WIND PROJECT IN MAHARASHTRA, INDIA BY KAYATHAR AND JATH

Document Prepared By NSL Wind Power Company (Kayathar) Pvt. Ltd.

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Project Title	Wind Project in Maharashtra, India by Kayathar and Jath.
Version	02.0
Date of Issue	19-March-2016
Monitoring Period	30-March-2014 to 31-January-2016
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PROJECT DETAILS

1.1 Summary Description of the Project and its Implementation Status

The proposed project activity is a Greenfield wind power generation activity. The project activity involves installation of 67.5 MW capacity wind power generation project out of which 37.5 MW by NSL Wind Power Company (Kayathar) Pvt. Ltd. (Project Proponent[1]) and 30.0 MW capacity wind power generation project by Jath Wind Energy Private Limited. The project activity is expected to generate clean electricity, which will be exported to the Maharashtra State Electricity Distribution Company Limited (MSEDCL), which falls under the Northern, Eastern, Western and North-Eastern regional grids (NEWNE) grid of India.

- This activity involves total installation and operations of following WTGs:

Project Proponent	Number of WTG	Supplier of WTG	Rated Capacity	Total Installed Capacity	Location
NSL Wind Power Company (Kayathar) Pvt. Ltd.	25	ReGen Power Vensys V87	1.5 MW	37.5 MW	Taluka: Jath, District: Sangli, State: Maharashtra in India
Jath Wind Energy Private Limited	15	Inox Wind Ltd. WT- 2000 DF	2.0 MW	30.0 MW	Taluka: Jath, District: Sangli, State: Maharashtra in India
Total Project Capacity				67.5 MW	

The commissioning dates of the WTGs are listed in the Appendix 2.

- 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 (i.e. total capacity of 67.5 MW) is expected to generate and export around 118,260MWh of electricity per annum to the NEWNE Grid. It is estimated that the project activity

[1] The project activity is a bundled project of total capacity 67.5 MW developed by two project participants and the bundle has been represented by only one project proponent, i.e. NSL Wind Power Company (Kayathar) Pvt. Ltd..

will contribute to GHG emission reduction of about 115,504 tCO_2e annually and 1,155,040 tCO_2e 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 project activity. It is bundled project activity of total 67.5 MW developed by two project participants.

1.3 Project Proponent

Organization name	M/s NSL Wind Power Company (Kayathar) 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

30-March-2014[2].

1.6 Project Crediting Period

The proposed crediting period under VCS is as follows:
Fixed crediting period : 30th March-2014 to 29th-March-2024.
Total number of years : 10.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	Yes
Large project	

Year	Estimated GHG emission reductions or removals (tCO_2e)

[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.

Year 1[3]	115,504
Year 2	115,504
Year 3	115,504
Year 4	115,504
Year 5	115,504
Year 6	115,504
Year 7	115,504
Year 8	115,504
Year 9	115,504
Year 10	115,504
Total estimated ERs	1,155,040
Total number of crediting years	10
Average annual ERs	115,504

1.8 Description of the Project Activity

Project activity is a grid connected facility. The project activity involves installation of 67.5 MW capacity wind power generation project out of that 37.5 MW implemented by NSL Wind Power Company (Kayathar) Pvt. Ltd. and 30.0 MW capacity wind power generation project by Jath Wind Energy Private Limited (other Project developer).The project activity is expected to generate renewable electricity by harnessing Wind energy, which will be exported to the Maharashtra State Electricity Distribution Company Limited (MSEDCL), 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 are provided under the Appendix 1.

The project activity is located in the Jath Taluka, Sangli 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 Jath Taluka, Sangli district of Maharashtra State, India.
The location maps are included below. The details of geo-coordinated are as follows:
Location of 15 WTGs from INOX (By: Jath Wind Energy Private Limited):

[3]The first year is: 30th March 2014 to 29th March 2015

S. No.	WTG No.	UTM (Universal Transverse Mercator) format		DD-MM-SS (Degree/minutes/Seconds) format		Location
		Easting (m)	Northing (m)	Latitude N	Longitude E	
1	MV T-5	533120	1889212	17° 5' 13.4"	75° 18' 40.67"	Village : Valsang Teshil : Jath District : Sangli
2	MV T-11	531602	1889817	17° 5' 33.16"	75° 17' 49.33"	Village : Karajangi Teshil : Jath District : Sangli
3	MV T-10	531476	1889319	17° 5' 16.96"	75° 17' 45.03"	Village : Karajangi Teshil : Jath District : Sangli
4	MV T-61	535796	1883332	17° 2' 1.9"	75° 20' 10.86"	Village : Shedyal Teshil : Jath District : Sangli
5	MV2 T-42	530238	1879946	17° 0' 12.01"	75° 17' 2.68"	Village : Ravalgun dawadi Teshil : Jath District : Sangli
6	MV T-45	533218	1889748	17° 5' 30.83"	75° 18' 44"	Village : Karajangi Teshil : Jath District : Sangli
7	MV2 T - 17	531346	1879175	16° 59' 46.87"	75° 17' 40.12"	Village : Ravalgun dawadi Teshil : Jath District : Sangli

8	MV2 T-2	532993	1880588	17° 0' 32.77"	75° 18' 35.9"	Village : Muchandi Teshil : Jath District : Sangli
9	MV2 T-15	530784	1879320	16° 59' 51.61"	75° 17' 21.12"	Village : Ravalgun dawadi Teshil : Jath District : Sangli
10	MV2 T-41	530175	1879560	16° 59' 59.45"	75° 17' 0.54"	Village : Ravalgun dawadi Teshil : Jath District : Sangli
11	MV2 T-28	532352	1875997	16° 58' 3.4"	75° 18' 13.98"	Village : Ravalgun dawadi Teshil : Jath District : Sangli
12	MV2 T-3	533289	1880081	17° 0' 16.25"	75° 18' 45.88"	Village : Muchandi Teshil : Jath District : Sangli
13	MV T-62	534857	1882341	17° 1' 29.71"	75° 19' 39.04"	Village : Muchandi Teshil : Jath District : Sangli
14	MV T-63	534898	1882806	17° 1' 44.84"	75° 19' 40.45"	Village : Muchandi Teshil : Jath District : Sangli
15	MV2 T-37	531281	1880464	17° 0' 28.81"	75° 17' 37.99"	Village : Muchandi Teshil : Jath District : Sangli

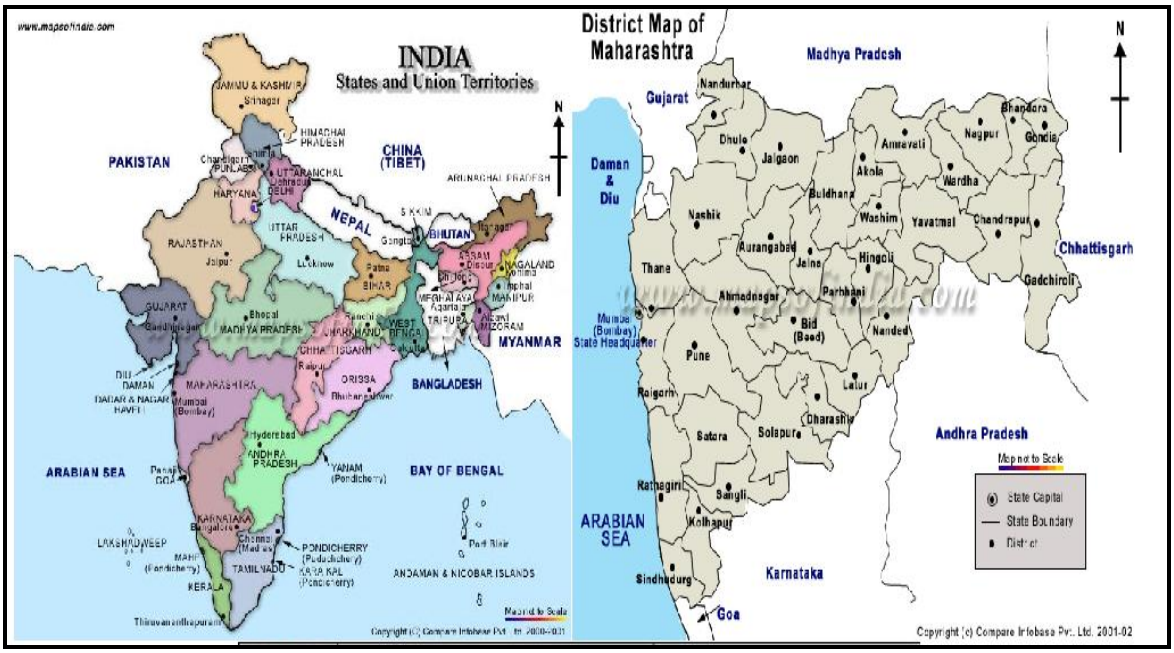
Location of 25 WTGs from ReGen Power (By NSL Wind Power Company (Kayathar) Pvt. Ltd.):

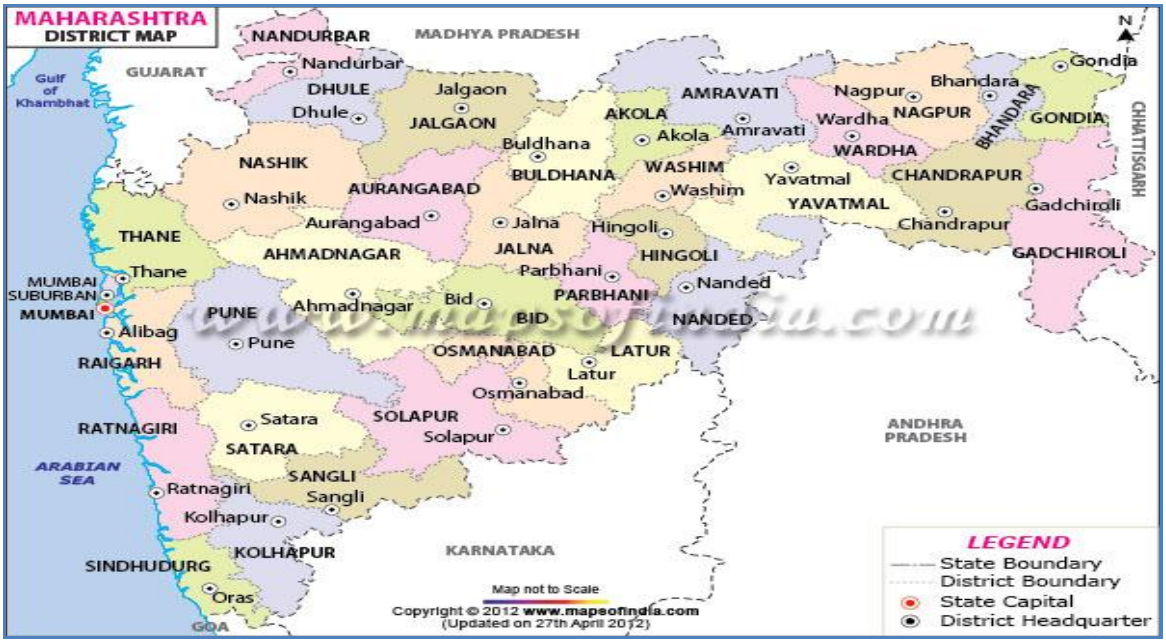
S. No.	WTG No.	UTM (Universal Transverse Mercator) format		DD-MM-SS (Degree/minutes/Seconds) format		Location
		Easting (m)	Northing (m)	Latitude N	Longitude E	
1	NSL P1-332	524859	1894452	17° 8' 4.29"	75° 14' 1.35"	Village : Wayphal Teshil : Jath District : Sangli
2	NSL P1-408	525895	1895627	17° 8' 42"	75° 14' 36.46"	Village : Wayphal Teshil : Jath District : Sangli
3	NSL P1-186	526238	1894037	17° 7' 50.73"	75° 14' 48.01"	Village : Banali Teshil : Jath District : Sangli
4	NSL P1-331	524784	1894116	17° 7' 53.36"	75° 13' 58.8"	Village : Banali Teshil : Jath District : Sangli
5	NSL P1-179A	525198	1895440	17° 8' 36.43"	75° 14' 12.87"	Village : Banali Teshil : Jath District : Sangli
6	NSL P1-179	525260	1895102	17° 8' 25.43"	75° 14' 14.95"	Village : Banali Teshil : Jath District : Sangli
7	NSL P1-310	525023	1894815	17° 8' 16.1"	75° 14' 6.92"	Village : Banali Teshil : Jath District : Sangli

8	NSL P1-1001	527255	1898405	17° 10' 12.83"	75° 15' 22.62"	Village : Wayphal Teshil : Jath District : Sangli
9	NSL P1-1000	527255	1898405	17° 10' 12.83"	75° 15' 22.62"	Village : Wayphal Teshil : Jath District : Sangli
10	NSL P1-1028	527971	1897996	17° 9' 59.49"	75° 15' 46.84"	Village : Wayphal Teshil : Jath District : Sangli
11	NSL P1-95	528098	1897567	17° 9' 45.52"	75° 15' 51.12"	Village : Wayphal Teshil : Jath District : Sangli
12	NSL P1-930	527308	1899768	17° 10' 57.18"	75° 15' 24.47"	Village : Wayphal Teshil : Jath District : Sangli
13	NSL P1-229	527201	1894912	17° 8' 19.16"	75° 15' 20.64"	Village : Wayphal Teshil : Jath District : Sangli
14	NSL P1-929	527156	1899108	17° 10' 35.71"	75° 15' 19.303"	Village : Wayphal Teshil : Jath District : Sangli
15	NSL P1-276	527115	1895607	17° 8' 41.79"	75° 15' 17.76"	Village : Wayphal Teshil : Jath District : Sangli
16	NSL P1-1034	527184	1897750	17° 9' 51.51"	75° 15' 20.19"	Village : Wayphal Teshil : Jath District : Sangli

17	NSL P1-1078/1	526377	1896547	17° 9' 12.41"	75° 14' 52.82"	Village : Wayphal Teshil : Jath District : Sangli
18	NSL P1-169A	524926	1896003	17° 8' 54.76"	75° 14' 3.68"	Village : Banali Teshil : Jath District : Sangli
19	NSL P1-169B	524882	1896306	17° 9' 4.62"	75° 14' 2.21"	Village : Banali Teshil : Jath District : Sangli
20	NSL P1-252A	525005	1893004	17° 7' 17.16"	75° 14' 6.23"	Village : Banali Teshil : Jath District : Sangli
21	NSL P1-252B	525073	1892655	17° 7' 5.81"	75° 14' 8.52"	Village : Banali Teshil : Jath District : Sangli
22	NSL P1-407	525915	1895958	17° 8' 53.25"	75° 14' 37.16"	Village : Wayphal Teshil : Jath District : Sangli
23	NSL P1-216	528475	1896022	17° 8' 55.23"	75° 16' 3.81"	Village : Wayphal Teshil : Jath District : Sangli
24	NSL P1-236	526679	1894772	17° 8' 14.63"	75° 15' 2.96"	Village : Wayphal Teshil : Jath District : Sangli
25	NSL P1-171,172	530643	1887491	17° 4' 17.52"	75° 17' 16.76"	Village : Valsang Teshil : Jath District : Sangli

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. The following are the approvals received[4]:

1. NOC from Gram Panchayat
2. MEDA Infrastructure permissions
3. NOC from MERC (Maharashtra Electricity Regulatory Commission)
4. Mining & Geology permission
5. Power Purchase Agreement (PPA)
6. Commissioning Certificate

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 sub-projects are listed as part of CDM project individually as follows;

Project developer	Project Title under CDM	Current status
Jath Wind Energy Private Limited	Wind Power Project by M/s Jath Wind Energy Private Limited in Maharashtra, India.	Under validation
NSL Wind Power Company (Kayathar) Pvt. Ltd.	Kayathar Wind Power Project in Maharashtra, India	Under validation

However, the PP has provided declaration stating that Net GHG emission reductions or removals generated by the Project will not be used for compliance with an emissions trading program or to meet binding limits on GHG emissions in any Emission Trading program or other binding limits any specific monitoring period under two mechanisms.
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.

[4]The copies these approvals/NOCs are submitted to DOE for validation purpose.

The project may have been eligible to participate in different mechanism such as 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

As discussed in the section 1.12.2, both the sub-projects seeking registration under CDM.

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 not a grouped project activity, the project activity is a bundled project developed by the two project developers and bundle has been represented by one project proponent.

The project activity consists of 40 WTGs implemented by the two project developers as listed in the section 1.1. The project WTGs have been bundled together as new project activity from the beginning and 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 sources[5]

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

[5] 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/unitof 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/m^2 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/m^2 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 system[6] that the CDM project power plant is connected to*."

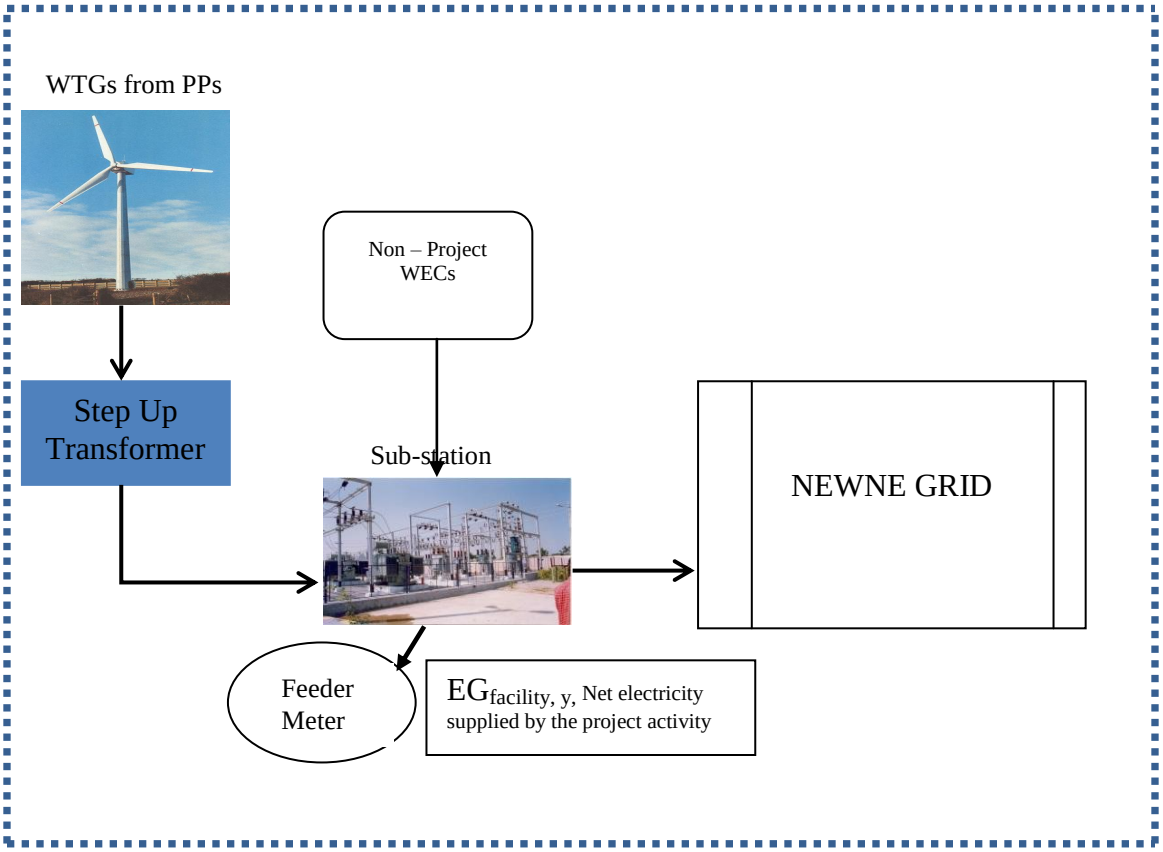
Therefore, the project boundary includes all WTGs of the project along with the WTGs of the other project owners connected to the sub-station, which is further connected to the network of the NEWNE grid, i.e. the project boundary also includes the NEWNE grid. Thus, the project boundary further includes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

Source	Gas	Included?	Justification/Explanation

[6] As per Tool to calculate the emission factor for an electricity system, Version 05.0.0, "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_2O	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_2O	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 (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 $EF_{grid,CM,y}$ is given in Section 3.1

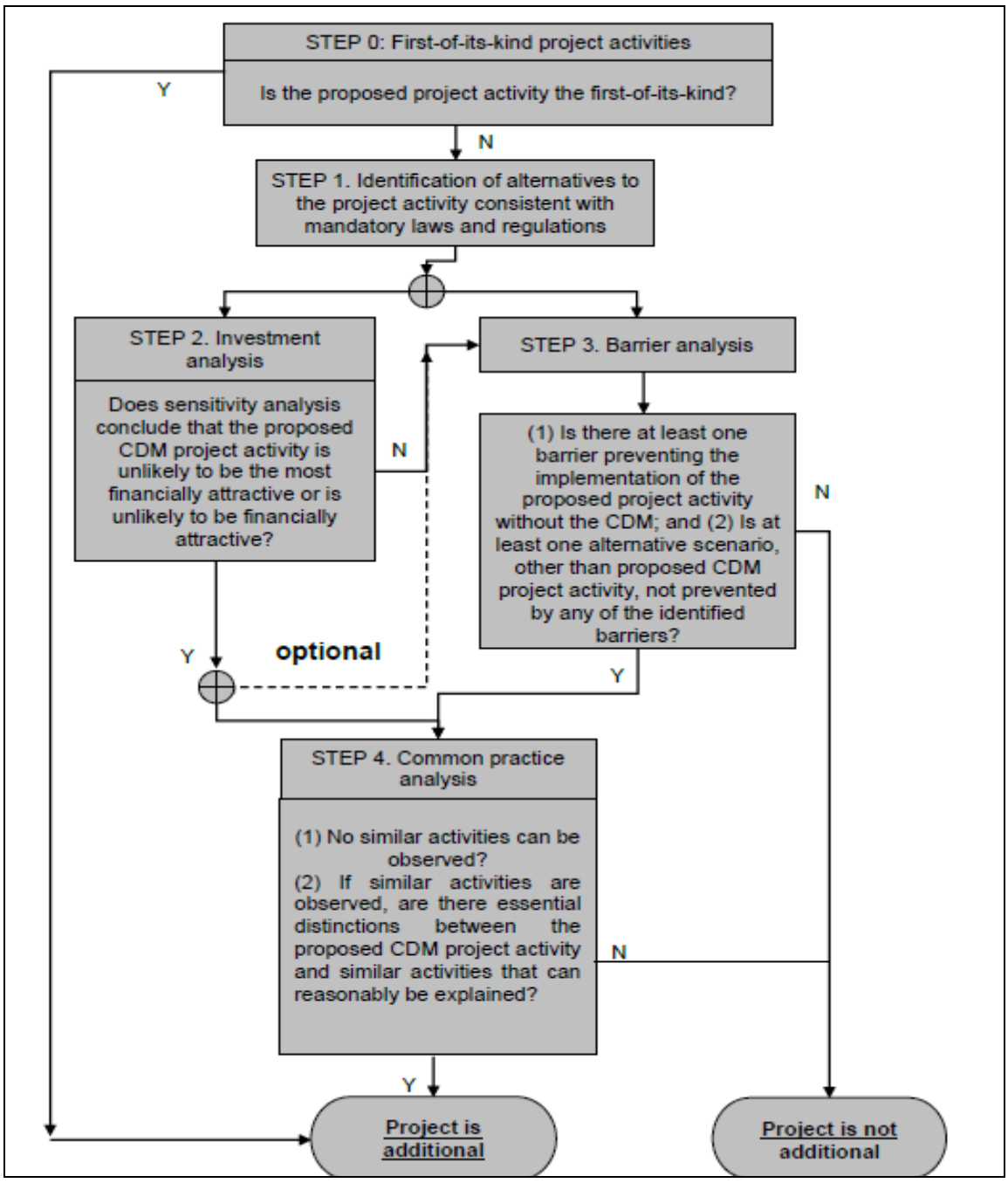
Data / Parameter used to determine the baseline scenario

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 tCO2/MWh	Operating margin CO_2 emission factor for the project electricity	Calculated as the last 3 year (2011-12, 2012-13, 2013-14)

		system in year y	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 tCO2/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)	118,260 MWh	Quantity of net electricity supplied to the grid as a result of the implementation of the grouped 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 tool defines the following steps:



Sub Step 0: Demonstration whether the proposed project activity is the first-of-its-kind

The proposed project activity is not the first of its kind as implementation of wind power project in the State of Maharashtra is not first of its kind since the state already has commissioned 2773 MW of power[7].

[7] http://www.mahaurja.com/wra.html

Since the proposed project activity is not the first-of-its-kind, this step is being skipped.

Step 1: Identification of alternatives to the project activity consistent with current laws and regulations

Sub-step 1a.: Identification of alternatives to the project activity:
As per the applied ACM0002 version 16.0; Para 23, *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 plant and by the addition of new generation sources.* Therefore, continuation of the current situation is the only suitable alternative for the project activity. As per the CDM Validation and verification standard (paragraph 124, Ver. 09.0) "*where the baseline scenario is prescribed in the approved methodology, no further analysis is required*". As the project activity is an installation of a new grid connected renewable power plant, hence no further analysis on the alternatives is carried out.

Outcome of Sub-Step 1(a):
Hence the alternative to the project activity is the Continuation of the current situation.

Sub-Step 1b: Consistency with mandatory laws and regulations:
The PPs have chosen continuation of the current situation as the realistic and credible alternative(s) for the project activity. In India, for an investor, is not mandatory to put a wind power plant. Both the investors have choice to choose which technology he would like to invest in.

Outcome of Sub-Step 1(b):
The alternative scenario(s) to the project activity 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. Proceed to step 2 i.e. investment analysis.

Step 2: Investment analysis
Investment analysis is conducted for the project activity as per the applicable version of "Tool for the demonstration and assessment of additionality".

Sub-Step 2a: Determine appropriate analysis method:

As per "Tool for the demonstration and assessment of additionality" (version 07.0.0), for financial analysis of the project, the following three options are available:

1. Option I: Simple Cost Analysis
2. Option II: Investment Comparison Analysis
3. Option III: Benchmark Analysis

The project activity will have two revenue streams, i.e., revenue from the sale of electricity through the Energy Purchase Agreement and the income from the sale of VERs generated. Thus Option-1 (Simple Cost Analysis) cannot be used for the project activity.

Again, the Investment Comparison Analysis can only be used if there is more than one most realistic and credible alternative to the project activity. Since, continuation of the current situation is the only suitable alternative for the project activity; hence investment comparison analysis may not be appropriate.

As per Para 19 of "Guidelines on the Assessment of Investment Analysis, Version 05, EB 62, Annex 5", '*a benchmark approach is suited to the circumstances where the baseline doesn't require investment or is outside the direct control of the project developer, i.e. cases where the choice of the developer is to invest or not to invest'*.

Since, identified baseline for the proposed project activity is the same continuation of current practice (i.e. equivalent amount of energy would be generated by grid electricity system through its currently operating power plants and by new capacity addition) and which is outside the direct control of the project participant, **hence benchmark analysis (option III) is selected as the most appropriate method** for the proposed project activity's financial analysis.

The equity Internal Rate of Return (Equity IRR) has been chosen as the financial indicator for the investment analysis. As in this case, the baseline does not require investment and the choice of the developers is to invest or not to invest in this project, hence Equity IRR has been considered as indicator for the investment analysis. The purpose of the equity IRR calculation is to determine the final return on the initial equity investment. Therefore, Equity IRR could be the suitable indicator for PP to analysis the investment.

The Equity IRR calculation has been performed for both the investors (i.e. participants) separately.

Sub-step 2b: Option III. Apply benchmark analysis

As per the Guidelines on the Assessment of Investment Analysis, Version 05, EB 62, Annex 5, Required/expected returns on equity are appropriate benchmarks for equity IRR. As in the project activity, equity IRR has been chosen as the financial indicator, return on equity is the appropriate benchmark.

Further, as per para 13 of the guideline states that "*In the cases of projects which could be developed by an entity other than the project participant the benchmark should be based on parameters that are standard in the market*". Since the project could be developed by an entity other than the project participant, the benchmark is calculated based on parameters that are standard in the market.

Additionally, para 15 of the guideline also states that "*If the benchmark is based on parameters that are standard in the market, the cost of equity should be determined either by: (a) selecting the values provided in Appendix A; or by (b) calculating the cost of equity using best financial practices, based on data sources which can be clearly validated by the DOE, while properly justifying all underlying factors*."

Accordingly, the cost of equity is being determined using approach (a) wherein a value of cost of equity is provided in Appendix A. However, as per paragraph 7 of the appendix to the guidelines, the default values provided in the appendix are real term values that can be converted to nominal values by adding the inflation rate.

The default value for expected return on equity for energy industry in India in real term rates as per appendix to the Guidelines on the assessment of investment analysis is 11.75%.

The long-term inflation forecast from Reserve Bank of India which is the central bank of the host country provides the inflation forecast over the next ten years. The inflation expected over the

next ten years (duration of crediting period) is 6.0 [8] reflected at the time of investment decision (applicable for both the investors as their investment decision date were in the same month).

Therefore, the expected return on equity in nominal terms is 11.75% + 6.0% = **17.75%** and is selected as the **Cost of Equity Benchmark**.

Sub-step 2c: Calculation and comparison of financial indicators

The investment analyses are performed for both the investors separately. All the input values, along with their source, used for the computation of post-tax equity IRR are applicable at the time of investment decision for the respective investors. The input parameters are provided in the IRR spreadsheets. The post-tax equity IRR computation worksheet will be provided to the DOE for validation.

The results of equity IRRs for both the investors and their compared benchmarks are as follows:

	Equity IRR	Benchmark
NSL Wind Power Company (Kayathar) Pvt. Ltd.	10.72%	17.75%
Jath Wind Energy Private Limited	10.89%	17.75%

As the results confirm, it is evident that the project activity is not financially viable[9].

Sensitivity Analysis

As per guidance 20 of Guidelines on the assessment of investment analysis, "*Only variables, including the initial investment cost, that constitute more than 10% of either total project costs or total project revenues should be subjected to reasonable variation".*The parameters therefore subjected to sensitivity analysis are:

- Project cost
- O&M cost
- PLF
- Power tariff

The results of sensitivity analysis are presented in details in the IRR spreadsheet.

The results show that project activity is not financially attractive on its own. The post-tax equity IRR of the project activity is below the chosen benchmark and the project activity is financially not attractive without additional revenues.

The details of Sensitivity Analysis are presented below:

For 37.5 MW Capacity by Kayathar:

Sensitivity Analysis (+/- 10% variation)			
Change in PLF	-10%	0%	10%
Equity IRR	7.46%	10.72%	14.95%

[8] http://www.rbi.org.in/scripts/PublicationsView.aspx?id=14917

[9] Please refer to final IRR sheets. As referred in the sheet, the investment analysis has been checked based on per MW capacity scenario as well as for 30 MW & 37.5 MW capacities; project remains additional at all capacity scenarios.

Change in Project cost	-10%	0%	10%
Equity IRR	14.31%	10.72%	7.97%
Change in Operation &Maintenance Expense	-10%	0%	10%
Equity IRR	11.05%	10.72%	10.36%
Change in Tariff	-10%	0%	10%
Equity IRR	7.63%	10.72%	14.02%

Sensitivity Analysis (Threshold values)				
Parameters	**Factor Value**	**At what percentage the IRR crosses the Benchmark Value**	**Factor value which reaches the benchmark value**	**Remarks**
PLF	20.0%	**19.60%**	23.90%	*The PLF in the region was evaluated by third party study and same is 20% estimated , however the PP has actual generation data from WTGs for year 2014 and 2015 and the actual PLF archived were 17. 57 % and 19.63% for respective years. This is well below the limit of 23.90%.*
Project cost	2575.00	**-17.30%**	INR 2129.53 Million	*The Project is already installed and actual cost INR 2581.85 Million is well above this break even value of INR 2129.53 Million.*
Operation & Maintenance Expense	40.00	**-220.00%**	INR -48.0 Million	*The project is already operational and actual O&M contract is signed as INR 20.00 Million, hence this is not reduced.*
Power Tariff	5.81	**21.10%**	7.04 INR/kWh	*The Project PPA has already been signed for 5.81 INR/kWh, which is fixed for 20 years from the date of commissioning of WTGs*

For 30 MW Capacity by Jath:

Sensitivity Analysis (+/- 10% variations)			
Change in PLF	-10%	0%	10%
Equity IRR	7.67%	10.89%	14.27%
Change in Project cost	-10%	0%	10%
Equity IRR	14.39%	10.89%	8.18%

Change in Operation &Maintenance Expense	-10%	0%	10%
Equity IRR	11.13%	10.89%	10.64%
Change in Tariff	-10%	0%	10%
Equity IRR	7.84%	10.89%	14.02%

Sensitivity Analysis (Threshold Values)				
Parameters	**Factor Value**	**At what percentage the IRR crosses the Benchmark Value**	**Factor value which reaches the benchmark value**	**Remarks**
PLF	20.0%	**19.40%**	23.90%	*The PLF in the region was evaluated by third party study and same is 20% estimated , however the PP has actual generation data from WTGs for year 2014 and 2015 and the actual PLF archived were 17. 57 % and 19.63% for respective years. This is well below the limit of 23.90%.*
Project cost	2074.80	**-17.20%**	INR 1717.93 Million	*The Project is already installed and actual cost is already over and above the project cost assumed.*
Operation &Maintenance Expense	24.00	**-290.00%**	INR - 45.60 Million	*The project is already operational and actual O&M contract is signed as INR 20.00 Million , hence , this is not reduced.*
Power Tariff	5.81	**20.80%**	7.02 INR/kWh	*The Project PPA has already been signed for 5.81 INR/kWh, which is fixed for 20 years from the date of commissioning of WTGs*

Step 4: Common practice analysis

Unless the proposed project type has demonstrated to be first-of-its kind (according to Sub-step 3a), and for measures different from those listed in paragraph 6 the above generic additionality tests shall be complemented with an analysis of the extent to which the proposed project type (e.g. technology or practice) has already diffused in the relevant sector and region.

The project activity is not first-of-its kind and also not a measure listed in paragraph 6 of the tool. Therefore, the common practice analysis is carried out as mentioned below[10].

[10]The common practice analysis has been carried out for the entire project activity capacity of 67.5 MW.

Since the project activity comes under option b (ii) of para 13 of the *Tool for the demonstration and assessment of additionality*, version 7.0.0, Project Participant has used **Sub-step 4 (a)** to demonstrate common practice analysis.

The project activity is a power generation based on renewable energy, which falls under measures listed in definition section of *"Tool for the demonstration and assessment of additionality".* Hence, sub step 4a is been followed and latest version of Guidelines on Common Practice Version 3.1 approved in EB 84 Annex 07 is been used.

The guidance states that *"Projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc".* Therefore, activities similar to the proposed project activity have been selected based on the following assumption:

For Common practice analysis, Version 3.1 of the guidelines on common practice has been used. As per the guideline the following steps have been followed:

Step 1: calculate applicable capacity or output range as +/-50% of the total design capacity or output of the proposed project activity:

The proposed project activity is of total capacity 67.5 MW. Considering +/- 50% of the project activity capacity the output range to be considered for the common practice analysis, the capacity ranges for assessment is 33.75 MW to 101.25 MW.

The following steps are, therefore conducted for both the capacity range separately.

Step 2: identify similar projects (both CDM and non-CDM) which fulfil all of the following conditions:

a. The projects are located in the applicable geographical area
b. The projects apply the same measure as the proposed project activity
c. The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity
d. The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant
e. The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1 (for both the capacity range)
f. The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity.

Justifications:

a) In line with the Para 1of the "GUIDELINES ON COMMON PRACTICE", PP can choose a specific geographical area (such as province, region, etc.), within the host country. Hence, the Maharashtra state of India has been chosen as the applicable geographical area. Hence, projects in the Maharashtra state have been chosen for analysis.

Justification for the choice of geographical area for the project activity:

The Electricity Act 2003, which came into effect from June 10, 2003, replaced all the acts governing the Indian power sector. Since this Act is applicable to the project activity, all projects commissioned before 2003 have not been considered for the common practice analysis.

Every state in India has its own State Electricity Regulatory Commission. The policy / regulations for each state are unique and different from the others. For example parameters like tariff, regulatory frameworks and investment climate varies from state to state in Indian. Hence only the projects located in Maharashtra can be compared with the project activity. The proposed project activity is governed by the policy /regulations of Maharashtra Electricity Regulatory Commission. Wind projects in other states will follow their respective policy / regulations and will be different from that of the proposed project activity. Also, the geographic condition (i.e. PLF availability) also varies from state to state which eventually impacts the electricity generation and subsequently on revenues. **In line with the aforesaid guidelines, the investment climate and geographic condition in the state of Maharashtra is different from that of other states in India. Therefore, the applicable geographical area for common practice analysis has been limited to the state of Maharashtra alone and for projects commissioned after 2003.**

b) The proposed project is a wind power project supplying electricity to the grid. Hence, similar projects in the capacity range which use the same source of energy and apply the same measure have been selected.

c) The energy source used by the project activity is wind. Hence, only wind energy projects have been considered for analysis.

d) The plants which produce goods or services with comparable quality, properties and applications have been considered.

e) The projects within the applicable capacity range have been considered.

f) The projects which started commercial operations before the start date of the proposed project activity have been considered as the project start date is before the date of global stakeholder consultation.

Thus, all wind power plants which supply electricity to the grid in the Maharashtra state, within the applicable capacity range and commissioned before the project start date have been considered. From Indian wind energy directory (2013) and with the help of CDM pipeline database, 33 projects were found to satisfy the capacity range between 33.75 MW – 101.25 MW, grid connected wind power projects and installed in the Maharashtra state before project start date.[11]

Step 3: Within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number "N_{all}".

[11] A detail common practice analysis worksheet has been provided to DOE for validation, please refer to the version 02, dated 25/02/2016.

All the project activities identified in Step 2 are already registered/under validation stage of CDM[12].

Therefore, N_{all} = 0

Step 4: within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number N_{diff}

As per paragraph 4 of guideline on common practice, "*Different technologies are technologies that deliver the same output and differ by at least one of the following (as appropriate in the context of the measure applied in the proposed clean development mechanism (CDM) project activity and applicable geographical area):*"

a. Energy source/fuel
b. Feed stock
c. Size of installation (power capacity)/energy savings:
d. Investment climate on the date of the investment decision,
e. Nature of the investment

Since no projects has been identified under N_{all}, N_{diff} found to be zero.

Hence N_{diff} = 0

Step 5: calculate factor $F=1-N_{diff}/N_{all}$ representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity

F = 1 - (0/0)

Thus, for both the capacity ranges the results are same, i.e. F = 1, and (N_{all} – N_{diff})= 0.

As per paragraph 4 of guideline on common practice, the proposed project activity is a common practice within a sector in the applicable geographical **area if both the following conditions are fulfilled:**

(a) The factor F is greater than 0.2, and
(b) N_{all} - N_{diff} is greater than 3.

In this case, though the factor is F>0.2, but the difference of "N_{all} - N_{diff}" is less than 3, hence the project activity is not common practice in the region. Therefore, the project activity cannot be considered as a common practice within the applicable geographical area.

[12]Projects under CDM have been sourced from CDM pipeline.

This proves that similar activities are not widely observed or commonly carried out. Therefore the project activity is not a common practice.

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

2.6 -Methodology Deviations

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

3 ESTIMATED 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 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 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 5.0) 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 CO_2emissions 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 CO_2 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 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:

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

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[13] (Version 10.0, Dec 2014) for the last three years is as follows.

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 database[14] (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 0.9857[15] 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:

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

Where:

$EF_{grid,BM,y}$ - Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EG_{m,y}$ - Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$ - CO_2 emission factor of power unit m in year y (tCO_2/MWh)
m - Power units included in the build margin
y - Most recent historical year for which power generation data is available

[13] http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver10.pdf

[14] http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver10.pdf

[15] ER sheet will be provided separately with detail calculation.

The CO_2emission 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 ($\mathbf{EF_{grid,BM,y}}$) for the year 2013-14 (most recent year) for NEWNE grid is 0.9495 tCO_2/MWh

STEP 6. Calculate the combined margin emissions factor

The emission factor *EFy*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 $\boldsymbol{EF_{gridOM,y}}$and $\boldsymbol{EF_{gridBM,y}}$, then the *EFy*is given by:

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

Where:

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

= 0.9767 tCO_2/MWh

3.2 Project Emissions

There is no project emission associated with the project activity.

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3.3 Leakage

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

3.4 Estimated Net GHG Emission Reductions and Removals

Baseline Emission Reduction is calculated as:

BE_y = $EG_{facility,y}$* $EF_{grid,CM,y}$
= 118,260 *0.9767
= 115,504 tCO_2e

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

Therefore, Net Emission Reductions are:

ER_y = $BE_y - PE_y$
= 115,504 - 0
= 115,504 tCO_2e

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

Year	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)
Year 1	115,504	0	0	115,504
Year 2	115,504	0	0	115,504
Year 3	115,504	0	0	115,504
Year 4	115,504	0	0	115,504
Year 5	115,504	0	0	115,504
Year 6	115,504	0	0	115,504
Year 7	115,504	0	0	115,504
Year 8	115,504	0	0	115,504
Year 9	115,504	0	0	115,504
Year 10	115,504	0	0	115,504
Total	1,155,040	0	0	1,155,040

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. The following table contains the available data & parameters

Data / Parameter	$EF_{grid,OMsimple,y}$
Data unit	tCO_2/MWh
Description	Operating margin CO_2 emission factor of NEWNE grid
Source of data	Central Electricity Authority:CO_2 Emission Database CEA CO_2 Baseline database Version 10
Value applied:	0.9857
Justification of choice of data or description of measurement methods and procedures applied	The operating margin emission factor is a 3-year generation-weighted average data, based on the most recent data available on CEA database at the time of submission of the VCS-PDD to the DOE for validation. Data compiled in CEA CO_2 CDM database is in line with the requirements Version 5.0 of "Tool to calculate the emission factor for an electricity system".
Purpose of Data	Calculation of baseline emissions
Comments	This parameter is calculated ex ante and remains fixed during the crediting period.

Data / Parameter	$EF_{grid,BM,y}$
Data unit	tCO_2/MWh
Description	Build margin CO2 emission factor of NEWNE grid
Source of data	Central Electricity Authority:CO_2 Emission Database CEA CO_2 Baseline database Version 10
Value applied:	0.9495
Justification of choice of data or description of measurement methods and procedures applied	The build margin emission factor is the most recent data available from CEA CO_2 Baseline database. Data compiled in CEA CO_2 CDM database is in line with the requirements Version 5.0 of "Tool to calculate the emission factor for an electricity system".
Purpose of Data	Calculation of baseline emissions
Comments	The build Margin would be calculated ex ante and fixed during the crediting period.

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO_2/MWh
Description	Combined margin CO_2 emission factor of NEWNE grid
Source of data	Central Electricity Authority:CO_2 Emission Database CEA CO_2 Baseline database Version 10
Value applied:	0.9767
Justification of choice of data or description of measurement methods and procedures applied	The combined margin emissions factor is calculated as follows: $EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$ The following default values should be used for $w_{OM}$and w_{BM}: For Wind power generation project activities: w_{OM}= 0.75 and w_{BM} = 0.25 for the selected crediting period Data compiled in CEA CO_2 CDM database is in line with the requirements Version 5.0 of "Tool to calculate the emission factor for an electricity system".
Purpose of Data	Calculation of baseline emissions
Comments	The Combined Margin would be calculated ex ante and fixed during the crediting period.

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 as per the following tables of data and parameters:

Data / Parameter	**$EG_{facility,y}$**
Unit	MWh
Description	Quantity of Net Electricity exported to the grid by the project WTGs (i.e. total 40 WTGs) to the grid during the year y.
Source of data	Calculated

Description of measurement methods and procedures to be applied	This parameter is calculated based on the measured parameters those are continuously measured and monthly recorded. **Metering at common metering point:** The electricity generated by the project activity WTGs along with non-project WTGs are metered at feeder-wise common metering point. The metering point consists of a main meter& check meter, having accuracy of 0.2s. The meters measures parameters like export & import for all the connected WTGs. The export reading for a given metering point for a given billing month is obtained by subtracting initial reading (taken in previous month) from the final reading (taken in billing month). The difference is multiplied by the applicable meter multiplication factor. Similar procedure is followed to arrive the import reading. The monitoring & measurement[16]of electricity at project metering point is being done on continuous basis; while recording is being done on monthly basis as Joint Meter Reading by the representatives of State Utility & PP. **Calculation of net electricity export to the grid by project activity WTG:** The export & import by the project activity WTG connected to the metering point is calculated by apportioning of the electricity at feeder level by the state utility. The apportioning of the electricity is based on the controller reading of project activity WTG, controller reading for all WTGs connected at the given metering point and the electricity reading (export, import etc) recorded by the main meter at the given metering point on monthly basis. It gives monthly values of export & import for project activity WTG. The net export for any given month by the project activity WTG to the grid is then obtained by subtracting import from export. Thus: $\mathbf{EG_{facility,y}}=\sum EG_{JMR,\ project,\ export} - \sum EG_{JMR,project,\ import}$ (Here $\mathbf{EG_{JMR,\ project,\ export}}$ & $\mathbf{EG_{JMR,\ project,\ import}}$ signifies values related to all WTGs included in the project activity, i.e WTGs from both the participants - NSL Wind Power Company (Kayathar) Pvt. Ltd. &Jath Wind Energy Private Limited) The value of the monthly net electricity delivered to the Grid by the project activity WTG is aggregated annually to get quantity of net electricity supplied by the project plant/unit to the grid in year y i.e. ($\mathbf{EG_{facility,y}}$). Note: The apportioning of the electricity is the responsibility of the state utility & same is beyond the control of the PP.

[16] The meters are capable of measuring the electricity parameters (export, import etc.) on real time basis. It complies

Frequency of monitoring/recording	Monthly recording.
Value(s) applied	118,260
Monitoring equipment	Not applicable as the parameter is calculated
QA/QC procedures	The quantity of net electricity supplied will be cross-verified from the invoices raised on MSEDCL by the project participant. QA/QC procedures will be as implemented by DISCOM pursuant to the provisions of the power purchase agreement and there will be no additional QA/QC procedures.
Purpose of data	Used to calculate baseline emissions
Calculation method	Calculation method is described in detail in section 4.3.
Comments	Date will be archived for crediting period plus two years after the end of Crediting period.

Data / Parameter	**$EG_{JMR, Project, export,y}$**
Unit	MWh
Description	Quantity of Electricity exported by the Project WTGs connected to the feeder i to the grid during the year y.
Source of data	Monthly statements/credit notes issued by Maharashtra State Electricity Distribution Co. Ltd. (MSEDCL).
Description of measurement methods and procedures to be applied	Quantity of electricity export would be calculated using the apportioning procedure as described in section 4.3.
Frequency of monitoring/recording	Monthly recording
Value(s) applied	118,260
Monitoring equipment	Calculated parameter, hence no monitoring equipment is required.
QA/QC procedures	The value is calculated and can be cross checked from the invoices raised on the state utility. The monitoring frequency of the data parameter will be on monthly basis.
Purpose of data	Used to calculate baseline emissions
Calculation method	Calculation method is described in section 4.3.
Comments	Date will be archived for crediting period plus two years after the end of Crediting period

Data / Parameter	**$EG_{JMR, Project, import,y}$**
Unit	MWh
Description	Quantity electricity imported by the Project WTGs connected to the feeder i from the grid during the year y.

the hourly measurement requirement as per the monitoring methodology

Source of data	Monthly statements/credit notes issued by Maharashtra State Electricity Distribution Co. Ltd. (MSEDCL).
Description of measurement methods and procedures to be applied	Quantity of electricity import would be calculated using the apportioning procedure as described in section 4.3.
Frequency of monitoring/recording	Monthly recording
Value(s) applied	0 (will be monitored and taken on actuals)[17]
Monitoring equipment	No monitoring equipment is required
QA/QC procedures	The value is calculated and can be cross checked from the invoices raised on the state utility. The monitoring frequency of the data parameter will be on monthly basis.
Purpose of data	Used to calculate baseline emissions
Calculation method	Calculation method is described in section 4.3.
Comments	Date will be archived for crediting period plus two years after the end of Crediting period

Data / Parameter	**$EG_{Controller,gen}$**
Unit	MWh
Description	Quantity electricity generated by the project activity WTGs recorded at respective controller meters
Source of data	Monthly operating logs recorded in electronic format by O&M contractor
Description of measurement methods and procedures to be applied	The value is recorded continuously by the online monitoring station. This reading can also be seen in the electronic panel installed inside the WTG tower. The LCS meter(Controller meter) do not require calibration as the energy readings of electricity generated at the LCS meter is cross verified by the energy calculated by inverting system installed in the WEGs. In case there is any mismatch in the energy values recorded by the Panel meter and the energy values calculated by the inverting system; the machine will stop working and generate the error report. The operations and maintenance staff will attend to the problem immediately in order to identify and correct the error.
Frequency of monitoring/recording	Continuous monitoring and Monthly recording
Value(s) applied	-
Monitoring equipment	LCS meter (Controller Meter)

[17] The value is considered to be zero for simplicity of ex-ante emission reduction calculations, and it can't be predicted at the time of validation. However, during the crediting period the actual export and import to/from the grid will be monitored and considered for the calculation of emission reduction.

QA/QC procedures	This data parameter will be logged electronically on a monthly basis by O&M contractor on its online portal. The value of this parameter shall be compared with the value of $EG_{PJ,y}$ and the conservative approach would be taken by the PP for estimating the net electricity supplied value for the calculation of emission reduction..
Purpose of data	Used to calculate baseline emissions
Calculation method	Not applicable
Comments	Date will be archived for crediting period plus two years after the end of Crediting period

4.3 Monitoring Plan

As per approved monitoring methodology ACM0002 / Version 16.0, **'Net electricity generation from the project activity'** is required to be monitored.

As the emission reductions from the project are determined by the number of units exported to the grid by the project activity it is mandatory to have a monitoring system in place and ensure that the project activity produces and supplies the rated power at the stipulated norms.

The purpose of the monitoring plan is to define the organizational structure of the monitoring team, monitoring practices, QA and QC procedures and archiving procedures. The monitoring plan will ensure that the emission reductions from the project activity are reported accurately and transparently.

Since the baseline methodology is based on ex ante determination of the baseline, the monitoring of operating margin emission factor and build margin emission factor is not required. Further, wind based electricity generation is not associated with any kind of leakages. Hence, the sole parameter for monitoring is the electricity generated by the project and supplied to the grid.

Monitoring at common metering point:

Quantity of electricity generated and supplied to the grid by the all the WTGs (project activity WTGs and non-project WTGs) connected to the particular feeder will be measured through the energy meters (Main Meter and Check Meter) installed at the substation. The meter readings at the substations are taken jointly by the representatives of Project participant representative and Maharashtra State Electricity Distribution Company Limited (MSEDCL) representative and recorded in the JMR.

The metering equipment is duly approved, tested and sealed by MSEDCL. The metering equipment (consisting of the Main Meter and the Check Meter) is identical in make and technical standards and is of 0.2% accuracy class. They comply with the requirements of the Electricity Rules.

The MSEDCL carries out the calibration, periodical testing, sealing and maintenance of meters in the presence of PPs representative. The frequency of meter testing is once in 3 years. All meters are tested only at the Metering Point.

Metering Equipment and Metering Arrangement Information and Emergency preparedness:

- The meters are two-way meter and measure the electricity import and export and give the net electricity.
- As per the Power Purchase Agreement entered into with the electricity distribution utility, there will be two meters, one main meter and one backup meter. Both meters would be two-way export import meters that measure both export and import of electricity and provide net electricity exported to the grid.
- In case the meters are found to operate outside the permissible limits, the meters will be either replaced immediately or calibrated. Whenever a main meter goes defective, the consumption recorded by the backup meter will be referred.
- If main as well as back up metering system becomes defective, the details of the malfunctioning along with date and time and snaps shot parameters along with load survey will be retrieved from the main meter. The exact nature of the malfunctioning will be determined after analysing the data so retrieved and the consumption recorded by the main meter will be adjusted accordingly.
- The main meter readings are apportioned based upon the LCS meter readings from the individual WTGs to compute net electricity supplied from individual WTGs. The LCS meter readings of project activity WTGs are archived electronically on continuous basis. Joint meter reading at the DISCOM substation is noted each month. Therefore cumulative LCS meter reading for each month is used for purpose of allocation of net electricity supplied to the grid from the project activity.
- Both main and check meters will be calibrated once in 3 years.

Project proponents have signed "Operation and Maintenance" contracts with the respective suppliers, i.e. ReGen Power Tech Private Limited and INOX Wind Limited to operate the wind mills for a period of ten years from the date of commissioning of each WTG. The performance of the mills, safety in operation and scheduled /breakdown maintenances are organized and monitored by the contractor. The technology providers will monitor the generation of the WTG daily on a regular basis and will maintain a log book recording daily generation details for each WTG comprising the project, as metered at the wind farm.

Apportioning Procedure followed:

The allocation of the net electricity supplied to the grid by the project activity is done based on the joint meter readings taken at the DISCOM substation & LCS meter readings of individual WTGs. Apportioning procedure is applied is explained in below:

$EG_{JMR, Export}$ = Electricity exported by all the WTGs (project WTGs & non-project WTGs), as recorded by the main meter at the substation

$EG_{JMR, Import}$ = Electricity imported by all the WTGs (project WTGs & non-project WTGs), as recorded by the main meter at the substation

$EG_{Controller, gen}$ = Electricity exported by a project WTG, as measured at the controller

$EG_{Controller, gen, total}$ = Electricity exported by all the WTGs (project activity & non project activity) connected to the main meter at the substation, measured at the controller of each WTG

$\sum EG_{Controller, gen}$ = Summation of electricity generated by the project activity WTGs recorded at respective LCS meters.

$EG_{JMR, Project, export}$ = Electricity exported by a WTG to the grid, calculated

$EG_{JMR, Project, import}$ = Electricity imported by a WEC from the grid, calculated.

Electricity exported by each WTG is apportioned on the basis of electricity exported recorded at the controller of each WTG and the electricity exported at the main meter and mentioned in the JMR. The export multiplication factor is calculated as follows-

Export Multiplication Factor = $EG_{JMR, Export} \div EG_{Controller, gen, total}$ …….. (1)

Thus the energy exported by a WTG to the grid is given by the equation-

$\mathbf{EG_{JMR, NSL, export}}$ = Export Multiplication factor X $\sum EG_{Controller, gen}$…….. (2)

As the controller meter doesn't record import, the apportioning of energy imported by each WTG is also done on the basis of electricity exported recorded at the controller of each WTG and the electricity imported at the main meter and mentioned in the JMR. The import multiplication factor is calculated as follows-

Import Multiplication Factor = $EG_{JMR, Import} \div EG_{Controller, gen, total}$ …….. (3)

Thus the energy imported by a WTG to the grid is given by the equation-

$\mathbf{EG_{JMR,Project, import}}$ = Import Multiplication factor X $\sum EG_{Controller, gen}$ …….. (4)

The net electricity exported by the WTGs of the project is given by the equation-

$\mathbf{EG_{facility,y}} = \sum \mathbf{EG_{JMR, Project, export}} - \sum \mathbf{EG_{JMR, Project, import}}$…….. (5)

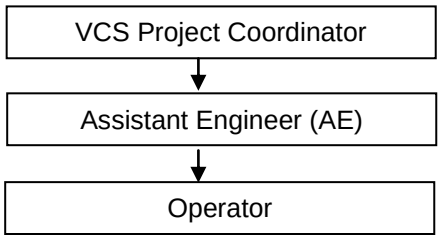
$\sum EG_{JMR, NSL, export} = \mathbf{EG_{JMR, Project, export, y}}$

$\sum EG_{JMR, NSL, import} = \mathbf{EG_{JMR, Project, import, y}}$

Based on the above calculation, a monthly statement/credit note is prepared and signed by the representatives of PP and endorsed by the state utility (MSEDCL) . The statement mentions the total electricity exported to grid, total electricity imported from the grid and the net electricity supplied. The net electricity supplied is calculated as the difference of the total electricity exported to grid and total electricity imported from the grid by the project activity.

Upon receipt of the "Monthly Statement/credit note", Project participant generates invoices on sale of electricity and sends to respective district level MSEDCL office and MSEDCL makes payments against the invoices. The value of net electricity supplied can be cross checked with the monthly invoices.

The operational and management structure implemented for data monitoring is as follows:



The day to day operation of the WTGs at the ground level is looked after by the operator. The operator reports to the Assistant Engineer (AE) - Wind Farm, who is responsible for collecting the required information from the operator. The AE – Wind Farm records the generation on a daily basis for each service connection point and reports the cumulative generation to the Management. VCS Project coordinator will be responsible for assessment of emission reduction achieved every year and documentation of the same.

Personnel training: The training for operating and maintaining the plant will be provided by the technology suppliers.

Data collection and archiving:

The daily data at the site is collected in electronic form. Monthly data is collected and maintained in hard copies. The project proponent shall keep complete and accurate records of all the data as a part of monitoring for at least a period of 2 years after the end of the crediting period or the last issuance of VERs for the project activity, whichever occurs later.

NOTE:

As per the monitoring plan, the monitoring parameters $EG_{JMR, project, export, y}$, $EG_{JMR, project, import, y}$ and $EG_{facility,y}$ to be calculated based on the generation data of other project activities connected to the same substation. Since the generation data of other project activities is only available with the O&M contractor, apportioning cannot be done by PP and hence the other parameters $EG_{JMR, Export}$,$EG_{JMR, Import}$ and $EG_{Controller, gen, total}$ are not included in section 4.2 of the PD.

Thus, the monitoring plan is complete, accurate and in line with actual metering and monitoring arrangement finalised by DISCOM in consultation with State Electricity Regulatory Commission.

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 Project Participants have invited different stakeholders to attend Stakeholders consultation rounds (commonly called as stakeholders meeting) to explain the proposed project activity and benefits associated with it. Also the purpose of the meetings was to understand the views of the local stakeholders, their comments and feedback for the project.

For both the project participants, the stakeholder's consultation has been carried out in common. Hence, information related to the stakeholders meeting are reported in common in this section,

✓ **Summary:**

All the stakeholders have been invited through the News Paper advertisement; Dated: 23/01/2014. The documentary evidence towards the same has been submitted to the DOE during validation. Project Participants have requested all the stakeholders to attend the meeting on 06/02/2014 at the Project Site in Jath Taluka, Sangli district, Maharashtra. The objective of the meeting was to discuss and record their comments on the project activity.

The stakeholders identified for the project activity are as follows:
1. Local villagers
2. Local Gram Panchayat Members
3. Employees of NSL Wind Power Company (Kayathar) Pvt. Ltd, and Jath Wind Energy Pvt. Ltd

The opinion of the institutional stakeholder is reflected in the form of approvals and clearances granted for the project activity. The project promoters have sought and obtained the necessary regulatory clearances for setting up of the project activity. The residents of neighbouring villages, the contractors and the employees were identified as the important local stake holders for the project activity.

In the meeting, the stakeholders were briefed about the project activity in the local language and were informed as to how power is generated using wind energy. They were then informed about global warming and its causes and the effects. Subsequently, they were introduced to the concept of CDM and how it is helping the world in mitigating Green House Gas emissions. The stakeholders were then invited to provide their comments on how the project activity had affected their lives and about their expectations from the project activity.

Summary of comments received:
The local villagers and the contractors expressed their happiness with the setting up of the power project in their village as it had resulted in generation of business opportunities for the local people. They were also happy because by setting up of wind power plant, the quality of power supply would also improve and would also help in improvement in agricultural activities.

Report on consideration of comments received:
No negative comments were received from any of the stakeholders which mandated an action on the part of the project promoters.

All the documents related to stakeholders meetings have been made available for validation. The sample copies of invitation, attendance, Comments etc. are listed under the Appendix 2.

7 ACHIEVED GHG EMISSION REDUCTIONS AND REMOVALS

7.1 Data and Parameters Monitored

The information related to all data and parameters that will be monitored during the project crediting period shall be as per the following tables of data and parameters:

Data / Parameter	$EG_{facility,y}$	
Data unit	MWh	
Description	Quantity of Net Electricity exported to the grid by the project WTGs (i.e. total 60 WTGs) to the grid during the year y.	
Value applied:	NSL Wind Power Company (Kayathar) Pvt. Ltd.	24,740.41
	Jath Wind Energy Private Limited	2201.27
	Total (MWh)	26941.68
Comments	Date will be archived for crediting period plus two years after the end of Crediting period.	

Data / Parameter	$EG_{JMR, Project, export,y}$	
Data unit	MWh	
Description	Quantity of Electricity exported by the Project WTGs connected to the feeder I to the grid during the year y.	
Value applied:	NSL Wind Power Company (Kayathar) Pvt. Ltd.	24,783.49
	Jath Wind Energy Private Limited	2219.51
	Total (MWh)	27003.00
Comments	Date will be archived for crediting period plus two years after the end of Crediting period	

Data / Parameter	$EG_{JMR, Project, import,y}$	
Data unit	MWh	
Description	Quantity electricity imported by the Project WTGs connected to the feeder i from the grid during the year y.	
Value applied:	NSL Wind Power Company (Kayathar) Pvt. Ltd.	43.08
	Jath Wind Energy Private Limited	18.24

	Total (MWh)	61.32
Comments	Date will be archived for crediting period plus two years after the end of Crediting period	

Data / Parameter	**EG** $_{Controller, gen}$	
Data unit	MWh	
Description	Quantity electricity generated by the project activity WTGs recorded at respective controller meters	
Value applied:	NSL Wind Power Company (Kayathar) Pvt. Ltd.	25679.78
	Jath Wind Energy Private Limited	2431.49
	Total (MWh)	28111.27
Comments	Date will be archived for crediting period plus two years after the end of Crediting period	

7.2 Baseline Emissions

According to the methodology and VCS PD, 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 (tCO_2)
PE_y = Project emissions in year y (tCO_{2e})

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 project 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 project 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)

Emission reduction (ER) calculation for the period 30/03/2014 to 31/01/2016 (including first and last day):

BE_y = $EG_{facility,y}$* $EF_{grid,CM,y}$
= (24,740.41 MWh +2,201.27) * 0.9767 tCO_2e/MWh
= 26,313 tCO_2e (values rounded down)

Note: All the project WTGs were commissioned between 30/03/2015 to 31/10/015.However the WTGs could not be synchronized with grid till June 2015.Hence the generation started from July 2015 onwards is considered for emission reductions calculations.

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

Therefore, Net Emission Reductions are:

ER_y = $BE_y - PE_y$
= 26,313 - 0
= 26,313 tCO_2e

7.3 Project Emissions

There is no project emission associated with the project activity.

7.4 Leakage

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

7.5 Net GHG Emission Reductions and Removals

The details of net emission reductions year-wise are provided in the table below:

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
Year 2014	0	0	0	0
Year 2015	23,264	0	0	23,264
Year 2016	3,049	0	0	3,049
Total	26,313	**0**	**0**	26,313

APPENDIX 1: TECHNICAL SPECIFICATION

Technical Specification of WTGs:

1) WTGs supplied by ReGenPowertech:

ReGenPowertech	VENSYS 87
POWER	
Rated power	1500 kW
Cut-in wind speed (10 min. mean)	3 m/s
Rated Wind Speed (10 min. mean)	approx. 12 m/s
Cut-out wind speed (10 min. mean)	22 m/s
Survival wind speed	52.5 m/s
Generator	Variable Speed, Multi-pole Synchronous with Permanent Magnet Excitation
ROTOR	
Diameter	87
Swept area	5942 sq. m
Speed range (variable)	9 to 17.3 rpm
TOWER AND FOUNDATION	
Hub height	85 m
Design	Tubular, Four sections
Foundation type	Floating foundation
CONTROL AND SAFETY SYSTEMS	
Control of output	Pitch Regulation
Speed control	Variable, Micro-controller based
Low Voltage Ride Through (LVRT)	3 seconds
Primary brake system	Aerodynamic Brake, Single Pitch Control/triple redundant
Pitch System	Electromechanical, Maintenance Free Toothed Belt Drive (Patented)
Remote Monitoring	VPN, Visualization via web-browser
TYPE CLASSES	
Wind turbine type class	GL III B

2) WTGs supplied by INOX Wind:

No. of WTGs[18] - 15	
INOX WIND - MODEL[19] WT 2000 DF	
OPERATING DATA	
Rated power	2000 kW
Cut-in wind speed	3 m/s
Rated wind speed	11.5m/s
Cut-out wind speed	20 m/s
Survival wind speed	52.5 m/sec
Hub height	80 meters
Type class	TC IIIB
Rotor speed	15.9 RPM
Operational mode	Variable speed
Design Standards	Germanischer Lloyd
ROTOR	
Pitch system	Pitch control- electrical, variable speed inverters, power back up with ultra capacitor
Diameter	93 meters
Swept area	6785 sq meters
Blade material type	Epoxy glass fibre
GENERATOR	
Type	Double fed induction generator
Rated power	2000 kW
Rated voltage	690 V AC, 3 Phase
Frequency	50 Hz
Cooling system	Water Cooled
Insulation	Class H
BRAKING SYSTEM	
Aerodynamic brake	Full span independent blade pitching
Mechanical brake	Disc brakes
DRIVE TRAIN	
Drive train	Patented integral drive train with rotor shaft and drive train as single unit

[18] Arrangement of project activity & monitoring points is detailed in the Project Boundary diagram under section B.3

[19] http://www.inoxwind.com/technical-data.html

Rated drive torque	1280 kNm
Maximum static torque	2235 kNm
Type of gearing	Two planetary and one parallel shaft gear
Transmission ratio	1: ~ 114.7
Gear lubrication	Forced lubrication
Connection gear / generator	Flexible coupling
YAW SYSTEM	
Type	Driven by 4 gear motors
Bearings	Slide bearings
TOWER	
Type	Conical tubular steel tower
Tower Height	78 meters
Corrosion protection	Protective paint
Average Lifetime	20 years (Reference – CA letter & Technology Provider Specification)

APPENDIX 2: COMMISSIONING DATES OF THE WTGs

WTG ID ref.	Date of Commissioning
NSL Wind Power Company (Kayathar) Pvt. Ltd.	
NSL P1-332	30/03/2014
NSL P1-408	30/03/2014
NSL P1-186	31/03/2014
NSL P1-331	31/03/2014
NSL P1-179A	31/03/2014
NSL P1-179	31/03/2014
NSL P1-310	31/03/2014
NSL P1-1001	31/03/2014
NSL P1-1000	31/03/2014
NSL P1-1028	31/03/2014
NSL P1-95	31/03/2014
NSL P1-930	31/03/2014
NSL P1-229	31/03/2014
NSL P1-929	31/03/2014
NSL P1-276	31/03/2014
NSL P1-1034	31/03/2014
NSL P1-1078/1	31/03/2014
NSL P1-169A	03/10/2015
NSL P1-1698	03/10/2015
NSL P1-252A	03/10/2015
NSL P1-252B	03/10/2015
NSL P1-407	03/10/2015
NSL P1-216	03/10/2015
NSL P1-236	03/10/2015
NSL P1-171,172	31/10/2015
Jath Wind Energy Private Limited	
MVT-10	30/03/2014
MVT-11	30/03/2014
MVT-45	30/03/2014
MVT-61	30/03/2014
MVT-62	30/03/2014
MVT-63	30/03/2014
MVT-05	30/03/2014
MV2T-2	31/03/2014
MV2T-41	31/03/2014
MV2T-28	31/03/2014
MV2T-42	31/03/2014
MV2T-15	31/03/2014
MV2T-17	31/03/2014
MV2T-3	31/03/2014
MV2T-37	31/10/2015

APPENDIX 3: ENERGY METERS CALIBRATION DETAILS

For Jath Wind Energy Private Limited:

Metering Points	Meter Details					Test Result
	Serial no	Make	Type	Accuracy class	Date of Calibration	
FEEDER No. 3	Main meter – HT01140155 Check meter – HT01140156	WALLABY	MK6E	0.2S	30/03/3014	Satisfactory
FEEDER No. 4	Main meter – HT01140157 Check meter – HT01140158	WALLABY	MK6E	0.2S	30/03/3014	Satisfactory

For NSL Wind Power Company (Kayathar) Pvt. Ltd.:

Metering Points	Meter Details					Test Result
	Serial no	Make	Type	Accuracy class	Date of Calibration	
FEEDER No. 5	Main meter – HT01131245 Check meter – HT01131246	WALLABY	MK6E	0.2S	30/03/3014	Satisfactory
FEEDER No.6	Main meter – HT01131248 Check meter – HT01131249	WALLABY	MK6E	0.2S	30/03/3014	Satisfactory