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CHAKALA WIND POWER PROJECT IN MAHARASHTRA



Document Prepared by EKI Energy Services Limited

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Prepared By	EKI Energy Services Limited
Contact	Anjali Rao Project Manager Email ID : anjali@enkingint.org T +91 731 42 89 086, M +91 9109120940 Address: Office no. 201, Plot 48, Scheme 78 part 2 Vijay Nagar, Near Brilliant Convention Centre Indore - 452010 (M.P, India) Website www.enkingint.org

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Bindu Vayu Urja Private Limited (BVUPL) is working into the renewable energy sector with an objective to build wind power assets in India. BVUPL has set up 39 MW wind power project in Chakla Village in the state of Maharashtra. The project activity comprises of 26 Wind Electric Generators (WTGs) with a capacity of 1.5 MW each.

The project activity will help to reduce the supply demand gap in the state and also helps in contributing to the sustainable development by using wind energy as the source of power generation and reduction of GHG Emissions. In the project site, there are other wind projects owned by other customers connected to the same substation. There is an apportioning procedure which is approved by the state nodal agency for apportioning the electricity to each and every customer.

The technical specifications of WTGs and commissioning details are mentioned in section 3.1 of MR.

The total VCU generated achieved during this monitoring period is 61,098 tCO_{2e}.

1.2 Sectoral Scope and Project Type

The project activity falls under

Sectoral Scope : 01 - Energy industries (renewable / nonrenewable sources)

Project Type : I - Renewable Energy Projects

Title : Consolidated baseline methodology for grid-connected electricity generation from renewable resources

Methodology : The methodology applied for the project is ACM 0002 of version 13.0.0¹

This project is not a grouped project activity.

1.3 Project Proponent

Organization name	Bindu Vayu Urja Private Limited (BVUPL)
Contact person	Mr. Ravinder Kumar Rana
Title	Assistant Manager

¹ <http://cdm.unfccc.int/methodologies/DB/VJI9AX539D9MLOPXN2AY9UR1N4IYGD>

Address	8001, 8 th Floor, Q-City, Nanakramguda, Gachibowli, Hyderabad 500032, Telangana, India.
Telephone	+ 91 9907534900
Email	manish@enkingint.org

1.4 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the Project	Project Consultant
Contact person	Anjali Rao
Title	Project Manager
Address	Office No 201, Plot No 48, Scheme 78, Vijay Nagar Part- II, Indore 452010, India
Telephone	+91-9109120940
Email	anjali@enkingint.org

1.5 Project Start Date

The project start date for this project is said to be 30-December-2011. This is because the first WTG was commissioned as on the said date. Commissioning certificate issued on Dt. 30-December-2011.

1.6 Project Crediting Period

The project is registered under Clean Development Mechanism (CDM) of UNFCCC with 10 years crediting period (Reference No: 9472) on 31-December-2012². Crediting period of the project under CDM starts on 02-January-2013 and ends on 1-January-2023.

The project has begun generating GHG emission reductions from 30-December-2011. Hence, crediting period for VCS begins on 30-December-2011 and ends on 29-December-2021.

The project proponent will also not claim GHG emission reductions under two schemes for the same period.

² <https://cdm.unfccc.int/Projects/DB/BVQI1356940326.49/view>

1.7 Project Location

The project is located in Chakala village, Maharashtra state of India. A map of India with the project location is provided below.

The nearest major town is Nandurbar

Nearest airport is Aurangabad

Nearest seaport would be Mumbai.

The nearest railhead is Nandurbar

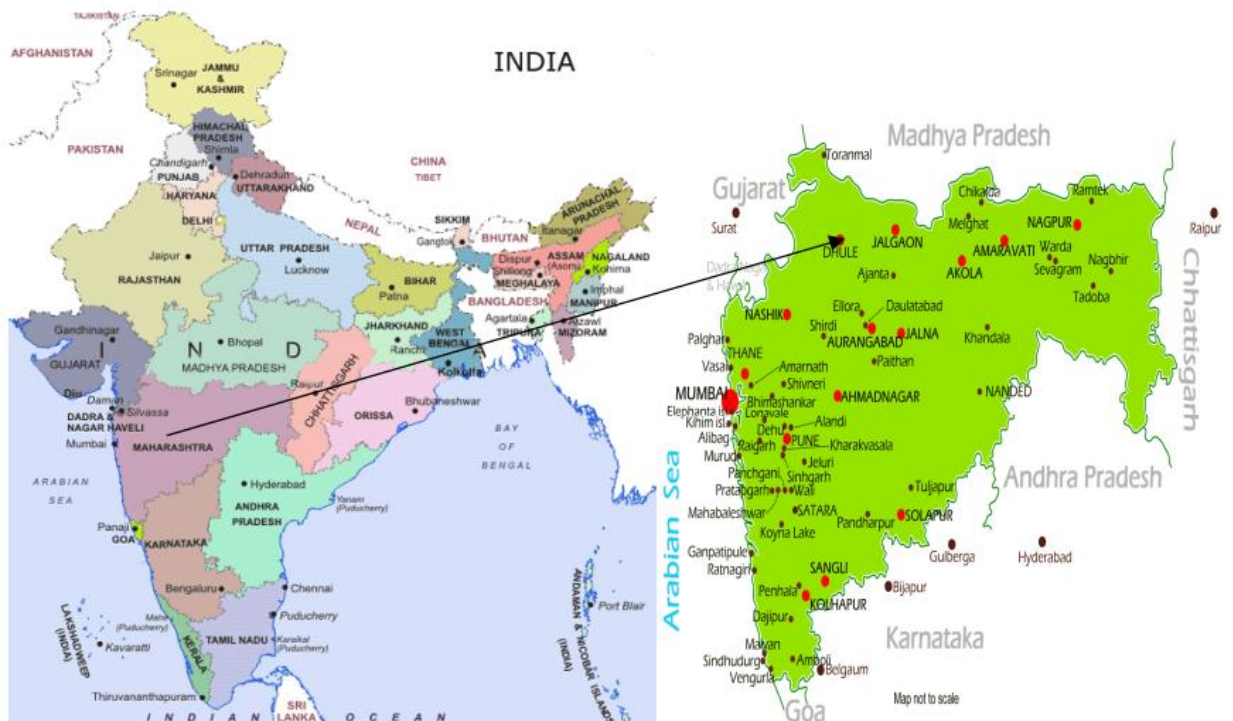


Figure 1. Map showing state and village in which project activity is located



Figure 2. Location of WTGs situated at the project activity

The geo coordinates of each WTGs are as follows:

Sl.No	State	WTG number	Latitude (N)	Longitude (E)
1	Maharashtra	C-38	21° 15' 30"	74° 19' 48"
2	Maharashtra	C-39	21° 15' 17.2"	74° 19' 39.4"
3	Maharashtra	C-40	21° 15' 13.6"	74° 19' 19.7"
4	Maharashtra	C-41	21° 14' 58.2"	74° 19' 26.7"
5	Maharashtra	C-42	21° 15' 48.2"	74° 19' 15"
6	Maharashtra	C-43	21° 15' 35.7"	74° 19' 10.5"
7	Maharashtra	C-44	21° 15' 23.9"	74° 19' 3.2"
8	Maharashtra	C-45	21° 15' 10.5"	74° 18' 59.2"
9	Maharashtra	C-46	21° 14' 57.1"	74° 19' 0.1"
10	Maharashtra	C-47	21° 15' 46.2"	74° 18' 41.2"
11	Maharashtra	C-48	21° 15' 33.2"	74° 18' 37.7"
12	Maharashtra	C-49	21° 15' 20"	74° 18' 36.1"
13	Maharashtra	C-50	21° 15' 6.6"	74° 18' 38"
14	Maharashtra	C-51	21° 15' 47.8"	74° 18' 13.7"
15	Maharashtra	C-52	21° 15' 33.4"	74° 18' 10.2"
16	Maharashtra	C-53	21° 15' 15.3"	74° 18' 01.9"
17	Maharashtra	C-54	21° 14' 43.8"	74° 18' 30.9"
18	Maharashtra	C-55	21° 15' 35.4"	74° 17' 45.6"
19	Maharashtra	C-56	21° 15' 23.3"	74° 17' 52"
20	Maharashtra	C-57	21° 15' 47.6"	74° 18' 14.0"
21	Maharashtra	C-58	21° 15' 1.1"	74° 18' 9"
22	Maharashtra	C-59	21° 14' 41.2"	74° 17' 53.4"

23	Maharashtra	C-60	21° 14' 29.6"	74° 18' 6.5"
24	Maharashtra	C-63	21° 14' 31"	74° 17' 41.1"
25	Maharashtra	C-64	21° 14' 23"	74° 17' 48.3"
26	Maharashtra	C-66	21° 14' 48.5"	74° 16' 37.2"

1.8 Title and Reference of Methodology

Title: Consolidated baseline methodology for grid-connected electricity generation from renewable resources

Methodology: The methodology applied for the project is ACM 0002 of version 13.0.0³

References: ACM002 draws upon the following tools which have been used in the PD

- Tools to calculate the emission factors for an electricity system – Version 2.2.1 (EB 63 annex 19)⁴
- Tools for the demonstration and assessment of additionality – Version 6.0.0 (EB 65 annex 21)⁵

1.9 Participation under other GHG Programs

The PP has participated under CDM mechanism of UNFCCC. The UN reference id 9472⁶ of program with this project activity. This project has considered credits from the monitoring period of 02-January-13 to 28-October-13 under CDM mechanism and the PP would not consider the credit from any other mechanism for the current monitoring plan. The undertaking is provided to confirm that there is no any double accounting for current monitoring period.

1.10 Other Forms of Credit

Emissions Trading Programs and Other Binding Limits

The PP has not applied this project in any Emission Trading Programs and other Binding Limits.

Other Forms of Environmental Credit

The PP has not applied this project in any other form of environmental credits or for REC benefits. PP not participating for REC benefits can be verified from this link-
https://www.recregistryindia.nic.in/index.php/publics/accredited_regens

1.11 Sustainable Development

Contribution to sustainable development

³ <http://cdm.unfccc.int/methodologies/DB/VJI9AX539D9MLOPXN2AY9UR1N4IYGD>

⁴ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.2.1.pdf>

⁵ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v6.0.0.pdf>

⁶ <https://cdm.unfccc.int/Projects/DB/BVQI1356940326.49>

Ministry of Environment and Forests, Govt. of India has stipulated the following indicators for sustainable development in the interim approval guidelines for CDM project.

- a) Social and Economic well-being
- b) Environmental well-being
- c) Technological well-being

The project activity contributes to the above indicators in the following manner:

- **Social well-being:** The project helps in generating employment opportunities during the construction and operation phases. The project activity leads to development in infrastructure in the region like development of roads and also may promote business with improved power generation.
- **Economic well-being:** 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 is also helping to reduce the demand supply gap in the state. The project activity creates local employment generation which helps economic well-being of local people.
- **Technological well-being:** The successful operation of project activity leads to promotion of wind based power generation and is encouraging other entrepreneurs to participate in similar projects
- **Environmental well-being:** The project activity 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

2 SAFEGUARDS

2.1 No Net Harm

The project does not involve any potential negative environmental and socio economic impacts and hence this criteria is not applicable to this project activity.

2.2 Local Stakeholder Consultation

As a part of continual improvement process, feedback from the associated stakeholders is vital, therefore a dedicated Visitor register cum grievance register has been placed at the project site which is accessible to stakeholders to provide their feedback on the project. It is appropriate publicly accessible location at which local stakeholders can provide their feedback on the project. This location is also conducive to continuous and regular checks for stakeholder comments. For the global stakeholders, the suggestion and the grievance can be submitted to mail@mytrah.com

stakeholder meetings are organized on regular intervals in order to identify the major challenges around the area, stakeholders are invited well in advance through printed invitation, calls, meeting and a notice is placed around the local common areas. Various CSR activities around site are carried out with proper stakeholder requirements meeting. The stakeholders are also requested to share their experiences and grievances on continuous basis. Registers is used to records the grievances and feedback. During the current monitoring period, positive feedbacks had been received regarding site operation. No any grievances received during the current monitoring period, therefore, no any mitigation measures were required. Incase of grievances, the nature of probable resolution is discussed with the plant head office and implemented by the site incharge. The grievance copies have been submitted to DOE.

2.3 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 project is a Greenfield project. In absence of the project an equivalent amount of electricity would have been consumed from the NEWNE grid (now INDIAN grid), which is connected to fossil fuel based power plants. The first machine under the project activity was commissioned on 30-December-2011 and last machine under the project activity was commissioned on 22-February-2012. The project activity consists of 26 machines (1.5 MW each) of Suzlon make S-82-1.5 MW, totaling to a capacity of 39 MW. The commissioning schedule of the project activity is shown below. These technologies are all well-known in the wind power industry and have proven themselves. Wind power generation is an environmentally safe and sound technology that has no harmful emissions during its entire lifetime operations. The WTGs was supplied by Suzlon Energy Limited to the project participant. The components are manufactured in India and assembled at the project site. There is no transfer of technology from outside the host country for this project activity. The electricity is exported to the Maharashtra State Electricity Distribution Company Limited. The clean electricity generated from the project would aid in sustainable development of that region. It would also help in reducing greenhouse gas emissions by generating clean and green electricity. The major breakdown details have been included under Appendix 1.

The technical specification of the WTG is as follows:

OPERATING DATA	
Rated power	1500 kW
Cut-in wind speed	4 m/s
Rated wind speed	14 m/s
Cut-off wind speed	20 m/s
Survival wind speed	52.5 m/s

Lifetime of the wind turbines	20 years
ROTOR DATA	
Type	3 Blades, Upwind / Horizontal axis
Diameter	82 m
Rotational speed at rated power	15.6 to 18.4 rpm
Rotor blade material	Epoxy bonded fibre glass
Swept area	5281 m ²
Power regulation	Active pitch regulated with Suzlon Flexi Slip System
GEARBOX	
Type	1 planetary stage / 2 helical stages
Ratio	1 : 95.09
Nominal load	1650 kW
Type of cooling	Forced oil cooling lubrication system
GENERATOR	
Type	Single speed induction generator with slip rings, variable rotor resistance via Suzlon Flexi slip system
Speed at rated power	1511 rpm
Rated power	1500 kW
Rated voltage	690 V AC
Frequency	50 Hz
Insulation	Class H
Enclosure	IP 54 / IP 23 (slip ring unit)
Cooling system	Air cooled
TOWER	
Type	Tubular tower (corrosion proof painting on inner and outer surface) with welded steel plates.
Tower Height	76 m
Hub height (including foundation)	Approximately 78.5 m
BRAKING SYSTEM	
Aerodynamic braking	3 Independent systems with blade pitching
Mechanical braking	Hydraulic fail safe disk brake system
YAW SYSTEM	
Type	Active electrical yaw motor
Bearing	Polyamide Slide bearing with gear ring & automatic greasing system
Protection	Cable twist sensor, proximity sensor
PITCH SYSTEM	
Type	3 independent blade pitch control with battery backup for each blade
Operating range	-5 ° to +90 °
Resolution	0.1 to 10 Deg

No events or situations happened during the reported monitoring period that can alter the applicability of the applied methodology. Due to delay in calibration, the error factor is applied conservatively for current monitoring period and emission reductions are reduced accordingly.

The Commissioning dates of each WTGs are mentioned below:

Sl. No	State	WTG number	Date of Commissioning
1	Maharashtra	C-38	30-December-2011

2	Maharashtra	C-39	30-December-2011
3	Maharashtra	C-40	30-December-2011
4	Maharashtra	C-41	30-December-2011
5	Maharashtra	C-42	22-February-2012
6	Maharashtra	C-43	30-December-2011
7	Maharashtra	C-44	30-December-2011
8	Maharashtra	C-45	30-December-2011
9	Maharashtra	C-46	30-December-2011
10	Maharashtra	C-47	15-February-2012
11	Maharashtra	C-48	12-January-2012
12	Maharashtra	C-49	15-February-2012
13	Maharashtra	C-50	03-January-2012
14	Maharashtra	C-51	20-January-2012
15	Maharashtra	C-52	20-January-2012
16	Maharashtra	C-53	22-February-2012
17	Maharashtra	C-54	30-December-2011
18	Maharashtra	C-55	30-December-2011
19	Maharashtra	C-56	30-December-2011
20	Maharashtra	C-57	12-January-2012
21	Maharashtra	C-58	30-December-2011
22	Maharashtra	C-59	15-February-2012
23	Maharashtra	C-60	15-February-2012
24	Maharashtra	C-63	12-January-2012
25	Maharashtra	C-64	13-January-2012
26	Maharashtra	C-66	15-February-2012

3.2 Deviations

2.3.1 Methodology Deviations

There is no request for deviation applied during this monitoring period.

2.3.2 Project Description Deviations

Deviation-1

The monitoring plan includes $E_{WTG,i,y}$ (Quantity of Electricity generated by the individual WTGs of the PP in year y) . This parameter is not mentioned in monitoring plan. This deviation was approved during monitoring period of 29-October-2013 to 31-May-2018. Hence, the parameter is not considered for the current monitoring period.

This parameter is not used for ER calculations, hence exclusion of this parameter does not have any impact on project activity.

3.3 Grouped Projects

The project is not a grouped project thus this is not applicable.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid,OM,y}$
Data unit	tCO _{2e} /MWh
Description	Operating margin CO ₂ emission factor of NEWNE (Now INDIAN) grid
Source of data	Central Electricity Authority:CO ₂ Emission Database CEA CO ₂ Baseline database Version 07 ⁷
Value applied	0.9851
Justification of choice of data or description of measurement methods and procedures applied	The operating margin emission factor data has been deduced from CO ₂ database. CEA CO ₂ Baseline database Version 07
Purpose of Data	Calculation of baseline emissions
Comments	The operating margin emission factor is a 3-year (2008-09,2009-10 and 2010-11) generation-weighted average data, based on the most recent data available on CEA database at the time of validation i.e. The operating Margin is calculated ex ante and fixed during the crediting period.

Data / Parameter	$EF_{grid,BM,y}$
Data unit	tCO _{2e} /MWh
Description	Build margin CO ₂ emission factor of NEWNE (Now INDIAN) grid
Source of data	Central Electricity Authority:CO ₂ Emission Database CEA CO ₂ Baseline database Version 07 ⁸
Value applied	0.8587
Justification of choice of data or description of measurement methods and procedures applied	The operating margin emission factor data has been deduced from CO ₂ database. CEA CO ₂ Baseline database Version 07

⁷ https://cea.nic.in/wp-content/uploads/baseline/2020/07/user_guide_ver7.pdf

⁸ https://cea.nic.in/wp-content/uploads/baseline/2020/07/user_guide_ver7.pdf

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 _{2e} /MWh
Description	Combined margin CO ₂ emission factor of NEWNE (Now INDIAN) grid
Source of data	Central Electricity Authority:CO ₂ Emission Database CEA CO ₂ Baseline database Version 07 ⁹
Value applied	0.9527
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per the procedures in “Tool to calculate the emission factor for an electricity system” ¹⁰ based on CEA data.
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

Data / Parameter	$EG_{PJ,y}$
Data unit	MWh/yr
Description	Quantity of net electricity exported to the grid during the year y.
Source of data	Monthly billing records issued by MSEDCL.
Description of measurement methods and procedures to be applied	Net electricity supplied is based on the difference between calculated values of “export” and calculated value “import” on the MSEDCL energy meter and the percentage transmission loss incurred in the transmission line between the project and the interconnection point (i.e. sub-station). The meter reading is taken by MSEDCL official.
Frequency of monitoring/recording	Monthly recording of electricity export and import.

⁹ https://cea.nic.in/wp-content/uploads/baseline/2020/07/user_guide_ver7.pdf

¹⁰ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.2.1.pdf>

Value monitored	64,131.69 MWh
Monitoring equipment	Energy meters of 0.2s accuracy class
QA/QC procedures to be applied	The quantity of net electricity supplied is cross verified from the invoices raised on MSEDCL by the project proponent and the readings available from the meter available at site. The meters are calibrated annually as per the metering code by MSEDCL. The PP has no control over the calibration of the meters.
Purpose of the data	Calculation of baseline emissions
Calculation method	Delivered/Net electricity supplied to the MSEDCL is calculated based on the difference between measured values of “export” and “import” on the MSEDCL meter and the percentage transmission loss incurred in the transmission line between the project and the interconnection point (i.e. substation).
Comments	Data will be archived for crediting period plus two years after the end of Crediting period.

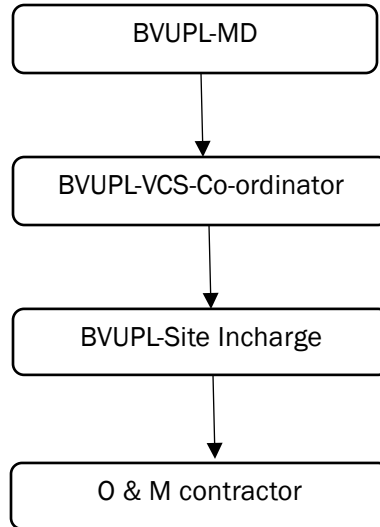
Data / Parameter	EG _{exp,y}
Data unit	MWh/year
Description	Electricity exported from each WTG of the project activity during the year y.
Source of data	Monthly Joint Meter Readings.
Description of measurement methods and procedures to be applied	Delivered/Net electricity supplied to the MSEDCL is calculated based on the difference between measured values of “export” and “import” on the MSEDCL meter and the percentage transmission loss incurred in the transmission line between the project and the interconnection point (i.e. sub-station). The meter reading is taken by MSEDCL officials in presence of BVUPL officials. The measurement is done once a month. All the meters are tri-vector meters, capable of measuring both export and import of electricity. The meters have an accuracy class of 0.2s
Frequency of monitoring/recording	Recording frequency: Monthly. This parameter is calculated by apportioning approach by using the measured parameters
Value monitored	64,609.59 MWh
Monitoring equipment	Energy meters of 0.2s accuracy class
QA/QC procedures to be applied	The quantity of net electricity supplied is cross verified from the invoices raised on MSEDCL by the project proponent and the readings available from the meter available at site. The meters are

	calibrated annually as per the metering code by MSEDCL. The PP has no control over the calibration of the meters.
Purpose of the data	Calculation of baseline emissions
Calculation method	This parameter is calculated by apportioning approach by using the measured parameters
Comments	Data will be archived for crediting period plus two years after the end of Crediting period.

Data / Parameter	EG _{imp,y}
Data unit	MWh
Description	Electricity imported from the grid by the project activity during the year y
Source of data	Monthly Joint Meter Readings.
Description of measurement methods and procedures to be applied	Delivered/Net electricity supplied to the MSEDCL is calculated based on the difference between measured values of “export” and “import” on the MSEDCL meter and the percentage transmission loss incurred in the transmission line between the project and the interconnection point (i.e. sub-station). The meter reading is taken by MSEDCL officials in presence of BVUPL officials. The measurement is done once a month. All the meters are tri-vector meters, capable of measuring both export and import of electricity. The meters have an accuracy class of 0.2s
Frequency of monitoring/recording	Recording frequency: Monthly. This parameter is calculated by apportioning approach by using the measured parameters
Value monitored	477.92 MWh
Monitoring equipment	Energy meters of 0.2s accuracy class
QA/QC procedures to be applied	The quantity of net electricity supplied is cross verified from the invoices raised on MSEDCL by the project proponent and the readings available from the meter available at site. The meters are calibrated annually as per the metering code by MSEDCL. The PP has no control over the calibration of the meters.
Purpose of the data	Calculation of baseline emissions
Calculation method	This parameter is calculated by apportioning approach by using the measured parameters
Comments	Data will be archived for crediting period plus two years after the end of Crediting period.

4.3 Monitoring Plan

The organizational structure of this project activity is as follows.



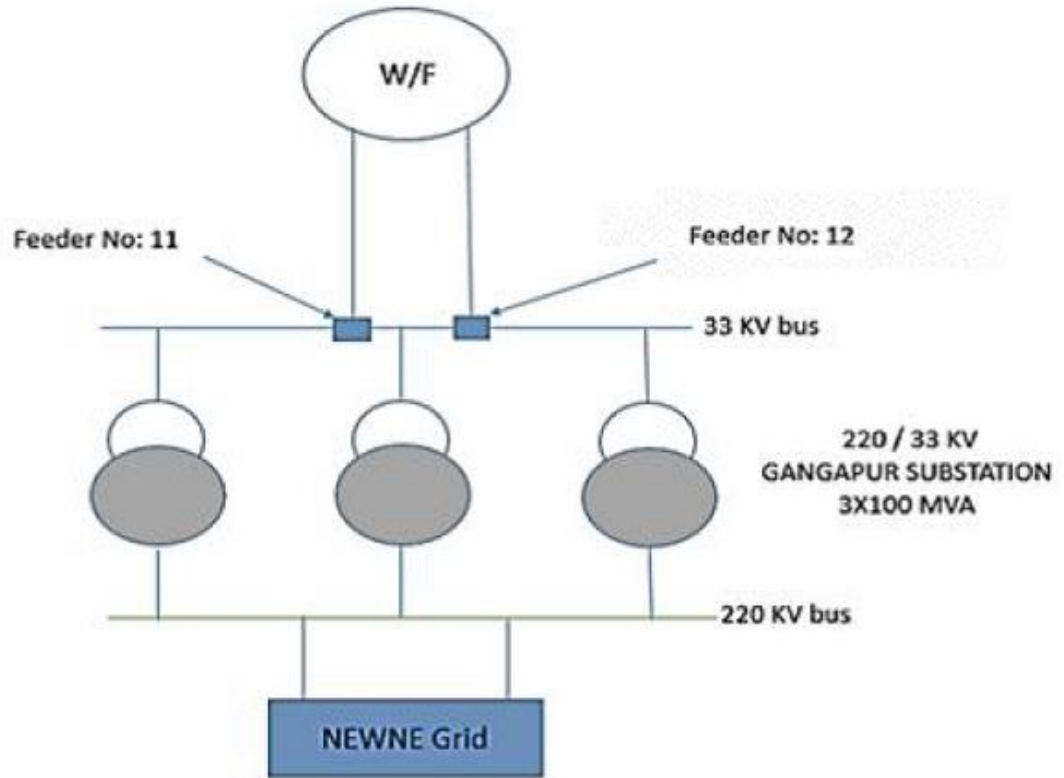
The project proponent has entered into agreement with the WTG- Supplier – Suzlon Energy Limited for the operation and maintenance of WTGs. The WTG supplier has dedicated and technically well-equipped O&M team for day-to-day Operation and maintenance of each WTG. O&M contractor provides a monthly report, which includes wind data, generation data, major breakdown events and machine availability. Site in-charge is responsible for recording of monthly Joint Meter Readings of export and import. Monthly power export and import data is sent regularly to CDM coordinator of BVUPL.

Energy generated from the wind farm is being recorded at the metering point at the HT end of the respective Pooling station which shall be considered as the energy for billing. The station may be having more than one metering point depending on the No. of feeders connected by No. of Wind farms. This entire meter is termed as Feeder meter/s. The total energy recorded in the feeder meter/s is considered as the energy for billing. The option for considering the meter reading shall be Main meter in normal practice. In case of fault in the Main meter check Meter reading will be considered (However no such case has been occurred). The meter reading is taken jointly by MSETCL (representative of state grid)/ MSEDCL and the company/ its representative every month. The Main meter reading is jointly certified by the above entity. Using the above meter reading.

MSEDCL will provide the credit note on generation through letter. The energy referred in the credit note shall be considered for raising invoice accordingly payment will be received from MSEDCL.

All the meters are calibrated by MSEDCL once a year. The details of calibrations are mentioned in Appendix 1.

The schematic representation of project WTG and metering arrangement is shown below:



5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

The baseline emissions are the product of electrical energy baseline $EG_{PJ,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor. Baseline emission factor is calculated as combined margin, consisting of a combination of operating margin (OM) and build margin (BM) factors.

The baseline emissions are to be calculated as follows:

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

Where,

BE_y = Baseline emissions in year y (tCO₂)

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

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

As per registered CDM PDD, combined margin emission factor is 0.9527 tCO₂ /MWh. The project activity is wind power project, project emissions are zero and the resulting emission reduction are as follows.

$$ER_y = BE_y$$

Baseline emission factor (Combined Margin) is found to be 0.9527 tCO_{2e}.

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

$$BE_y = 64,131.69 * 0.9527$$

$$BE_y = \mathbf{61,098 \text{ tCO}_2e} \text{ (round down values)}$$

5.2 Project Emissions

The project activity involves in harnessing wind power. So the emissions from the project are zero.

5.3 Leakage

As per methodology, the Leakage emissions for the project are zero.

5.4 Net GHG Emission Reductions and Removals

The emission reductions are calculated as below

$$ER_y = BE_y - PE_y - LE_y$$

Where,

ER_y = Emission reductions in year y (t CO_{2e})

BE_y = Baseline emissions in year y (t CO_{2e})

PE_y = Project emissions in year y (t CO_{2e}) – This is zero for project activity.

LE_y = Leakage emissions in year y (t CO_{2e}) - This is zero for project activity.

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
01/04/2020 to 31/12/2020	39,947	0	0	39,947
01/01/2021 to 31/05/2021	21,151	0	0	21,151
Total	61,098	0	0	61,098

During the current monitoring period, the actual VERs generated (61,098) is 29.55% less than the estimated (86,725) values. This variation is majorly due to the variations in wind flow pattern, grid availability and other parameters which are not in the control of PP. The above variations is conservative.

APPENDIX 1: CALIBRATION DETAILS

L o c a t i o n N o .	Date of Commis sioning	WT G cap acit y (M W)	M e t e r i n g P o i n t	M e t e r M a k e	MSE DCL Main Mete r Seria l	MSEDC L Check Meter Serial Number	Calibration date	Calibration due date	Next calibration	Calibration due date
C 5 4	30- Decem ber- 2011	1.5	Ga ng ap ur 12	El st e r	0281 1287	028112 88	20-March- 2020	19-March- 2021	16-March- 2021	15-March- 2022
C 5 5	30- Decem ber- 2011	1.5								
C 5 6	30- Decem ber- 2011	1.5								
C 5 8	30- Decem ber- 2011	1.5								
C 5 7	12- January -2012	1.5								
C 6 3	12- January -2012	1.5								
C 6 4	13- January -2012	1.5								

C	15- 5 Februar 9 y-2012	1.5								
C	15- 6 Februar 0 y-2012	1.5								
C	15- 6 Februar 6 y-2012	1.5								
C	22- 5 Februar 3 y-2012	1.5								
C	30- 3 Decem 8 ber- 2011	1.5	Ga ng ap ur 11	El st e r	028 3155 4	028315 55	20-March- 2020	19-March- 2021	16-March- 2021	15-March- 2022
C	30- 3 Decem 9 ber- 2011	1.5								
C	30- 4 Decem 0 ber- 2011	1.5								
C	30- 4 Decem 1 ber- 2011	1.5								
C	30- 4 Decem 3 ber- 2011	1.5								
C	30- 4 Decem 4 ber- 2011	1.5								
C	30- 4 Decem 6 ber- 2011	1.5								

C 5 0	03- January -2012	1.5								
C 5 1	20- January -2012	1.5								
C 5 2	20- January -2012	1.5								
C 4 8	12- January -2012	1.5								
C 4 7	15- Februar y-2012	1.5								
C 4 9	15- Februar y-2012	1.5								
C 4 2	22- Februar y-2012	1.5								

APPENDIX II: BREAKDOWN DETAILS

Date	WTGs	Total B/D in hrs.	Due to
18-April-2020	C49	24.00	Material shortage
19-April-2020	C49	24.00	Material shortage
20-April-2020	C49	24.00	Material shortage
21-April-2020	C49	24.00	Material shortage
04-June-2020	C50	24.00	Material shortage
05-June-2020	C50	24.00	Material shortage
06-June-2020	C50	24.00	Material shortage
07-June-2020	C50	24.00	Material shortage
08-June-2020	C50	24.00	Material shortage

09-June-2020	C50	24.00	Material shortage
10-June-2020	C50	24.00	Material shortage
11-June-2020	C50	24.00	Material shortage
12-June-2020	C50	24.00	Material shortage
13-June-2020	C50	24.00	Material shortage
14-June-2020	C50	24.00	Material shortage
15-June-2020	C50	24.00	Material shortage
16-June-2020	C50	24.00	Material shortage
18-July-2020	C49	24.00	Material shortage (OFC cable)
22-September-2020	C39	24.00	transformer fail
23-September-2020	C39	24.00	transformer fail
07-October-2020	C40	24.00	Material shortage (pitch coil & break pad)
08-October-2020	C40	24.00	Material shortage (pitch coil & break pad)
09-October-2020	C40	24.00	Material shortage (pitch coil & break pad)
10-October-2020	C40	24.00	Material shortage (pitch coil & break pad)
09-November-2020	C41	24.00	pitch coil
28-November-2020	C39	24.00	Slip ring issue
29-November-2020	C39	24.00	Slip ring issue
30-November-2020	C39	24.00	Slip ring issue
19-December-2020	C44	24.00	Material shortage (battery cells)
20-December-2020	C44	24.00	Material shortage (battery cells)
20-December-2020	C44	24.00	Material shortage (battery cells)
13-Feb-2021	C38	24.00	Material shortage (pitch coil & break pad)
14-Feb-2021	C38	24.00	Material shortage (pitch coil & break pad)
26-April-2021	C64	24.00	Material shortage (pitch coil & break pad)
28-April-2021	C64	23.30	Material shortage (pitch coil & break pad)
29-April-2021	C64	24.00	Material shortage (pitch coil & break pad)
30-April-2021	C64	24.00	Material shortage (pitch coil & break pad)
01-May-2021	C64	24.00	Material shortage (pitch coil & break pad)
02-May-2021	C64	24.00	Material shortage (pitch coil & break pad)