



199.70 MW WIND PROJECT IN MAHARASHTRA BY BWDPL



Document Prepared by EKI Energy Services Limited

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Prepared By	Tapti Saha Asst. Manager Operations- EKI Energy Services Limited
Contact	EnKing Embassy, Office No. 201, Plot 48, Scheme 78, Part 2 Vijay Nagar, Near brilliant Convention Centre, Indore- 452010 Madhya Pradesh, India Website: www.enkingint.org Email ID: tapti@enkingint.org T: +91 731 42 89 086, M: +91 8017028148

CONTENTS

1	PROJECT DETAILS.....	3
1.1	Summary Description of the Implementation Status of the Project	3
1.2	Sectoral Scope and Project Type	3
1.3	Project Proponent	3
1.4	Other Entities Involved in the Project	4
1.5	Project Start Date	4
1.6	Project Crediting Period	4
1.7	Project Location	4
1.8	Title and Reference of Methodology	8
1.9	Participation under other GHG Programs.....	8
1.10	Other Forms of Credit.....	8
1.11	Sustainable Development.....	9
2	SAFEGUARDS	9
2.3	AFOLU-Specific Safeguards	10
3	IMPLEMENTATION STATUS	10
3.1	Implementation Status of the Project Activity	10
3.2	Deviations	12
3.3	Grouped Projects	12
4	DATA AND PARAMETERS.....	12
4.1	Data and Parameters Available at Validation	12
4.2	Data and Parameters Monitored.....	13
4.3	Monitoring Plan.....	15
5	QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS	19
5.1	Baseline Emissions	19
5.2	Project Emissions	20
5.3	Leakage.....	20
5.4	Net GHG Emission Reductions and Removals.....	20
	APPENDIX 1: <METER CALIBRATION DETAIL>	21

1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The main purpose of this project activity is to generate clean form of electricity through renewable wind energy source. Bothe Windfarm Development Pvt. Ltd. is the promoter of the proposed project activity. The Project activity envisages implementation of 40 WTGs of individual capacity 2 MW each, and 57 WTGs of individual capacity 2.1 MW each, in the state of Maharashtra. The technology employed is of Suzlon Energy Limited (2.1 MW) and Vestas (2 MW). The total project capacity is 199.7 MW.

The Project activity is a new facility (Greenfield) and it plans to utilize wind energy to generate electricity and supply it to distribution licensees which is a part of the NEWNE (Northern, Eastern, Western and North-Eastern) grid of India.

Start date for this project is 17/05/2013. This is the day on which the first WTG was commissioned under the Project activity.

The Project activity has generated 2,002,754.35 MWh of energy to the NEWNE Grid (now a part of unified Indian grid) of India during the current monitoring period. This result in emission reductions of 1,956,688 tCO_{2e} by its operation during the current monitoring period.

1.2 Sectoral Scope and Project Type

As per the categorization by UNFCCC, the project activity falls under: “Grid-connected electricity generation from renewable sources” Sectoral Scope 1.

Methodology applied is ACM 0002 of version 16.0¹

Project type is renewable (wind).

The project is not a grouped project activity.

1.3 Project Proponent

Organization name	Bothe Windfarm Development Pvt. Ltd.
Contact person	Mr. Himir Shah
Title	Sr. Manager - Corporate Finance

¹ <https://cdm.unfccc.int/methodologies/DB/EY2CL7RTEHRC9V6YQHLAR6MJ6VEU83>

Address	102, 'El Tara Building', Orchard Avenue, Hiranandani, Powai, Mumbai - 400 076
Telephone	+91-22-25701567
Email	himir.shah@continumenergy.in

1.4 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the Project	Project Consultant
Contact person	Tapti Saha
Title	Assistant Manager-Operations
Address	Office No 201, Plot No 48, Scheme 78, Vijay Nagar Part-II, Indore 452010, India
Telephone	+91 8017028148
Email	tapti@enkingint.org

1.5 Project Start Date

The project start date for this project is 17/05/2013. This is the day on which the first WTG was commissioned under the Project activity.

1.6 Project Crediting Period

The Project has begun generating GHG emission reductions from 17/05/2013. Hence, crediting period for VCS begins on 17/05/2013 and ends on 16/05/2023 i.e. 10 years crediting period which can be renewed for maximum 2 times.

1.7 Project Location

The project activity is located in 9 villages namely, Khokade, Bothe, Ransingwadi, Shripalwan, Ugalyachiwadi, Khandyachiwadi, Garudachiwadi, Katalgewadi, and Shirawali, in Satara district in the state of Maharashtra.

S No.	WTG ID	Village Name	Commissioning Date	Easting	Northing	Turbine Type	Capacity	Feeder No.
1	I - 48	Khokade	21/06/2013	432715	1970045	Vestas V100 - 2.0 MW		Feeder 1
2	I - 64	Khokade	21/06/2013	432816	1969730	Vestas V100 - 2.0 MW		Feeder 1
3	I - 1	Khokade	27/05/2013	433203	1970143	Vestas V100 - 2.0 MW		Feeder 1
4	I - 66	Khokade	20/09/2013	433311	1969611	Vestas V100 - 2.0 MW		Feeder 1
5	I - 7	Khokade	17/05/2013	433073	1969188	Vestas V100 - 2.0 MW		Feeder 1
6	I - 23	Khokade	18/06/2013	433292	1968940	Vestas V100 - 2.0 MW		Feeder 1
7	I - 25	Khokade	21/06/2013	433388	1968741	Vestas V100 - 2.0 MW		Feeder 1
8	I - 29	Khokade	21/06/2013	433497	1968475	Vestas V100 - 2.0 MW		Feeder 1
9	I - 68	Khokade	21/06/2013	433145	1968359	Vestas V100 - 2.0 MW		Feeder 6
10	I - 2	Khokade	27/05/2013	432698	1969429	Vestas V100 - 2.0 MW		Feeder 1
11	I - 21	Khokade	18/06/2013	43388	196812	Vestas V100 - 2.0 MW		Feeder 1
12	I - 27	Khokade	21/06/2013	43397	196789	Vestas V100 - 2.0 MW		Feeder 6
13	I - 3	Khokade	27/05/2013	43396	196856	Vestas V100 - 2.0 MW		Feeder 1
14	I - 39	Khokade	21/08/2013	43349	196929	Vestas V100 - 2.0 MW		Feeder 1
15	I - 49	Khokade	09/10/2013	43392	196920	Vestas V100 - 2.0 MW		Feeder 1
16	I - 30	Khokade	10/10/2013	43454	196911	Vestas V100 - 2.0 MW		Feeder 1
17	I - 15	Bothe	10/10/2013	43374	196484	Vestas V100 - 2.0 MW		Feeder 5
18	I - 47	Bothe	09/10/2013	43561	196759	Vestas V100 - 2.0 MW		Feeder 4
19	I - 59	Bothe	24/01/2014	43534	196689	Vestas V100 - 2.0 MW		Feeder 4
20	I - 52	Bothe	20/02/2014	43369	196579	Vestas V100 - 2.0 MW		Feeder 3
21	I - 8	Bothe	11/09/2013	43324	196660	Vestas V100 - 2.0 MW		Feeder 3
22	I - 35	Bothe	11/09/2013	43590	196422	Vestas V100 - 2.0 MW		Feeder 5
23	I - 37	Bothe	24/01/2014	43550	196386	Vestas V100 - 2.0 MW		Feeder 5
24	I - 5	Bothe	15/06/2013	43347	196612	Vestas V100 - 2.0 MW		Feeder 3
25	I - 56	Bothe	11/09/2013	43431	196688	Vestas V100 - 2.0 MW		Feeder 4
26	I - 41	Bothe	11/09/2013	43453	196738	Vestas V100 - 2.0 MW		Feeder 4
27	I - 63	Bothe	11/09/2013	43508	196736	Vestas V100 - 2.0 MW		Feeder 4
28	I - 6	Bothe	11/09/2013	43533	196567	Vestas V100 - 2.0 MW		Feeder 3
29	I - 60	Bothe	09/01/2013	43545	196713	Vestas V100 - 2.0 MW		Feeder 4
30	I - 4	Bothe	15/06/2013	43559	196645	Vestas V100 - 2.0 MW		Feeder 4
31	I - 42	Bothe	11/09/2013	43513	196479	Vestas V100 - 2.0 MW		Feeder 5
32	I - 40	Bothe	24/01/2014	43541	196410	Vestas V100 - 2.0 MW		Feeder 5
33	I - 43	Bothe	11/09/2013	43496	196344	Vestas V100 - 2.0 MW		Feeder 5
34	I - 45	Bothe	11/09/2013	43558	196330	Vestas V100 - 2.0 MW		Feeder 5
35	I - 33	Bothe	31/01/2014	43295	196623	Vestas V100 - 2.0 MW		Feeder 3
36	I - 71	Bothe	24/01/2014	43472	196697	Vestas V100 - 2.0 MW		Feeder 4
37	I - 72	Bothe	24/01/2014	43497	196561	Vestas V100 - 2.0 MW		Feeder 3
38	I - 73	Bothe	31/01/2014	43388	196624	Vestas V100 - 2.0 MW		Feeder 3

39	I - 75	Bothe	31/01/2014	43446	196474	Vestas V100 - 2.0 MW	Feeder 5
40	I - 76	Bothe	24/01/2014	43584	196459	Vestas V100 - 2.0 MW	Feeder 5
41	I - 22	Bothe	29/03/2014	43291	196650	Suzlon S97 - 2.1 MW	Feeder 3
42	I - 57	Bothe	26/03/2014	43328	196548	Suzlon S97 - 2.1 MW	Feeder 3
43	I - 16	Bothe	26/03/2014	43316	196498	Suzlon S97 - 2.1 MW	Feeder 5
44	I - 24	Bothe	26/03/2014	43397	196521	Suzlon S97 - 2.1 MW	Feeder 3
45	I - 34	Bothe	31/03/2014	43505	196653	Suzlon S97 - 2.1 MW	Feeder 4
46	I - 26	Bothe	07/09/2013	43489	196432	Suzlon S97 - 2.1 MW	Feeder 5
47	I - 77	Bothe	24/01/2014	43502	196319	Suzlon S97 - 2.1 MW	Feeder 5
48	I - 81	Bothe	26/03/2014	43492	196613	Suzlon S97 - 2.1 MW	Feeder 4
49	I - 82	Bothe	26/03/2014	43581	196375	Suzlon S97 - 2.1 MW	Feeder 5
50	I - 18	Ransingwadi	30/03/2014	43515	196249	Suzlon S97 - 2.1 MW	Feeder 5
51	SP40	Shripalwan	11/12/2014	43772	197277	Suzlon S97 - 2.1 MW	Feeder 8
52	SP05	Shripalwan	11/12/2014	437652	1971805	Suzlon S97 - 2.1 MW	Feeder 8
53	SP06	Shripalwan	11/12/2014	437635	1972144	Suzlon S97 - 2.1 MW	Feeder 8
54	SP07	Shripalwan	11/12/2014	437525	1972413	Suzlon S97 - 2.1 MW	Feeder 8
55	SP08	Shripalwan	11/12/2014	437221	1972545	Suzlon S97 - 2.1 MW	Feeder 8
56	SP09	Shripalwan	11/12/2014	438792	1972391	Suzlon S97 - 2.1 MW	Feeder 8
57	SP10	Shripalwan	11/12/2014	438573	1972616	Suzlon S97 - 2.1 MW	Feeder 8
58	SP12	Shripalwan	25/12/2014	439547	1972523	Suzlon S97 - 2.1 MW	Feeder 8
59	SP13	Shripalwan	25/12/2014	439328	1972768	Suzlon S97 - 2.1 MW	Feeder 8
60	SP17	Shripalwan	25/12/2014	439689	1973423	Suzlon S97 - 2.1 MW	Feeder 8
61	SP19	Ugalyachiwadi	16/12/2014	441226	1970762	Suzlon S97 - 2.1 MW	Feeder 6
62	SP20	Ugalyachiwadi	16/12/2014	441217	1971075	Suzlon S97 - 2.1 MW	Feeder 6
63	SP21	Ugalyachiwadi	30/12/2014	441113	1971358	Suzlon S97 - 2.1 MW	Feeder 6
64	SP22	Khandyachiwadi	30/12/2014	441487	1971736	Suzlon S97 - 2.1 MW	Feeder 6
65	SP26	Khandyachiwadi	30/12/2014	442326	1971555	Suzlon S97 - 2.1 MW	Feeder 6
66	SP27	Khandyachiwadi	16/12/2014	441879	1971908	Suzlon S97 - 2.1 MW	Feeder 6
67	SP29 ²	Khandyachiwadi	26/12/2014	444070	1969891	Suzlon S97 - 2.1 MW	Feeder 6
68	SP30	Khandyachiwadi	26/12/2014	444028	1970223	Suzlon S97 - 2.1 MW	Feeder 6
69	SP31	Khandyachiwadi	26/12/2014	444072	1970498	Suzlon S97 - 2.1 MW	Feeder 6
70	SP32	Khandyachiwadi	26/12/2014	443768	1970738	Suzlon S97 - 2.1 MW	Feeder 6
71	SP33	Khandyachiwadi	26/12/2014	443821	1971105	Suzlon S97 - 2.1 MW	Feeder 7
72	SP34	Khandyachiwadi	30/12/2014	443637	1971320	Suzlon S97 - 2.1 MW	Feeder 7
73	SP35	Khandyachiwadi	30/12/2014	443207	1971303	Suzlon S97 - 2.1 MW	Feeder 7
74	SP36	Khandyachiwadi	30/12/2014	443201	1971719	Suzlon S97 - 2.1 MW	Feeder 7
75	SP37	Khandyachiwadi	30/12/2014	444567	1970614	Suzlon S97 - 2.1 MW	Feeder 7

² As per registered PD commissioning dates for WTG no SP29, SP30, SP31, SP32 AND SP33 are 16-12-2014 and as per commissioning certificate this date is 26-12-2014. Hence same has been corrected in monitoring report.

76	SP38	Khandyachiwadi	30/12/2014	444335	1970801	Suzlon S97 - 2.1 MW	Feeder 7
77	SP39	Khandyachiwadi	30/12/2014	445038	1971267	Suzlon S97 - 2.1 MW	Feeder 7
78	SP41	Garudachiwadi	16/12/2014	441422	1972960	Suzlon S97 - 2.1 MW	Feeder 6
79	SP24	Garudachiwadi	16/12/2014	440601	1972323	Suzlon S97 - 2.1 MW	Feeder 6
80	SP28	Garudachiwadi	30/12/2014	441239	1972441	Suzlon S97 - 2.1 MW	Feeder 6
81	I - 13	Ransingwadi	22/08/2014	434217	1961171	Suzlon S97 - 2.1 MW	Feeder 2
82	I - 19	Katalgewadi	01/10/2014	434737	1961237	Suzlon S97 - 2.1 MW	Feeder 2
83	I - 31	Katalgewadi	01/10/2014	435289	1961773	Suzlon S97 - 2.1 MW	Feeder 2
84	I - 38	Katalgewadi	03/11/2014	435475	1961574	Suzlon S97 - 2.1 MW	Feeder 2
85	I - 53	Katalgewadi	22/08/2014	436157	1961880	Suzlon S97 - 2.1 MW	Feeder 2
86	I - 69	Katalgewadi	03/11/2014	434557	1960987	Suzlon S97 - 2.1 MW	Feeder 2
87	I - 28	Shirawali	03/11/2014	435370	1962109	Suzlon S97 - 2.1 MW	Feeder 2
88	I - 46	Shirawali	22/08/2014	435648	1962339	Suzlon S97 - 2.1 MW	Feeder 2
89	I - 61	Shirawali	22/08/2014	435954	1962087	Suzlon S97 - 2.1 MW	Feeder 2
90	I - 51	Katalgewadi	03/11/2014	436663	1962098	Suzlon S97 - 2.1 MW	Feeder 2
91	I - 80	Shirawali	16/11/2014	438325	1962057	Suzlon S97 - 2.1 MW	Feeder 2
92	I - 78	Shirawali	27/11/2014	437099	1961893	Suzlon S97 - 2.1 MW	Feeder 2
93	I - 79	Shirawali	16/11/2014	437872	1961810	Suzlon S97 - 2.1 MW	Feeder 2
94	I - 83	Shirawali	16/11/2014	437163	1962752	Suzlon S97 - 2.1 MW	Feeder 2
95	I - 17	Shirawali	27/11/2014	437427	1961851	Suzlon S97 - 2.1 MW	Feeder 2
96	I - 84	Khandyachiwadi	30/12/2014	444824	1971013	Suzlon S97 - 2.1 MW	Feeder 7
97	SP25	Garudachiwadi	30/12/2014	440644	1972737	Suzlon S97 - 2.1 MW	Feeder 6



1.8 Title and Reference of Methodology

The methodology applied for the project is ACM0002 of version 16.0 titled “Grid-connected electricity generation from renewable sources³”

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

- Tool to calculate the emission factor for an electricity system (Version 04)⁴
- Tool for demonstration and assessment of additionality (Version 7.0.0)⁵

1.9 Participation under other GHG Programs

The Project does not intend to participate in any other GHG mechanism which includes GHG allowance trading. It does not generate any other form of GHG-related environmental credit apart from GHG emission reductions or removals claimed under the VCS Program.

1.10 Other Forms of Credit

India is Non-annex1 country and there is no compliance with an emission trading program or to meet binding limits on GHG emissions for this project activity. PP has submitted undertaking that it would not use net GHG emission reductions by the projects for compliance with emission trading program to meet binding limits on GHG emissions. PP

³ <https://cdm.unfccc.int/methodologies/DB/EY2CL7RTEHRC9V6YQHLAR6MJ6VEU83>

⁴ <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v4.0.pdf>

⁵ <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-01-v7.0.0.pdf>

has also submitted undertaking for not availing other forms of environmental credit for the same crediting period under consideration

1.11 Sustainable Development

Contribution to sustainable development:

Ministry of Environment and Forests, has stipulated economic, social, environment and technological well-being as the four indicators of sustainable development. The project contributes to sustainable development using the following ways:

Social wellbeing: The project would help in generating employment opportunities during the construction and operation phases. The project activity would lead to development in infrastructure in the region like development of roads and also may promote business with improved power generation.

Economic wellbeing: The project is a clean technology investment in the region, which would not have been taken place in the absence of the VCS benefits the project activity would also help to reduce the demand supply gap in the state.

The project activity would generate power using zero emissions wind based power generation which helps to reduce GHG emissions and specific pollutants like SO_x, NO_x, and SPM associated with the conventional thermal power generation facilities.

Technological wellbeing: The successful operation of project activity would lead to promotion of wind based power generation and would encourage other entrepreneurs to participate in similar projects.

Environmental well-being: Wind being a renewable source of energy, it reduces the dependence on fossil fuels and conserves natural resources which are on the verge of depletion. Due to its zero emission the Project activity also helps in avoiding significant amount of GHG emissions.

There is no requirement of monitoring of sustainability development parameters neither according to the monitoring plan of the registered PD or host country regulation and through the above, the PP has considered that the project activity profoundly contributes to the sustainable development.

Additionally report on sustainable developments related to this project activity is being submitted to VERRA registry board regularly according to the requirement.

2 SAFEGUARDS

2.1 No Net Harm

The project activity has no significant impact on the environment. wind power projects are not included in the Schedule I of the EIA notification S.O.1533 (E) dated 14th September 2006 and

thus an EIA is not required. Ministry of Environment & forests vide their OM J-11013/41/2006 - IA II (I) dated 13th May 2011, has re-affirmed this and exempted wind power plants from EIA and Environmental Consent requirement.

2.2 Local Stakeholder Consultation

The Stakeholder Consultation Report primarily deals with socio-economic impact of the project activity and provided an opportunity for the local population to express their viewpoints and comments with respect to the project.

Before implementation of the project activity, the project proponent did thorough consultation with stakeholders – identifying the stakeholders, consultation with the stakeholders in number of phases and through number of media – focus group discussion, detailed social mapping and fieldwork, inclusion of local stakeholders from all sections of community, explanation of project activity – purpose and details to them and resolving the comments/ grievances along with seeking suggestions from them. The PP has engaged a number of local NGOs for local stakeholder consultations by applying various strategies to engage them in project and for taking care of their complaints/grievances/suggestions. The process is ongoing and continuous; this process is undertaken throughout the year.

During the current monitoring period, the project proponent has engaged with the local stakeholders in different ways including various Corporate Social Responsibility (CSR) activities undertaken by the company. Besides, the PP has kept grievance register in plant site office seeking complaints/grievances from local community. There has also been the provision of receiving letters from local community for any suggestion/comment/complaint.

2.3 AFOLU-Specific Safeguards

Not applicable to this as this is not an AFOLU project activity.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The implementation of the project has been started on 17/05/2013 and completed on 30/12/2014.

Wind power technology details – The technology employed, converts wind energy to electrical energy. In wind power generation, energy of wind is converted into mechanical energy and subsequently into electrical energy. The project activity is the installation of an environmentally safe and sound technology since there are no GHG emissions associated with the electricity generation.

The technical specifications of the WTGs have been provided as below. There is no transfer of technology involved in the project activity. The project activity consists of WTGs of Following Machines:-

Key Technical Particulars of Vestas V-100 2.0 MW WTG

Particulars	Specifications
Make	Vestas
Model	V-100
Rated Capacity	2000 kW
Rotor Diameter	100 m
Hub height	95 m
Type of Tower	Tubular
Number of Blades	3
Geared/Gearless	Geared
Gear Box	One planetary stage and two helical stages
Cut-in Wind speed	3 m/s
Rated Wind speed	12 m/s
Cut-out Wind speed	20 m/s
Wind Class	IEC S (IEC IIIA average wind and IEC IIIA extreme wind)

Key Technical Particulars of Suzlon S- 97 90 2.1 MW WTG

Particulars	Specifications
Make	Suzlon
Model	S-97
Rotor diameter	97 m
Hub height	90 m
Estimated service life	20 years
Rated power	2.1 MW
Rated wind speed	11 m/s (without turbulence intensity according to GL guideline)
Cut in wind speed	3.0 m/s (30-second average)
Cut out wind speed	20 m/s (10-minute average)
Controller type	Programmable Logic Controller with SUZLON CONTROL SYSTEM Software

No any events has occurred during the current monitoring period that may impact the GHG emission reductions or removals and monitoring.

3.2 Deviations

2.3.1 Methodology Deviations

The project activity has been implemented as described in the VCS-PD and there was no methodological deviation applied during the monitoring plan.

2.3.2 Project Description Deviations

As per registered PD, commissioning dates for WTG no SP29, SP30, SP31, SP32 AND SP33 are 16/12/2014 whereas the commissioning certificate, the date is mentioned 26/12/2014. The commissioning dates of these WTGs have been updated as per commissioning certificate date in table of section I.7.

3.3 Grouped Projects

Not applicable as the project is non-grouped.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	EF _{grid,OM,y}
Data unit	tCO ₂ /MWh
Description	Operating Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA database, Version 10, December 2014 ⁶
Value applied	0.9862 (NEWNE Grid) ⁷
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per “Tool to calculate the emission factor for an electricity system, version 04.0.0” as 3-year generation weighted average using data for the years 2011-2012, 2012-2013 & 2013-2014. The data are obtained from “CO ₂ Baseline Database for Indian Power Sector” version 10.0, published by the Central Electricity Authority, Ministry of Power, and Government of India.
Purpose of Data	For the calculation of Baseline Emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	EF _{grid,BM,y}
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⁶ https://cea.nic.in/wp-content/uploads/baseline/2020/07/user_guide_ver10.pdf

⁷ Now INDIAN Grid

Data unit	tCO ₂ /MWh
Description	Built Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA database, Version 10, December 2014 ⁸
Value applied	0.9495 (NEWNE Grid) ⁹
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per “Tool to calculate the emission factor for an electricity system, version 04.0.0” as 3-year generation weighted average using data for the years 2011-2012, 2012-2013 & 2013-2014. The data are obtained from “CO ₂ Baseline Database for Indian Power Sector” version 10.0, published by the Central Electricity Authority, Ministry of Power, and Government of India.
Purpose of Data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire crediting period.
Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO ₂ /MWh
Description	Combined Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA database, Version 10, December 2014 ¹⁰
Value applied	0.9770 (NEWNE Grid) ¹¹
Justification of choice of data or description of measurement methods and procedures applied	The combined margin emissions factor is calculated as follows: $EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}$ $EF_{grid,BM,y}$ = Build margin CO ₂ emission factor in year y (tCO ₂ /MWh) $EF_{grid,OM,y}$ = Operating margin CO ₂ emission factor in year y (tCO ₂ /MWh) W_{OM} = Weighting of operating margin emissions factor (%) = 75% W_{BM} = Weighting of build margin emissions factor (%) = 25%
Purpose of Data	For the calculation of the Baseline Emission.
Comments	This parameter is fixed ex-ante for the entire crediting period.

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{PJ,y}$
Data unit	MWh

⁸https://cea.nic.in/wpcontent/uploads/baseline/2020/07/user_guide_ver10.pdf/plannin/cdm_co2/user_guide_ver10.pdf

⁹ Now INDIAN Grid

¹⁰ https://cea.nic.in/wp-content/uploads/baseline/2020/07/user_guide_ver10.pdf

¹¹ Now INDIAN Grid

Description	Quantity of net electricity generation supplied by the project to the grid in year y
Source of data	Monthly electricity share certificates
Description of measurement methods and procedures to be applied	The value of net electricity generation supplied to the grid as per monthly electricity share certificates forms the basis for calculation of the emission reductions; which can be cross checked from the invoice raised to the DISCOM. Net electricity supplied to grid has been calculated as the difference of the measured values of “export” and “import” of electricity through the dedicated SEB energy meter (electronic trivector bidirectional main meter & check meter which measures both export & import concurrently) installed at the delivery point (i.e. the connected substation). Net electricity generated and supplied by the project to the grid = Electricity Export to the grid - Electricity Import from the grid Monthly meter readings have been taken from the main and check meters installed at the substation and certified by the representatives of SEB Officials and the representatives of the project proponent. For apportioning procedure refer section 4.3 of the monitoring report.
Frequency of monitoring/recording	Continuous monitoring, hourly measurement and at least monthly recording
Value monitored	2,002,754
Monitoring equipment	Monitoring: Tri vector meter would be used Data type: Measured Type of meter: Static type meter (Main & Check). Both are Bidirectional meters. Class of meter: 0.2s.
QA/QC procedures to be applied	• The energy meter readings are taken on monthly basis • Energy meters would be calibrated annually and faulty meters would be duly replaced immediately. • All the energy meters are under the control of state utility and calibration/testing of energy meters is also under the jurisdiction of state utility. • The Net electricity exported to the grid would be cross checked against the invoice raised by the PP towards the DISCOM. The calibration records of the main and check meters have been provided in Appendix 1.

Purpose of the data	This data has been used to calculate Baseline emissions
Calculation method	-
Comments	The data would be archived electronically and maintained for the entire crediting period plus two years.

4.3 Monitoring Plan

The monitoring methodology specified in the methodology requires that the project-monitoring plan to consist of monitoring of quantity of net electricity supplied to the grid in the year y. In order to monitor the mitigation of GHG due to the project activity, the total energy exported needs to be measured. The net energy supplied to grid by the project activity multiplied by emission factor for regional grid, would form the baseline for the project activity.

Since the baseline emission factor is based on an *ex-ante* determination, monitoring of this parameter is not required. The sole parameter for monitoring is the net electricity exported to the grid.

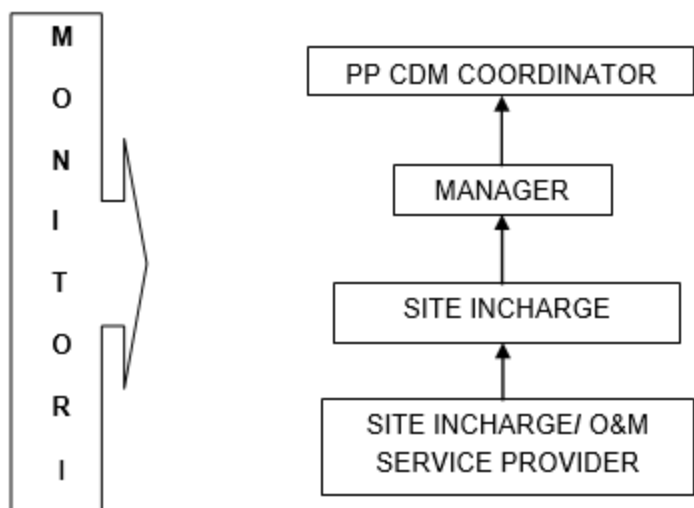
Aim of Monitoring:

The monitoring procedure would set guidelines for the project investor to monitor the parameters regularly and to ensure quality and accuracy in monitoring. It elaborates on the functions of the monitoring team and procedures to be followed in monitoring of the CDM parameters.

The monitoring procedure has include all the equipment's that contribute towards reduction in GHG emissions. Since the project activity focuses mainly on the generation of renewable power, it is important to monitor all the equipment involved in the metering of all the necessary instruments.

The project investor has a well-defined management structure for monitoring the project activity.

Organizational Structure for monitoring



Designation	Responsibilities
PP CDM COORDINATOR	Overall project monitoring including collecting and aggregating JMRs/Invoices for all WTG investors
MANAGER	Holds complete control over monitoring aspects pertaining to the project
SITE INCHARGE	- Recording - Verification - Storage of Data
SITE INCHARGE/ O&M SERVICE PROVIDER	- Operation and Maintenance - Storage of data - Data Recording

In case of INDIAN grid, multiple WTGs would be connected to the feeder, one of which would be part of the project activity and rest of which would not be part of the project activity (WTGs owned by other entities). The import and export of electricity is continuously monitored by the export/import meter and the data is recorded on a monthly basis jointly by the proponent and the electricity board. The meter is located at the delivery point of wind power in the grid. This accounts for the import of electricity that is used by the Project proponent. Hence the net electricity generated is calculated from the joint meter reading and recorded /archived in paper/electronic.

SEB/O&M Contractor follows an apportioning procedure to account for electricity generation from individual WTGs based on data from individual WTG controllers.

Following the joint meter readings, apportioning of net electricity supplied to grid by each WTG is done by the SEB/O&M Contractor based on the individual meter readings recorded from the

controller panel meter of each WTG and based on the meter reading recorded from the meters situated at the connected substations.

Based on the monthly export and import data as per main/check meters and the WTG controller readings, SEB provides a break-up of the electricity exported and imported for each WTG.

A monthly joint meter reading of the energy meters is taken by MSEDCL officials and O&M contractors (representatives of the project investor). Apportioning of net electricity generation from each WTG connected to NEWNE grid is then determined as follows:

1.	Apportioning Ratio	=	Generation at WTG Controller
			Total Generation of All WTG Controller for the feeder
2.	Electricity Import from WTG by the grid (EG_{import})	=	Import from Main/Check Meter * Apportioning Ratio
3.	Electricity Export to the WTGs by the grid (EG_{export})	=	Export from Main/Check Meter * Apportioning Ratio
4.	Net electricity generated by WTG	=	Electricity Import from WTG by the grid - Electricity Export to the WTGs by the grid

Above steps for calculation of EG_{import} and EG_{export} are carried out by MSEDCL Officials & energy break-up sheet is issued by the MSEDCL Officials. Based on the break-up sheets Project investor raises invoice to DISCOM which forms the cross-check for the net electricity generated. The Project investor has no role in the entire procedure of apportioning.

Emergency Preparedness and Uncertainty Procedure:

In case Main meter or check meter is found to be outside the acceptable limits of accuracy or faulty or not functioning properly, it would be repaired, recalibrated or replaced as soon as possible. In the event that the Main meter is not in service as a result of maintenance, repairs or testing, the check meter would be used. In case both the main and check meter are found to be outside the acceptable limits of accuracy or faulty or not functioning properly, both the meters shall be calibrated immediately and the error percentage found in the main meter during its calibration shall be applied to its metered energy data for the entire period since its last calibration to obtain the corrected value of net electricity exported to the grid.

Data Recording and Archiving:

O&M operator would keep complete and accurate records of operating log at the Power Plant. The data would be archived electronically as well as in log books at the power plant and would

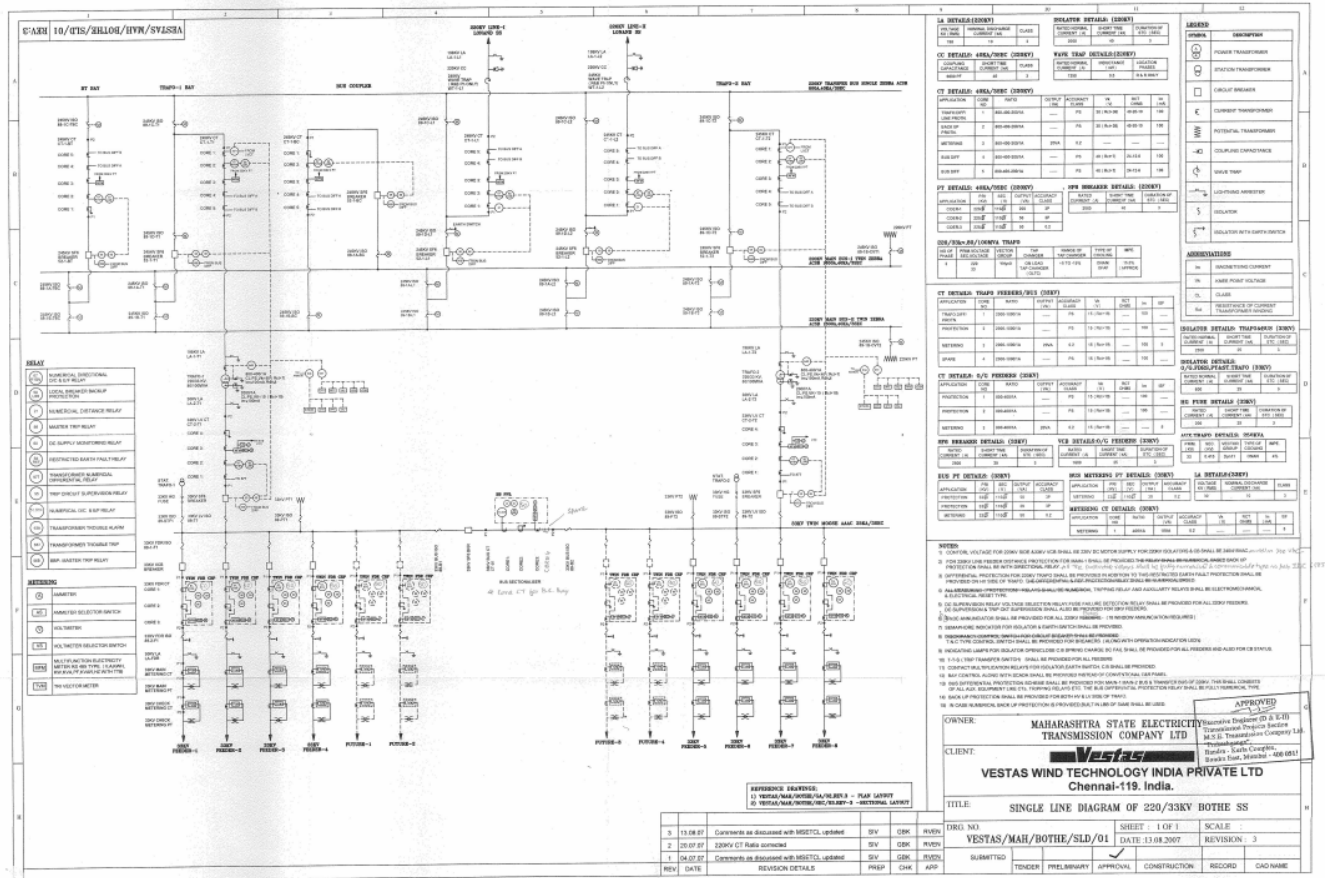
be kept for two years after the end of the crediting period or the last issuance of VERs for this project activity, whichever occurs later.

In case the dates of a particular monitoring period do not match with the dates of the billing cycle, the net electricity exported to the grid would be calculated from:

- Apportioning the net electricity exported to grid, as recorded in the consolidated Share Certificate / JMR Report / Credit Notes certified by the respective state discom, based on the number of days in the monitoring period and the number of days for which Share Certificate / JMR Report / Credit Notes was prepared.

The calculated value after apportioning would be used for calculation of emission reductions during that period.

Single Line Diagram



5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

The baseline emissions are calculated using the following formula:

$$\text{Baseline Emissions (BE}_y\text{)} = \text{EG}_{\text{PJ},y} \times \text{EF}_{\text{Grid,CM},y}$$

Where:

BE_y = Baseline Emission in Year y (tCO₂/yr)

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

EF_{grid,CM,y} = Combined Margin CO₂ emission factor for grid connected power generation in year y Calculated using the latest version of the “Tool to calculate the emission factor for an electricity system, ver. 02.2.1” (tCO₂/MWh)

As per the VCS PD, the baseline emissions factor ($EF_{Grid,CM,y}$) is 0.9770 tCO₂/MWh.

For the project activity, monthly generation records have been aggregated to arrive at the yearly net generation values. The yearly net generation values have been provided below:

Year	Net Generation (MWh)	Baseline emissions factor (tCO ₂ /MWh)	Baseline emissions (ER _y)
2016 (from 02-April-2016 to 31-December-2016)	401,827	0.9770	392,585
2017	405,691	0.9770	396,360
2018	412,515	0.9770	403,027
2019	427,977	0.9770	418,133
2020(Till 30 th November 2020)	354,742	0.9770	346,583*

*Calculation details are provided in excel worksheets

5.2 Project Emissions

As per the para 35 of methodology ACM0002 (Version 16.0), “For most renewable power generation project activities, $PE_y = 0$.”

5.3 Leakage

As per para 60 of the methodology ACM0002 (Version 16.0) does not consider any leakage emissions, $LE_y=0$.

5.4 Net GHG Emission Reductions and Removals

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})
2016	392,585	0	0	392,585
2017	396,360	0	0	396,360
2018	403,027	0	0	403,027
2019	418,133	0	0	418,133
2020	346,583	0	0	346,583
Total	1,956,688	0	0	1,956,688 (Round down value)

During the present monitoring period, actual emission reductions achieved are 1,956,688 tCO_{2e} whereas estimated emission reductions was 1,700,345 tCO_{2e}. The project witnessed an increase of

15.1 % in emission reductions as compared to ex-ante emissions, which is due to natural phenomena and nature dependent and cannot be controlled by the Project Proponent.

Though the emission reduction amount is higher during the monitoring period but additionality of the project activity is not influenced due to this as average breaching value of 3 PLF mentioned in table of section 2.5 (page 22) of the registered VCS PD is coming around 19% which is still higher from 15.1.% PLF achieved during the monitoring period.

Further, the IRR of the project activity was demonstrated based on the generation amount of the entire crediting period. It is noted the electricity generation amount from the first to present monitoring period is still 11.3% lower from the estimated in the registered VCS PD.

Based on the above, it can be confirmed that there is no impact on the additionality of the project activity despite increase of emission reduction achieved during monitoring period.

APPENDIX 1: METER CALIBRATION DETAIL

Year 2016-17

Sr. No.	Name of the Company	Feeder No.	Meter Sr. No. (Main)	Meter Sr. No. (Check)	WTG ID	Accuracy Class	Date of Calibration	Due Date of Calibration
1	BWDPL	1	15687851	05269326	I-66, I-01, I-01, I-02, I-30, I-49, I-39, I-25, I-48, I-29, I-64, I-21, I-23, I-3, I-7	0.2%	19/05/2016	18/05/2017
2		2	15687861	15687859	I-13, I-46, I-53, I-61, I-19, I-31, I-28, I-69, I-38, I-51, I-79, I-80, I-83, I-78, I-17			
3		3	05269324	05269316	I-22, I-24, I-57, I-52, I-33, I-73, I-72, I-8, I-6, I-5			
4		4	05269327	15687848	I-34, I-81, I-59, I-71, I-47, I-60, I-41, I-56, I-63, I-4			
5		5	16351048	16351049	I-15, I-75, I-26, I-18, I-82, I-16, I-77, I-37, I-40, I-76, I-35, I-42, I-43, I-45			

6		6	16351050	16351051	I-27, I-68, SP-19 , SP- 20, SP-24, SP-41, SP- 22, SP-26, SP-28, SP- 27, SP-21, SP-25, SP- 29, SP-30, SP-31, SP- 32			
7		7	16351052	16351053	SP-33, SP- 34, SP-37, SP-39, SP- 35, SP-36, SP-38, I-84			
8		8	16351054	16351055	SP-05, SP- 06, SP-07, SP-08, SP- 10, SP-40, SP-09, SP- 09, SP-12, SP-13, SP- 17			

Year 2017-18

Sr. No.	Name of the Company	Feeder No.	Meter Sr. No. (Main)	Meter Sr. No. (Check)	WTG ID	Accuracy Class	Date of Calibration	Due Date of Calibration
1	BWDPL	1	15687851	05269326	I-66, I-01, I-02, I-30, I-49, I-39, I-25, I-48, I-29, I-64, I-21, I-23, I-03, I-07	0.2 %	19/05/2017	18/05/2018

2		2	15687861	15687859	I-13, I-46, I-53, I-61, I-19, I-31, I-28, I-69, I-38, I-51, I-79, I-80, I-83, I-78, I-17			
3		3	05269324	05269316	I-22, I-24, I-57, I-52, I-33, I-73, I-72, I-08, I-06, I-05			
4		4	05269327	15687848	I-34, I-81, I-59, I-71, I-47, I-60, I-41, I-56, I-63, I-04			
5		5	16351048	16351049	I-15, I-75, I-26, I-18, I-82, I-16, I-77, I-37, I-40, I-76, I-35, I-42, I-43, I-45			
6		6	16351050	16351051	I-27, I-68, SP-19, SP-20, SP-24, SP-41, SP-22, SP-			

					26, SP-28, SP-27, SP-21, SP-25, SP-29, SP-30, SP-31, SP-32			
7		7	16351052	16351053	SP-33, SP-34, SP-37, SP-39, SP-35, SP-36, SP-38, I-84			
8		8	16351054	16351055	SP-05, SP-06, SP-07, SP-08, SP-10, SP-40, SP-09, SP-12, SP-13, SP-17			

Year 2018-19

Sr. No.	Name of the Company	Feeder No.	Meter Sr. No. (Main)	Meter Sr. No. (Check)	WTG ID	Accuracy Class	Date of Calibration	Due Date of Calibration
1	BWDPL	1	15687851	05269326	I-66, I-01, I-02, I-30, I-49, I-39, I-25, I-48, I-29, I-64, I-	0.2%	21/05/2018	20/05/2019

					21, I-23, I-03, I-07			
2		2	15687861	15687859	I-13, I- 46, I-53, I-61, I- 19, I-31, I-28, I- 69, I-38, I-51, I- 79, I-80, I-83, I- 78, I-17			
3		3	05269324	05269316	I-22, I- 24, I-57, I-52, I- 33, I-73, I-72, I- 08, I-06, I-05			
4		4	05269327	15687848	I-34, I- 81, I-59, I-71, I- 47, I-60, I-41, I- 56, I-63, I-04			
5		5	16351048	16351049	I-15, I- 75, I-26, I-18, I- 82, I-16, I-77, I- 37, I-40, I-76, I- 35, I-42, I-43, I-45			
6		6	16351050	16351051	I-27, I- 68, SP- 19, SP- 20, SP- 24, SP- 41, SP-			

					22, SP-26, SP-28, SP-27, SP-21, SP-25, SP-29, SP-30, SP-31, SP-32			
7		7	16351052	16351053	SP-33, SP-34, SP-37, SP-39, SP-35, SP-36, SP-38, I-84			
8		8	16351054	16351055	SP-05, SP-06, SP-07, SP-08, SP-10, SP-40, SP-09, SP-12, SP-13, SP-17			

Year 2019-20

Sr. No.	Name of the Company	Feeder No.	Meter Sr. No. (Main)	Meter Sr. No. (Check)	WTG ID	Accuracy Class	Date of Calibration	Due Date of Calibration
1	BWDPL	1	15687851	05269326	I-66, I-01, I-02, I-30, I-49, I-39, I-25, I-48, I-29,	0.2%	18/06/2019	17/06/2020

					I-64, I-21, I-23, I-03, I-07			
2		2	15687861	15687859	I-13, I-46, I-53, I-61, I-19, I-31, I-28, I-69, I-38, I-51, I-79, I-80, I-83, I-78, I-17			
3		3	05269324	05269316	I-22, I-24, I-57, I-52, I-33, I-73, I-72, I-08, I-06, I-05			
4		1	05269327	15687848	I-34, I-81, I-59, I-71, I-47, I-60, I-41, I-56, I-63, I-04			
5		5	16351048	16351049	I-15, I-75, I-26, I-18, I-82, I-16, I-77, I-37, I-40, I-76, I-35, I-42, I-43, I-45			
6		6	16351050	16351051	I-27, I-68, SP-19, SP-			

					20, SP-24, SP-41, SP-22, SP-26, SP-28, SP-27, SP-21, SP-25, SP-29, SP-30, SP-31, SP-32			
7		7	16351052	16351053	SP-33, SP-34, SP-37, SP-39, SP-35, SP-36, SP-38, I-84			
8		8	16351054	16351055	SP-05, SP-06, SP-07, SP-08, SP-10, SP-40, SP-09, SP-12, SP-13, SP-17			

Year 2020-2021

Sr. No.	Name of the Company	Feeder No.	Meter Sr. No. (Main)	Meter Sr. No. (Check)	WTG ID	Accuracy Class	Date of Calibration	Due Date of Calibration
1	BWDPL	1	15687851	05269326	I-66, I-01, I-02, I-30, I-49, I-39, I-25, I-48,	0.2%	08/07/2020	07/07/2021

					I-29, I-64, I-21, I-23, I-03, I-07			
2		2	15687861	15687859	I-13, I-46, I-53, I-61, I-19, I-31, I-28, I-69, I-38, I-51, I-79, I-80, I-83, I-78, I-17			
3		3	05269324	05269316	I-22, I-24, I-57, I-52, I-33, I-73, I-72, I-08, I-06, I-05			
4		1	05269327	15687848	I-34, I-81, I-59, I-71, I-47, I-60, I-41, I-56, I-63, I-04			
5		5	16351048	16351049	I-15, I-75, I-26, I-18, I-82, I-16, I-77, I-37, I-40, I-76, I-35, I-42, I-43, I-45			
6		6	16351050	16351051	I-27, I-68, SP-19, SP- 20, SP-24, SP-41, SP- 22, SP-26, SP-28, SP- 27, SP-21, SP-25, SP- 29, SP-30, SP-31, SP- 32			
7		7	16351052	16351053	SP-33, SP- 34, SP-37,			

					SP-39, SP-35, SP-36, SP-38, I-84			
8		8	16351054	16351055	SP-05, SP-06, SP-07, SP-08, SP-10, SP-40, SP-09, SP-12, SP-13, SP-17			

Calibration dates have been revised as per calibration certificates in the revised MR. There is a delay in calibrations of all WTGs in the month of May,2018, May and June, 2019 and June,July,2020 within a permissible limit of accuracy class of 0.2%. Hence an error Factor of 0.2% has been applied in the due months readings.