	Project design document form **(Version 12.0)**
BASIC INFORMATION	
Title of the project activity	Wind power project in Maharashtra by TVS Energy Limited
Scale of the project activity	☒ Large-scale ☐ Small-scale
Version number of the PDD	10
Completion date of the PDD	09/12/2022
Project participants	Green Infra BTV Limited (Private Entity)[1]
Host Party	India
Applied methodologies and standardized baselines	Applied methodology - ACM0002 Version 12.3.0 - Consolidated baseline methodology for grid-connected electricity generation from renewable sources[2] standardized baselines –N/A
Sectoral scopes	1- Energy industries (renewable - / non-renewable sources)
Estimated amount of annual average GHG emission reductions	48,590 metric tonnes CO_2 equivalent per annum

[1] https://cdm.unfccc.int/Projects/DB/DNV-CUK1354626555.71/view

[2] https://cdm.unfccc.int/UserManagement/FileStorage/4W1SCKX3EMPO6AYGRJUTD7BQ8IVN0H

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

>>

TVS Energy Limited (TVS Energy) is developing a 25.5 MW wind farm in the state of Maharashtra in India. The project consists of 17 WEGs (Wind Electric Generators) of capacity 1500kW each. The project will generate clean electricity which shall be supplied to Unified Indian (Northern, Eastern, Western and North-Eastern) grid of India.

The Project with total capacity of 25.5 MW will utilize Vensys 82 Wind Energy Generators (WEGs) of ReGen Powertech Private Limited (RPPL). The detailed specifications for the same have been presented in section A.4.3. The project harnesses renewable resources (wind) in the region, thereby displacing nonrenewable fossil resources resulting to sustainable economic and environmental development. The Erection, Procurement and Construction (EPC) contractor is also responsible for post implementation activities which will essentially involve:

1. Operation and maintenance at site.
2. Coordination with the state electricity utility for measurement (metering) of generated electricity.
3. Site security.

Objective of the Project

The installations in this project have been carried out with a motive of generation of electricity from environmentally benign source of energy. The WEGs are connected to the transformer (33 kV / 690 V) at yard and this is in turn fed to the pooling substation (220 kV / 33 kV).

The electricity generation from the project activity will contribute to annual Green House Gas (GHG) reductions estimated at 48,590 tCO_2e (tonnes of carbon dioxide equivalent). The project life is envisaged as 20 years.

Pre-project scenario

The project activity is a Greenfield project. There was no activity at the site of the project participant prior to the implementation of this project activity.

Baseline

The baseline scenario is the electricity delivered to the grid by the project activity that otherwise would have been generated by the operation of grid-connected power plants and by the addition of new generation sources. In the absence of the Clean Development Mechanism (CDM) project activity, the equivalent amount of electricity would have been generated from the connected / new power plants in the Unified Indian Grid. The installed capacity in these grids is predominantly fossil fuels based and therefore is a major source of carbon dioxide emissions in India. The main emission source in the pre-project scenario is the power plants connected to the grids and main GHG involved is CO_2.

Nature of the Project

The WEGs contemplating this project activity are generating electricity through the available wind potential at the site and the generated electricity is exported to the grid.

TVS Energy[3] proposes to enter into a Power Purchase Agreement (PPA) with the state utility for the project.

Contribution to Greenhouse Gas Emissions Reduction

The Ministry of Environment, Forest and Climate Change (MoEFCC), Govt. of India has stipulated the social well-being, economic well-being, environmental well-being and technological well being as the four indicators for sustainable development in the interim approval guidelines by host country for CDM projects[4] approval. The following paragraphs details out the project adherence to the indicators-

Social well-being:

"The CDM project activity should lead to alleviation of poverty by generating additional employment, removal of social disparities and contribution to provision of basic amenities to people leading to improvement in quality of life of people"

The project activity has led to the development of supporting infrastructure such as road network etc., in the wind park location, which also provides access to the local population.
Use of a renewable source of energy reduces the dependence on imported fossil fuels and associated price variation thereby leading increased energy security.
In addition to this, the project proponent will contribute 2% of the CDM revenue realized from the candidate CDM project for sustainable development including society / community development. PP is aware about the Designated National Authority (DNA) guideline and a formal undertaking is being submitted separately.

Economic well-being:

"The CDM project activity should bring in additional investment consistent with the needs of the people*"* The use of a renewable energy source reduces the nation's dependence on imported fossil fuels and associated price variation thereby leading to increased energy security.

The generated electricity will be fed into the Unified Indian grid through local grid, thereby improving the grid frequency and availability of electricity to the local consumers (villagers & sub-urban habitants) which will provide new opportunities for industries and economic activities to be setup in the area thereby resulting in greater local employment, ultimately leading to overall development.

Technological well-being:

"The CDM project activity should lead to transfer of environmentally safe and sound technologies with a priority to the renewables sector or energy efficiency projects that are comparable to best practices in order to assist in upgradation of technological base"

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

Environmental well-being:

[3] https://cdm.unfccc.int/UserManagement/FileStorage/VCNTZDQEBAF8M64KLJGRU0P53S79H2

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

"This should include a discussion of impact of the project activity on resource sustainability and resource degradation, if any, due to activity; bio-diversity friendliness; impact on human health; reduction of levels of pollution in general;"

The project activity employs renewable energy source for electricity generation instead of fossil fuel-based electricity generation which would have emitted gaseous, liquid and/or solid effluents/wastes.

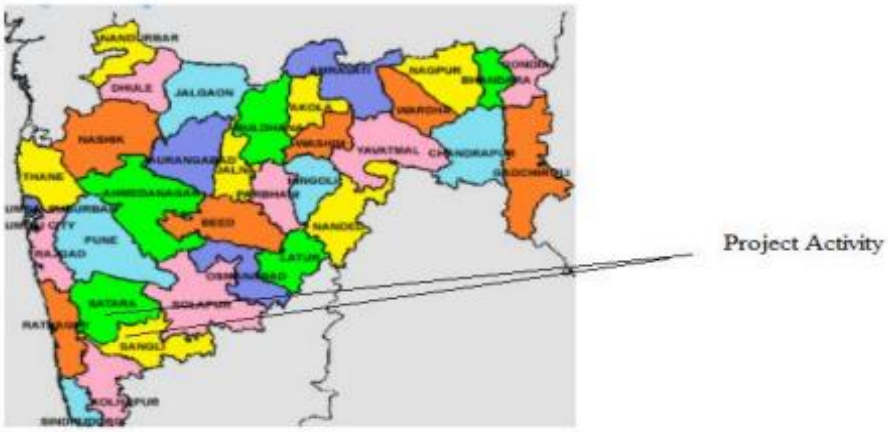
Being a renewable resource, using wind energy to generate electricity contributes to resource conservation. Thus, the project causes no negative impact on the surrounding environment and contributes to environmental well-being.

A.2. Location of project activity

The project activity is located across villages Kaledhon, Mulikwadi and Panchwad in district Satara and villages Vibhutwadi and Kurundwadi in district Sangli, Maharashtra India. The railway station nearest to the site is Karad (50 KMs from site) and the nearest airport is Pune (200 KMs).

Refer Appendix 8 Section for Geo co-ordinates and commissioning dates of all WEGs.

Map of India



Map of Maharashtra state

A.3. Technologies/measures

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The Project involves 17 WEGs of ReGen Powertech make Vensys 82. Each WEG has a rated capacity of 1,500 kW with internal electrical lines connecting the Project with a local evacuation facility. The Project is a renewable energy project which generates electricity from wind sources at project site. As the Project does not modify or retrofit an existing generation facility, the baseline scenario is the emissions generated by the operation of grid-connected power plants and by the addition of new generation sources. The project uses technology that is environmentally clean and safe since there are no GHG emissions associated with the electricity generation from WEGs. The technical specifications of the 1,500 kW WEG is given below:

General	
Wind Turbine Class	GL III A
Hub Height	85 m
Type	Direct Drive Horizontal Axis Wind Turbine with variable Rotor Speed
Power Regulation	Independent electromechanical pitch system for each blade
Rated Power	1500 kW
Rotational Speed	Variable, 9 -17.3 rpm
Design Life Time	20 years
Wind Conditions	
Air Density	1.225 kg / cu.m
Annual Average Wind Speed	7.5 m/s
Wind shear	0.16
Cut-in wind speed	3 m/s
Cut-out wind speed	22 m/s
Re cut-in wind speed	< 22 m/s (10 min. avg.)
Rated wind speed	approx. 13 m/s
Survival wind speed	52.5 m/s
Maximum in-flow angle	8 Deg
Rotor	
Diameter	82 m
No. of Blades	3
Swept Area	5258 sq. m
Orientation	Up-wind
Direction of Rotation	Clockwise (from up-wind side)
Cone Angle	-3 Deg
Tilt Angle	3 Deg
Blade	
Type	LM 40.3 P2
Material	Glass Fiber Reinforced Plastic
Profile	NACA 64618 and DU
Starting	Self-starting
Lightening Protection	Provided

Hub	
Hub Type	Rigid – Star
Material	EN-GJS-400-18U-LT
Pitch System	
Blade Bearing	Ball Slew Bearing (without gearing)
Mechanism	Toothed Belt Drive
Drive	Planetary geared AC motor
Backup power	Ultra-capacitor
Braking System	
Primary Brake System	Aerodynamic Brake, Individual full 90 deg. blade pitch and control for each blade
Maintenance	Hydraulic Brake Caliper at Generator Rotor
Generator	
Type	Synchronous, Variable Speed
Cooling	Passive Air Cooled
Excitation	Permanent Magnet
Rated Power	1500 kW
No. of poles	88
Winding	Medium Voltage, Fractional Slot
Rated Voltage	690 V
Frequency	Variable /
No. of phases	6
Insulation Class	F
Protection Class	IP 23
Generator Protection	2 x Circuit Breaker Switches at Nacelle

Main Shaft and Bearing

Main Shaft Type	Hollow Shaft and Main Axle
Material	EN-GJS-400-18U-LT
Bearing Type	Cylindrical Roller / Taper Roller
Location	Inside the generator
Lubrication	Manual
Nacelle	
Material	EN-GJS-400-18U-LT
Maintenance Hoist	1 x 250kg SWL
Wind Measuring Devices	1 x Anemometer + 1 x Wind Vane
Top Box	Provided

Yaw System	
Yaw Bearing	Ball Slew Bearing with external gearing
Yaw Motor	3 kW, planetary geared motor with brake
No. of Yaw Drive	3
Yaw Brake	Hydraulic Calipers

No. of Yaw Brake Calipers	8/10
Tower	
Type	Tubular Steel Tower with Embedded Steel Can in Foundation - Cylindrical Conical
Material	S 355
No. of Sections	4
Assembly	Bolted Connection
No. of Platforms and Type	5, Chequerred Plates
Ascent	Ladder inside Tower with safety harness
Ventilation	Air Inlet at Tower Top and Exhaust Fan at Tower Bottom
Corrosion Protection	
Corrosion class (outside)	DIN EN ISO 12944-C5
Color	RAL 7035
Foundation	
Type	Floating Foundation
Power Converter and Controller	
Type	AC-DC-AC Full Power Converter
Design	Modular
Cooling	Forced Air Cooled
System Power Factor	Full Reactive Power Control 0.95 cap .....0.95 ind
Rated Output Voltage	620 V
Voltage Variation	+/-10%
Frequency	50 Hz
Frequency Variation	-5% / 3%
Cut-in-system	Active IGBT
Low Voltage Ride Through (LVRT)	3 seconds
Safety System	PLC Based Control System
SCADA	Remote Monitoring & Control

Technology transfer:

No technology transfer from other countries is involved in this project activity

A.4. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India	Green Infra BTV Limited (Private Entity)[5]	No

[5] https://cdm.unfccc.int/Projects/DB/DNV-CUK1354626555.71/view

A.5. Public funding of project activity

No public funding or Official Development Assistance (ODA) has been used on this project activity. The investment funds required for the project will be raised by the project promoter using its internal resources.

A.6. History of project activity

The start date for the project activity is after 2nd August 2008 and hence as per EB 49, Annex 22 "Guidelines on the demonstration and assessment of prior consideration of the CDM", TVS Energy has intimated the UNFCCC[6] as well as the host country DNA of their intention of setting up the 25.5 MW wind power project as a CDM project. The letter to the UNFCCC as well as the Indian DNA were sent within six months of the project start date and hence the as per the EB guidance it can be concluded that CDM was seriously considered during decision to invest in the project. Please refer to Annex 6 for the Prior Consideration Notification to UNFCCC. The detailed chronology of events is provided below:

Activity	Date
Board Meeting for Approval for awarding contract for setting up wind project	06/06/2011
Date of first Purchase Order (project start date)	19/08/2011
Award of contract to CDM consultant	20/12/2011
Intimation to UNFCCC for prior consideration of CDM	29/12/2011
Intimation to NCDMA for prior consideration of CDM	29/12/2011
Stakeholder Consultation	14/02/2012

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

2. Declare whether:
(a) The proposed CDM project activity was not a CPA that has been excluded from a registered CDM PoA;

b) A registered CDM project activity or a CPA under a registered CDM PoA whose crediting period has not expired exists in the same geographical location as the proposed CDM project activity.

3. As the declaration on 2(a) or 2(b) above is not positive, Hence demonstrate that the proposed CDM project activity meets all conditions for registration in accordance with the applicable provisions in the project standard relating to registration of an excluded CPA as a CDM project activity or registration of a project activity that is in the same geographical location is not applicable.

A.7. Debundling

Not Applicable, for large project activity.

[6] http://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html

SECTION B. Application of methodologies and standardized baselines

B.1. References to methodologies and standardized baselines

Title: ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources "
Reference: Version 12.3.0, EB 66

ACM0002 draws upon the following tools which have been used in the PDD:

- Tool to calculate the emission factor for an electricity system – Version 2.2.1, EB 63
- Tool for the demonstration and assessment of additionality – Version 6.1.0, EB 69

B.2. Applicability of methodologies and standardized baselines

>>
The Project is wind based, zero emission power project supplying electricity to the Maharashtra state grid, which forms part of the Unified Indian grid. The Project will displace fossil fuel based electricity generation that would have otherwise been provided by the operation and expansion of the fossil fuel based power plants in Unified Indian grid.

The approved consolidated baseline and monitoring methodology ACM0002 is applicable to the project, because the project meets all the applicability criteria stated in the methodology:

Applicability Condition	Project Specifications
The project activity is the installation capacity addition retrofit or replacement of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir) wind power plant/unit geothermal power plant/unit solar power plant/unit wave power plant/unit or tidal power plant/unit	The Project is installation of grid connected renewable power generation project activity from wind energy.
In the case of capacity additions, retrofits or replacements (except for capacity addition projects for which the electricity generation of the existing power plant(s) or unit(s) is not affected): the existing plant started commercial operation prior to the start	The project does not involve any capacity additions, retrofits or replacements and therefore this condition is not applicable.

of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity addition or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity;	
In case of hydro power plants: At least one of the following conditions must apply ○ The project activity is implemented in an existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or ○ The project activity is implemented in an existing single or multiple reservoirs, where the volume of any of reservoirs is increased and the power density of each reservoir, as per the definitions given in the Project Emissions section, is greater than 4 W/m2 after the implementation of the project activity; or ○ The project activity results in new single or multiple reservoirs and the power density of each reservoir, as per the definitions given in the Project Emissions section, is greater than 4 W/m2 after the implementation of the project activity. • In case of hydro power plants using multiple reservoirs where the power density of any of the reservoirs is lower than 4 W/m2 after the implementation of the project activity all of the following conditions must apply: • The power density calculated for the entire project activity using equation 5 is greater than 4 W/m2; • All reservoirs and hydro power plants are located at the same river and were designed together to function as an integrated project that collectively constitutes the generation capacity of the combined power plant; • The water flow between the multiple reservoirs is not used by any other hydropower unit which is not a part of the project activity; • The total installed capacity of the power units, which are driven using water from the reservoirs with a power density lower than 4 W/m2, is lower than 15 MW; • The total installed capacity of the power units, which are driven using water from reservoirs with a power density lower than 4 W/m2, is less than 10% of the total installed capacity of the project activity from multiple reservoirs.	This condition is not applicable as the project is electricity generation from wind.

The methodology is not applicable to the following:-

Condition	Project Specifications
Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site	The Project does not involve switching from fossil fuel to renewable energy at the site of project activity since the Project is green-field electricity generation from wind sources at sites where there was no electricity generation source prior to the Project.
Biomass fired power plants	This condition is not applicable as the project represents electricity generation from wind sources
Hydro power plants that result in new reservoirs or in the increase in existing reservoirs where the power density of the reservoir is less than 4 W/m2.	This condition is not applicable as the project represents electricity generation from wind sources.

In view of the above, the approved consolidated baseline and monitoring methodology ACM0002 Version 12.3.0 has been chosen as the baseline and monitoring methodology for the project and the geographical and system boundaries of the Unified Indian Grid can be clearly identified and information on the characteristics of the grid is available.

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

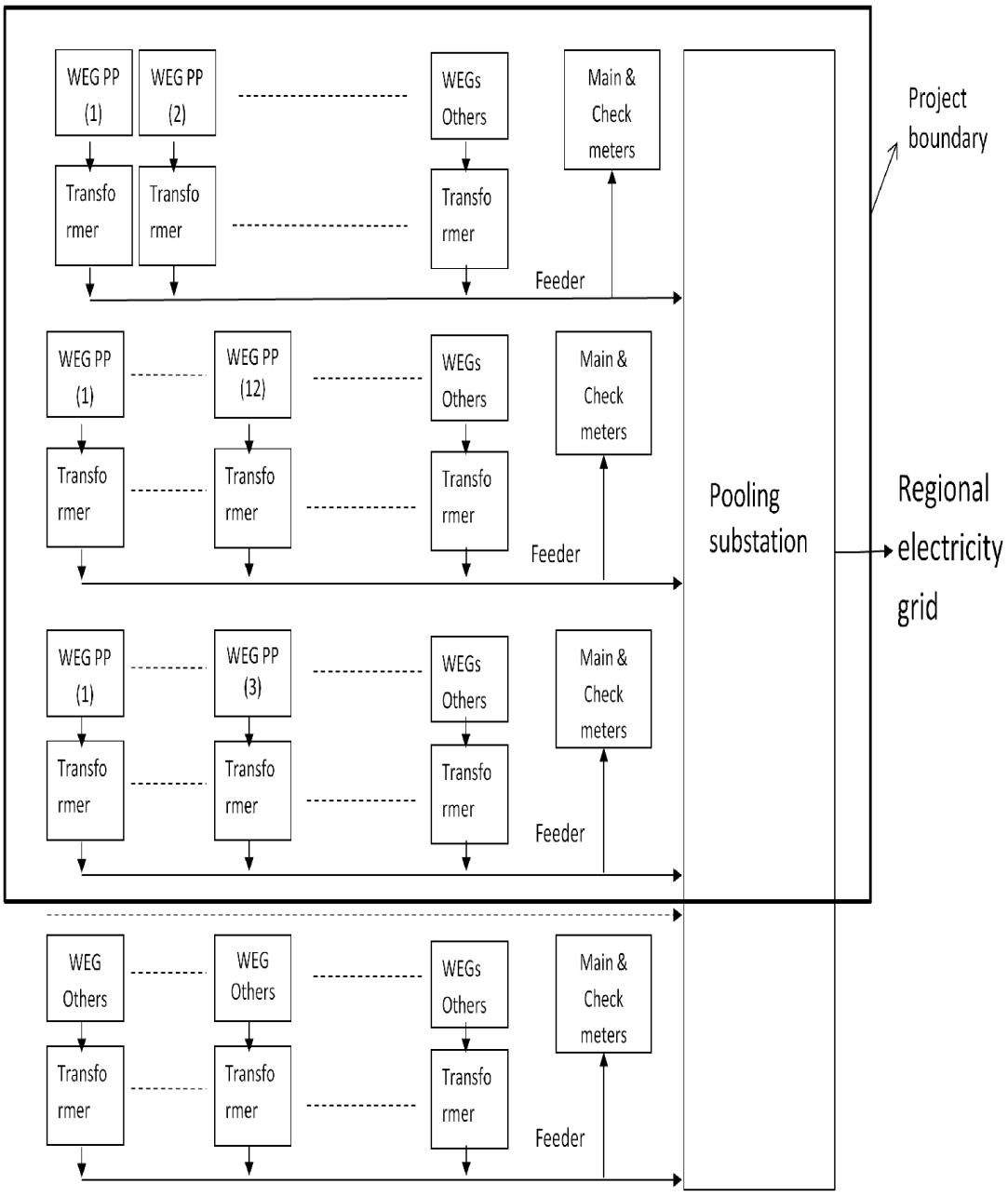
>>

As per the approved methodology, ACM0002, "the spatial extent of the project boundary includes the project site and all power plants are connected to a 33 kV feeder, Feeders which feeds the electricity to the pooling sub-station, which is a part of the Unified Grid of India."

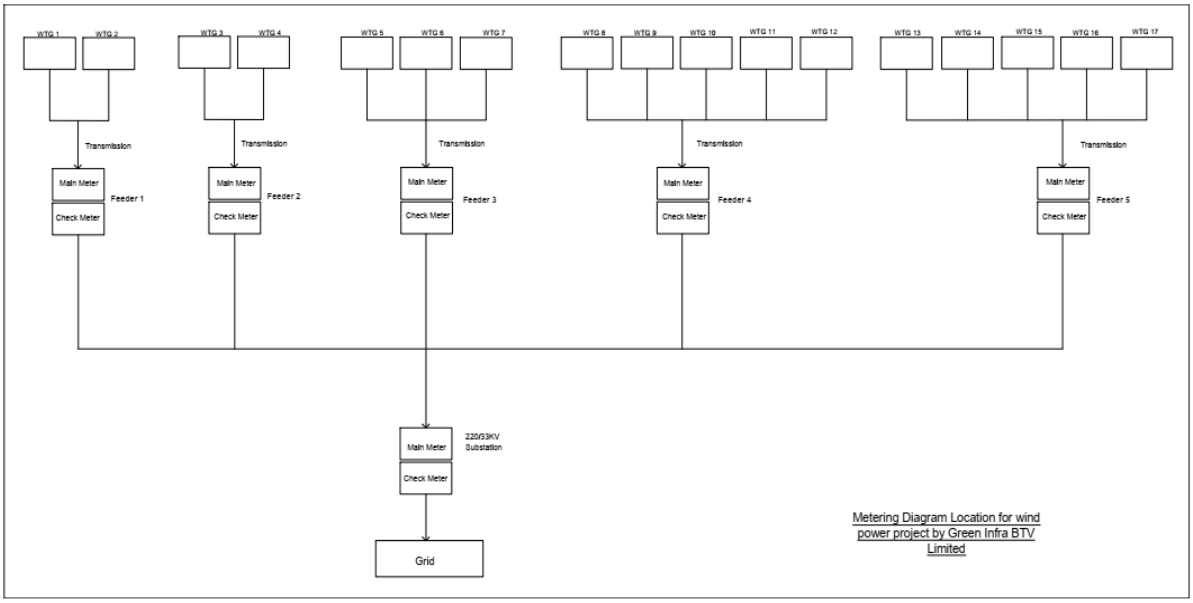
The "Tool to calculate the emission factor for an electricity system" states that Grid/project electricity system is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity and that can be dispatched without significant transmission constraints.

In line with the above the project boundary includes the 25.5 MW power plant, evacuation infrastructure including grid interconnection point and all power plants connected to the Unified Indian grid to which the project is connected to. Further details of identification of the relevant electric power system for the project have been given in Section B.6.1

A schematic of the project boundary is given below:



Metering location diagram is shown below.



The table below summarizes the sources of all possible sources of GHG emissions. The project activity itself does not emit any GHG emissions. GHG emissions that can be characterized as occurring beyond the boundary of the project activity include those from other power plants connected to the high voltage transmission system. Those emissions do, however, comprise the baseline for the project activity.

Source		GHG	Included?	Justification/Explanation
Baseline	Grid- connected electricity generation	CO_2	Yes	In the baseline scenario the electricity would have been sourced from the Unified Indian Grid which in turn would be connected to fossil fuel fired power plants which emit CO2.
		CH_4	No	No methane generation is expected to be emitted.
		N_2O	No	No nitrous oxide generation is expected to be emitted.
Project activity	Greenfield wind energy conversion system	CO_2	No	The project activity does not emit any emissions.
		CH_4	No	No methane generation is expected to be emitted.
		N_2O	No	No nitrous oxide generation is expected to be emitted

B.4. Establishment and description of baseline scenario

>>

As this project installs a new grid connected renewable power plant, the baseline according to ACM0002, Version 12.3.0 is –

"**Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system**".

Since the Project does not modify or retrofit an existing generation facility, the baseline scenario is the emissions generated by the operation of grid-connected power plants and by the addition of new generation sources. This is estimated using calculation of Combined Margin multiplied by electricity delivered to the grid by the Project.

During the implementation of the project activity, the relevant national and/or sectoral policies, regulations and circumstances are taken into account.

- Implementation of wind-based power projects for electricity generation is not mandatory under any law in India, the project activity is a voluntary action.
- Despite the gradual increase in renewable energy sources (including wind energy) in power sector, still about two-third of installed power generation capacity is based on fossil-fuel based energy sources, hence the electricity grid is fed by electricity generated predominantly in fossil-fuel based power plants.

wind based power plants belong to white category[7] as per Central Pollution Control Board, Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India and also as per the Environmental Impact Assessment notification 14/09/2006[8] published by Ministry of Environment, Forest and Climate Change (MoEFCC) the solar power projects are exempted from Environmental Impact Assessment (EIA).

There is no legal and regulatory requirement that mandates the production of energy by the chosen technology.

Accordingly the baseline emissions are given as:

$BE_y = EG_{PJ,y} * EF_{grid,CM,y}$

Where:
BE_y = Baseline emissions (tCO2e)
$EG_{PJ,y}$ = Electricity generation by the project activity (MWh)
$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the "Tool to calculate the emission factor for an electricity system" version 2.2.1 (tCO_2/MWh)

The steps to calculate the combined margin emissions factor is detailed in section B.6

B.5. Demonstration of additionality

>>
According to decision 17/CP.7 para 43, a project will be defined additional if the anthropogenic GHG emissions from the source are reduced below that would have occurred in the absence of the registered project activity. Within the scope of the adopted baseline methodology, the additionality of the project activity has been demonstrated and assessed using the "Tool for the demonstration and assessment of additionality" (Version 6.0.1 from EB 69). The tool prescribes the following steps for proving additionality of a project.

[7] https://cpcb.nic.in/openpdffile.php?id=TGF0ZXN0RmlsZS8xNDZfMTQ5MjQ4OTg4OF9tZWRpYXBob3RvMTMxOTgucGRm

[8] http://www.environmentwb.gov.in/pdf/EIA%20Notification,%202006.pdf

STEP 1: Identification of alternatives to the project activity consistent with current laws and regulations (para 15 of the tool**)**

Sub-step 1a: Define alternatives to the project activity*:* (para 16-18 of the tool)
Realistic and credible alternative(s) available to the project participants or similar project developers include:

Alternative (a): Implementation of the project without CDM

Under this alternative, TVS Energy Limited would have gone ahead with the implementation of the project without CDM benefits. The project would have produced electricity from the renewable source and the generating electricity would have been sold to the grid under a power purchase agreement with the state utility. This is in compliance with all applicable legal and regulatory requirements and can be a part of the baseline. However, the project activity is not viable enough without CDM revenues. This argument has been discussed in step 2 of the Additionality section.

Alternative (b): No project activity

The project proponent would have continued without investment in project and would have continued with usual business activities. The equivalent capacity additions in the grid would have continued by a fossil fuel based power plant and thus there would also be the associated GHG emissions from the fossil fuel based power plant. Thus new capacity add-on from a fossil fuel based power plant is the most plausible baseline alternative for the project. This is a realistic and credible alternative to the project activity.

Outcome of Step 1a: Alternatives (a) and (b) above have been identified as realistic and credible alternative scenario(s) to the project activity

As the approved methodology that is selected for the CDM project activity prescribes a pre-defined baseline scenario which is “Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system”, hence no further analysis of the alternatives is required.

Sub-step 1b: Consistency with mandatory laws and regulations: (para 19-21 of the tool)
There are no legal and regulatory requirements that prevent Alternatives (a) and (b) from occurring.

Outcome of Step 1b: Identified realistic and credible alternative scenario(s) to the project activity that are in compliance with mandatory legislation and regulations taking into account the enforcement in the region or country and EB decisions on national and/or sectoral policies and regulations.

Hence, as per Tool for the demonstration and assessment of additionality, it has been identified that there is at least one realistic and credible alternative to the project scenario.

STEP 2: Investment Analysis (para 22-34 of the tool)

Step 2: Investment analysis

Determine whether the project activity is not:

a) The most economically or financially attractive; or
b) Economically or financially feasible, without the revenue from the sale of Certified Emission Reductions (CERs*).*

The project proponent chose to use point (b) above

Sub Steps	Tool Guidelines	Submissions in favour of additionality
Sub-step 2a. - Determine appropriate analysis method	Determine whether to apply simple cost analysis, investment comparison analysis or benchmark analysis (sub-step 2b). If the CDM project activity generates no financial or economic benefits other than CDM related income, then apply the simple cost analysis (Option I). Otherwise, use the investment comparison analysis (Option II) or the benchmark analysis (Option III).	The project generates electricity which is being sold to state utility. Thus the project generates economic benefits from the sale of power The other possible revenue stream for the project is through trading of GHG emission reductions in Annex-1 countries. Thus Option-1 is not applicable for this project and Option-II or Option-III should be used.
Sub-step 2b. – Option II. Apply investment comparison analysis	Identify the financial indicator, such as IRR, NPV, cost benefit ratio, or unit cost of service (e.g., levelized cost of electricity production in $/kWh or levelized cost of delivered heat in $/GJ) most suitable for the project type and decision-making context.	Project proponent chooses to exercise option-III i.e. Benchmark analysis.
Sub-step 2b. – Option III. Apply benchmark analysis	Identify the financial indicator, such as IRR, NPV, cost benefit ratio, or unit cost of service (e.g., levelized cost of electricity production in $/kWh or levelized cost of delivered heat in $/GJ) most suitable for the project type and decision context.	There are various benchmarks available for the power sector investment issued by banking institutions and regulatory commissions for fixation of tariff for the specific states.

Sub-step2b. (Tool for the demonstration and assessment of additionality) –

Apply benchmark analysis
A suitable financial indicator, project **IRR** has been identified to demonstrate the investment barriers faced by the project. The post-tax IRR of the project has been compared with the post-tax project IRR benchmark.

Suitability of the Benchmark used for Comparison:

The guidance to investment analysis issued in EB 62 (Annex 5, paragraph 14) states that in cases where a benchmark approach is used, the applied benchmark shall be appropriate to the type of

IRR calculated. Weighted average costs of capital (WACC) are appropriate benchmarks for the project IRR. Required/expected returns on equity are appropriate benchmarks for equity IRR.
The tool for demonstration and assessment of additionality [para-5, sub step 2(b)] states that in cases where the project has more than one potential developer, the benchmark shall be based on parameters that are standard in the market, considering the specific characteristics of the project type. Accordingly, the expected equity returns applicable to the project type has been considered as the benchmark.

Benchmark

The WACC benchmark is calculated using the CAPM model. Weighted average cost of capital (WACC) is calculated as weighted average cost of equity and cost of debt as illustrated below:

WACC = [D/ (D+E)]*[Cost of Debt] + [E/ (D+E)]*[Cost of Equity]

Cost of equity:

The benchmark has been derived based on the default values for the expected return on equity, as provided in Appendix, "guidance on assessment of investment analysis" version 05, Annex 5, EB 62. The project activity falls under Host Country India, Group 1 (S. No. 1. Energy Industries) hence the real value for expected return on equity is 11.75%.

As the investment analysis is carried out in nominal terms, this value has to be converted to nominal values by adding the inflation rate. The inflation rate, 5.5%, is taken from RBI's inflation forecasts for 10 years (the central bank of India)[9] RBI publish the forecast for a maximum duration of 10 years. The value was published on 25 May 2011 and hence was available at the time of decision making (June 2011). Thus, selection of this value is in line with para 6 of guidance on investment analysis (EB 62 Annex 5).

Cost of Debt:
Cost of debt is defined as the rate at which lenders agree to lend money to a project. The additionality tool and the guidance to investment analysis clarify that for projects that benchmark for project with more than one potential developer should not be based on project specific parameters but should represent the standard in the market. Accordingly, the bank prime lending rate (SBAR) [10] prevailing at the time of project start date has been considered as the cost of debt. The interest rate of 13.73% is taken from MERC's tariff order dated 29th April 2011 specified for wind projects in Maharashtra.

Interest costs are tax deductible, therefore in order to arrive at the post tax cost of debt, the cost of debt is multiplied with marginal tax rate. The applicable tax rate of 20.01% has been applied to calculate the cost of debt.

The post-tax cost of debt therefore works out to: 13.73% * (1-20.01%) = 10.98%

Calculation of Benchmark WACC:
The WACC is the weighted average of the cost of equity and cost of debt used for financing. As per the additionality tool, standard parameters (and not project specific ones) are required to be used for arriving at the benchmark rate. In India, a debt to equity ratio of 70:30 is considered as

[9] https://rbi.org.in/Scripts/Publications.aspx?publication=Annual

[10] Prime Lending Rate of State Bank of India

the norm for financing wind power projects[11]. Accordingly the WACC has been calculated based on a 70:30 debt to equity ratio.

WACC = [D/ (D+E)]*[Cost of Debt] + [E/ (D+E)]*[Cost of Equity]

For calculation of WACC, a debt to equity ratio of 70:30 has been considered, as typical for the project type.

WACC = 70%* Cost of debt + 30%*Cost of equity
= 70%* 10.98%% + 30%*17.9%
= 13.06%

Sub-step 2c. Calculation and comparison of financial **indicators (only applicable to options II and III):**

1. Calculate the suitable financial indicator for the CDM project activity and, in the case of Option II above, for the other alternatives. Include all relevant costs (including, for example, the investment cost, the operations and maintenance costs), and revenues (excluding CER revenues, but including subsidies/fiscal incentives where applicable), and, as appropriate, non-market cost and benefits in the case of public investors.
2. Present the investment analysis in a transparent manner and provide all the relevant assumptions in the CDM-PDD, so that a reader can reproduce the analysis and obtain the same results. Clearly present critical techno-economic parameters and assumptions (such as capital costs, fuel prices, lifetimes, and discount rate or cost of capital). Justify and/or cite assumptions in a manner that can be validated by the DOE. In calculating the financial indicator, the project's risks can be included through the cash flow pattern, subject to project-specific expectations and assumptions (e.g. insurance premiums can be used in the calculation to reflect specific risk equivalents).
3. Assumptions and input data for the investment analysis shall not differ across the project activity and its alternatives, unless differences can be well substantiated.
4. Present in the CDM-PDD submitted for validation a clear comparison of the financial indicator for the CDM activity and:
    a) The alternatives, if Option II (investment comparison analysis) is used. If one of the other alternatives has the best indicator (e.g. highest IRR), then the CDM project activity cannot be considered as the most financially attractive;
    b) The financial benchmark, if Option III (benchmark analysis) is used. If the CDM project activity has a less favourable indicator (e.g. lower IRR) than the benchmark, then the CDM project activity cannot be considered as financially attractive.

The financial calculations are based on actual figures from various proposals received from RPPL before the investment decision.

Financial Assumptions:

[11] MERC in its order dated 29th April 2011 has used this ratio in its tariff calculation. Likewise, several other regulations and orders refer this as the normative debt equity ratio for wind power projects

Capacity of Machines in MW	1.5		Offer from EPC contractor dated 27th May 2011 and available during decision making
Number of Machines	17		
Project Capacity in MW	25.50		
Expected project commissioning date	31-Mar-12		Expected, as envisaged during the decision making phase of the project activity and also mentioned in the offer from EPC contractor
Operations			
Plant Load Factor Base Case	22.83%		Assumed in the board approval. The same value was submitted to the bank. Thus, this is in line with EB 48 Annex 11.
Transformation loss and Transmission Loss up to metering point	0.0%		
Effective PLF	22.83%		
Insurance Charges @ % of capital cost	0.20%		Assumed in the project report dated 3 June 2011
Admin expenses (Million)	8.50		Assumed in the project report dated 3 June 2011
% escalation in admin expenses	5.5%		Assumed in the project report dated 3 June 2011
MERC tariff (till 13th year and beyond[12])	5.37		MERC order dated 29th April 2011[13], applicable at the time of decision making for the project activity
Generation Based Tariff- Rs./kWh	0.50		Generation based incentive are applicable to wind power projects at the rate of Rs. 0.50 per kWh with cap of Rs. 6.2 Million per MW[14] This was envisaged during the decision making of the project.
Project Cost	**Rs Million**		
Land and Infrastructure, Generator & Electrical Equipment's, Mechanical Equipment's, Civil Works, Instrumentation & Control			
Total Project Cost	**1,640.00**		As per offer from technology supplier, available during decision

[12] Please see below for justification of the assumption of tariff as INR 5.37 after 13th year

[13] http://www.mercindia.org.in/pdf/Order%2058%2042/Order_39_of_2011.pdf

[14] http://www.inwea.org/others/OPERATIONAL_GUIDELINES.pdf

			making phase of the project activity and also as per the actual agreement
Means of Finance		**Rs Million**	
Own Source	30%	492.00	MERC dated 29th April 2011, applicable at the time of decision making This is also the debt equity ratio for the previous projects of TVS Energy and conservative as compared to the actual debt equity of 89:11
Term Loan	70%	1,148.00	
Total Source		1,640.00	
Terms of Loan			
Interest Rate	10.5%		Actual interest rate for repayment in INR as para 11 of EB 62 (Annex 5)
Tenure	10	Years	
Moratorium		Months	
Income Tax Depreciation Rate (Written Down Value basis)			
on Wind Energy Generators	7.69%		Rate applicable at the time of decision making
Book Depreciation Rate (Straight Line Method basis			
On all assets	5.28%		Companies act[15]
Book Depreciation up to (% of asset value)	90%		MERC dated 29th April 2011
Income Tax			
Income Tax rate	32.45%		30% (base rate) + 5% (surcharge) + 3% (cess)
Minimum Alternate Tax	20.01%		18.5% (base rate + 5% (surcharge) + 3% (cess)
Working capital			
Receivables (no of days)	60		MERC dated 29th April 2011
Interest on working capital	13.2%		MERC dated 29th April 2011
O & m expenses (no of days)	180		Actual as it is conservative as compared to that assumed in the project report (365)

The project IRR is 10.23%.

Sub-step 2d: Sensitivity analysis (para 35 of the tool, only applicable to Options II and III):

[15] http://www.mca.gov.in/Ministry/latestnews/Explanatory_Statement_alongwith_Schedule_XIV_4dec2008.pdf

As per the guidance on assessment of investment analysis, parameters that constitute more than 20% of either total project costs or total project revenues shall be included in the sensitivity analysis. The most crucial parameters in this aspect for this project are electricity generation and project cost. A sensitivity analysis has hence been carried out on the project IRR to analyse how the financial attractiveness of the project activity varies with changes in project cost and O&M cost.

The sensitivity of the IRR shall be tested based on following parameters:

- Capital Cost
- O&M cost

Capital Cost

The sensitivity has been conducted at the variation of + / - 10% of the project cost as per the EB's guidance. However, it should be noted that any variation in capital cost is not a realistic scenario as the investment analysis has been done based on the final negotiated price offer from the equipment supplier and any deviation from the final negotiated price is not a probable scenario.

	10% Decrease (1476 Million)	**Base Case (164 Million)**	**10% Increase (1804 Million)**
Post tax project IRR	11.6%	10.23%	9.14%

The purchase order values have been fixed as per the final offer from the technology supplier and it is the same as assumed in during the investment decision of the project. Hence, probability of change in project cost is absent. Moreover, the IRR crosses the benchmark only in case of a 19 % decrease in the project cost.

O&M Cost

The Sensitivity in O&M cost has been conducted after taking to consideration +/-10% variation in the cost. However, it should be noted that any variation in O&M cost is not a realistic scenario as the investment analysis has been done based on the final negotiated offer from the equipment supplier

	10% Decrease (0.728 million/MW)	**Base Case (0.809 million/MW)**	**10% Increase (0.89 million/MW)**
Post tax project IRR	**10.33%**	**10.23%**	**10.13%**

The IRR does not cross the benchmark even if O & M expenses are reduced to zero, which is not a possible scenario as a WEG requires regular O & M practices.

PLF

A sensitivity analysis with respect to variation in the power generated by the project activity has been carried out. The sensitivity has been done after taking into consideration a +/-10% variation on the PLF achieved. The results have been presented below:

	10% Decrease (20.55%)	**Base Case (22.83%)**	**10% Increase (25.11%)**
Post tax project IRR	8.9 %	10.23%	11.59%

The IRR crosses the benchmark if the PLF goes to 27.67% (i.e. a 21.2% increase of base case PLF) for the entire lifetime of the project activity. The financial model has been prepared on the basis of the PLF values as submitted to the bank while applying for loan. This is as per Annex 11 of EB 48. The banks have offered debt while considering the base case PLF of 22.83%.

It is unlikely that the project activity will consistently achieve such high PLF throughout its lifetime as the PLF specified for the applicable wind zone (wind zone-1) as per MERC tariff order for the project is only 20%.

Tariff

Tariff after 13th year
MERC has fixed the tariff for the first 13 years of the project activity at INR 5.37. The tariff from 14 th year will be determined by MERC. This tariff of INR 5.37 is the levelized tariff for wind energy projects determined for the entire lifetime of the WEGs by MERC. Thus the same tariff has been assumed for the entire lifetime of the WEGs. A sensitivity analysis on the tariff after 13 th year has also been carried out.

Sensitivity on tariff

Sensitivity on the power sale tariff applicable to the project activity has been carried out. The results have been presented below:

	10% Decrease (INR 4.83)	**Base Case (INR 5.37)**	**10% Increase (INR 5.97)**
Post tax project IRR	8.93%	10.23%	11.57%

It can be seen that the IRR does not cross the benchmark even with a 10% increase in tariff. The IRR crosses the benchmark with a tariff of 6.52, assuming the tariff increases for the entire lifetime of the WEGs

Even though the project was envisaged to be commissioned before 31 March 2012, the commissioning got delayed because of procedural issues. The applicable tariff for the 2 WEGs of the project that were commissioned on 31 March 2012 is INR 5.37 and INR 5.67 for the remaining 15 WEGs as they will be commissioned in 2012-13. MERC's tariff order on 29th April 2011 fixed the tariff at INR 5.37 only WEGs that were commissioned in FY 2011-12 only. MECR tariff order dated 30 th March 2012 fixed the tariff as INR 5.67 for only WEGs that will be commissioned in 2012-13 only. Thus it can be seen that subsequent tariff orders only increase the tariff proactively for new installations and there is no retroactive benefits to older installations. Thus it is highly unlikely that any subsequent tariff order would increase the applicable tariff for

the WEGs of this project activity. Thus tariff rates of INR 5.37 and INR 5.67 can be assumed to remain the same for 13 years of the project activity.

Considering this, the tariff can only increase from 14th year. The benchmark is crossed at a tariff of INR 15.5 (applicable from 14th to 20th year), an increase of more than 180% over the base tariff of INR 5.37. This is a hypothetical scenario as the tariff rates of INR 5.37 and INR 5.67 are levelized tariff for the entire lifetime of the WEGs calculated by MERC and is thus expected to remain the same after the expiry of PPA at the end of 13 years. Thus, tariffs of INR 6.52 for the entire lifetime of the WEGs or INR 15.5 from 14th year are hypothetical scenarios.

Outcome of Step 2: The sensitivity analysis clearly shows even with a higher PLF, the project is not able to generate sufficient returns. It can therefore be concluded that the project is financially not viable without CDM benefits. Hence as per Step 2c para 11b, we proceed to Step 4 (Common practice analysis).

Step 3: Barrier analysis
Not Opted for.

Step 4: Common practice analysis

Step 1: Calculate applicable output range as +/-50% of the design output or capacity of the project activity.

The capacity of the project is 25.5 MW and thus the applicable range for the common practice analysis is 12.75 MW to 38.25 MW.

Step 2: In the applicable geographical area, identify all plants that deliver the same output or capacity, within the applicable output range calculated **in Step 1, as the project activity and have started commercial operation before the start date of the project[16]. Note their number Nall. Registered CDM project activities and projects activities undergoing validation shall not be included in this step;**

The lists of projects are as follows is obtained from the CEA database ver 7.0. The CEA database lists all power plants (hydro and thermal) in India. There are 355 projects.

There are no solar projects within the applicable range that were commissioned before the start date of the project.

Biomass projects

Andhra Pradesh

S. No	Name of project owner	Capacity
356	Clarion Power Corp.	12 MW

Chhattisgarh

[16] While identifying similar projects, project participants may also use publically available information, for example from government departments, industry associations, international associations, on the market penetration of different technologies, etc.

S. No	Name of project owner	Capacity
357	Godavari Power & Ispat Ltd.	20 MW
358	R.R.Energy Ltd.	15 MW

Haryana

There are no projects in Haryana within the applicable range

Karnataka

S. No	Name of project owner	Capacity
359	Nuziveedu Seeds Limited	20 MW
360	Prabhat Textiles Limited	15 MW
NA	R K Power Gen Private Limited	20 MW

R K Power Gen Private Limited's project is in registered CDM project17 and therefore excluded from the analysis.

Maharashtra

S. No	Name of project owner	Capacity
361	Ind-Barath Energies Ltd	20 MW

Punjab

No information on operational biomass power plants in the public domain

Rajasthan

S. No	Name of project owner	Capacity
362	Birla Corporation Ltd.	15 MW
363	Sambhav Energy Ltd.	20 MW

Tamil Nadu

S. No	Name of project owner	Capacity
364	Nandha Energy Ltd	18 MW
365	Aurobindo Energy P Ltd	15 MW
366	Auro Mira Bio Power India Pvt	15 MW

West Bengal

[17] http://cdm.unfccc.int/Projects/DB/DNV-CUK1160632473.69

The total installed capacity in the state is 16 MW and out of this capacity, 6 MW is installed by a single project proponent. Thus there are no projects in the applicable range in West Bengal.

Uttar Pradesh

Most of the projects are cogeneration and thus not comparable to the project activity

Wind Projects

Andhra Pradesh

S. No	Name of the project owner	Capacity
367	RCI Power Ltd	20 MW

Kerala

There are no projects within the applicable range

Gujarat

S. No	Name of project owner	Capacity	Comments
NA	Patnaik Minerals	35.2 MW	The project is currently in CDM pipeline: https://cdm.unfccc.int/Projects/DB/RWTUV1288029478.94/view
NA	MSPL Group	30 MW	This project is available in CDM pipeline: https://cdm.unfccc.int/Projects/DB/BVQI1286434210.07/view?cp=1
NA	Gujarat Gardain Limited	31.6 MW	The Project activity is considering carbon finance and has already received carbon benefits through the Voluntary VER route.
NA	SREI	24.8 MW	Installations under the PDD titled "Green House Gas Abatement through installation of a wind power project for export to the Grid." The PP name in the PDD is given as India Power Corporation Limited (IPCL), SREI is Finance providers, and have the major stakes of the projects.
NA	GACL	23.75 MW	The project is in the CDM pipeline: https://cdm.unfccc.int/Projects/Validation/DB/PLJVAOHCZK3WX6GN4QGVAH8C3MGAYP/view.html
NA	Aarvee Denims & Exports Ltd.	20.5 MW	The project is in the CDM pipeline: http://cdm.unfccc.int/UserManagement/FileStorage/87A0BK6E ZUR53VIFMHCQNDJO9PX4LG
NA	Ratnamani Metals & Tubes Ltd.	19 MW	A part of 19.0 MW has been included in the bundled project activity. - Ratnammani Metals & Tubes Ltd. Has 1.25 MW in the bundled project activity. Ratnamani Metals & Tubes Ltd. Has 2.5 MW in the bundled project activity. Post these bundled projects the second phase consisting

			of 13.25 MW has been as a separate CDM project activity. The above references totals to 17 MW of WEG installations by Ratnamani Metals & tubes Ltd. which are under CDM pipeline. The rest of the 2 MW is not on a comparable scale of investment to the project activity and may be under CDM pipeline or VER pipeline but is not traceable. Thus, it is excluded in the analysis.
NA	Indian Renewable Energy foundation	16.875 MW	The project is available at: http://cdm.unfccc.int/UserManagement/FileStorage/P6H2USF8 MRBYOJZCLKX4Q30TGA19ND
NA	Surajbari Wind farm Dev. Pvt. Ltd.	16.5 MW	The project is available at: http://cdm.unfccc.int/UserManagement/FileStorage/XV9ZK78N 40SLABET6UMFJPG3OW2YHQ
NA	IOCL	21 MW	The project is available at: http://cdm.unfccc.int/Projects/DB/DNV-CUK1304071464.49/view
NA	Ansal Properties & Infrastructure Limited	12 MW	The project is available at: http://cdm.unfccc.int/Projects/DB/SGS- UKL1240927655.64/view
NA	Gautam Freight Pvt. Ltd (GFPL)	12 MW	The project is available at: http://cdm.unfccc.int/Projects/DB/RWTUV1234362231.0/view
NA	Ratnamani Metals and Tubes Ltd	13.25 MW	The project is available at: http://cdm.unfccc.int/Projects/DB/RWTUV1222760737.24/view
NA	GNFC	12 MW	The project is available at: http://cdm.unfccc.int/Projects/Validation/DB/YUDD28JXBUG1 GTWJL469JQIE3OCG2K/view.html

Karnataka

S. No	Name of project owner	Capacity	Comments
NA	DLF Limited	25.6 MW	The project is available at: http://cdm.unfccc.int/Projects/DB/BVQI1239021527.94/view
NA	VSL Mining Co. Pvt Ltd.	17.5 MW	The project is available at: http://cdm.unfccc.int/filestorage/1/V/5/1V5DW5ZJNU9BGYUL 8N04SIF0NERRP4/PDD-V%20S%20Lad.pdf?t=cDN8bTZtZWp0fDA9ipTLhr93ty3xOo QHij5D
NA	Nuziveedu Seeds Ltd.	32.65 MW	The project is available at: http://cdm.unfccc.int/filestorage/7/M/K/7MKGRE0K2J0D6O1 WKHV6XTW67UCAD6/NSL%20PDD.pdf?t=TTN8bTZtZWxt fDB7QvbR8LRr9EGckBo8nrSE

NA	Enercon Wind farms Limited	29.4 MW	The project is available at: http://cdm.unfccc.int/Projects/DB/DNV-CUK1185356859.49/view
NA	Sanjay Ghodawat	15 MW	CDM project under the PDD titled: 18.86 MW Bundled Wind Power Project, India http://planetair.ca/modules/mastop_publish/files/files_47b06ef0 0939d.pdf 8 MW bundled wind power project designed by Ghodawat Industries India Private Limited http://www.carbonneutral.com/cnregistry/uploaded/GIIPL_PDD .pdf
NA	MMTC Limited	15 MW	CDM project under the PDD titled: 15 MW grid-connected wind power project by MMTC in Karnataka http://www.global-arming.de/files/new_mediagallery/HostedMMTC- 24July2007.pdf
NA	Minerals Enterprises	15 MW	CDM project under the PDD titled: 15 MW Grid Connected Wind Turbine Project in Karnataka http://cdm.unfccc.int/UserManagement/FileStorage/VSTO0ZBE HAHLDL0VIIG6TBZ8
NA	Godavat Pan masala	15 MW	CDM project under the PDD titled: Wind Power Generation in VaniVilasSagar http://www.climatepartner.ch/hintergrund/climate-protection- projects/vanivilassagar-indien/?L=1
NA	Enercon Windfarms Krishna Ltd	15 MW	CDM project under the PDD titled: Enercon Wind Farms in Karnataka Bundled Project- 73.6 MW http://cdm.unfccc.int/Projects/Validation/DB/SUS27DV38HTO VPIP0IFV3N670OCPZT/view.html
NA	Indo Wind Energy ltd	14.875 MW	The company website clearly states that the project is CDM project that is bein developed. http://www.indowind.com/images/ar9.pdf, http://myiris.com/shares/company/writeDet.php?icode=indenerg,http://www.moneycontrol.com/news_html_files/pdffiles/mar200 7/indowinden.pdf
NA	Acciona Wind Energy Pvt Ltd	29.7 MW	The project is available at: http://cdm.unfccc.int/Projects/DB/DNV-CUK1216117082.43/view
NA	Belgaum Wind Farms Pvt.Ltd.	24.8 MW	The project is available at: http://cdm.unfccc.int/Projects/Validation/DB/58DEVSA9VLAR MKY7W57UH8PVDQ82KR/view.html

S. No	**Name of the project**	**Capacity**	**Comments**
NA	Manganese Ore (India) Limited	15.2 MW	The project is available at: http://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1265262346.25/view

NA	Ruchi Soya Industries Limited	22.5 MW	The project is available at: http://cdm.unfccc.int/Projects/DB/RWTUV1285157251.43/view

Madhya Pradesh

Rajasthan

S. No	Name of project owner	Capacity	Comments
NA	Rajasthan Ren. Energy Corp. Ltd.	36.45	It is under 2 CDM PDDs 1) 10.2 MW Grid Connected Wind Farm project by RRECL in Jaisalmer, India. http://cdm.unfccc.int/UserManagement/FileStorage/62MTX5WDKKBC2WS06RBD0P10SK20TZ 2) 25 MW Grid Connected Wind Farm project by RRECL in Jaisalmer, India. http://cdm.unfccc.int/UserManagement/FileStorage/QPGDS3PM9B0B667ZEI1KIU6XYNE8MH
NA	DLF Home Developers	33.00	PDD titled "Wind Power based electricity generation project in India by DLF Home Developers Limited" http://cdm.unfccc.int/Projects/Validation/DB/34CAG54CUL49MILW9S0SKWCWU38SSX/view.html
NA	Enercon Wind Farms (Raj) Pvt. Ltd.	24.00	PDD titled "Bundled wind energy power projects (2003 policy) in Rajasthan" http://cdm.unfccc.int/Projects/DB/SGS-UKL1181738388.43/view
NA	Power Finance Corp.	24.00	PDD titled "Bundled Wind power project in Jaisalmer (Rajasthan in India) managed by Enercon (India) Ltd" * http://cdm.unfccc.int/UserManagement/FileStorage/QHZU5CN321RNIWYQQ8DGK5HHYO9BBC
NA	Hindustan Pertoleum Corporation Ltd.	21.25	PDD titled "Bundled grid-connected electricity generation using wind energy by Hindustan Petroleum Corporation Limited." http://cdm.unfccc.int/UserManagement/FileStorage/3VMQRC5EO6G7AB028WZUPDJ1SK9Y4X
NA	Modern Road Makers Pvt. Ltd.	20.00	PDD titled"MRMPLWind Power Project " http://cdm.unfccc.int/Projects/Validation/DB/AERX8YCUI2RBEAK41JC7IF8SN67G1P/view.html
NA	K S Oils Ltd.	15.50	It is under 2 CDM PDDs 1) 7.5 MW Wind Power project in Jodhpur,Rajasthan tp://cdm.unfccc.int/Projects/Validation/DB/RA6L3V9EWLLXCYTDYOJIEE1QYAKT31/view.html 2) 8 MW Wind power project by K.S Oils Limited http://cdm.unfccc.int/Projects/Validation/DB/9K96F1AVNBCPWHZA103MFZZAEFC345/view.html

Tamil Nadu

S. No	Name of project owner	Capacity	Comments
NA	KPR Mill Pvt. Ltd.	33.17	The project is available at: http://cdm.unfccc.int/Projects/Validation/DB/KBAXDG75UAPOH4J4P20YB2AIQKM36G/view.html

NA	Tamilnadu Newsprint & Paper Ltd	28	Expanding wind farm as proved by the news report. 6.75 MW under validation as proved by the uploaded PDD on UNFCCC websitehttp://www.thehindubusinessline.com/2005/08/24/stories/2005 082402740200.htm,http://cdm.unfccc.int/Projects/Validation/DB/QIJV59ENWGKVMRV8VFVC7SDNJTCHM6/view.html
NA	achine Works	27.95	The project is available at: http://cdm.unfccc.int/UserManagement/FileStorage/7LXZLFECVXR5YBOJ5TH8J6XNHIPOCN
NA	Shanmuga vel Group	25.5	One of the participant in the bundled registered project (UNFCCC ref no. 991) http://cdm.unfccc.int/UserManagement/FileStorage/AE2042RXII12SBXNF29XDKVT2BCEWG
NA	Best & Co.	25	One of the participant in the bundled registered project (UNFCCC ref no. 991) http://cdm.unfccc.int/UserManagement/FileStorage/AE2042RXII12SBXNF29XDKVT2BCEWG
NA	Grace Infrastructure (P) Ltd.	31	The project is available at: http://cdm.unfccc.int/Projects/Validation/DB/FFZD3FVFDVCBV7VFLEO18LOFADFR7Z/view.html
NA	Premier Fine Yarns Pvt. Ltd.	29.7	Under CDM- host country approval obtained http://cdmindia.nic.in/cdmindia/projects/PCN_141_06.pdf
NA	TCS Textiles Ltd.	20.750	One of the participant in the bundled registered project (UNFCCC ref no. 991): http://cdm.unfccc.int/UserManagement/FileStorage/AE2042RXII12SBXNF29XDKVT2BCEWG
NA	Loyal Textile Mills Ltd	22.250	The project is available at: http://cdm.unfccc.int/UserManagement/FileStorage/TPAONMX73CHPZ69AQ5CSP9BI1UKU99
NA	CPCL	17.6	The project is available at: http://cdm.unfccc.int/Projects/Validation/DB/178HZLVK21QHH5Y3SZI88Q1O865IMB/view.html
NA	Suzlon Infrastructure Limited	17.5	Registered project http://www.sgsqualitynetwork.com/tradeassurance/ccp/projects/512/PDD%2023.75MW%20grid%20connected%20electricity%20generation%20project%20at%20Tirunelveli%20in%20Tamil%20Nadu..pdf, http://cdm.unfccc.int/UserManagement/FileStorage/TW7B0AWSBQH8PMNM8WXFW5QE5I9546

368	Chettinad Cement Corp	17.35	Not in CDM pipeline
NA	Arvind A Traders	16.85	One of the participant in the bundled project http://cdm.unfccc.int/Projects/DB/DNV- CUK1174976416.26/view
NA	Dalmia Cements (B) Ltd	16.525	Not in CDM pipeline
NA	Premier Spg & Wvg Mills Pvt. Ltd	16.25	The project is available at: http://cdmindia.nic.in/cdmindia/projects/PCN_141_06.pdf
NA	Rasi Seeds (P) Ltd.	16.25	One of the participant in the bundled registered project (UNFCCC ref no. 991) http://cdm.unfccc.int/Projects/DB/TUEV- SUED1173364563.43/view
NA	Bannari Amman Spinning Mills Ltd.	16.2	The project is available at: http://www.dnv.com/focus/climate_change/upload/version%202%20-%20pdd%20%20sept%2005.pdf
NA	Jayajyoti & Co. Ltd	15.7	One of the participant in the bundled registered project (UNFCCC ref no. 991) http://cdm.unfccc.int/Projects/DB/TUEV- SUED1173364563.43/view
NA	Muthoot Fincorp Ltd.	15	The project is available at: http://www.dnv.com/focus/climate_change/Upload/Wind%20Based%20bundled%20renewable%20energy%20project%20Tamil%20Nadu%20India.pdf
NA	MRF Ltd	15.3	The PDD is for 14.4 MW Enercon turbines further to this MRF have 4 x 0.225 NEPC turbines also in TN This totals to 14.4 + 0.9 = 15.3 MW. The details of NEPC turbines is given in wind power directory http://www.sgsqualitynetwork.com/tradeassurance/ccp/projects/272/MRF%20PDD.pdf
NA	Sapthagiri Distilleries	21	The project is available at: http://cdm.unfccc.int/UserManagement/FileStorage/QN0BCHDRZ8PI17S2JEMLVW9TYFGO65
NA	Super Wind Project Pvt Ltd	33 MW	The project is available at: http://cdm.unfccc.int/Projects/DB/DNV- CUK1280379317.22/view
NA	Soundararaja Mills Ltd.	34.8 MW	The project is available in 4 PDDs: http://cdm.unfccc.int/Projects/Validation/DB/LO3RUNJBAVPC94GWP0N3IPQZM866Y0/view.html, http://cdm.unfccc.int/Projects/Validation/DB/1VD4I971NMFAB70C0LGFR01GV4RI4H/view.html, http://cdm.unfccc.int/UserManagement/FileStorage/6QDL0CJW95NYIX8U14H3STGKAF2BEV and http://cdm.unfccc.int/UserManagement/FileStorage/UMHY7TQXXEBNNYBUIC017UDWWZXTCT
NA	Ashok Leyland	29.17 MW	The project is available at: http://cdm.unfccc.int/Projects/Validation/DB/37X42BG16GG63VK5L84D6WZ0UM8YGG/view.html
NA	ITC Limited	14.1 MW	The project is available at: http://cdm.unfccc.int/Projects/DB/DNV- CUK1255509409.35/view

NA	SRF	13.95 MW	The project is available at: http://cdm.unfccc.int/Projects/DB/SGS- UKL1231860367.09/view

Maharashtra

Sl. No.	Name of project owner	Capacity	Comments
NA	Reliance Innoventures Pvt Ltd	37.5	The project is available at: http://cdm.unfccc.int/UserManagement/FileStorage/D59AFLHK1U23OTNZ74S0ECVJMPQXBG
NA	Gujarat Fluorochemicals Ltd.	23.1	The project is available at: http://cdm.unfccc.int/UserManagement/FileStorage/MBU2TOWWYPYBCDT8WOVH7YFBVQOS5D
NA	Shree Naman Developers Limited	29.25	The project is available at: http://cdm.unfccc.int/UserManagement/FileStorage/29V83ADQ4SI6E7YJC5KGFRO0HXBZML
NA	Roaring 40s	28	The project is available at: http://cdm.unfccc.int/UserManagement/FileStorage/JN4HZXCBP2DV9IFTQSW8G73L56EKAU, http://cdm.unfccc.int/UserManagement/FileStorage/C1UNHEPDTF6K5WJYQ3BL84ORGZISXV, http://www.dnv.com/focus/climate_change/Upload/Roaring%2040s%20%20Maharastra.pdf
NA	Shraddha Construn. & PowerGen. P.Ltd.	24.4	The project is available at: http://cdm.unfccc.int/Projects/Validation/DB/8A07E1ILQFSU987VE25G42BUJCJ90K/view.html, http://cdm.unfccc.int/UserManagement/FileStorage/KB4U21VQGNDI45MU0I2I7T5NZM03AJ
NA	REI Agro Limited	22.4	The project is available at: http://cdm.unfccc.int/Projects/Validation/DB/PRGIFS0LCB17KXBE0L9AU3XPJN147O/view.html, http://cdm.unfccc.int/Projects/Validation/DB/LFTIDSON660NHIT5389DOU44QT1ZI2/view.html, http://cdm.unfccc.int/Projects/Validation/DB/C1QZHJ7KFG7HWISQM8MHLAPJKYIKXP/view.html, http://cdm.unfccc.int/Projects/Validation/DB/NEY6LY0N53NMIHHCTEZ3QHNHVV4RWV/view.html, http://sebiedifar.nic.in/documents/REIAGROLTD/ar062008.pdf
369	Tata Finance Ltd	21.95	Not in CDM, commissioned before March 2003
NA	MSPL Limited	20	The project is available at: http://www.mspllimited.com/wind%20power.htm, http://cdm.unfccc.int/Projects/DB/DNV-CUK1142448670.58/view, http://cdm.unfccc.int/UserManagement/FileStorage/Q7FCFG27XNUZ6IB32EM7CTVC7KZG6R, http://cdm.unfccc.int/UserManagement/FileStorage/VN5EVS2SR0VKYCGEKG73TTWGL0QCXP, http://www.sgsqualitynetwork.com/tradeassurance/ccp/projects/434/Revised%20Final%20CDM_4_Kar_PDD.pdf

370	GI Windfarms Ltd	21	Not in CDM, commissioned before March 2003
371	Nishkalp Investment & Trading	20.95	Not in CDM, commissioned before March 2003
372	Bharat Forge Ltd	15.93	Not in CDM, commissioned before March 2003
373	Dhariwal Industries Ltd	15.4	Not in CDM, commissioned before March 2003
NA	Enercon Windfarms Sai Limited	20	The project is available at: http://cdm.unfccc.int/filestorage/Z/B/G/ZBGUK2PA8QDE3FM5WTY19S046CXHJO/PDD%203854.pdf?t=UEZ8bHh6OG9tfDBQ0tvzn0RwAMBL5jP5vuao
NA	Jindal Steel and Power Ltd.	24	The project is available at: http://cdm.unfccc.int/filestorage/M/L/S/MLS5EOQV2YUGJCR9DWXB0A3HP6FN4K/14072010_PDD_JSPL_WindPower_Satara.pdf?t=Nml8bHh6OWRzfDAhpS2RR1pR6VUQ0uqrbTl7
NA	Aryan Coal Beneficiation PVt. Ltd	15	The project is available at: http://cdm.unfccc.int/Projects/Validation/DB/SB3OIAHMLZK0Z0KZ1J4ZLHHC8O8541/view.html
NA	Bharti Shipyards Limited	15	The project is available at: http://cdm.unfccc.int/Projects/Validation/DB/OSY88IBYCEI708IP81TGN0YJ1RC3P3/view.html
NA	Patnaik Minerals Private Limited	15	The project is available at: http://cdm.unfccc.int/Projects/DB/RWTUV1288029478.94/view
NA	Shah Promoters and Developers	14	The project is available at: http://cdm.unfccc.int/Projects/DB/RWTUV1229007791.61/view
NA	Savita Chemicals Limited	13.95 MW	The project is a part of the bundled project available at: http://cdm.unfccc.int/filestorage/O/Q/C/OQCXWA3IB0M5RH4LJVD1GF27UT6ES8/SAVITA%20Final_2009_validation.pdf?t=ZEN8bTZtdHQ1fDCTkGdz9udJajNT82k4OEgN

Thus, N_{all} = 373 with the following breakup:

$N_{thermal}$ = 100

N_{hydro} = 255

$N_{biomass}$ = 11

N_{wind} = 7

N_{solar} = 0

Step 3: Within plants identified in Step 2, identify those that apply technologies different that the technology applied in the project activity. Note their number N_{diff}.

Difference in energy source/fuel- 366 (power plants excluding wind) power plants identified above use energy source (hydro uses kinetic energy of water, gas and coal based power plants use fossil fuels and biomass power plants use biomass) than that employed in the project activity (kinetic energy of wind energy)

Different technologies have been identified as per para 9 of the additionality tool. Difference in investment climate:

1. Legal regulations: In India, different states follow different policy regimes for power projects in case of wind turbines. The regulations in India for renewable energy projects (including wind hydro, biomass and solar)electricity generation are handled by the respective regulatory commissions that have the responsibility to determine the tariff for the projects that supply electricity to the grid by means of long term PPA executed between the distribution licensee and the project owner. Therefore each state will have the different regulation with respect to procurement and supply of power from renewable energy sources. Hence, the state of Andhra Pradesh, Gujarat, Karnataka, Madhya Pradesh, Rajasthan and Tamil Nadu has been eliminated from the analysis.

2. Promotional policies:
   Till the year 2002-03, wind power developers in Maharashtra enjoyed sales tax benefits of Rs. 10 million per MW per year for a period of 5 years from the date of commissioning (Source: Maharashtra wind power policy 1998), making investment in wind attractive on a standalone basis. The sales tax benefits were withdrawn for projects commissioned after March-2003. Therefore wind capacity additions before March 2003 have been eliminated.

Thus 5 (369-373) wind projects in Maharashtra have been eliminated

Step 4: Calculate factor F=1-Ndiff/Nall representing the share of plants using technology similar to the technology used in the project activity in all plants that deliver the same output or capacity as the project activity.

F= 1 – 373/373 = 0

Thus the project is not a common practice as F = 0 and Nall – Ndiff = 0

The above discussions show that wind power development is not a common practice in the state of Maharashtra and the project activity is not financially attractive; hence the project activity is additional.

Prior consideration of CDM
The start date for the project activity is after 2nd August 2008 and hence as per EB 49, Annex 22 “Guidelines on the demonstration and assessment of prior consideration of the CDM”, TVS Energy has intimated the UNFCCC[18] as well as the host country DNA of their intention of setting up the 25.5 MW wind power project as a CDM project. The letter to the UNFCCC as well as the Indian DNA were sent within six months of the project start date and hence the as per the EB guidance it can be concluded that CDM was seriously considered during decision to invest in the project. Please refer to Annex 6 for the Prior Consideration Notification to UNFCCC. The detailed chronology of events is provided below:

[18] http://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html

Activity	Date
Board Meeting for Approval for awarding contract for setting up wind project	06/06/2011
Date of first Purchase Order (project start date)	19/08/2011
Award of contract to CDM consultant	20/12/2011
Intimation to UNFCCC for prior consideration of CDM	29/12/2011
Intimation to NCDMA for prior consideration of CDM	29/12/2011
Stakeholder Consultation	14/02/2012

The table clearly highlights that CDM was seriously considered during the decision to undertake investment in the wind project.

B.6. Estimation of emission reductions

B.6.1. Explanation of methodological choices

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According to the approved methodology ACM0002 (Version 12.3.0) Emission Reductions are calculated as: -

$$ER_y = BE_y – PE_y – L_y$$

Where:
BE_y Baseline Emissions in year y (tCO_2e)
PE_y Project Emissions in year y (tCO_2e)
L_y Leakage Emissions in year y (t CO2e)

Estimation of Baseline Emissions:

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows

$$BE_y = EG_{PJ,y} * EF_{grid,CM,y}$$

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 CDM project activity in year y (MWh)

$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the “Tool to calculate the emission factor for an electricity system” version 2.2.1 (tCO_2/MWh)

Since the project activity is the installation of a new grid connected renewable power plant the $EG_{PJ,y}$ is calculated as :

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

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

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

The project activity is in the state of Maharashtra which falls under Unified Indian grid, baseline emission factor is calculated as combined margin, consisting of a combination of operating margin and build margin factors according to the procedures prescribed in the tool for calculating the emission factor for an electricity system. The steps of calculation are as follows:

Step 1: Identify the relevant electricity systems

Historically, the Indian power system was divided into five independent regional grids, namely Northern, Eastern, Western, Southern, and North-Eastern. Each grid covered several states. Since August 2006, however, all regional grids except the Southern Grid have been integrated and are operating in synchronous mode, i.e., at same frequency. Consequently, the Northern, Eastern, Western and North- Eastern grids will be treated as a single grid and is being named as Unified Indian grid from FY 2007-08 onwards as depicted in the CO_2 Baseline Database. The Southern grid has also been planned to be synchronously operated with rest of all Indian Grid by early 12th Plan (2012-2017).

Unified Indian Grid				**Southern 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 and Nagar Haveli	Meghalaya	Tamil Nadu
Jammu & Kashmir	Sikkim	Madhya Pradesh	Mizoram	Pondicherry
Punjab	Andaman-Nicobar	Maharashtra	Nagaland	Lakshadweep
Rajasthan		Goa	Tripura	
Uttar Pradesh				
Uttarakhand				

As the Project is connected to the Unified Indian electricity grid, the Unified Indian grid is the "project electricity system"

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)
Project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

Option I: Only grid power plants are included in the calculation.

Option II: Both grid power plants and off-grid power plants are included in the calculation.

Option I is chosen for calculation of OM & BM emission factor

Step 3: Select a method to determine the operating margin (OM)
According to the tool the calculation of the operating margin emission factor is based on one of the following methods:
(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch data analysis OM, or
(d) Average OM.

Any of the four methods can be used, however, the simple OM method (option a) can only be used if low cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.
The share of Low Cost / Must-Run (% of Net Generation) in the generation profile of the different grids in India in the last three years is as follows:

	2007-08	**2008-09**	**2009-10**	**2010-11**
Unified Indian Grid	19.0%	17.4%	15.9%	17.6%
Southern Grid	27.1%	22.8%	20.6%	21.0%

Source: CO_2 Baseline Database Version 7 for the Indian Power Sector – Central Electricity Authority
As per tool to calculate emission factor for an electricity system, The simple OM method (option a) can only be used if low-cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production. Since the low cost/must run resources constitute less than 50% of total grid generation as seen from the average of five most recent years, the Simple OM method can be used to calculate the Operating Margin Emission factor. The project proponents choose an ex-ante option for calculation of the Simple OM with a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period.

STEP 4: Calculate the operating margin emission factor according to the selected method:
The simple OM emission factor is calculated as the generation-weighted average CO 2 emissions per unit net electricity generation (t CO2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units. The simple OM may be calculated:

Option A: Based on the net electricity generation and a CO2 emission factor of each power unit; or

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

The Central Electricity Authority (CEA), Ministry of Power, Government of India has published a of Carbon Dioxide Emission from the power sector in India based on detailed authenticated information obtained from all operating power stations in the country. This database i.e. The

CO_2 Baseline Database provides information about the Combined Margin Emission Factors of all the regional electricity grids in India. The Combined Margin in the CEA database is calculated ex ante using the guidelines provided by the UNFCCC in the "Tool to calculate the emission factor for an electricity system". We have, therefore, used the Combined Margin data published in the CEA database Version 7, for calculating the Baseline Emission Factor.

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

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

Where:

$EF_{grid,\ OMsimple,y}$ = Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)

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

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

M = All power units serving the grid in year y except low-cost / must-run power units

y =The relevant year as per the data vintage chosen in STEP 3

The CO_2 emission factor ($EF_{EL,m,y}$) data for simple OM, available under the CEA database (Version 7.0) for the last three years is as follows.

CO_2 emission factor for simple OM (tCO_2/MWh) (incl. Imports)			
Grid	2008-09	2009-10	2010-11
Unified Indian grid	1.0065	0.9777	0.9706

The net electricity generation ($EG_{m,y}$) data, available under the CEA database (Version 7.0), of all generating power plants (not including low-cost / must-run power plants / units) for the last three year is as follows:

Net Electricity Generation for Simple OM (MWh) (incl. Imports)			
Grid	2008-09	2009-10	2010-11
Unified Indian grid	421,803	458,043	476,987

Thus, as can be seen from the above tables, the 3 years generation-weighted OM average for the most recent three years available at the time of PDD for validation, i.e. 2008-09, 2009-10 and 2010-11 for Unified Indian grid is:

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

(421,803,000*1.0065+ 458,043,000*.9777 + 476,987,000*0.9706)/

= (421,803,000 + 458,043,000 + 476,987,000)

= 0.9842 tCO_2/MWh

The ex-ante OM value obtained is 0.9842 tCO_2/MWh

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

Option 1 has been chosen for the project activity i.e. for the first crediting period the BM emission factor would be calculated based on the recent information available on units already built for sample group m at the time of CDM-PDD 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.

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

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

Where:

$EF_{grid,BM,y}$ = The build margin CO_2 emission factor in year 'y' (tCO_2/MWh)

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

$EF_{EL,m,y}$ = The CO_2 emission factor of power unit 'm' in year 'y' (tCO_2/MWh) m is power units included in the build margin

y= The most recent historical year for which power generation data is available

The CO_2 emission factor of each power unit m ($EF_{EL,m,y}$) is determined as per the procedures given in step 3 (a) for the simple OM, using options B1 using for 'y' the most recent historical year for which power generation data is available, and using for 'm' the power units included in the build margin.

The build margin emission factor ($EF_{grid,BM, y}$) for the year 2010-11 (most recent year) is 0.8587 tCO_2/MWh.

STEP 6: Calculate the combined margin emissions factor

The emission factor EF_y of the grid is represented as a combination of the Operating Margin (OM) and the Build Margin (BM). Considering the emission factors for these two margins as $EF_{grid\ OM,y}$ and $EF_{grid\ BM,y}$, then the EF_y is given by:

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

Where:

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

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

W_{OM} = Weighting of operating margin emissions factor

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

The "Tool to calculate the emission factor for an electricity system" version 2.2.1 requires that for intermittent sources for power generation like wind as in the case of CDM project activity the following weights to be used for calculating the emission factor for Combined Margin.

$W_{OM} = 0.75$

$W_{BM} = 0.25$

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

$EF_{grid, CM, y}$

$= 0.9842 * 0.75 + 0.8587 * 0.25\ tCO_2/MWh$

$= 0.9528\ tCO2/MWh$

Details of Baseline data:

Data of operating for the three financial years from 2008-09, 2009-10 and 2010-11 has been obtained from -

The CO_2 Baseline Database for the Indian Power Sector Ministry of Power: Central Electricity Authority (CEA) Version 7

Key baseline information is reproduced in Annex 3. The detailed excel sheet is available at: https://cea.nic.in/renewable-project-monitoring/?lang=en#

Estimation of Project Emissions

As per ACM0002 Version 12.3.0, for most renewable power generation project activities,

$PE_y = 0$.

The project activity is a wind power project does not involve fossil fuel consumption or operation of geothermal power plants or hydro power plants. Therefore, there will be no project emissions in the project activity ($PE_y = 0$).

Estimation of Leakage Emissions

As per ACM0002 Version 12.3.0, no leakage has been considered for the calculation of emission factor ($LE_y = 0$).

The details on OM, BM and CM estimates as provided by the CEA are shown in Annex-4.

B.6.2. Data and parameters fixed ex ante

The Central Electricity Authority, Ministry of Power, Government of India has published a database of Carbon Dioxide Emission from the power sector in India based on detailed authenticated information obtained from all operating power stations in the country. This database i.e. The CO_2 Baseline Database provides information about the Combined Margin Emission Factors of all the regional electricity grids in India. The Combined Margin in the CEA database is calculated ex ante using the guidelines provided by the UNFCCC in the "Tool to calculate the emission factor for an electricity system", version 2.2.1. This data, being a published source, is available at validation.

Data/Parameter	**$EF_{grid,OMsimple,y}$**
Data unit	tCO_2e/MWh
Description	Operating Margin Emission Factor of Unified Indian Electricity Grid
Source of data	"CO_2 Baseline Database for Indian Power Sector , version 7 published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO_2 Baseline Database for Indian Power Sector" is available at www.cea.nic.in
Value(s) applied	0.9842
Choice of data or measurement methods and procedures	Operating Margin Emission Factor has been calculated by the Central Electricity Authority using the simple OM approach in accordance with ACM0002.
Purpose of data	To calculate the baseline emissions.
Additional comment	Detailed information available at https://www.cea.in

Data/Parameter	**$EF_{grid,BM,y}$**
Data unit	tCO_2e/MWh
Description	Build Margin Emission Factor of Unified Indian Electricity Grid
Source of data	"CO_2 Baseline Database for Indian Power Sector, version 7 published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO_2 Baseline Database for Indian Power Sector" is available at www.cea.nic.in
Value(s) applied	0.8587
Choice of data or measurement methods and procedures	Build Margin Emission Factor has been calculated by the Central Electricity Authority in accordance with ACM0002.
Purpose of data	To calculate the baseline emissions.
Additional comment	Detailed information available at https://www.cea.in

Data/Parameter	$EF_{grid, CM, y}$
Data unit	tCO_2e/MWh
Description	Combined Margin Emission Factor of Unified Indian Electricity Grid
Source of data	"Combined Margin Emission Factor ($EF_{CM,y}$) is calculated as the weighted average of Operating Margin Emission Factor ($EF_{OM,y}$) and Build Margin Emission Factor ($EF_{BM,y}$). The "CO2 Baseline Database for Indian Power Sector" published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO2 Baseline Database for Indian Power Sector" is available at https://cea.nic.in/?lang=en
Value(s) applied	"CO2 Baseline Database for Indian Power Sector", version 7 published by the Central Electricity Authority, Ministry of Power, Government of India. Combined Margin Emission Factor (EFy or EFCM,y) is 0.9528 Refer Annex – 3 for comprehensive calculation of Combined Margin Emission Factor.
Choice of data or measurement methods and procedures	Combined Margin Emission Fac tor has been calculated by the Central Electricity Authority in accordance with CDM methodologies: ACM0002, and Tool to Calculate the emission Factor for an Electricity System.
Purpose of data	To calculate the baseline emissions.
Additional comment	- Detailed information available at https://cea.nic.in/?lang=en

B.6.3. Ex ante calculation of emission reductions

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Ex-ante calculation of emission reductions is equal to ex-ante calculation of baseline emissions as project emissions and leakage are nil.

Baseline emission factor (Combined Margin)

= 0.9528 tCO_2e/MWh

Annual electricity supplied to the grid by the Project

= 25.5 MW (Capacity) x 22.83% (PLF) x 8,760 (hours) MWh
= 50,997 MWh

Annual Baseline Emissions Reduction:

= 0.9528 tCO_2e/MWh x 50,997 MWh
= 48,590 tCO_2

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

Year	Baseline emissions (t CO_2 e)	Project emissions (t CO_2 e)	Leakage (tCO_2e)	Emission reductions (tCO_2e)
20/12/2012-31/03/2013	13,579	0	0	13,579
01/04/2013-31/03/2014	48,590	0	0	48,590

01/04/2014-31/03/2015	48,590	0	0	48,590
01/04/2015-31/03/2016	48,590	0	0	48,590
01/04/2016-31/03/2017	48,590	0	0	48,590
01/04/2017-31/03/2018	48,590	0	0	48,590
01/04/2018-31/03/2019	48,590	0	0	48,590
01/04/2019-19/12/2019	35,011	0	0	35.011
Total	340,130	0	0	340,130
Total number of crediting years	7			
Annual average over the crediting period	48,590	0	0	48,590

1st year begins from the date of registration, and each year extends for 12 months.

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data/Parameter	**$EG_{Facility, y}$**
Data unit	MWh (Mega-watt hour)
Description	Net electricity supplied to the grid by the Project in the year y
Source of data	Monthly credit notes issued by state utility for net electricity generation by WEGs of the Project
Value(s) applied	For the purpose of validation, estimated quantity of electricity calculated ex-ante would be used. Actual values will be monitored during annual monitoring and verification. Estimated annual electricity supplied to the grid by the project = 25.5 MW (Capacity) x 22.83% (PLF) x 8,760 (hours) MWh = 50,997 MWh

Measurement methods and procedures	1. Each project activity WEG has a controller meter which continuously records the electricity generated and records in hourly. 2. The project activity WEGs are connected to 33 kV feeders for transmitting the electricity generated by WEGs to pooling sub-station; the 17 WEGs of PP are connected to 3 feeders; 2 WEGs on one feeder, 3 WEGs on another feeder and 12 WEGs on another feeder. 3. A main and check meter is installed at the pooling sub-station end of each feeder. These meters are of 0.2 accuracy class and owned by the state utility. These meters are bidirectional meters that measure and record electricity export and import continuously. 4. Readings from the main meter of each feeder is taken on a monthly basis by representatives of state utility, RPPL and PP on a designated day to determine the net electricity generated (export minus import) $EG_{Facility, y}$ Net electricity generation determined by export and import values from monthly JMRs
Monitoring frequency	Monthly
QA/QC procedures	Invoices raised by PP on the state utility could be used to verify the electricity generation units as shown in the credit note.
Purpose of data	To calculate the emission reductions
Additional comment	Archiving policy: State utility credit notes will be archived for a period of crediting period + 2 years in paper form. The data therein will be stored electronically.

B.7.2. Sampling plan

Not Applicable

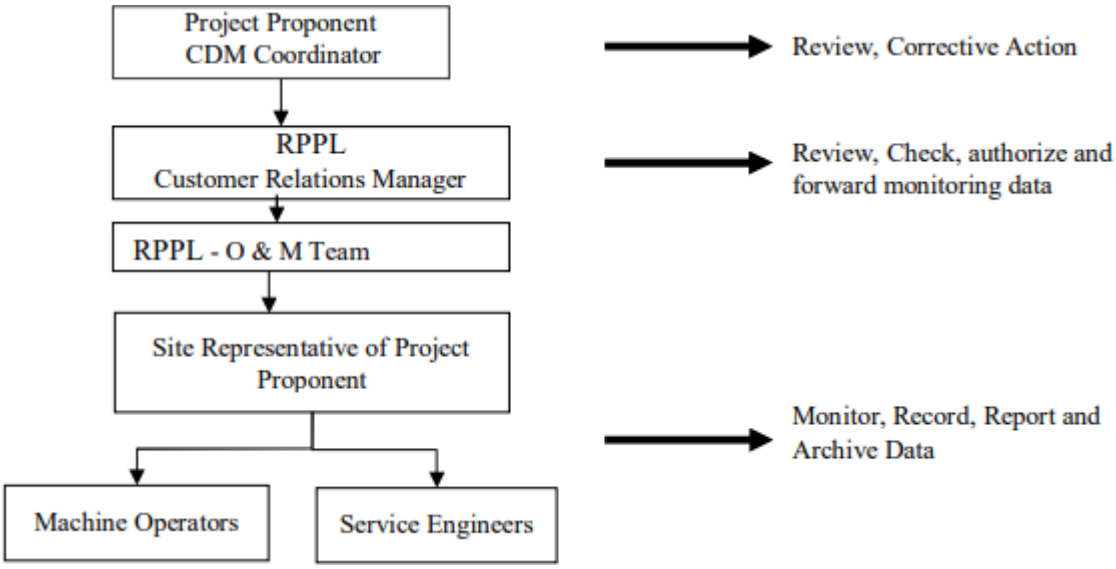
B.7.3. Other elements of monitoring plan

Wind based electricity generation is not associated with any kind of leakages. Hence, the sole parameter for monitoring is the net electricity supplied to the grid. The Project is operated and managed by RPPL. They follow the documentation practices to ensure the reliability and availability of the data for all the activities as required from the identification of the site, wind resource assessment, logistics, finance, construction, commissioning and operation of the wind power project. The output from the WEGs is connected to the transformer (33 kV / 690 V) at yard. The output from the yard transformer is connected to a 33 kV feeder, which feeds the electricity to the pooling sub-station, which is a part of the Unified Indian grid of India. From there it goes to the utility. Throughout the CDM crediting period and beyond, the electricity generated from the project will be monitored.

The project promoter has hired the services of RPPL for the Operation and Maintenance of the wind farm under a contract.

Roles and responsibilities

The operational and management structure implemented by project proponent and RPPL is as follows: The meters located at the grid sub-station are sealed and maintained by the state electricity utility. The meters are calibrated annually for accuracy.



Monitoring will be done as:

Meter reading:

There is group metering arrangement at the pooling substation. Meter reading of both main and check meter of each feeder i are undertaken jointly by representatives of the state utility and RPPL on an appointed day of every month for the preceding month. At the conclusion of each meter reading, the meter readings are jointly certified by the representatives of state utility and RPPL

Such meter readings shall be treated as the accurate and final measurement of the electricity supplied to the state utility by power producers connected to feeder i for preceding month. Reading from the check meter reading is taken by the representatives of state utility and the PP in case the main meter is faulty. The main meter reading recorded indicates total net electricity exported by all the WEGs connected to the feeder.

Along with the monthly main meter reading of the feeder, the PP's representative, RPPL also provides the electricity generated by each WEG connected to feeder and based on the monthly WEG controller meter reading of each WEG connected to the feeder to the state utility. Based on the monthly main meter reading of at the substation and the monthly WEG controller meter reading of all WEGs connected to provides by RPPL, the state electricity utility prepares and submits the credit notes for electricity generated by each group of WEGs belonging to the individual investor.

Based on this credit note authorized by the state electricity utility, the PP raises an invoice on the state utility for the energy exported. Payments are made by the state utility to the PP through either the cheque or online transfer.

Meter Test Checking

The main and check meter is calibrated for accuracy annually with reference to a portable standard meter which is of an accuracy class of 0.2%. The portable standard meter is owned by the state utility and tested and certified by an accepted laboratory in accordance with electricity standards. The meters are deemed to be working satisfactorily if the errors are within specifications i.e. +0

.2%. The consumption registered by the meter holds well for the purpose of billing as long as the error in the main meter is within the permissible limits.

The calibration frequency for the meters is annual.

Data Collection and Archiving

1. The monthly credit notes will be collected from the state utility by representative of RPPL and maintained at the site office by a representative of RPPL.
2. Further, for the purpose of Emission reduction calculations, the PP at its head office will maintain copies of the monthly credit report and will record the monthly electricity generation in an excel sheet. The data will be available at both site level and in the project, proponent's head office at Chennai.
3. The monthly credit report will be archived and the data kept electronically for a minimum of two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.
4. Multiplication by EKVAH% - in some cases of readings of monthly Export and import value can be calculate by multiplying the Ikwh and Ekwh with EKVAH % in the monthly JMR.

Procedures for handling data uncertainty:

a) In case main meter is faulty- check meter shall be used to calculate the electricity exported to the grid by the feeder. Main meter is immediately rectified or replaced by a new meter and meter reading from the rectified/replaced meter shall be used thereafter.
b) In case the check meter is faulty- The check meter is immediately replaced. The emission reduction calculation would not be affected as reading from main meter is used to calculate the net electricity exported to the grid.
c) In case error is identified during annual calibration- If during the annual calibration, the meter is found to be beyond the permissible limits of error, the meter shall be immediately rectified or replaced, if necessary. The error that is identified in the annual calibration would be applied to all the readings of electricity exported as indicated in the credit note from the date of previous. Billing for the period thereafter shall be as per the calibrated meter.

Action plan for monitoring of 2% CER revenue contributed towards sustainable development

TVS Energy Limited is committed to contribute a minimum of 2% of the CER revenue accrued every year for sustainable development activities for the local population. The table below provides an estimation of the revenue that would be committed every year for sustainable development activities.

Year	Estimation of total emission reduction (tCO_2e)	Estimated CER Price(Euro)	Exchange rate (Euro o INR)	Estimation of CER Revenue generated by the project (INR)	Estimation of minimum revenue commitment for sustainable development(INR)**
1	48,590	5	65	15,791,750	315,835
2	48,590	5	65	15,791,750	315,835
3	48,590	5	65	15,791,750	315,835
4	48,590	5	65	15,791,750	315,835
5	48,590	5	65	15,791,750	315,835
6	48,590	5	65	15,791,750	315,835
7	48,590	5	65	15,791,750	315,835

** The revenue committed will vary every year as per the actual CERs generated, the CER price that is actually transacted and the prevailing exchange rate at the time of transaction.

TVS Energy will undertake an annual review process of the actual CERs accrued and the price transacted. On the basis of the actual price and exchange rate, TVS Energy will commit 2% of the revenue for sustainable development activities in the local areas.

As part of the annual review, TVS Energy will undertake informal discussions with the locals at the project site and commit the revenue towards society / community developmental activities in areas that are of most concern to the local population. These areas could include health, Education, sanitation, skill development, infrastructure development, etc. The annual review process will detail the exact activities that would be undertaken using the 2% revenue and the detailed mode of implementation of the activity.

Apportioning procedure:

Apportioning Procedures in case the dates of monitoring period do not match with billing cycle dates:
The dates of the monitoring period for the project activity may not coincide with the dates of the generation statement issued by state electricity utility. For instance the monitoring period may start on the 20th of the month whereas the generation statement may report the net electricity generation data from the first of the month to the first of the next month. In such a scenario, the net electricity supplied to the grid data would have to be apportioned.

For carrying out the apportioning procedures, WEG controller data (data recorded by the WEG controller software) would be utilized. The electricity generation from WEG controllers is recorded on a daily basis in the Power Generation Reports maintained by the O&M contractors. The data from Power Generation Reports would be referred for determination of the apportioning ratio.

The following steps will be applied to carry out the apportioning:

(i) Apportioning Ratio = (Generation at WEG controller for apportioning period) / (Generation at WEG controller for period covered under generation statement)

(ii) Apportioned Electricity Export = Apportioning Ratio x Electricity Export as per Generation statement

(iii) Apportioned Electricity Import = Apportioning Ratio x Electricity Import as per Generation statement

(iv) Apportioned Net Electricity exported = Apportioned Electricity Export – Apportioned Electricity Import

Following electricity generation apportioning procedure will be followed, if the crediting period date of the project activity falls in-between the billing cycle of state electricity utility.
The option presented below will be adopted for arriving at the partial day's electricity generation of the month.

Based on average generation per day calculated from state electricity utility generation report for the month: Apportioned days of operation of month: A
Total days of operation of month: B
Generation as per state electricity utility generation report per month: C
Electricity generation for apportioned days as per state electricity utility Generation statement used for emission reduction calculations (MWh): (A/B) *C

SECTION C. Start date, crediting period type and duration

C.1. Start date of project activity

19/08/2011, being the date of acceptance EPC contractor's offer for the wind power project

C.2. Expected operational lifetime of project activity

20 years and 0 months

C.3. Crediting period of project activity

C.3.1. Type of crediting period

The project activity will use a renewable crediting period of 21 year (7 *3)
Type of crediting period – Renewable

First crediting period -20/12/2012 to 19/12/2019

Second crediting period -20/12/2019 to 19/12/2026

Crediting period renewal date -23/02/2021

C.3.2. Start date of crediting period

20/12/2012 is the start date of crediting period.

C.3.3. Duration of crediting period

7 years and 00 months

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

As per the Schedule 1 of Ministry of Environment and Forests (Government of India) notification dated January 27, 1994 and EIA Notification (S.O 1533) dated 14th September 2006 a list of activities that require undertaking environmental impact assessment studies has been provided. EIA is not a regulatory requirement in India for wind energy projects and PP does not expect any adverse impacts of the CDM project activity on the environment.

D.2. Environmental impact assessment

There are no significant environmental impacts from the CDM project activity. Furthermore, there are no trans-boundary impacts of the CDM project activity.

SECTION E. Local stakeholder consultation

E.1. Modalities for local stakeholder consultation

A local stakeholder meeting was conducted at RPPL's Office at Mayani, Maharashtra on 14th February 2012, to invite comments from local stakeholders and to understand their concerns with regard to the project activity. The local stakeholders, through the advertisements in Lokmat and Tarun Bharat newspapers, were notified 15 days in advance (notice period) to the actual date of the local stakeholder consultation meeting.

The stakeholders included the members of the local village Panchayats and, resident villagers of the area, RPPL representatives as well as Project Proponent (TVS Energy Limited) representatives.

E.2. Summary of comments received

S.No.	Query	Query Raised By	Response	Response given by
1	Will the project help in improving electricity supply to the villagers or the neighboring areas?	Mr. Brahmadev Tukaram Pukle, Pukalwadi village	The power generated from the wind farm will be fed to the state electricity grid. It is expected that the supply position in the village will be Strengthened.	Mr Suresh Shinde, RPPL
2	Will the Project provide employment opportunities or helped in economic development of the area?	Mr. Ranjit Jagtap, Hiwarwadi village	The social and economic development of the nearby villages will take place as a result of employment	Mr. R Ragavan, TVS Energy

			opportunities created by the project activity during the construction phase and the operation phase	
3	Will there be any problem for animal grazing or any other activity being carried out at the project site?	Mr. Sashi Kanth Monee, Hiwarwadi	The project activity will pose no obstruction to the animal grazing in and around the local premised of the project activity	Col. Brid, RPPL
4	Will there be any harm to the local infrastructure because of the project activity?	Mr.Ranjit Jagtap, Hiwarwadi village	There will be no harm to any local infrastructure because of the project activity. As a matter of fact, local infrastructure, such as roads will be improved.	Mr Suresh Shinde, RPPL

E.3. Consideration of comments received

There was no negative comment received from the villagers

SECTION F. Approval and authorization

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The approval letter from the host country[19] DNA is available for project activity and having reference no. 4/12/2012-CC dated 30/12/2020.

https://cdm.unfccc.int/filestorage/V/C/N/VCNTZDQEBAF8M64KLJGRU0P53S79H2/8551_LoA_India_merged2021.pdf?t=UW58cmlsbmhufDB0ZA8EnAfcce2CNszNZ2m5

[19] https://cdm.unfccc.int/filestorage/V/C/N/VCNTZDQEBAF8M64KLJGRU0P53S79H2/8551_LoA_India_merged2021.pdf?t=UW58cmlsbmhufDB0ZA8EnAfcce2CNszNZ2m5

Appendix 1. Contact information of project participants

Organization name	Green Infra BTV Limited
Country	India
Address	Chennai, Tamil Nadu
Telephone	+91-44-26258212
Fax	+91-44-26257177
E-mail	rragavan@scl.co.in
Website	NA
Contact person	Mr. R. Ragavan

Appendix 2. Affirmation regarding public funding

The project activity does not involve any public funding

Appendix 3. Applicability of methodologies and standardized baselines

Please refer section B.2

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

CENTRAL ELECTRICITY AUTHORITY: CO_2 BASELINE DATABASE			
VERSION	07	http://www.cea.nic.in/tpeandce.html	
DATE	January, 12		
Tool Applied	"Tool to Calculate the Emission Factor for an Electricity System", Version 7.0		

Net Generation in Operating Margin (GWH) (incl. Imports)			
	2008-09	**2009-10**	**2010-11**
Unified Indian grid	421,802	458,043	476,987

Simple Operating Margin (tCO2/MWh) (incl. Imports)			
	2008-09	**2009-10**	**2010-11**
Unified Indian grid	1.0066	0.9777	0.9706

Build Margin (tCO2/MWh) (not adjusted for imports)	**2010-11**
Unified Indian grid	0.8587

Weighted Generation Operating Margin	
Unified Indian grid	0.9842

Combined Margin Emission Factor	
Indian Grid	0.9528

Detailed information on calculation of Operating Margin Emission Factor and Build Margin Emission Factor is available at www.cea.nic.in

Appendix 5. Further background information on monitoring plan

Please refer to Section B.7.3.

Appendix 6. Summary report of comments received from local stakeholders

Refer section E of the PDD

Appendix 7. Summary of post-registration changes

The following Post Registration Changes have been made:

PRC Category: Corrections –

For the post registration changes for this project activity new and latest version of PDD template has been used. The following changes have been made due to latest version of PDD template which is version 12.0.

1. The cover page, is revised for completion of additional fields namely Project participant(s), Host Party, Sectoral scope and selected methodology(ies), mandatory and conditional sectoral scope and Estimated amount of annual average GHG emission reductions in line with the new PDD template.
2. Section A.6 is revised to include history of the project activity as per the requirements of the new template.
3. Section A.7 is revised as per the latest PDD template: The capacity of the project activity being 25.5 MW which is more than 15 MW type 1 limit and thus it qualifies as large-scale project activity. Thus, debundling is not applicable for the current project activity.
4. Section F is now included as per the new PDD template which mentions the details of the Host country approval. PP has received the letter of approval from the Host Country DNA vide Letter No. 4/12/2012-CC dated 30/12/2020. The same is available at UN Project webpage - CDM: Wind power project in Tirunelveli, Tamil Nadu by TVS Energy Limited (unfccc.int).
5. NEWNE Grid now has been replaced with Unified Indian grid in throughout the PRC PDD.
6. Name of Ministry of Environment and Forests is updated to Ministry of Environment, Forest and Climate Change (MoEFCC)

PRC Category: Permanent Changes

The parameter – $EG_{feeder\ i}$ & $EG_{CM,WEG\ PP,\ feeder\ i}$ & $EG_{CM,other\ WEG\ ,\ feeder,i.}$ are no longer following at the site as not relevant to present site practice and no longer use in current practice. Hence no longer parameter to be monitored.

In section B.7.3 Apportioning procedure added to the monitoring plan in case of mis-match between dates of the JMRs of first & last months and start & end dates of this monitoring period.

In section B.7.3 Multiplication by EKVAH% - in some cases of readings of monthly Export and import value can be calculated by multiplying the Ikwh and Ekwh with EKVAH % in the monthly JMR, has been included.

Category: Permanent Changes during the revision of monitoring plan and parameters.

Parameters as per old PDD	Parameters as per new PDD	Reason
In section B.7.1 parameter $EG_{feeder\ i}$, $EG_{CM,WEG\ PP,\ feeder\ i}$ & $EG_{CM,other\ WEG\ ,\ feeder,i.}$ was mentioned	The parameter is no longer relevant to project activity hence not included in revised PRC PDD	These parameters are no longer following at the site as not relevant to present site practice.
Details of Multiplication by EKVAH% is not given in previous PDD	In section B.7.3 Multiplication by EKVAH% - in some cases of readings of monthly Export and import value can be calculate by multiplying the Ikwh and Ekwh with EKVAH % in the monthly JMR, has been included.	This method are in practice to calculate monthly electricity generation.
In registered PDD Apportioning procedure were not concluded	In section B.7.3 Apportioning procedure added to the monitoring plan	in case of mis-match between dates of the JMRs of first & last months and start & end dates of this monitoring period

Appendix 8. Geo Co-ordinates for all WEG & Commissioning dates

WTG Location	Villages	Taluka	District	GPS Coordinates	
				Latitude (Deg Min Secs)	Longitude (Deg Min Secs)
RP67_P	Vibhutwadi	Aatpadi	Sangli	17° 29' 5.6868"	74° 43' 2.827"
RP68_P				17° 29' 2.2776"	74° 43' 9.887"
RP69_P				17° 28' 56.8848"	74° 43' 15.287"
RP70_P				17° 28' 51.3912"	74° 43' 20.687"
RP71_P				17° 28' 45.4764"	74° 43' 25.406"
RP72_F	Vibhutwadi and Kurundwadi	Aatpadi & Khanapur		17° 28' 40.998"	74° 43' 33.686"
RP73_F				17° 28' 33.6756"	74° 43' 32.344"
RP74_F				17° 28' 26.3172"	74° 43' 30.76"
RP75_F				17° 28' 18.8328"	74° 43' 30.4"
RP76_F				17° 28' 12"	74° 43' 30.544"
G3	Kaledhon	Khatav	Satara	17° 25' 30.9828"	74° 40' 13.127"
G5				17° 25' 21.2124"	74° 40' 28.06"
G6				17° 25' 17.778"	74° 40' 18.268"
N3	Mulikwadi		Satara	17° 27' 36"	74° 40' 10.564"
N2	Mulikwadi			17° 27' 39.9924"	74° 40' 5.268"
RP_11P	Panchwad		Satara	17° 29' 34.5372"	74° 38' 14.784"
RP_11Pb				17° 29' 29.1912"	74° 38' 9.37"

All the WEGs in the project have been commissioned. The dates are as follows:

Location	Date of commissioning
RP67_P	17/09/2012
RP68_P	17/09/2012
RP69_P	17/09/2012
RP70_P	17/09/2012
RP71_P	17/09/2012
RP72_F	17/09/2012
RP73_F	17/09/2012
RP74_F	17/09/2012
RP75_F	17/09/2012
RP76_F	17/09/2012
G3	30/05/2012
G5	30/05/2012
G6	30/05/2012
N3	31/03/2012
N2	17/09/2012
RP_11P	31/03/2012
RP_11Pb	30/05/2012

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Document information

Version	*Date*	*Description*
12.0	8 October 2021	Revision to: Improve consistency with version 03.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN).
11.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN); • Make editorial improvements.
10.1	28 June 2017	Revision to make editorial improvement.
10.0	7 June 2017	Revision to: • Improve consistency with the "CDM project standard for project activities" and with the PoA-DD and CPA-DD forms; • Make editorial improvement.
09.0	24 May 2017	Revision to: • Ensure consistency with the "CDM project standard for project activities" (CDM-EB93-A04-STAN) (version 01.0); • Incorporate the "Project design document form for small-scale CDM project activities" (CDM-SSC-PDD-FORM); • Make editorial improvement.
08.0	22 July 2016	EB 90, Annex 1 Revision to include provisions related to automatically additional project activities.
07.0	15 April 2016	Revision to ensure consistency with the "Standard: Applicability of sectoral scopes" (CDM-EB88-A04-STAN) (version 01.0).
06.0	9 March 2015	Revision to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Make editorial improvement.

Version	*Date*	*Description*
05.0	25 June 2014	Revision to: • Include the Attachment: Instructions for filling out the project design document form for CDM project activities (these instructions supersede the "Guidelines for completing the project design document form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from F-CDM-PDD to CDM-PDD-FORM; • Make editorial improvement.
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b.
04.0	13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03.0	26 July 2006	EB 25, Annex 15
02.0	14 June 2004	EB 14, Annex 06b
01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.

Decision Class: Regulatory
Document Type: Form
Business Function: Registration
Keywords: project activities, project design document