



**Verified Carbon
Standard**

SUZLON 8.40 MW WIND POWER PROJECT



Document Prepared by EKI Energy Services Limited

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1 PROJECT DETAILS

1.1 Summary Description of the Project

The project activity is promoted by Kishangarh Hi-tech Textile Park Ltd. The project activity involves supply, erection, commissioning and operation of 4 Wind Turbine Generators (WTGs) of 2100 kW each and the total capacity of the project activity is 8.4 MW (2.1 X 4) at Jaisalmer District in Rajasthan. All WTGs are supplied and manufactured by Suzlon Energy Limited. The main purpose of the project activity is to generate electrical energy through sustainable means using wind power resources, to utilize the generated output for selling it to the third party and to contribute to climate change mitigation efforts.

Pre-project Scenario:

The project participant was not involved in generation of wind based power and supplying the electricity to the Unified Indian Grid under the pre-project scenario, therefore, in the absence of the project activity the equivalent amount of electricity would have been generated from the connected / new power plants in the Unified Indian Grid, which are predominantly based on fossil fuels. The project proponent was using grid electricity for the operations of its textile park at Kishangarh under pre-project scenario; therefore, in the absence of the project activity the equivalent amount of electricity would have been used from the Unified Indian Grid.

The relevant implementation dates

The project plant has commissioned on 31-December-2010 and run satisfactorily since then. The total estimated GHG emission reductions achieved in the second crediting period i.e. from 31-December-2020 to 30-December-2030 (first and last days included) is 128,870 tCO₂e with annual average emission reduction of 12,887 tCO₂e. The first crediting period was from 31-December-2010 to 30-December-2020 (first and last days included) and the estimated annual emission reduction was 13,081 tCO₂e.

The project activity was registered at UNFCCC (Ref. No. 7804) on 19-October-2012.

The plant was in shutdown condition from January-2019 to June-2020 as the state Government stopped banking for this period and operation and maintenance charge was increased. The plant remained closed from October-2020 to December-2020 due to maintenance work of plant.

1.2 Sectoral Scope and Project Type

Sectoral Scope: 01 Energy Industries (renewable-'non renewable)

Project Type: Type 1 Renewable Energy Projects

Project Category: AMS I. D (Version 18, EB 81) – for second crediting period

AMS I.D (Version 17, EB 61) – for first crediting period

Tool: Tool to calculate the Emission Factor for an Electricity System, Version 07.0, Annex 04, EB 100 – for second crediting period

Tool to calculate the Emission Factor for an Electricity System, Version 02.2.0, Annex 12, EB 61- for first crediting period.

1.3 Project Eligibility

The project activity involves installation and generation of electricity using wind energy resources i.e. by using the renewable sources replacing electricity supply from a fossil-fuel dominated electricity, thus leads to reductions of anthropogenic GHG emissions from atmosphere. Hence the project activity is eligible Sectoral scope 1 i.e. energy industries (renewable/ non-renewable sources) under the scope of the VCS Program.

1.4 Project Design

The project involves setting up a wind farm of 8.4 MW ("Project) in the state of Rajasthan, India Hence, the project has been designed to include a single installation of an activity and is not a grouped activity.

Eligibility Criteria

Not applicable to this project activity as this is not a grouped project.

1.5 Project Proponent

Organization name	Kishangarh Hi-tech Textile Park Ltd
Contact person	Vijay Kumar Agrawal
Title	Director
Address	Bhat Mohalla, Madanganj, Agrawal Sadan, Kishangarh, Rajasthan-305801
Telephone	0731 428 9086
Email	registry@enkingint.org

1.6 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the project	Project Consultant
Contact person	Mr. Bibhushita Ghose
Title	Assistant Manager - Operations
Address	Plot No 48, Scheme 78, Vijay Nagar Part- II, Indore 452010, Madhya Pradesh, India

Telephone	0731 428 9086
Email	bibhushita@enkingint.org

1.7 Ownership

As per VCS Program Definitions version 4, the project ownership is the legal right to control and operate the project activities.

Kishangarh Hi-Tech Textile Park Ltd.(KHTPL) is the project proponent (PP) of project activity and they have the legal right to control and operate the project activities.

The project ownership has been demonstrated through below supporting document:

Power Purchase Agreement (PPA) – The Power Purchase Agreement (PPA) indicates that PP have the legal right to control and operate the project activities.

Based on above evidences, the project ownership is demonstrated and Kishangarh Hi-Tech Textile Park Ltd.(KHTPL) is authorized project owner.

1.8 Project Start Date

The project start date for this project is said to be 31-December-2010. This is the day on which all the four machines were commissioned.

1.9 Project Crediting Period

Project Crediting Period Start date: 31-December-2020

Project Crediting Period End date: 30- December-2030

Total Crediting Period:10 years

This is the second crediting period of this project activity. The first crediting period of this project activity was from 31-December-2010 to 30-December-2020.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Estimated average annual GHG emission reductions from the project activity for second crediting period are 12,887 tCO_{2e} per year, which is less than 300,000 tCO_{2e} per year. Hence the project scale of the project activity will become “Projects” as shown below:

Project Scale	
Project	√
Large project	

Year	Estimated GHG emission reductions or removals (tCO _{2e})
Year 1	12,887
Year 2	12,887
Year 3	12,887
Year 4	12,887
Year 5	12,887
Year 6	12,887
Year 7	12,887
Year 8	12,887
Year 9	12,887
Year 10	12,887
Total estimated ERs	128,870
Total number of crediting years	10
Average annual ERs	12,887

1.11 Description of the Project Activity

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.

Technical details for 2100 KW Machine manufactured by Suzlon Energy Limited

S.NO.	PARTICULARS	DETAILS
1	Rated power	2.1 MW
2	Cut-in wind speed	4 m/s

3	Rated wind Speed	14 m/s
4	Cut-out wind speed	25 m/s
5	Hub height	79 m (Foundation top equal to ground level)
6	Rotational Speed	15 to 17.6 rpm
7	Swept area	6082 m square
8	Type	Tubular Tower (4 sections)
9	Gear box Ratio	1:98.8
10	Rated power	2100 kW

1.12 Project Location

The project activity is located in District- Jaisalmer, State- Rajasthan in India. The details of project location are given below:

Project WTG Titled	UID	Latitude	Longitude
Kishangarh Hi - tech Textile Park Ltd.	MK 5	N 27° 10' 46.9"	E 70° 38' 12.0"
	MK 6	N 27° 10' 40.3"	E 70° 38' 29.7"
	MK 7	N 27° 10' 33.7"	E 70° 38' 47.4"
	MK 8	N 27° 10' 18.2"	E 70° 39' 00.9"
Total Capacity	8.4 MW		

1.13 Conditions Prior to Project Initiation

The project activity is a Greenfield project. The project activity replaces the carbon intensive grid electricity. Thereby reducing the dependence on fossil fuel based generation units and as there are no associated emissions with this project it contributes to the reduction of green house gases (GHG) emissions.

The project activity harnesses wind energy to generate and supply electricity to the Unified IndianGrid of India. The employed WTGs can only convert wind energy into electrical energy and do not use any other fuel as input for electricity generation. The operation of WTGs is emission free and no GHG emissions are generated during the lifetime of the project activity.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

The Project has received all the necessary approvals for development and commissioning forthe project from the respective State Nodal Agencies and is in compliance to the local laws and regulations

The relevant national laws and regulations pertaining to generation of energy in India are:

- Electricity Act 2003
- National Electricity Policy 2005
- Tariff Policy 2006

1.15 Participation under Other GHG Programs

1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

This is registered in UNFCCC under Clean Development Mechanism. The reference no. for the project is 7804 and it was registered on 19-October-2012. The web link for the same is mentioned below:

<https://cdm.unfccc.int/Projects/DB/LRQA%20Ltd1350651308.1/view>

1.15.2 Projects Rejected by Other GHG Programs

This project has not been rejected by any other GHG program.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

India is Non-annex1 country and there is no compliance with an emission trading program or to meet binding limits on GHG emissions for this project activity. The project is registered under CDM with registration ID 7804. Project Proponent has submitted undertaking that they will not claim same GHG emission reductions of the project from CDM and VCS. PP would not use net GHG emission reductions by the projects for compliance with emission trading program to meet binding limits on GHG emissions.

1.16.2 Other Forms of Environmental Credit

Emission reduction generated from the project activity will not be double counted (i.e. issuance of other form of environmental credit/certificate) for a particular crediting period. PP has submitted an undertaking that they shall not claim GHG Emission Reduction credits from another type of credit.

1.17 Additional Information Relevant to the Project

Leakage Management

The Project activity No leakage emissions are considered for this Project activity since no energy generating equipment is transferred from another activity and/or the existing equipment is transferred to another activity.

Commercially Sensitive Information

There is no such information which is deemed as commercially sensitive.

Sustainable Development

The project activity has contributed to the sustainable development as discussed below according to the indicators stipulated by Ministry of Environment, Forest and Climate Change(MoEFCC), Govt. of India for sustainable development in its interim approval guidelines for host country approval eligibility criteria for Clean Development Mechanism (CDM) projects:

I. Social well being:

- The project activity provided job opportunities to some of the local people during erection and operation of the wind farms contributing up to some extent in poverty alleviation of the local community. The company has developed both the sites and approach roads.
- The project activity also contributed in infrastructure development by improving the availability of the electricity to the Unified IndianGrid, hence contributing towards meeting the electricity deficit in Rajasthan.

II. Economic well being:

- The project activity leads to investment to a developing region which otherwise would not have happened in the absence of project activity. The generated electricity is fed into the Unified Indian Grid, thereby improving the grid frequency and availability of electricity to the local consumers (villagers & sub-urban habitants) which provides new opportunities for industries and economic activities to be setup in the area thereby resulting in greater local employment, ultimately leading to overall development.
- Theproject activity requires temporary and permanent, skilled and semi-skilled manpower at the wind park; this creates additional employment opportunities.

III. Environmental well being:

- The project utilizes wind energy for generating electricity which otherwise would have been generated through the operation of power plants in the Unified indian Grid mix, contributing to reduction in specific emissions (tons of emissions /MWh of energy generated) including GHG emissions.
- As wind power projects produce no end products in the form of waste (eg. Particulate Matter, Fly ash, Water effluent etc.).
- Being a renewable resource, using wind energy to generate electricity contributes to natural scare resource (eg. Fossil fuel used for electricity generation) conservation.
- Thus, the project causes no negative impact on the surrounding environment contributing to environmental well being.

IV. Technological well being:

- The project activity leads to the promotion of 2.1 MW of SEL WTGs into the region, demonstrating the success of this type of wind turbines, which fed the generated power into substation in Rajasthan, thus strengthening the grid supply and improving quality of power under the service area of the substation. Hence the project leads to technological well being.
- The project technology manufactured, operated & maintained indigenously and doesn't involve any technology transfer from foreign countries.

Further Information

There is no additional relevant legislative, technical, economic, sectoral, social, environmental, geographic, site-specific and/or temporal information that may have a bearing on the eligibility of the project, the net GHG emission reductions or removals, or the quantification of the project's net GHG emission reductions or removals.

2 SAFEGUARDS

2.1 No Net Harm

According to Indian regulation, the implementation of the wind park does not require an environmental impact assessment. The Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India notification¹ dated 14-September-2006 regarding the requirement of Environment Impact Assessment (EIA) studies as per the Environment Protection Rule, 1986 (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii) MINISTRY OF ENVIRONMENT AND FORESTS) states that any project developer in India needs to file an application to the Ministry of Environment, Forest and Climate Change (including a public hearing and an EIA) in case the industry or project is listed in a predefined list. Wind parks are not included in this list and thus an EIA is not required.

2.2 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 personal invitation letters to attend the stakeholders meeting.

In the introductory speech, the representatives of EnKing International 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 receipt copy has been submitted to the DOE.-

Name of the PP	Invitation Date	Meeting date	Location of the Local Stakeholder Meeting		
			Village	District	State
Kishangarh Hi-tech Textile Park Ltd.	7-March-2011	15-March-2011	Habur	Jaisalmer	Rajasthan

Summary of the comments received:

Stakeholders had no objections from installations of WTGs; instead they have openly said that wind power projects helped them by:

¹<http://www.environmentwb.gov.in/pdf/EIA%20Notification,%202006.pdf>

- Additional revenue generated through land / lease to outsiders like contractors & their employees
- Job opportunities for day -to - day maintenance and security of WTGs
- Developments of roads
- No any adverse impact on rains, agriculture .

Report on how due account was taken of any comments received:

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

The process of Local Stakeholder Consultation is continuous. Registers is used to records the grievances and feedback. During the current monitoring period, No grievances received during the current monitoring period, therefore, no any mitigation measures are required. In case of grievances, the nature of probable resolution is discussed with the plant head office and implemented by the site incharge. The grievance copies have been submitted to DOE.

2.3 Environmental Impact

The guidelines on Environmental Impact Assessment have been published by Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India (GOI) under Environmental Impact.

Assessment notification 14-September-2006². Further amendments to the notification have been done on 01-December-2009³. 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.”

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

2.4 Public Comments

²EIA Notification 2006, <http://envfor.nic.in/legis/eia/so1533.pdf>

³ EIA Amended Notification dated 01/12/2009, <http://moef.nic.in/downloads/rules-and-regulations/3067.pdf>

The Global Stakeholder Consultation commenting period had been completed before first crediting period. No comments had been received in the commenting period.

2.5 AFOLU-Specific Safeguards

The project activity deals with generation of electricity using wind and not from AFOLU projects. Hence not applicable.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Title:“Grid connected Renewable Electricity Generation” – AMS-I.D, Version 18.0 for second crediting period

“Grid connected Renewable Electricity Generation” – AMS-I.D, Version 17.0 for first crediting period

Reference: AMS I. D.: Small-scale Consolidated Methodology

The methodology applicable to this project activity for second crediting period is “Grid connected Renewable Electricity Generation – AMS-I.D.”, Version 18.0⁴, Sectoral Scope: 01.

Tool: Tool to calculate the Emission Factor for an Electricity System, Version 07.0, Annex 04, EB 100 – for second crediting period

Tool to calculate the Emission Factor for an Electricity System, Version 02.2.0, Annex 12, EB 61- for first crediting period.

“Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period.” Version 03.0.1⁵.

3.2 Applicability of Methodology

The applicability conditions of the methodology on the project activity are demonstrated as follows:

Applicability Criterion	Project Case
<p>1. This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass:</p> <p>a) Supplying electricity to a national or a regional grid.</p> <p>b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.</p>	<p>The project activity is a Renewable Energy Project i.e. Wind Power Project which falls under applicability criteria option 1(a) i.e., “Supplying electricity to a national or a regional grid”. Hence the project activity meets the given applicability criterion.</p>

⁴<https://cdm.unfccc.int/UserManagement/FileStorage/2P7FS6ZQAR84LG3NMKYUH50WI9ODBC>

⁵<https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-11-v3.0.1.pdf>

Applicability Criterion					Project Case																														
<p>2. 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 included below</p> <table border="1"> <thead> <tr> <th></th> <th>Project Type</th> <th>AMS-I.A</th> <th>AMS-I.D</th> <th>AMS-I.C</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Project supplies electricity to a national/regional Grid</td> <td></td> <td>√</td> <td></td> </tr> <tr> <td>2</td> <td>Project displaces grid electricity consumption (e.g. grid import) and/or captive fossil fuel electricity generation at the user end (excess electricity may be supplied to a grid)</td> <td></td> <td></td> <td>√</td> </tr> <tr> <td>3</td> <td>Project supplies electricity to an identified consumer facility via national/regional grid (through a contractual arrangement such as wheeling)</td> <td></td> <td>√</td> <td></td> </tr> <tr> <td>4</td> <td>Project supplies electricity to a mini grid¹ System where in the baseline all generators use exclusively fuel oil and/or diesel fuel</td> <td></td> <td></td> <td>√</td> </tr> <tr> <td>5</td> <td>Project supplies electricity to household users (included in the project boundary) located in off grid areas</td> <td>√</td> <td></td> <td></td> </tr> </tbody> </table>						Project Type	AMS-I.A	AMS-I.D	AMS-I.C	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 ¹ 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	√			<p>The 1st option of Table 1 “Scope of AMS-I.D., AMS-I.F. and AMS-I.A. based on project types” of AMS I.D. Version 18, EB 81 is applicable.</p>
	Project Type	AMS-I.A	AMS-I.D	AMS-I.C																															
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5	Project supplies electricity to household users (included in the project boundary) located in off grid areas	√																																	
<p>3. This methodology is applicable to project activities that:</p> <ol style="list-style-type: none"> Install a Greenfield plant; Involve a capacity addition in (an) existing plant(s); Involve a retrofit of (an) existing plant(s); <p>b) Involve a rehabilitation of (an) existing plant(s)/unit(s); or</p> <p>c) Involve a replacement of (an) existing plant(s).</p>					<p>The project is installation of new wind based electricity generation plants (not addition to existing system). Option (a) is applicable.</p>																														
<p>4. Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology:</p> <ol style="list-style-type: none"> 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 					<p>The project is wind power project and thus the criterion is not applicable to this project activity.</p>																														

Applicability Criterion	Project Case
<p>definitions given in the project emissions section, is greater than 4 W/m² ;</p> <p>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.</p>	
<p>5. If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.</p>	<p>The project activity is a 8.4 MW wind electricity generation. Unit does not co-fire fossil fuels. Hence the criterion is not applicable to the project activity.</p>
<p>6. Combined heat and power (co-generation) systems are not eligible under this category</p>	<p>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</p>
<p>7. 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 distinct¹ from the existing units.</p>	<p>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</p>
<p>8. In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted, rehabilitated or replacement power plant/unit shall not exceed the limit of 15 MW.</p>	<p>Not applicable, the wind project is a Green field project activity and this project is not the enhancement or up gradation project.</p>
<p>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.</p>	<p>The Project activity is a renewable wind power project and is not a landfill gas, waste gas, wastewater treatment and agro-industries projects or recovered methane emissions project. Hence the criteria is not applicable to the project activity</p>
<p>10. In case biomass is sourced from dedicated plantations, the applicability criteria in the tool “Project emissions from cultivation of biomass” shall apply</p>	<p>The Project activity is a renewable wind power project and is not a biomass project. Hence the criteria is not applicable to the project activity.</p>
Applicability conditions of “Tool to calculate the emission factor for an electricity system”	
<p>1. 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).</p>	<p>This condition is applicable. OM, BM and CM are estimated using the tool under section 4.1 for calculating baseline emissions.</p>
<p>2. Under this tool, the emission factor for the project</p>	<p>Since the project activity is grid</p>

Applicability Criterion	Project Case
<p>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, the conditions specified in “Appendix 2: Procedures related to off grid power generation” should be met. Namely, the total capacity of off-grid 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.</p>	<p>connected, this condition is applicable and the emission factor has been calculated accordingly.</p>
<p>3. 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.</p>	<p>The project activity is located in India, a non-Annex I country. Therefore, this criterion is not applicable for the project activity.</p>
<p>4. Under this tool, the value applied to the CO2 emission factor of biofuels is zero.</p>	<p>The project activity is a grid connected wind power project and not a hydro power plant. Therefore, this criterion is not applicable for the project activity.</p>

In this project, total electricity generation capacity of all six windmills is 8.4 MW, which is less than the limit of 15 MW of maximum output capacity as specified in Annex-II “Simplified Modalities & Procedures for Small Scale CDM Project Activities” for Type (I) project activities: renewable energy project activities with a maximum output capacity equivalent to up to 15 megawatts (or an appropriate equivalent) (decision 17/CP.7, paragraph 6 (c) (i)). Thus, this project reduces anthropogenic emissions by sources and its maximum output capacity is less than 15 MW. Therefore it confirms to this category thereby qualifying as a small-scale project activity.

3.3 Project Boundary

As per par 18 of AMS I. D Version 18, EB 81 – “The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to”. The project boundary includes the wind turbine generator, sub-stations and all equipments in between.

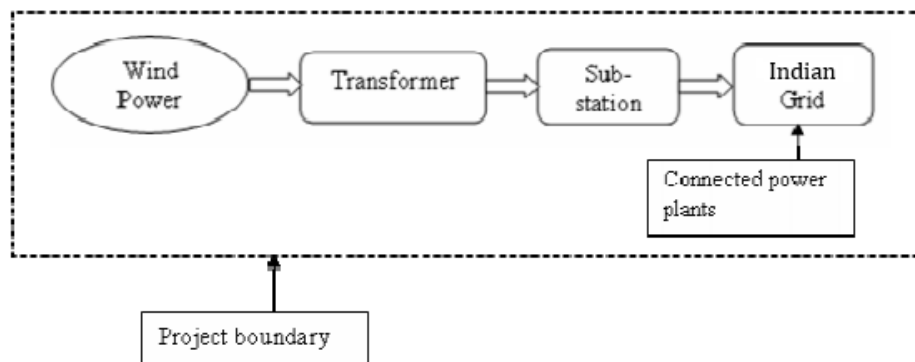


Figure 01: Project Boundary

Baseline and project emission sources:

Source	Gas	Included?	Justification/Explanation	
Baseline	Combustion emissions from generating grid connected electricity.	CO ₂	Included	Main emission source.
		CH ₄	Excluded	Minor emission source.
		N ₂ O	Excluded	Minor emission source.
		Other	Excluded	Minor emission source.
Project	Emissions from the project activity	CO ₂	Excluded	Wind energy generation does not have any GHG emissions
		CH ₄	Excluded	
		N ₂ O	Excluded	
		Other	Excluded	

No leakage is applicable to the project activity as per applied methodology.

3.4 Baseline Scenario

Baseline scenario 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 03.0.1⁶.

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

⁶<https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-11-v3.0.1.pdf>

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 VCS.

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 370,047. MW as on 31.03.2020, consisting of 230,809.57 MW Thermal, 86,759.19 MW Renew and 6,780 MW Nuclear. Sector-wise details of installed capacity are shown in Table 1. However, it is evident from Table 1⁷ 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 CO₂ emissions in the country by increased use of renewable energy sources.

Furthermore, project participant has considered the latest available CO₂ Baseline Database (CEA database, version 16) 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. As per below table, the fossil fuel based thermal power generation is dominant over the renewable based power generation, thus baseline scenario remains same as original.

Table 1: Sector- wise installed capacity (MW) as on 31-March-2020 (CEA Database version 16)

Sector	Thermal					Nuclear	Hydro	RES	Total
	Coal	Lignite	Gas	Diesel	Total				
State	65571.50	1290.00	7118.71	236.01	74216.21	0.00	26958.50	2357.03	103531.74
Central	58990.00	3490.00	7237.91	0.00	69717.91	6780.00	15346.72	1632.30	93476.93
Private	74173.00	1830.00	10598.74	273.70	86875.45	0.00	3394.00	82769.86	173039.30
All India	198734.50	6610.00	24955.36	509.71	230809.57	6780.00	45699.22	86759.19	370047.97

Thus, current baseline remain same and there is no impact if circumstances, existing at the time of requesting renewal of crediting period.

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. The project activity in green field project and there is no any baseline equipment or investment involved in project activity. 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 VCS project activity.”

⁷https://cea.nic.in/wp-content/uploads/baseline/2021/06/User_Guide_ver_16_2021-1.pdf

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 of CEA database available at the time of PD submission for renewal.

In line with the project standard version 03.0, the impact of new relevant national and/or sectoral policies and circumstances on the baseline taking into account relevant EB guidance with regard to renewal of the crediting period at the time of requesting renewal of crediting period; and the correctness of the application of an approved baseline methodology for the determination of the continued validity of the baseline or its update, and the estimation of emission reductions for the applicable crediting period

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

The Government of India enacted the Electricity Act in the year 2003 to harmonize and rationalize the provisions in the 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 Policy⁸ on 12-February-2005 which was in force at the time of completion of the baseline study as stated in the registered PD 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.

The state electricity regulatory commission issues tariff order in respect of procurement of power generated from renewables and there is no mandatory national and/or sectoral policies have come into effect that would affect the compliance of the current baseline. Hence, it can be concluded the current baseline complies with all relevant mandatory national and/or sectoral policies that have come into effect after the submission of the project activity for validation and are applicable at the time of requesting renewal of the crediting period.

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 Southern 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 Southern Grid.

⁸<http://www.cercind.gov.in/Act-with-amendment.pdf>

The approved small scale methodology for Grid connected renewable electricity generation, AMS-I.D (Version 18), has been used to determine the baseline and the estimation of emission reductions for the applicable crediting period. As referred in the methodology “Tool to calculate the emission factor for an electricity system” (version 07.0) has been used to determine continued validity of the baseline based on combined margin (CM) calculations.

As per CEA database version 16, the fossil fuel dominated electricity is more than renewable sector and is continuing with same pattern. In light of the above discussion it is to be concluded that in accordance with relevant guidelines stipulated in the Project Standard version 03.0 of UNFCCC CDM mechanism, national and/or sectoral policies and circumstances had been considered towards formulating the OM & BM baseline scenario. Hence the baseline scenario as applied for the present project activity remains justified.

As per the approved small scale methodology for Grid connected renewable electricity generation, AMS-I.D (Version 18.0) para 19: “If the project activity is the installation of a Greenfield power plant, 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, 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 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 16 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
$EF_{grid,CM,y}$	0.9346 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 16.0, Mar 2021 published by Central Electricity Authority (CEA), Government of India
$EF_{grid,OM,y}$	0.9568 tCO ₂ /MWh	Operating margin CO ₂ emission factor for the project electricity system in year y	Calculated as the last 3 year (2017-18, 2018-19, 2019-20) generation-weighted average, sourced from Baseline CO ₂ Emission Database, Version 16.0, Mar 2021 published by Central Electricity Authority (CEA), Government of India

EF _{grid, BM, y}	0.8682 tCO ₂ /MWh	Build margin CO ₂ emission factor for the project electricity system in year y	Baseline CO ₂ Emission Database, Version 16.0, Mar 2021 published by Central Electricity Authority (CEA), Government of India
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3.5 Additionality

Regulatory Surplus Demonstration:

In India, there is no any regulation to install the wind projects and the project activity is a voluntary step taken by PP. In India, the fossil fuel based thermal power generation is dominant over the renewable based power generation, thus baseline scenario remains same as original. As discussed in section 3.4 of VCS PD-MR, there is no any Impact of the national and/or sectoral policies and circumstances upon the baseline scenario of the project activity and project activity is additional as per CDM Tool for the demonstration and assessment of additionality and as per VCS Program rules.

There are no certain laws and regulations which give comparative advantage to more emission intensive technologies or less emission intensive technologies. There are no any Type E+ and E- policies applicable to the project activity which prevent the implementation of local laws and regulations that would seek to contribute towards climate change mitigation. The project activity is in compliance with local laws and regulations. As explained in section 3.4, the current baseline complies with all relevant mandatory national and/or sectoral policies.

Project Additionality:

As per the Guidelines on the demonstration of additionality of small-scale project activities, to establish the project additionality, it has to be shown that the project activity would not have occurred anyway due to at least one of the following barriers:

- **Investment barrier:** a financially more viable alternative to the project activity would have led to higher emissions;
- **Technological barrier:** a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions;
- **Barrier due to prevailing practice:** prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions;
- **Other barriers:** Without the project activity, for another specific reason identified by the project proponent, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher.

The additionality of this wind power project is demonstrated by using the Investment barrier(option a)in accordance with *Guidelines on the demonstration of additionality of small-scale project activities(Version09,EB 68,Annex27)&Guidelines on the Assessment of Investment Analysis(Version- 5,EB-62, Annex-5).*

(a)Investment barrier:a financially moreviable 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.

The identified baseline (supply of electricity by grid) as well as project activity is in compliance with all applicable legal and regulatory requirements as

- The implementation of the project activity is a voluntary initiative as taken by the project proponent and is not mandatory or a legal requirement;
- The Electricity Act, 2003, does not restrict or allow any authority to restrict the fuel choice for power generation; and
- The applicable Environmental Regulations do not restrict the use of wind energy and there is no legal requirement on the selection of a particular technology.

For project specific evaluation in terms of the financial feasibility, the following has been explained:

Appropriateness of using benchmark analysis for additionality demonstration and its conformity to guidance 19 of Annex 13, EB 61

Considering the fact that the alternative to the project is the supply of electricity from the grid & the choice of the developer is to invest or not to invest, benchmark analysis has been considered appropriate for demonstration of additionality, which is in conformity with guidance 19 Annex 13 EB 61.

Benchmark - Internal Rate of Return (Equity IRR)

The benchmark value has been determined according to the “Tool for demonstration and assessment of additionality” (Version 5.2, Clause- 6(a), Sub-step- 2b, Option- III), which states that - Government bond rates, increased by a suitable risk premium to reflect private investment and/or the project type, as substantiated by an independent (financial) expert or documented by official publicly available financial data.

In the context of above project proponent has used Capital Asset Pricing Model (CAPM) for deciding benchmark for this project activity. CAPM is a model of linear general equilibrium return. In the CAPM theory, investors are assumed to have homogeneous expectations during the decision-making period. Investors make their decision only on the basis of the expected returns, standard deviations, and covariance of all pairs of security. According to CAPM, all investors hold only the market portfolio and riskless securities. The market portfolio is a portfolio comprised of all stocks in the market. The required rate of return is given by the following formula.

$$\text{Required rate of return} = R_F + \beta \times (R_M - R_F)$$

Where

R_F = Risk free rate

β = Beta which shows risk

R_M = Market return

Risk free rate

The risk free rate is the return on a security (or a portfolio of securities) that is free from default risk. Typically, the rate of long term government bonds is used to determine the risk free rate. In

the context of the present project activity, YTM (Yield to Maturity) at primary issues over a period of 20 years has been considered to represent the risk free rate.

Market Risk Premium

The market risk premium is the difference between the expected market rate of return and the average risk free rate and is usually measured by looking at the average of the historical returns on a market portfolio. In the context of the present project activity, the period selected to calculate the expected market return is one year before the Offer Letter date. Expected market rate of return BSE-500 has been used for determining the market return (R_M). Thus the market risk premium estimated is

Expected market rate of return

BSE-500 has been used for determining the market return (R_M).

Thus the market risk premium estimated is

$$\text{Market risk premium} = R_M - R_F$$

However, the market risk premium should not be viewed on a standalone basis. The overall risk premium depends on market risk premium as well as on a parameter called Beta, which has been explained below:

Beta

Equity Beta is the measure of the expected volatility of a particular stock relative to a well-diversified market portfolio. It measures the systematic risk of a stock, i.e. the risk that cannot be eliminated in a well-balanced, diversified portfolio. The beta of equity is calculated as the covariance between its return and the return on a well-diversified market portfolio, divided by the variance of the return on a well-diversified market portfolio.

$$\text{Equity Beta} = \text{Covariance}(R, R_M) / \text{Variance}(R_M)$$

In this case, BSE power index (since there is no any Index related to renewable energy in India) and BSE 500 (which represents a diversified index in the Indian Equity Markets) index has been taken for calculating value of Beta and Market return factor. The values of Risk free rate are referred from Reserve Bank of India.

Benchmark determination input values is based on publicly available data sources which can be clearly validated by the DOE, thus it complies with paragraph 13 of EB 61, Annex 13 -

The input values to calculate Benchmark are tabulated below:

Parameter	Value	Source
R _F	8.2628%	Month-endYieldtoMaturityofSGLTransactioninCentralGovernmentDated Securities for10yearMaturity http://www.rbi.org.in/scripts/BS_ViewBulletin.aspx?Id=10986
β	0.97	Slopeof Power Indexw.r.t.BSE-500 (Market Index)
R _M	18.44%	Market Return ofBSE-500 http://www.bseindia.com/histdata/hindices.asp http://bseindia.com/about/abindices/bse500.asp
Benchmark	18.15%	Calculated asperaboveformula

The input values to calculate IRR are tabulated below:

Details of the project (For 2.1 MW X 4 WTG)			
State where the project is situated		Rajasthan	As Per Offer Letter dated 15-January-2010
No. of machine		4	As Per Offer Letter dated 15-January-2010
Capacity/machine	MW	2.10	As Per Offer Letter dated 15-January-2010
Total Capacity	MW	8.40	Calculated
Expected Date of Commissioning		30-October-2010	As Per Offer Letter dated 15-January-2010
Generation and sale of electricity			
Net Plant load factor	Percent	18.74%	As per Third Party Report in accordance to para 3(b) of Annex 11, EB48.
Net Generation	kWh	13,789,642	Calculated
Transmission Charges	Percent	8.00%	As per RERC Order dated 02-February-2010
Annual generation considered for revenues	KWh	12,686,470	Calculated
Tariff rate	INR/kWh	5.00	Considered by PP in investment decision making on 15-March-2010
Wheeling Charges	INR/kWh	0.055	As per RERC Order dated 02-February-2010
Effective tariff rate	INR/kWh	4.945	Calculated
Fixed Charges	INR/kW/month	57.58	As per RERC Order dated 02-February-2010
Operation and maintenance cost and Insurance			
O&M charges	INR Million	10.15	As per offer letter dated 15-January-2010
Escalation in the O&M Expenses	Percent	5%	As per offer letter dated 15-January-2010
O&M free for	Year	1	As per offer letter dated 15-January-2010
Insurance Charges	INR Million	0.69	As per TAC order 2001
Term loan			
Loan Amount	INR Million	227.92	As per CERC order ⁹ dated 03-December-2009, Pg10
Interest rate	Percent	14.29%	As per CERC order dated 03-December-2009, Pg13
Moratorium	Months	-	As per CERC order dated 03-December-2009, Pg13

⁹ http://www.cercind.gov.in/2009/November09/284-2009_final_3rdDecember09.pdf

Repayment	Months	40	As per CERC order dated 03-December-2009, Pg13
Repayment Instalment Value	INR Million	5.698	
1st instalment from		31-December-2010	
Financial parameters			
TOTAL COST	INR Million	460.00	As per offer letter dated 15-January-2010
Loan Amount	INR Million	322.00	Calculated considering 70% debt
Equity	INR Million	138.00	Calculated considering 30% equity
Cost of land	INR Million	6.90	Assumed by PP as 1.5% of project cost at investment decision making on 15-March-2010
Salvage value (plant and machinery)	INR Million	45.31	As per CERC order dt. 09-November-2010
Net Depreciable Value	INR Million	407.79	Calculated: Total project cost – salvage value – land cost
Residual Value	INR Million	52.21	Calculated: Salvage value + land cost
IT Depreciation rate			
	Percentage	80% (40% in first year as commissioning was expected in October 2010)	As per Income Tax Act
Tax Rates			
Income tax rate	Percentage	30.00%	As Per Income tax rule
MAT	Percentage	15.00%	As Per Income tax rule
Surcharge	Percentage	10.00%	As Per Income tax rule
Education cess	Percentage	3.00%	As Per Income tax rule
Service Tax	Percentage	10.00%	As Per Income tax rule
Final Tax Rates			
Income tax rate	Percentage	33.99%	As per host country tax regulations
MAT	Percentage	17.00%	As per host country tax regulations
Service Tax	Percentage	10.30%	As per host country tax regulations
Life of the plant			
	Years	20	As per WTG Manufacturers Specification

The result of the analysis is as follows –

Investor	Kishangarh Hi-tech Textile Park
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	Ltd
Equity IRR without CDM	9.21%
Benchmark (equity IRR)	18.15%

This substantiates that the investment is not financially attractive (equity IRR for the project activity is less than the Benchmark equity IRR) for any of the investor. Thus it can be easily concluded that project activity is additional & is not business as usual scenario.

Sensitivity Analysis

As per Guidance 20 of Annex 13 of EB 61, 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 and the results of this variation should be presented in the PDD and be reproducible in the associated spreadsheets. Guidance also states, "All parameters varied need not necessarily be subjected to both negative and positive variations of the same magnitude". The guideline also states, as a general point of departure, variations in the sensitivity analysis should at least cover a range of +10% and -10%, unless this is not deemed appropriate in the context of the specific project circumstances.

The identified parameters as per the guidelines are as -

1. PLF
2. O&M Cost
3. Project Cost
4. Tariff

The results of sensitivity analysis are as follows:

EquityIRR	KishangarhHi-techTextileParkLtd		
Variation%	-10%	Normal	10%
PLF	5.71%	9.21%	12.79%
O&M	9.89%	9.21%	8.49%
ProjectCost	11.97%	9.21%	7.05%
TariffRate	5.67%	9.21%	12.84%

The Tariff for HT-5 category was the same for 10 years since 2001, i.e., INR 4.01 per kWh. It was increased only in September 2011 to INR 5.00 per kWh. That amounts to a CAGR of 2.23%. The probability of the tariff increasing by this amount every year is negligible. Even if the tariff were to increase by this amount, the IRR would only reach 14.75%, much below the benchmark.

As evident from the results given above, the project remains additional even under the most favorable sensitive conditions variation.

Serious CDM Consideration Demonstration:-

Again, As per "GUIDANCE ON THE DEMONSTRATION AND ASSESSMENT OF PRIOR CONSIDERATION OF THE CDM" in Annex 13 in EB 62 Report,

Date	Event
15-March-2010	Board resolution for investing in the project activity and release of letter of intent to the supplier

16-March-2010	Purchase orders issued to supplier
19-August-2010	Email correspondence sent by PP to UNFCCC and Host country DNA on prior consideration of CDM
31-December-2010	Commissioning of project activity

3.6 Methodology Deviations.

There is no request for methodology deviation applied during current monitoring period.

4 ESTIMATED GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Baseline Emissions (BE_y):

As per the approved consolidated Methodology AMS I.D. (Version 18.0) para 22:

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:

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

Where:

BE _y	Baseline emissions in year y (tCO 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 project activity in year y (MWh)
EF _{grid,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.

CO₂ Baseline Database for the Indian Power Sector, Version 16, March 2021 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);
- (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 synchronized 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 is serving 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)

	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
India	16.8%	15.1%	14.6%	14.3%	14.5%	17.0%

Data Source: Central Electricity Authority (CEA) database Version 16, March'2021¹⁰

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 CO₂ emissions per unit net electricity generation (tCO₂/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.

¹⁰https://cea.nic.in/wp-content/uploads/baseline/2021/06/User_Guide_ver_16_2021-1.pdf

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:

Net Generation in Operating Margin (GWh) (incl. Imports)			
	2017-18	2018-19	2019-20
INDIAN Grid	960,693	995,957	965,009

Simple Operating Margin (tCO ₂ /MWh) (incl. Imports)			
	2017-18	2018-19	2019-20
INDIAN Grid	0.9543	0.9603	0.9555

Weighted Generation Operating Margin	
INDIAN Grid	0.9568

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, and 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.

Build Margin (tCO₂/MWh) (not adjusted for imports)	
	2019-20
INDIAN Grid	0.8682

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

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 ($EF_{grid,CM,INDIA,y}$) 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:

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

Where:

- $EF_{grid,BM,y}$ = Build margin CO₂ emission factor in year y (t CO₂/MWh)
- $EF_{grid,OM,y}$ = Operating margin CO₂ emission factor in year y (t CO₂/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 W_{OM} and W_{BM} :

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, $EF_{grid,y} = 0.9346$ tCO₂/MWh

Baseline emission factor (EF_y):

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

Therefore, $EF_y = EF_{grid,y} = 0.9346$ tCO₂/MWh

Baseline Emissions

$$\begin{aligned} BE_y &= EG_{PJ,y} \times EF_{grid,CM,y} \\ &= 13,789 \text{ MWh} * 0.9346 \text{ tCO}_2\text{e/MWh} \\ &= 12,887 \text{ tCO}_2\text{e(Rounded Down Value)} \end{aligned}$$

4.2 Project Emissions

The project activity is based on renewable wind energy, therefore, project emissions should not be considered as per methodology, $PE_y = 0$

4.3 Leakage

No other leakage emissions are considered. $LE_y = 0$

4.4 Estimated Net GHG Emission Reductions and Removals

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
Year 1	12,887	0	0	12,887
Year 2	12,887	0	0	12,887
Year 3	12,887	0	0	12,887
Year 4	12,887	0	0	12,887
Year 5	12,887	0	0	12,887
Year 6	12,887	0	0	12,887
Year 7	12,887	0	0	12,887
Year 8	12,887	0	0	12,887
Year 9	12,887	0	0	12,887
Year 10	12,887	0	0	12,887
Total	128,870	0	0	128,870

5 MONITORING

5.1 Data and Parameters Available at Validation. For First Crediting Period

Data / Parameter	$EF_{CO_2,grid,y}$
Data unit	tCO ₂ /MWh
Description	Combined margin CO ₂ emission factor for the project electricity system.
Source of data	CEA CO ₂ Baseline Database (Version- 6.0, Date- March 2011)
Value applied:	0.9487
Justification of choice of data or description of measurement methods and procedures applied	The CO ₂ Baseline Database is the most authentic data available in India since it has been prepared & published by Central Electricity Authority, Government of India. The $EF_{grid,CM,y}$ calculation is based on equation 13 of the 'Tool to calculate the emission factor for an electricity system' (Version-02.2.1, EB- 63, Annex- 19) which is given below as: $EF_{grid,CM,y} = 0.75 \times EF_{grid,OM,y} + 0.25 \times EF_{grid,BM,y}$
Any Comments	The calculation is done as <i>ex ante</i>

Data / Parameter	$EF_{grid,OM,y}$
Data unit	tCO ₂ /MWh
Description	Operating marginCO ₂ emission factor for the project electricity system.
Source of data	CEA CO ₂ Baseline Database(Version-6.0,Date-March2011)
Value applied:	0.9942
Justification of choice of data or description of measurement methods and procedures applied	The CO ₂ Baseline Database is the most authentic data available in India since it has been prepared & published by Central Electricity Authority, Government of India.
Any Comments	The calculation is done as <i>ex ante</i> .

Data / Parameter	$EF_{grid,BM,y}$
Data unit	tCO ₂ /MWh

Description	Build margin CO ₂ emission factor for the project electricity system.
Source of data	CEA CO ₂ Baseline Database (Version-6.0, Date-March2011)
Value applied:	0.8123
Justification of choice of data or description of measurement methods and procedures applied	The CO ₂ Baseline Database is the most authentic data available in India since it has been prepared & published by Central Electricity Authority, Government of India.
Any Comments	The calculation is done as ex ante.

For Second Crediting Period

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO ₂ /MWh
Description	Combined margin CO ₂ emission factor for the project electricity system.
Source of data	CEA CO ₂ Baseline Database (Version-16.0, Date-March2021)
Value applied:	0.9346
Justification of choice of data or description of measurement methods and procedures applied	The CO ₂ Baseline Database is the most authentic data available in India since it has been prepared & published by Central Electricity Authority, Government of India. The $EF_{grid,CM,y}$ calculation is given belows: $EF_{grid,CM,y} = 0.75 \times EF_{grid,OM,y} + 0.25 \times EF_{grid,BM,y}$
Any Comments	The calculation is done as ex ante.

Data / Parameter	$EF_{grid,OM,y}$
Data unit	tCO ₂ /MWh
Description	Operating margin CO ₂ emission factor for the project electricity system.
Source of data	CEA CO ₂ Baseline Database (Version-16.0, Date-March2021)
Value applied:	0.9568
Justification of choice of data or description of measurement methods and procedures applied	The CO ₂ Baseline Database is the most authentic data available in India since it has been prepared & published by Central Electricity Authority, Government of India. The $EF_{grid,CM,y}$ calculation is based on the guidelines in 'Tool to

	calculate the emission factor for an electricity system'(Version-07.0)
Any Comments	The calculation is done as ex ante.

Data / Parameter	$EF_{grid,BM,y}$
Data unit	tCO ₂ /MWh
Description	Build margin CO ₂ emission factor for the project electricity system.
Source of data	CEA CO ₂ Baseline Database(Version-16.0,Date-March2021)
Value applied:	0.8682
Justification of choice of data or description of measurement methods and procedures applied	<p>The CO₂ Baseline Database is the most authentic data available in India since it has been prepared & published by Central Electricity Authority, Government of India.</p> <p>The $EF_{grid,CM,y}$ calculation is based on the guidelines in 'Tool to calculate the emission factor for an electricity system'(Version-07.0)</p>
Any Comments	The calculation is done as ex ante.

5.2 Data and Parameters Monitored

Data / Parameter	$EG_{PJ, facility,y}$
Data unit	MWh/year
Description	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y
Source of data	<p>Breakup of Net Export as per Monthly Generation Report and Joint Meter Reading authorized by R.R.V.P.N.L.</p> <p>The quantity of net electricity supplied to the grid (i.e. Net Export in kWh) by the project activity will be taken from the break-up sheet prepared by Suzlon India Limited on the basis of monthly Joint Meter Reading (JMR) certificate certified by Rajasthan Rajya Vidyut Prasaran Nigam Limited (RRVPL).</p> <p>The value for net electricity supplied to the grid is cross verified from the monthly invoice raised by the project participant.</p>
Description of measurement methods and procedures applied	<p>Net electricity delivered to the Grid:</p> <p>The net electricity delivered to the Grid by the given WTG for the given month(net export kWh) is obtained by subtracting import from export as below:</p> $EG_{PJ, facility,y} = EG_{Export, Project,y} - EG_{Import, Project,y}$ <p>The values of the net electricity delivered to the Grid are</p>

	<p>aggregated annually to get $EG_{PJ, facility, y}$.</p> <p>The value of net electricity delivered to the Grid ($EG_{PJ, facility, y}$) by the project activity per annum is converted to MWh before the calculation of emission reductions.</p> <p>The details on the calculation of net electricity exported to grid and the apportioning mechanism adopted are explained in detail under section 5.3</p>
Frequency of monitoring/recording	Continuously monitoring and monthly recording.
Value applied:	13,789
Monitoring equipment	Energy meters are used to measure electricity export and import value.
QA/QC procedures applied	<p>The energy meter reading are taken on monthly basis.</p> <p>Annual Testing of all the meters will be undertaken and faulty meters will be duly replaced immediately.</p> <p>However the meters will be calibrated at-least once in 3 years.</p> <p>The Net Units generated is cross checked against the invoice raised by the PP towards the Discom</p>
Purpose of data	To calculate baseline emission.
Calculation method	<p>The net electricity delivered to the Grid by the given WTG for the given month (net export kWh) is obtained by subtracting import from export as below:</p> $EG_{PJ, facility, y} = EG_{Export, Project, y} - EG_{Import, Project, y}$
Comments	Data will be archived in electronic form for two years after the end of crediting period or of the last issuance of VCUs for this project activity, whichever occurs later.

Data / Parameter	$EG_{Export, Project, y}$
Data unit	MWh/year
Description	Quantity of electricity exported to the grid as a result of the implementation of the CDM project activity in year y
Source of data	<p>Monthly Generation Report and Joint Meter Reading authorized by R.R.V.P.N.L.</p> <p>The value for net electricity supplied to the grid is cross verified from the monthly invoice raised by the project participant.</p>
Description of	The details on the calculation of electricity exported to grid and

measurement methods and procedures applied	the apportioning mechanism adopted are explained in detail under section 5.3.
Frequency of monitoring/recording	Continuously monitoring and monthly recording.
Value applied:	13,789
Monitoring equipment	Energy meters are used to measure electricity export and import value.
QA/QC procedures applied	<p>The energy meter reading are taken on monthly basis.</p> <p>Annual Testing of all the meters will be undertaken and faulty meters will be duly replaced immediately.</p> <p>However the meters will be calibrated at-least once in 3 years.</p> <p>The Net Units generated is cross checked against the invoice raised by the PP towards the Discom</p>
Purpose of data	To calculate baseline emission.
Calculation method	-
Comments	Data will be archived in electronic form for two years after the end of crediting period or of the last issuance of VCUs for this project activity, whichever occurs later.

Data / Parameter	EG _{Import, Project,y}
Data unit	MWh/year
Description	Quantity of electricity imported to the grid as a result of the implementation of the CDM project activity in year y
Source of data	<p>Monthly Generation Report and Joint Meter Reading authorized by R.R.V.P.N.L.</p> <p>The value for net electricity supplied to the grid is cross verified from the monthly invoice raised by the project participant.</p>
Description of measurement methods and procedures applied	The details on the calculation of electricity exported to grid and the apportioning mechanism adopted are explained in detail under section 5.3.
Frequency of monitoring/recording	Continuously monitoring and monthly recording.
Value applied:	0

Monitoring equipment	Energy meters are used to measure electricity export and import value.
QA/QC procedures applied	<p>The energy meter reading are taken on monthly basis.</p> <p>Annual Testing of all the meters will be undertaken and faulty meters will be duly replaced immediately.</p> <p>However the meters will be calibrated at-least once in 3 years.</p> <p>The Net Units generated is cross checked against the invoice raised by the PP towards the Discom.</p>
Purpose of data	To calculate baseline emission.
Calculation method	-
Comments	Data will be archived in electronic form for two years after the end of crediting period or of the last issuance of VCU for this project activity, whichever occurs later.

Data / Parameter	$EG_{controller,y}$
Data unit	MWh/year
Description	Electricity generated by installed WTG of PP connected to particular feeder.
Source of data	Record of metering available at Central Monitoring Station for the project activity
Description of measurement methods and procedures applied	Each WTG in Wind Farm is equipped with controller meter located inside the WTG. The controller meter provides daily generation report from each WTGs. The controller meter located in each WTG is a microprocessor based intelligent controller which controls entire turbine operation and record energy generation with basic signal of CT and PT .The controller meter does not require calibration as it is self calibration type. Further, controller will stop the turbine if it detects any error in measurement therefore avoids the uncertainty in the generation data.
Frequency of monitoring/recording	Continuously monitoring and recording.
Value applied:	13,789
Monitoring equipment	Controller meters
QA/QC procedures	The monitoring of all these wind turbines is performed from a common monitoring station as a part of central monitoring

applied	system. The system consists of a state- of- the- art monitoring station connected via optic cables to individual WTG. CMS managed by well trained staff personnel. The personal are always present on site to monitor various parameters of power generation and deal with any problems related to generation, transmission or maintenance.
Purpose of data	-
Calculation method	-
Comments	Data will be archived in electronic form for two years after the end of crediting period or of the last issuance of VCU for this project activity, whichever occurs later.

5.3 Monitoring Plan

Monitoring of the project activity:

- 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 at particular feeders 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 is 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 are approved, tested & sealed by the State Utility. The meters are in the custody of State Utility.
- The calibration of the meters will be carried out at least once in three years (as per paragraph 17 (c) of General Guidelines to SSC CDM methodologies, Version 17).
- In the absence or delay in meter calibration - appropriate guideline will be applied to confirm the conservativeness of emission reductions.
- 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.

Sample Apportioning Procedure:

The apportioning of the electricity is the responsibility of the State Utility. The sample apportioning procedure adopted for any given WTGs in project activity for any given month is given below:

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

The generation ratio for project activity 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

$$G_{R,y} = EG_{\text{Controller},y} / EG_{\text{AllController},y} \quad (a)$$

Where,

$G_{R,y}$: Generation Ratio at WTG for the project activity

$EG_{\text{Controller},y}$: Electricity generated by installed WTGs of PP connected to particular feeder EG

$EG_{\text{AllController},y}$: Total generation by all the connected WTGs to the particular feeder. This parameter is not in the control of the PP.

Calculation of net electricity exported at applicable metering point:

The Main and Check meters at the particular feeder measure a 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:

$$EG_{\text{Import},y} = G_{R,y} \times EG_{\text{Import feeder}}(b)$$

Where,

$EG_{\text{Import},y}$: Import, kWh by the project WTG apportioned at metering point at particular feeder.

$G_{R,y}$: Generation Ratio at WTG for the project activity

$EG_{\text{Import feeder},y}$: Total Import, kWh by all the WTGs at the metering point at particular feeder. This parameter is not within the control of the PP. The export, kWh by the WTG at the metering point is calculated in the following manner:

$$EG_{\text{Export},y} = GR_y \times EG_{\text{Export feeder},y} \quad (c)$$

Where,

$EG_{\text{Export},y}$: Export, kWh by the project WTG apportioned at metering point at particular feeder

GR_y : Generation Ratio at WTG for the project activity

$EG_{\text{Export feeder},y}$: Total Export, kWh by all the WTGs at the metering point at particular feeder. This parameter is not within the control of the PP. 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:

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

Transmission Loss Calculation :

The total transmission loss occurred during export/import of the electricity between the 33/220 kV level pooling station & 220 kV level common delivery point is calculated as per the guidelines under the Power Purchase Agreement and considered while calculating the net electricity supplied to the grid.

Calculation of net electricity delivered to the Grid ($EG_{PJ, \text{facility},y}$):

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

The net electricity delivered to the Grid (EG_{Bly}) by the project activity for the given month (net export kWh) is then obtained by subtracting import from export. Thus,

$$EG_{PJ, \text{facility},y} = EG_{\text{Export}, \text{Project},y} - EG_{\text{Import}, \text{Project},y} \quad (f)$$

The quantity of net electricity supplied to the grid (Net Export in kWh) i.e. EG_{Bly} by the project activity will be taken from the break-up sheet prepared by Suzlon India Limited on the basis of monthly Joint Meter Reading (JMR) certificate certified by Rajasthan Rajya Vidyut Prasaran Nigam Limited (RRVPL) and shall be used for emission reduction calculations.

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

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.

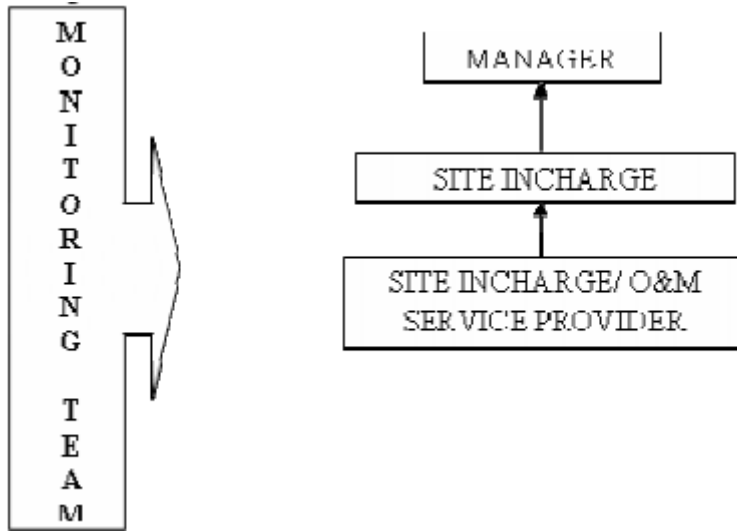
Taking monthly meter reading jointly with utility of power generated at promoter's wind turbines and supplied to grid from the meter/s maintained by utility for the purpose and coordinate to obtain necessary power credit report/ certificate.

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:



Designation	Responsibilities
MANAGER	Holds complete control over monitoring aspects pertaining to the project
SITE INCHARGE	<ul style="list-style-type: none"> • Recording • Verification • Storage of Data
SITE INCHARGE/O&M SERVICE PROVIDER	<ul style="list-style-type: none"> • Operation and Maintenance • Storage of data • Data Recording

6 ACHIEVED GHG EMISSION REDUCTIONS AND REMOVALS

6.1 Data and Parameters Monitored

Data / Parameter	EG _{PJ, facility, y}	
Data unit	MWh/y	
Description	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y	
Value applied:	Year	Net Generation(MWh)
	2018	334.445
	2019	0
	2020	837.745
	2021	8,837.507
	Total	10,009.697
Comments	Data will be archived in electronic form for two years after the end of crediting period or of the last issuance of VCUs for this project activity, whichever occurs later.	

Data / Parameter	EG _{Export, Project, y}	
Data unit	MWh/y	
Description	Quantity of electricity exported to the grid as a result of the implementation of the CDM project activity in year y	
Value applied:	Year	Electricity Export(MWh)
	2018	352.721
	2019	0
	2020	845.164
	2021	8,877.531
	Total	10,075.416

Comments	Data will be archived in electronic form for two years after the end of crediting period or of the last issuance of VCUs for this project activity, whichever occurs later.
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Data / Parameter	EG _{Import,Project,y}	
Data unit	MWh/y	
Description	Quantity of electricity imported to the grid as a result of the implementation of the CDM project activity in year y	
Value applied:	Year	Electricity Import(MWh)
	2018	18.276
	2019	0
	2020	7.419
	2021	40.024
	Total	65.719
Comments	Data will be archived in electronic form for two years after the end of crediting period or of the last issuance of VCUs for this project activity, whichever occurs later.	

Data / Parameter	EG _{Controller,y}	
Data unit	MWh/y	
Description	Electricity generated by installed WTG of PP connected to particular feeder.	
Value applied:	Year	Controller Generation(MWh)
	2018	369.538
	2019	0
	2020	877.843
	2021	9,245.503
	Total	10,492.884
Comments	Data will be archived in electronic form for two years after the end of crediting period or of the last issuance of VCUs for this project activity, whichever occurs later.	

6.2 Baseline Emissions

Baseline emission in 2018(19-October-2018 to 31-December-2018),

$$= 334.445 \text{ MWh} \times 0.9487 \text{ tCO}_2/\text{MWh}$$

$$= 317 \text{ tCO}_2\text{e(Rounded Down)}$$

Baseline emission in 2019(01-January-2019 to 31-December-2019),

$$= 0 \text{ MWh} \times 0.9487 \text{ tCO}_2/\text{MWh}$$

$$= 0 \text{ tCO}_2\text{e(Rounded Down)}$$

Baseline emission in 2020(01-January-2020 to 30-December-2020),

$$= 837.745 \text{ MWh} \times 0.9487 \text{ tCO}_2/\text{MWh}$$

$$= 794 \text{ tCO}_2\text{e(Rounded Down)}$$

Baseline Emission on 31-December-2020 which is under Second Crediting Period,

$$= 0 \text{ MWh} \times 0.9346^{11} \text{ tCO}_2/\text{MWh}$$

$$= 0 \text{ tCO}_2\text{e(Rounded Down)}$$

Baseline emission in 2021(01-January-2021 to 31-August-2021),

$$= 8,837.507 \text{ MWh} \times 0.9346 \text{ tCO}_2/\text{MWh}$$

$$= 8,259 \text{ tCO}_2\text{e(Rounded Down)}$$

6.3 Project Emissions

The project activity is based on renewable wind energy, therefore, project emissions should not be considered as per methodology, $PE_y = 0$

6.4 Leakage

No other leakage emissions are considered. $LE_y = 0$

6.5 Net GHG Emission Reductions and Removals

$$ER_y = BE_y - PE_y - LE_y$$

Where

ER_y = Emission reductions in year y (t CO₂e)

BE_y = Baseline emissions in year y (t CO₂e)

¹¹ From 31-December-2021 Second Crediting Period started, so combined margin emission factor of Second Crediting Period, 0.9346 tCO₂/MWh has been applied in baseline emission calculation.

PE_y = Project emissions in year y (t CO₂e)

LE_y=Leakage emissions in year y (t CO₂e)

The net GHG emission reduction for this project activity for current monitoring period is shown tablebelow:

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
19-October-2018 to 31-December-2018	317	0	0	317
01-January-2019 to 31-December-2019	0	0	0	0
01-January-2020 to 30-December-2020	794	0	0	794
31-December-2020 to 31-August-2021	8,259	0	0	8,259
Total	9,370	0	0	9,370

The total emission reduction from this project activity in current monitoring period(19-October-2018 to 31-August-2021) is 9,370 tCO₂e. The estimated emission reduction is calculated in following way:

The period from 19-October-2018 to 30-December-2020, the project activity was in First Crediting Period. The WTG was in running condition for 166 days in this period. The annual estimated emission reduction for First Crediting Period was 13,081 tCO₂e. So, estimated emission reduction for this project activity from 19-October-2018 to 30-December-2020 was

$$= (13,081\text{tCO}_2\text{e} / 365) \times 166$$

$$= 5,949 \text{ tCO}_2\text{e}$$

The period from 31-December-2020 to 31-August-2021, the project activity was in Second Crediting Period. The WTG was in running condition for 243 days in this period. The annual estimated emission reduction for Second Crediting Period was 12,887 tCO₂e. So, estimated emission reduction for this project activity from 31-December-2020 to 31-August-2021 was

$$= (12,887\text{tCO}_2\text{e} / 365) \times 243$$

$$= 8,579 \text{ tCO}_2\text{e}$$

So, the estimated emission reduction for entire monitoring period(19-October-2018 to 31-August-2021) is

$$=(5,949 + 8,579) \text{ tCO}_2\text{e}$$

= 14,528 tCO₂e

The actual emission reduction is 35.5% less than the estimated emission reduction. The generation in wind power plant is dependent on weather conditions which is out of control of Project Participant. So, this variation is justified

APPENDIX I: <METER CALIBRATION DETAILS>

Meter No.	Type of Meter	Make	Accuracy Class	Phase	Calibration Date	Validity of Calibration	Delay in Calibration ¹²
13195548	Main Meter	L&T	0.2s	SEL-73	29-January-2015, 23-January-2020	28-January-2018, 22-January-2023	There is delay in calibration from 29-January-2018 to 22-January-2020. Calibration of meters is not under the control of Project participant as this is in the control of state electricity authority.
13195549	Back up Meter	L&T	0.2s	SEL-73	29-January-2015, 23-January-2020	28-January-2018, 22-January-2023	There is delay in calibration from 29-January-2018 to 22-January-2020. Calibration of meters is not under the control of Project participant as this is in the control of state electricity authority.
RJB90206	Main Meter	Secure	0.2s	SEL-112 (2nd Line)	17-April-2017, 23-January-2020	16-April-2020, 22-January-2023	No delay.
RJB90207	Back up Meter	Secure	0.2s	SEL-112 (2nd Line)	17-April-2017, 23-January-2020	16-April-2020, 22-January-2023	No delay.

¹² Error factor 0.2% has been applied in export and import value of electricity in Emission Reduction Spreadsheet to maintain conservativeness where delay in calibration has been occurred.

APPENDIX II: <BREAKDOWN DETAILS >

Date	Location	Breakdown Hours
19-October-2018	MK005	168
19-October-2018	MK006	168
19-October-2018	MK007	168
19-October-2018	MK008	168
01-October-2020	MK005	2208 ¹³
01-October-2020	MK006	2208
01-October-2020	MK007	2208
01-October-2020	MK008	2208

¹³ From 01-October-2020 to 31-December-2020 the plant remained closed due to maintenance work.