed WTG to the total generation by all the connected WTGs/ or connected metering points under common delivery point). The values of transmission loss during export & import for the given WTG are subtracting from EG Export, metering point & EG Import, metering point respectively to get the values of export and import respectively for the given month. **Net electricity delivered to the Grid:** The net electricity delivered to the Grid by the given WTG for the given month (net export kWh) is then obtained by subtracting import from export. The values of the net electricity delivered to the Grid are aggregated annually to get $EG_{BL,y}$. The value of net electricity delivered to the Grid ($EG_{BL,y}$) by the project activity per annum is converted to MWh before the calculation of emission reductions.
Monitoring frequency	Monthly
QA/QC procedures	The meters are approved, tested & sealed by the State Utility. The meters are in

	the custody of State Utility. The calibration of all the meters will be undertaken at required intervals (once is five years as per CEA notification[19]) and faulty meters will be duly replaced immediately. The meter accuracy class and calibration interval is under purview of state electricity board and PP does not have any control on it. It is also noted that apportioning procedure is under control of state electricity board and PP does not have any control on it. In the absence or delay in meter calibration — appropriate guideline will be applied to confirm the conservativeness of emission reductions.
Purpose of data	The Data/Parameter is required to calculate the baseline emission
Additional comment	Data will be archived in electronic form for two years after the end of crediting period or of the last issuance of CERs for this project activity, whichever occurs later.

B.7.2. Sampling plan

Not Applicable

B.7.3. Other elements of monitoring plan

The monitoring of the project activity is given as below:

- The electricity generated by the project activity WTG/s is evacuated to the pooling station at 33 kV/220 kV level. The project activity WTG/s along with other WTGs, are connected to the feeder-wise metering point/s, where each metering point consists of both main & check meters. These energy meters are having accuracy class of 0.2s.
- The joint meter reading is taken on monthly basis at these metering point/s by the representatives of PP & State Utility, which records parameters like export, import.
- All these metering points are further connected to the common delivery point at the 220 kV level.
- The common metering point at 220 kV GSS concurrently records total electricity (total export and total import) received from all connected metering points. The common metering point consists of both main & check meters. These energy meters are having accuracy class of 0.2s. The monthly JMR is taken by the representative of PP & State Utility.
- Billing of the energy will be done based on the energy break up available at the metering at 220 kV level.
- The monitoring & measurement of electricity will be done on continuous basis; while recording will be done on monthly basis as Joint Meter Reading by the representatives of State Utility & PP.
- The value of monthly export by the project activity along with import and net export will be recorded in the monthly Break up of net export units report.
- The values of monthly export & import by the project activity recorded in the monthly Break up of net export units report is calculated based on the apportioning method by the state utility.
- The meters shall be approved, tested & sealed by the State Utility. The meters are in the custody of State Utility.
- The calibration of all the meters will be undertaken at required intervals (once is five years as per CEA notification) In the absence or delay in meter calibration — appropriate guideline will be applied to confirm the conservativeness of emission reductions.
- The net electricity supplied to the grid will be converted to MWh for calculation of emission reductions.
- Data will be archived in electronic form for two years after the end of crediting period or of the last issuance of CERs for this project activity, whichever occurs later.
- The PP is responsible for data collection & archiving.

[19] http://www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf

Sample Apportioning Procedure:

The apportioning of the electricity is the responsibility of the State Utility. The sample apportioning procedure adopted for any given WTG for any given month is given below:

Generation Ratio at metering point (33 kV/220 kV level GSS):

The generation ratio is the ratio of electricity generated by installed WTG of PP to the total generation by all the connected WTGs to the applicable metering point.

$$G_{R,\text{ metering point}} = EG_{\text{Controller, WTG}} / EG_{\text{Controller, metering point}} \quad \text{(a)}$$

Where:

$G_{R,\text{ metering point}}$: Generation Ratio at metering point
$EG_{\text{Controller, WTG}}$: Electricity generated by installed WTG of PP connected to the applicable metering point
$EG_{\text{Controller, metering point}}$: Total generation by all the connected WTGs to the applicable metering Point

Calculation of net electricity exported at applicable metering point:

The Main and Check meters at the applicable metering point measures number of parameters including export and import for all the connected WTGs.

The import, kWh by the WTG at the metering point is calculated in the following manner:

$$EG_{\text{Import, metering point}} = G_{R,\text{ metering point}} \times EG_{\text{Total Import, metering point}} \quad \text{(b)}$$

Where:

$EG_{\text{Export, metering point}}$: Export, kWh by the WTG at the metering point
GR, metering point : Generation Ratio at metering point
$EG_{\text{Total Export, metering point}}$: Total Export, kWh by all the WTGs at the metering point

The net electricity exported by the WTG at the 33 kV/220 kV level metering point is calculated by subtracting equation (b) from (c).

Thus, the net electricity exported at 33 kV/220 kV level metering point

$$= EG_{\text{Export, metering point}} - EG_{\text{Import, metering point}} \quad \text{(d)}$$

Transmission Loss Calculation:

The total transmission loss occurred during export of the electricity between the 33/220 kV level pooling station & 220 kV level common delivery point is calculated as the difference between total aggregated reading of export for all metering points at 33/220 kV level and the total reading of export for same metering points recorded at the 220 kV level. Similarly transmission loss occurred during import of the electricity is also calculated.

The PP/WTG wise transmission loss during export & import is calculated by multiplying the values of arrived transmission loss for export & import for wind farm with the *Generation Ratio at common delivery point.*

Generation Ratio at common delivery point:

It is the ratio of electricity generated by installed WTG to the total generation by all the connected WTGs/ or connected metering points under common delivery point.

$$G_{R,\text{ Common Delivery Point}} = EG_{\text{Controller, WTG}} / EG_{\text{Controller, Common Delivery Point}} \quad \text{(e)}$$

Where:

$G_{R,\text{ Common Delivery Point}}$: Generation Ratio at common delivery point
$EG_{\text{Controller, WTG}}$: Electricity generated by installed WTG
$EG_{\text{Controller, Common Delivery Point}}$: Total generation by all the connected WTGs/ or connected metering points under common delivery point

Calculation of net electricity delivered to the Grid:

The values of transmission loss during export & import for the given WTG are subtracting from $EG_{\text{Export, metering point}}$ & $EG_{\text{Import, metering point}}$ respectively to get the values of export and import respectively for the given month.

The net electricity delivered to the Grid by the given WTG for the given month (net export kWh) is then obtained by subtracting import from export. Thus,

= Export – Import (f)

These apportioned values viz import, export and net export kWh can be referred from the Monthly Break up of net export units report.

Operation & Maintenance of the Project:

Suzlon Infrastructure Services Ltd. is providing O & M services to the project promoter. Following services are provided by Suzlon Infrastructure Services Ltd.:

Routine Maintenance Services:

Routine maintenance labour work involves making available suitable manpower for operation and maintenance of the equipment and covers periodic preventive maintenance, cleaning and upkeep of the equipment including –

- Tower torquing
- Blade cleaning
- Nacelle torquing and cleaning
- Transformer oil filtration
- Control panel & LT panel maintenance
- Site and transformer yard maintenance

Security Services:

This service includes watch and ward and security of the wind turbines and the equipment.

Management Services:

- Data logging for power generation, grid availability, machine availability.
- Preparation and submission of monthly performance report in agreed format.
- Taking monthly meter reading jointly with utility of power generated at promoter's wind turbines and supplied to grid from the meter/s maintained by utility for the purpose and co-ordinate to obtain necessary power credit report/ certificate.

Technical Services:

- Visual inspection of the WTGs and all parts thereof.
- Technical assistance including checking of various technical, safety and operational parameters of the equipment, trouble shooting and relevant technical services

Operational & Management Structure:

Sr. No.	Monitoring Team	Responsibility
1.	Project Head	○ Overall project management ○ Project execution ○ Review of project operations ○ Review of generation & achieved emission reductions by project ○ Liazsoning with Consultant/Suzlon
2.	Project Coordinator	○ Data Archival (electronic) ○ Site visit for actual project monitoring Storage of data ○ Coordination with O & M Contractor for day to-day operations ○ Invoice preparation & follow ups ○ Coordination with Suzlon for regular calibration of meters ○ Reporting to Project Head ○ Online project monitoring ○ Feedback and corrective action wherever necessary
3.	O & M Contractor (Suzlon)	
	Suzlon Pune Office	○ Focal point between PP and O & M team at project site ○ Daily Generation Report to PP ○ Storage of data ○ Coordinating with PP/Consultant/Auditors during their site visit for validation/annual verification ○ Coordinating with state utility for monthly JMR reports ○ Compliment as per O & M Agreement with the PP ○ Requesting/coordinating state utility for annual calibration behalf of PP

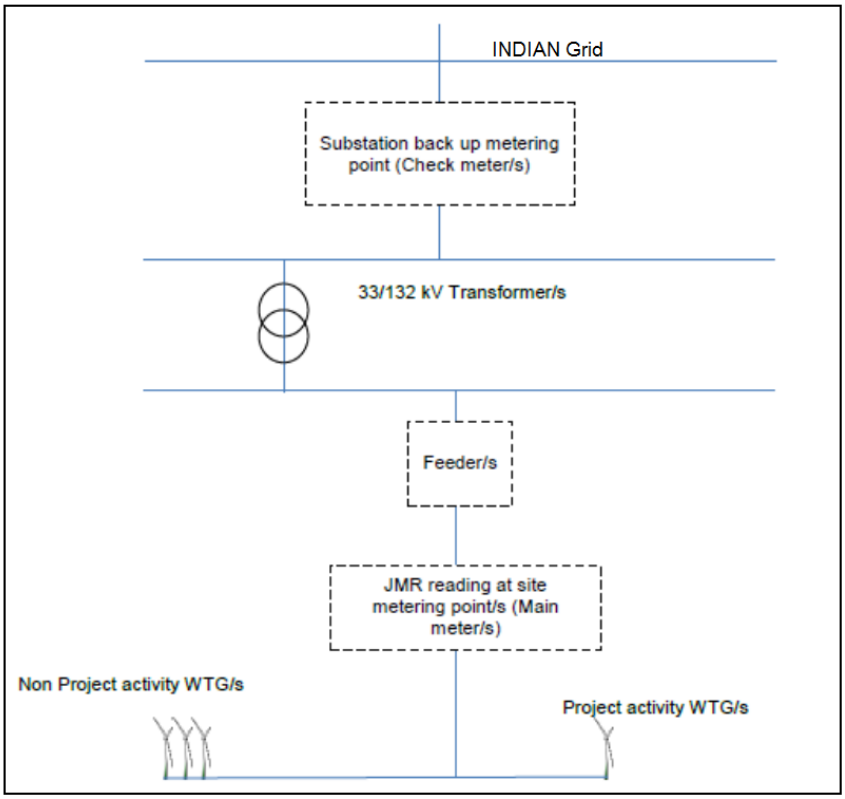

Figure 2. Line diagram depicting Metering location

SECTION C. Start date, crediting period type and duration

C.1. Start date of project activity

11/08/2011 (Purchase Order date of Wind Turbine Generators)

C.2. Expected operational lifetime of project activity

20 years and 0 months

C.3. Crediting period of project activity

C.3.1. Type of crediting period

The project activity has chosen renewable crediting period
Second crediting period: 01/07/2019 to 30/06/2026

C.3.2. Start date of crediting period

Renewed start date of crediting period: 01/07/2019[20]
Previous crediting period: 01/07/2012 to 30/06/2019

C.3.3. Duration of crediting period

7 years and 0 months

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

The guidelines on Environmental Impact Assessment have been published by Ministry of Environment and Forests (MoEF), Government of India (GOI) under Environmental Impact Assessment notification 14/09/2006[21]. Further amendments to the notification have been done on 14/07/2018[22]. As per the notification:

"The following projects or activities shall require prior environmental clearance from the concerned regulatory authority, which shall hereinafter referred to be as the Central Government in the Ministry of Environment and Forests for matters falling under Category 'A' in the Schedule and at State level the State Environment Impact Assessment Authority (SEIAA) for matters falling under Category 'B' in the said Schedule, before any construction work, or preparation of land by the project management except for securing the land, is started on the project or activity:

(i) All new projects or activities listed in the Schedule to this notification;
(ii) Expansion and modernization of existing projects or activities listed in the Schedule to this notification with addition of capacity beyond the limits specified for the concerned sector, that is, projects or activities which cross the threshold limits given in the Schedule, after expansion or modernization;
(iii) Any change in product - mix in an existing manufacturing unit included in Schedule beyond the specified range."

[20] As per para 32 of CDM-EB100 report, version 01.0 & para 412 of CDM validation and verification standard for project activities, version 02.0

[21] EIA Notification 2006: http://envfor.nic.in/legis/eia/so1533.pdf

[22] EIA Notification 2018: http://www.egcipl.com/Doc/Gazzette%20Notification.pdf

As the wind power generation projects are not listed in any of the categories of the schedule, it does not require Environmental Impact Assessment

D.2. Environmental impact assessment

As the wind power generation projects are not listed in any of the categories of the schedule, it does not require Environmental Impact Assessment.

Wind energy projects are considered environmentally safe and as per Host party- India no EIA is required.

SECTION E. Local stakeholder consultation

E.1. Modalities for local stakeholder consultation

The stake holder meeting was conducted at Suzlon's CMS Building at Ketu Ratan Ka Bas (RKB) on 13/10/2011. The stake holders were invited by Public Notice in local news paper dated 05/10/2011 as well as personal invitations. The meeting was coordinated by Suzlon Energy Limited & M/s D. J. Malpani. Mr. Chetan Mehra & Mr. Kuldeep Singh represented Suzlon in the meeting. The PP was represented by Mr. Raees Shaikh. The stake holders were identified based on the sustainability impact (direct & indirect) of this project activity on the life of the local people.

The project proponent & Suzlon welcomed the stakeholders for the meeting. The meeting was conducted in Hindi. The representative from Suzlon explained the purpose of the meeting to the present stakeholders and introduced all the stakeholders to all the representatives. He briefed the stakeholders about the concept of Clean Development Mechanism, wind technology, climate change, effect of green house gases on human life, environmental benefits of the wind power projects etc.

Stake holders welcome the project activity. The stakeholder meeting ended with vote of thanks by Suzlon and PP.

E.2. Summary of comments received

During the meeting the project proponent & Suzlon invited the stakeholders to offer their comments on the project through feedback forms.

The stakeholders gave following feedback which is recorded in the feedback forms:

The wind power project:

- Has no negative impact on the environment
- Will not emit pollutants or hazardous, toxic or noxious substances that could be harmful to
- human health
- Will not produce any adverse noise levels
- Does not cause any problem for radio/TV signals
- Operation will not affect the local water recourses
- Will improves the living condition of the region in terms of infrastructure, basic amenities etc. due to its implementation
- Will improve employment opportunities
- Is beneficial to local community

The stakeholders support for the project activity can be evident from the feedback given by them duly filled in the feedback form.

E.3. Consideration of comments received

No negative comments were received on the project activity, so no additional measures are required by the PP.

SECTION F. Approval and authorization

The project obtained Host Country Approval from Indian DNA i.e. Ministry of Environment Forest and Climate Change vide letter no. 4/05.2012-CCC dated 16th March, 2012.

Appendix 1. Contact information of project participants

Organization name	D. J. Malpani
Country	India
Address	Street/P.O.Box: Kasara Dumala ,Building: Malpani Estate ,City: Sangamner State/Region: Maharashtra ,Postfix/ZIP: 422 605
Telephone	+91-2425-225 035
Fax	+91-2425-225 035
E-mail	prafulla@malpani.com
Website	www.malpani.com
Contact person	Mr. Prafulla Khinvasara

Appendix 2. Affirmation regarding public funding

The project activity is not availing any public funding.

Appendix 3. Applicability of methodologies and standardized baselines

The baseline is explained under section B.2

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

The Central Electricity Authority (CEA) under the Ministry of Power, Government of India, has estimated the Combined Margin emission factor for the Indian grid, the details of which are available on the following website.
http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf
The procedures and formulas used for estimation of the baseline factor and the assumptions made have also been detailed in there

Appendix 5. Further background information on monitoring plan

The monitoring information is detailed under section B.7

Appendix 6. Summary report of comments received from local stakeholders

No negative comments received from local stakeholders. Please refer section E of the PDD

Appendix 7. Summary of post-registration changes

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Not applicable.

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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.

Version	*Date*	*Description*
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b.
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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