

SATARA WIND POWER PROJECT IN MAHARASHTRA, INDIA

Document Prepared By: **NSL Wind Power Company (Satara) Pvt. Ltd.**

Contact Information: +91 40 3051 4444

Project Title	Satara Wind Power Project in Maharashtra, India.
Version	01 ¹
Date of Issue	28 Dec 2015
Prepared By	NSL Wind Power Company (Satara) Pvt. Ltd.
Contact	8-2-684/2/A, NSL ICON, Road No. 12, Banjara Hills, Town/City: Hyderabad, Andhra Pradesh, Postal Code: 500034. Country: India E: rajnikant.a@nslpower.com

¹ This is the draft initial version to be submitted for project listing at VCS.

Table of Contents

1	Project Details.....	3
1.1	Summary Description of the Project.....	3
1.2	Sectoral Scope and Project Type	3
1.3	Project Proponent	4
1.4	Other Entities Involved in the Project	4
1.5	Project Start Date.....	4
1.6	Project Crediting Period.....	4
1.7	Project Scale and Estimated GHG Emission Reductions or Removals.....	4
1.8	Description of the Project Activity	5
1.9	Project Location	5
1.10	Conditions Prior to Project Initiation	6
1.11	Compliance with Laws, Statutes and Other Regulatory Frameworks.....	7
1.12	Ownership and Other Programs	7
1.12.1	Right of Use	7
1.12.2	Emissions Trading Programs and Other Binding Limits	7
1.12.3	Other Forms of Environmental Credit	7
1.12.4	Participation under Other GHG Programs.....	7
1.12.5	Projects Rejected by Other GHG Programs.....	8
1.13	Additional Information Relevant to the Project	8
2	Application of Methodology.....	8
2.1	Title and Reference of Methodology.....	8
2.2	Applicability of Methodology.....	9
2.3	Project Boundary.....	11
	Figure below demonstrates the project boundary for the proposed project activity.....	12
2.4	Baseline Scenario	13
2.5	Additionality	14
2.6	Methodology Deviations	14
3	Quantification of GHG Emission Reductions and Removals	15
3.1	Baseline Emissions.....	15
3.2	Project Emissions.....	19
3.3	Leakage	19
3.4	Net GHG Emission Reductions and Removals	19
4	Monitoring	20
4.1	Data and Parameters Available at Validation	20
4.2	Data and Parameters Monitored.....	21
4.3	Monitoring Plan	22
5	Environmental Impact.....	22
6	Stakeholder Comments.....	22
	APPENDIX X: <title of appendix>	23

1 PROJECT DETAILS

1.1 Summary Description of the Project

The proposed project activity is a Greenfield wind power generation activity. The project activity involves installation of 30 MW capacity wind power generation project by NSL Wind Power Company (Satara) Pvt. Ltd. (Project Participant). The project activity is expected to generate clean electricity, which will be exported to the Maharashtra State Electricity Transmission Company Limited (MAHATRANSCO), which falls under the Northern, Eastern, Western and North-Eastern regional grids (NEWNE) grid of India. The spatial extent of the project boundary is the NEWNE grid.

- This activity involves installation and operations of 20 numbers of Wind turbine generators (WTGs) of rated capacity 1.5 MW. The WTGs are of Vensys V87 type, supplied by ReGen Power Tech Pvt. Ltd.
- The WTGs are located in Village Mann, Taluka Man in the district of Satara in the state of Maharashtra, India.
- The electricity generated by the project activity will be displacing the grid electricity which would have been otherwise generated through sources dominated by fossil fuel based power plants at NWENE grid. The project activity reduces the emission of GHG gases which would have been generated in the absence of the project activity and also help to reduce the supply demand gap in the state with contribution in the sustainable development.
- The baseline for the project as per the applicable baseline methodology is defined as "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". Prior to the project activity there was no equipment present at the project site, this is a complete new facility. The baseline scenario is exactly same as the scenario prevailing before the project activity.
- The project activity is expected to generate and export around 52,560 MWh of electricity per annum to the NEWNE Grid. It is estimated that the project activity will contribute to GHG emission reduction of about 51,335 tCO₂e annually and 513,350 tCO₂e over ten years of the crediting period.

1.2 Sectoral Scope and Project Type

Sectoral scope : 01, Energy Industries (renewable- /non-renewable sources)
Project Type : I, Renewable energy projects

The project is not a grouped (but a bundled) project activity.

1.3 Project Proponent

Organization name	M/s NSL Wind Power Company (Satara) Pvt. Ltd.
Contact person	Mr. A. Rajnikant
Title	DGM – Power Division
Address	#8-2-684/2/A, NSL ICON, Road No. 12, Banjara Hills, Town / City: Hyderabad, Andhra Pradesh, PIN: 500034, India.
Telephone	+91 40 3051 4444
Email	rajnikant.a@nslpower.com

1.4 Other Entities Involved in the Project

NA

1.5 Project Start Date

06 March 2014².

1.6 Project Crediting Period

The proposed crediting period under VCS is as follows:

Fixed crediting period : 06 March 2014 to 05 March 2024.

Total number of years : 10.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	
Large project	Yes

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
Year 1 ³	51,335
Year 2	51,335

² The start date of the project activity has been considered as the date of commissioning of the first WTG in the bundle, which is in accordance with the VCS standard.

³ The first year is: 6th March 2014 to 5th March 2015

Year 3	51,335
Year 4	51,335
Year 5	51,335
Year 6	51,335
Year 7	51,335
Year 8	51,335
Year 9	51,335
Year 10	51,335
Total estimated ERs	513,350
Total number of crediting years	10
Average annual ERs	51,335

1.8 Description of the Project Activity

Project activity is a grid connected facility. The technology being employed in the project activity will comprise 20 numbers of WTGs having capacities of 1500 kW each. Thus, the total capacity of the proposed project activity is 30 MW. The project activity is expected to generate renewable electricity by harnessing Wind energy, which will be exported to the Maharashtra State Electricity Transmission Company Limited (MAHATRANSCO), which falls under the Northern, Eastern, Western and North-Eastern regional grids (NEWNE) grid of India. The spatial extent of the project boundary is the NEWNE grid.

The WTGs under the project activity is having an average lifetime of 25 years. The equipments are based on manufacturer's specifications and as per industry standards, the technology specification shall be provided during the course of validation.

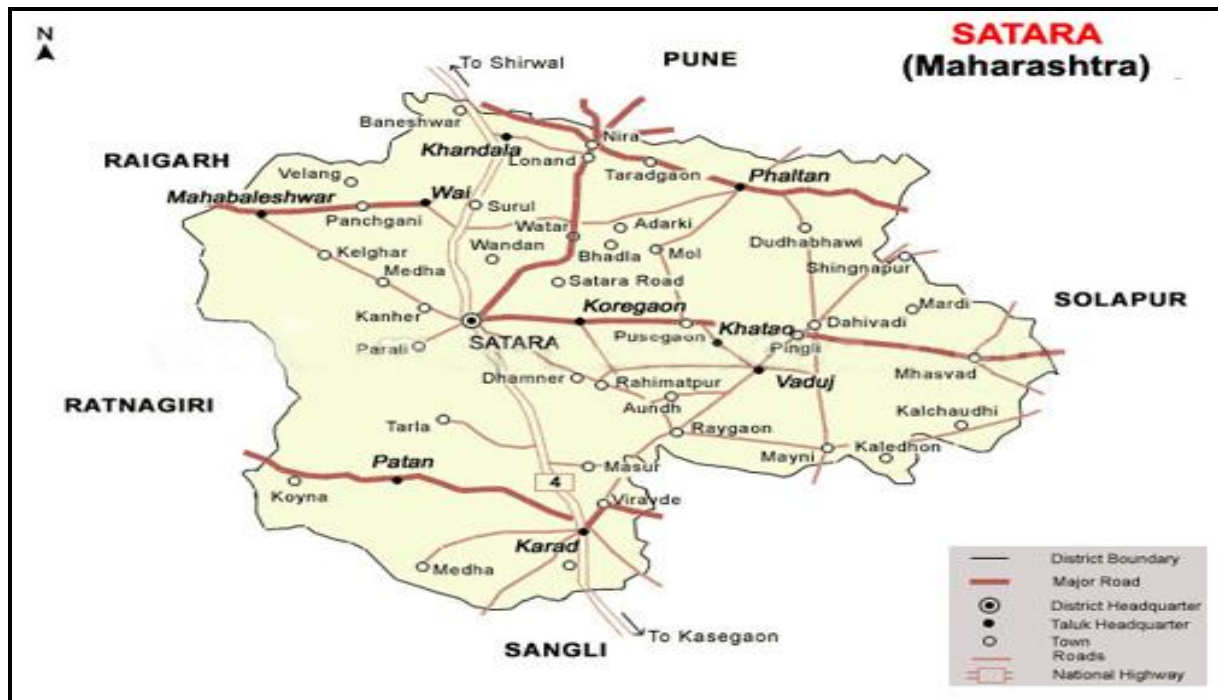
The project activity is located in the Satara district of Maharashtra, India. Therefore, the average Plant Load Factor (PLF) is considered as 20%, which is experienced in the region and also assessed by PLF assessment studies.

1.9 Project Location

Project activity is located in the Mann village, in the district Satara, state of Maharashtra.

The location maps are included below. The details of geo-coordinated shall be included during the time of validation.

The spatial extent of this project activity includes the project site and all the power plants connected physically to the electricity system that the project is connected to, i.e. the NEWNE Grid. Thus the project boundary includes all the power plants physically connected to the NEWNE grid.



1.10 Conditions Prior to Project Initiation

The project is a green field project activity harnessing clean energy from wind. The project activity replaces anthropogenic emissions of greenhouse gases (GHGs) from the atmosphere, by displacing the equivalent amount of electricity generation through the operation of existing fuel mix in the grid comprising mainly fossil fuel based power plants.

The power generated by the operation of wind turbines is emission free. In the absence of the project activity the equivalent amount of electricity would have been generated from the connected/ new power plants to the NEWNE grid, which are/will be predominantly based on fossil fuels.

As the project activity is a green field facility, the baseline scenario is the same as the conditions existing prior to the project initiation. Please refer to Section 2.4 (Baseline Scenario).

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

Yes, the project has received the required NOCs and approvals in order to implement and operate.

1.12 Ownership and Other Programs

1.12.1 Right of Use

The copy of the Power Purchase Agreements (PPAs) and the Commissioning Certificates shall be provided as evidence for right of use of the project activity, which is in accordance with the para 3.11.1 of the VCS Standard, version 3.5.

1.12.2 Emissions Trading Programs and Other Binding Limits

The host country (i.e. India) of the project activity is a non-Annex 1 country; hence, the project does not have any compliance driven emission trading program or other binding limits.

1.12.3 Other Forms of Environmental Credit

The project has not sought or received any other form of GHG related environmental credit.

The project may have been eligible to participate in different mechanisms (such as CDM, REC etc. to create another form of GHG related environmental credits, however project has never been applied under any such mechanism other as yet.

1.12.4 Participation under Other GHG Programs

Project has not been applied under any other GHG programs.

1.12.5 Projects Rejected by Other GHG Programs

No, project has not been rejected by any other GHG program.

1.13 Additional Information Relevant to the Project

Eligibility Criteria

This is a single project activity (bundle of 20 WTGs) developed by the same project participant. It is not a grouped project. Hence, there is no any new instance applicable to the project activity at this stage. Hence demonstration of eligibility criteria pertaining to group project activity is not applicable.

Leakage Management

As per the applicable methodology ACM0002, Version 16.0, no leakage emissions are considered.

Commercially Sensitive Information

There is no commercially sensitive information attached to this project. Hence, this section is not applicable.

Further Information

There is no further information available pertaining to this section.

2 APPLICATION OF METHODOLOGY

2.1 Title and Reference of Methodology

Title: Grid-connected electricity generation from renewable sources⁴

Reference: Approved consolidated baseline and monitoring methodology ACM0002, Version 16.0

⁴ <http://cdm.unfccc.int/methodologies/DB/EY2CL7RTEHRC9V6YQHLAR6MJ6VEU83>

2.2 Applicability of Methodology

The applicability of the methodology is as described below:

Applicability criteria	Applicability status
Para.03 of ACM0002, version 16.0: This methodology is applicable to grid-connected renewable power generation project activities that: (a) Install a Greenfield plant); (b) Involve a capacity addition to (an) existing plants; (c) Involve a retrofit of (an) existing operating plant(s)/units; or (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s)/units.	The project activity is the installation of a new Grid connected renewable (wind) power project activity at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant); Therefore, the project activity applicable under this methodology. Hence, the criterion is satisfied as per point (a)
Para.04 of ACM0002, version 16.0: The methodology is applicable under the following conditions: (a) The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without a run-of-river reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit; (b) In the case of capacity additions, retrofits or replacements (except for wind, solar, wave or tidal power capacity addition projects the existing plant started commercial operation prior to the start 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 expansion or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.	• The project is installing a wind power plant. Hence the criterion is satisfied as per Point (a) of Para 04 of ACM0002, version 16.0. • The project is not a capacity additions, retrofits or replacements. Hence this criterion Point (b) of Para 04 of ACM0002, version 16.0 is not applicable.
Para.05 of ACM0002, version 16.0: In case of hydro power plants: One of the following conditions must apply: (a) The project activity is implemented in an	The project is a wind power project; hence none of the conditions discussed under Para.05 of ACM0002, version 16.0 are applicable for the project activity.

existing single or multiple reservoirs, with no change in the volume of any of reservoirs; or (b) 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; or (c) The project activity results in new single or multiple reservoirs and the power density Calculated using equation (3), is greater than 4 W/m² or (d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (3), is lower than or equal to 4 W/m², all of the following conditions shall apply: i. The power density calculated using the total installed capacity of the integrated project, as per equation (4) is greater than 4 W/m²; ii. Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity. iii. Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m² shall be: a) Lower than or equal to 15 MW; and b) Less than 10 per cent of the total installed capacity of integrated hydro power project.	
Para.06, 07. 08 of ACM0002, version 16.0: Para 06:In the case of integrated hydro power projects, project participant shall: Para 07: Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or Para 08: Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of	The project is a wind power project, hence none of the conditions discussed under Para.06, 07 & 08 of ACM0002, version 16.0 are not applicable for the project activity.

reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.	
Para.09 of ACM0002, version 16.0: The methodology is not applicable to: (a) 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; (b) Biomass fired power plants;	The project is a wind power project, hence none of the conditions discussed under Para.09 of ACM0002, version 16.0 are applicable for the project activity.
Para.10 of ACM0002, version 16.0: In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is “the continuation of the current situation, i.e. to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance”	The project is not of retrofits, rehabilitations, replacements, or capacity additions. Hence the condition discussed under Para.10 of ACM0002, version 16.0 is not applicable for the project activity.

2.3 Project Boundary

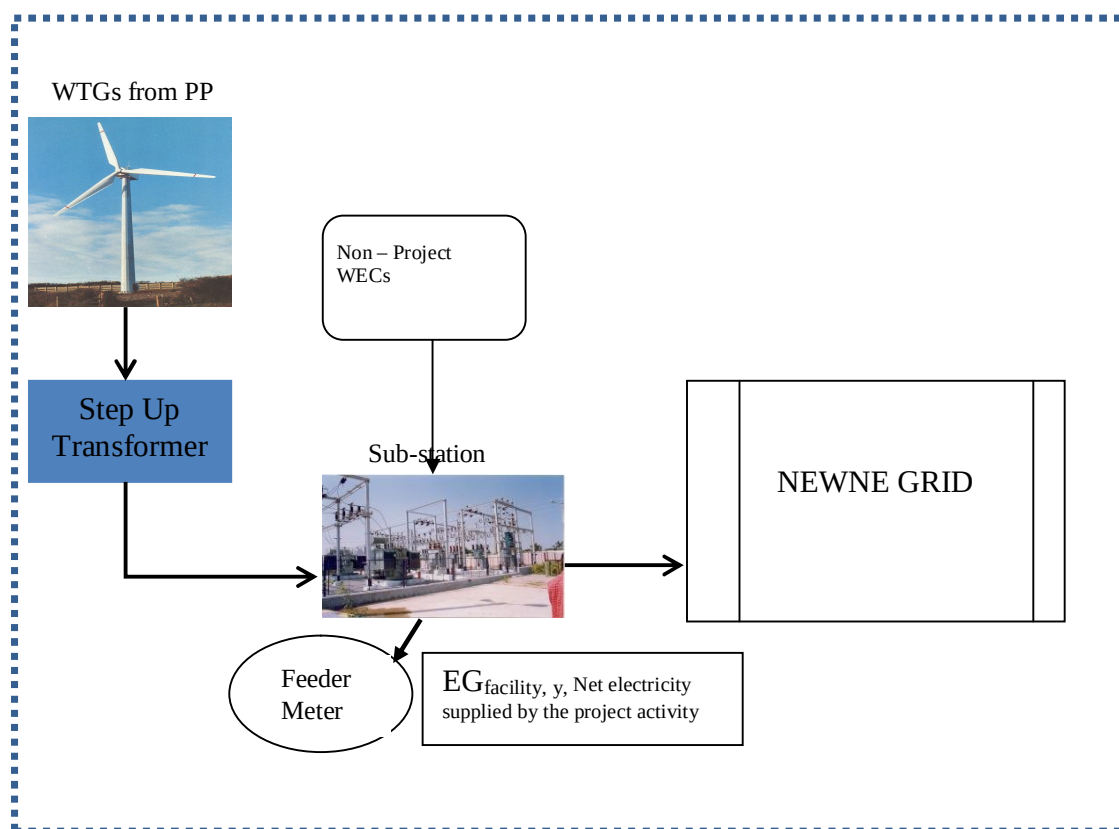
As per the applicable methodology ACM0002 (Version 16.0), Para 21: *“The spatial extent of the project boundary includes the project power plants/units and all power plants/units connected physically to the electricity system⁵ that the CDM project power plant is connected to.”*

Therefore, the project boundary includes all the 20 numbers of WTGs along with the WTGs of the other project participant connected to the sub-station, which is further connected to the network of the NEWNE grid, i.e. the project boundary also includes the NEWNE grid. Thus, the project boundary further includes all the power plants physically connected to the NEWNE grid.

⁵ As per Tool to calculate the emission factor for an electricity system, Version 04.0.0, “A 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 (e.g. the renewable power plant location or the consumers where electricity is being saved) and that can be dispatched without significant transmission constraints”.

Source		Gas	Included?	Justification/Explanation
Baseline	CO ₂ emissions from electricity generation in fossil fuel fired power plants that is displaced due to the project activity	CO ₂	Yes	In the baseline scenario, electricity would have been generated through emission intensive fossil fuel based power plants.
		CH ₄	No	Minor emission source
		N ₂ O	No	Minor emission source
		Other	No	NA
Project	Greenfield grid-connected wind power plant/unit	CO ₂	No	The project activity does not have any emissions.
		CH ₄	No	
		N ₂ O	No	
		Other	No	

Figure below demonstrates the project boundary for the proposed project activity.



Project Boundary

2.4 Baseline Scenario

As the project activity is a new grid connected renewable powers project, hence the baseline scenario for the project activity according to ACM0002, Version 16.0; Para 23 is:

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

The 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 (tCO₂)
- $EG_{PJ,Y}$ = 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 CO₂ emission factor for grid connected power generation in year y calculated using the latest version of the .Tool to calculate the emission factor for an electricity system. (tCO₂/MWh).

If the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, then:

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

Where:

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

Calculation of $EF_{grid,CM,y}$ is given in Section B.6.1

Data / Parameter used to determine the baseline scenario

Parameters	Value	Nomenclature	Source
$EF_{grid,CM,y}$	0.9767 tCO ₂ /MWh	Combined margin CO ₂ emission factor for the project electricity system in year y	Calculated as the weighted average of the operating margin (0.75) & build margin (.25) values, sourced from Baseline CO ₂ Emission Database, Version 10.0 (December 2014), published by Central Electricity Authority (CEA), Government of India

EF _{grid,OM, y}	0.9857 tCO ₂ /MWh	Operating margin CO ₂ emission factor for the project electricity system in year y	Calculated as the last 3 year (2011-12, 2012-13, 2012-13) generation-weighted average, sourced from Baseline CO ₂ Emission Database, Version 10 (December 2014), published by Central Electricity Authority (CEA), Government of India
EF _{grid,BM, y}	0.9495 tCO ₂ /MWh	Build margin CO ₂ emission factor for the project electricity system in year y	Baseline CO ₂ Emission Database, Version 10 (December 2014), published by Central Electricity Authority (CEA), Government of India
EG _{PJ,y} (Variable)	52,560 MWh	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in a year y	Calculated;

2.5 Additionality

The project is additional. The additionality of the project has been assessed using the Methodological tool “Demonstration and assessment of additionality” Version 07.0.0. The additionality shall be demonstrated based on Investment barrier. Benchmark analysis shall be conducted as per “Guidelines on the Assessment of Investment Analysis, Version 05”.

The details of investment analysis and the demonstration of additionality shall be justified and presented in the PD during the course of validation.

2.6 Methodology Deviations

Project is currently under validation stage; hence no methodology deviation is applicable.

3 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

3.1 Baseline Emissions

According to the methodology, Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

Where:

ER_y	=	Emission reductions in year y (tCO _{2e})
BE_y	=	Baseline emissions in year y (t CO ₂)
PE_y	=	Project emissions in year y (t CO _{2e})

Baseline Emissions:

Baseline emissions include only CO₂ 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 latest version of the "Tool to calculate the emission factor for an electricity system" (tCO ₂ /MWh)

If the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, then:

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

Where:

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

Calculation of the Baseline Emission Factor

The “Tool to calculate the Emission Factor for an electricity system” (Version 4.0.0) has been used for determination of the baseline emission factor.

Step 1: Identify the relevant electricity systems

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

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

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

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

Project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

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

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

Option I corresponds to the procedure contained in earlier versions of this tool. Option II allows the inclusion of off-grid power generation in the grid emission factor. Option II aims to reflect that in some countries off-grid power generation is significant and can partially be displaced by CDM project activities, e.g. if off-grid power plants are operated due to an unreliable and unstable electricity grid. Option II requires collecting data on off-grid power generation and can only be used if the conditions outlined therein are met. Option II may be chosen only for the operating margin emission factor or for both the build margin and the operating margin emission factor but not only for the build margin emission factor. If Option II is chosen, off-grid power plants should be classified in different classes of off-grid power plants. Each off-grid power plant class should be considered as one power plant *j*, *k*, *m* or *n*, as applicable.

In case of project activity, Option I is used.

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

The project participant wishes to use the Simple Operating Margin (OM) method for the estimation of the baseline. The use of the Simple OM method is justified as the share of the low cost/must-run resources constitutes less than 50% of the total grid generation in average of the five most recent years. The ex-ante option has been chosen where in a 3 year generation weighted average, based on the most recent data would be calculated and is fixed for the entire crediting period.

Step 4: Calculation of the operating margin emission factor according to the Simple OM method

The simple OM emission factor is calculated as the generation-weighted average CO₂ emissions per unit net electricity generation (tCO₂/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units.

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

As per 'Tool to calculate the emission factor for an electricity system', Option A ("Based on the net electricity generation and a CO₂ 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:

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

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 CO₂ emission factor ($EF_{EL,m,y}$) data for simple OM, available under the CEA database⁶ (Version 10.0, Dec 2014) for the last three years is as follows.

⁶ http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver10.pdf

CO ₂ emission factor for simple OM (tCO ₂ /MWh) (incl. Imports)			
Grid	2011-12	2012-13	2013-14
NEWNE	0.9699	0.9919	0.9953

The net electricity generation (EG_{m,y}) data, available under the CEA database⁷ (Version 10) December 2014, of all generating power plants (not including low-cost / must-run power plants / units) for the last three year has been taken from the database.

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. 2011-12, 2012-13 and 2013-14 for NEWNE grid is:

The ex-ante OM value obtained is 0.9857⁸ tCO₂/MWh

STEP 5. Calculate the build margin emission factor

The project participants have chosen Option I, i.e. fixing build margin emission factor ex ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation.

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

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

Where:

- EF_{grid,BM,y} - Build margin CO₂ emission factor in year y (tCO₂/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} - CO₂ emission factor of power unit m in year y (tCO₂/MWh)
- m - Power units included in the build margin
- y - Most recent historical year for which power generation data is available

The CO₂ emission factor of each power unit m (EF_{EL,m,y}) is determined as per the procedures given in step 4 (a) for the simple OM, using options A1B1 using for y the most recent historical year for which power generation data is available, and using for m the power units included in the build margin.

The build margin emission factor (EF_{grid,BM,y}) for the year 2013-14 (most recent year) for NEWNE grid is 0.9495 tCO₂/MWh

⁷ http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver10.pdf

⁸ ER sheet will be provided separately with detail calculation.

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 CO₂ emission factor in year y (tCO₂/MWh)

$EF_{grid, OM, y}$ - Operating margin CO₂ emission factor in year y (tCO₂/MWh)

w_{OM} - Weighting of operating margin emissions factor

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

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

$$w_{OM} = 0.75$$

$$w_{BM} = 0.25$$

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

$$= 0.9857 * 0.75 + 0.9495 * 0.25 \text{ tCO}_2/\text{MWh}$$

$$= 0.9767 \text{ tCO}_2/\text{MWh}$$

3.2 Project Emissions

There is no project emission associated with the project activity.

3.3 Leakage

As per the applicable methodology ACM0002, Version 16.0, no leakage emissions are considered.

3.4 Net GHG Emission Reductions and Removals

Baseline Emission Reduction is calculated as:

$$\begin{aligned} BE_y &= EG_{facility, y} * EF_{grid, CM, y} \\ &= 52,560 * 0.9767 \\ &= 51,335 \text{ tCO}_2\text{e} \end{aligned}$$

As the project activity is wind power project, project emissions are zero and there is no leakage emission.

Therefore, Net Emission Reductions are:

$$\begin{aligned} ER_y &= BE_y - PE_y \\ &= 51,335 - 0 \\ &= \mathbf{51,335 \text{ tCO}_2\text{e}} \end{aligned}$$

The ex-ante calculation (estimate) of net GHG emission reductions and removals are provided in the table below:

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
Year 1	51,335	0	0	51,335
Year 2	51,335	0	0	51,335
Year 3	51,335	0	0	51,335
Year 4	51,335	0	0	51,335
Year 5	51,335	0	0	51,335
Year 6	51,335	0	0	51,335
Year 7	51,335	0	0	51,335
Year 8	51,335	0	0	51,335
Year 9	51,335	0	0	51,335
Year 10	51,335	0	0	51,335
Total	513,350	0	0	513,350

4 MONITORING

4.1 Data and Parameters Available at Validation

The relevant monitoring data and parameters have been determined for the project activity as per the requirements of applied methodology and same would be made available at validation. The following table formats shall be used for presenting the data & parameters.

Data and parameters monitored during the operation of the project shall be included in Section 0 (Data and Parameters Monitored).

Data / Parameter	
Data unit	<i>Indicate the unit of measure</i>
Description	<i>Provide a brief description of the data/parameter</i>
Source of data	<i>Indicate the source(s) of data</i>
Value applied:	<i>Provide the value applied</i>
Justification of choice of data or description of measurement methods and procedures applied	<i>Justify the choice of data source, providing references where applicable. Where values are based on measurement, include a description of the measurement methods and procedures applied (eg, what standards or protocols have been followed), indicate the responsible person/entity that undertook the measurement, the date of the measurement and the measurement results. More detailed information may be provided in an appendix.</i>
Purpose of Data	<i>Indicate one of the following:</i> <i>Determination of baseline scenario (AFOLU projects only)</i> <i>Calculation of baseline emissions</i> <i>Calculation of project emissions</i> <i>Calculation of leakage</i>
Comments	<i>Provide any additional comments</i>

4.2 Data and Parameters Monitored

The information related to all data and parameters that will be monitored during the project crediting period shall be included in this section during the course of validation. The following table format shall be used to present the data and parameters.

Data / Parameter	
Data unit	<i>Indicate the unit of measure</i>
Description	<i>Provide a brief description of the data/parameter</i>
Source of data	<i>Indicate the source(s) of data</i>
Description of measurement methods and procedures to be applied	<i>Specify the measurement methods and procedures, any standards or protocols to be followed, and the person/entity responsible for the measurement. Include any relevant information regarding the accuracy of the measurements (eg, accuracy associated with meter equipment or laboratory tests).</i>
Frequency of monitoring/recording	<i>Specify measurement and recording frequency</i>
Value applied:	<i>Provide an estimated value for the data/parameter</i>
Monitoring equipment	<i>Identify equipment used to monitor the data/parameter including type, accuracy class, and serial number of equipment, as appropriate.</i>

QA/QC procedures to be applied	<i>Describe the quality assurance and quality control (QA/QC) procedures to be applied, including the calibration procedures where applicable.</i>
Purpose of data	<i>Indicate one of the following:</i> <i>Calculation of baseline emissions</i> <i>Calculation of project emissions</i> <i>Calculation of leakage</i>
Calculation method	<i>Where relevant, provide the calculation method, including any equations, used to establish the data/parameter.</i>
Comments	<i>Provide any additional comments</i>

4.3 Monitoring Plan

The detail monitoring plan shall be developed and presented in the PD during the course of validation.

5 ENVIRONMENTAL IMPACT

As per the prevailing Ministry of Environment and Forest laws, (the Schedule 1 of Ministry of Environment and Forests (Government of India) notification dated January 19, 2009), 38 activities are required to undertake environmental impact assessment studies. Environmental Impact Assessment study is not required for wind mill project as there is no negative environmental impact due to the project activity and wind energy is one of the cleanest sources of energy.

6 STAKEHOLDER COMMENTS

The stakeholders' consultation has been conducted and comments from stakeholders have been recorded. There is no negative comment from the stakeholders, project activity has been supported by the local people and they appreciate the initiatives.

The details of stakeholders' consultation and their records will be submitted to validator during the course of project validation.

APPENDIX X: <TITLE OF APPENDIX>

NA.