



46 MW MANGOLI WIND POWER PROJECT IN KARNATAKA



Document Prepared by: Kosher Climate India Private Limited

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The project activity is installation of 46 MW wind power project, promoted by Energon KN Wind Power Private Limited (Name changed to Vena Energy KN Wind Power Private Limited). The purpose of the project activity is to generate clean electricity with utilization of wind energy. The project consists of 23 numbers of Vestas V110 Wind Turbine Generators (WTGs) of 2.0 MW capacities each. The project WTGs are installed in the villages Mangoli & Hegadihala in Bijapur district of Karnataka in India.

All the WTGs of the project activity were commissioned on 23-July-2016.

The electricity generated by the project is exported to the Indian electricity grid. The project activity therefore displace an equivalent amount of electricity which would have otherwise been generated by fossil fuel dominant electricity grid. Since wind power is Greenhouse Gas (GHG) emissions free, the power generated prevents the anthropogenic gas emissions generated by fossil fuel based thermal power stations comprising coal, diesel, furnace oil and gas.

There was no activity at the site prior to implementation of the project activity. Hence the scenario existing prior to the project activity is same as baseline scenario which is continual use of highly carbon intensive electricity in the regional grid.

The estimation of GHG reductions by this project is limited to carbon dioxide (CO₂) only. Thus the project activity leads to an emission reduction of 1,202,680 tCO₂ for the chosen crediting period of 10 years.

The current monitoring period chosen is from 01-December-2019 to 31-December-2021 (inclusive of first & last date) and the GHG emission reductions calculated are 265,866 tCO₂

1.2 Sectoral Scope and Project Type

Sectoral Scope: 1 Energy Industries (Renewable/Non-Renewable Sources)

Methodology applied is ACM 0002 of version 19.0

The project is not a grouped project, it is a standalone wind power project by a single project developer.

1.3 Project Proponent

Organization name	Vena Energy KN Wind Power Private Limited (Formerly Energon KN Wind Power Private Limited)
Contact person	Rajesh Gathala
Title	Managing Director
Address	1 st Floor, Embassy Icon Annexe, 2/1 Infantry Road, Bangalore-560001, Karnataka, India
Telephone	080-66454000
Email	-

Organization name	Kosher Climate India Private Limited
Contact person	Vamsi Krishna M
Title	CAB Head
Address	#109, 2 nd Floor, 27 th Main, Sector – 1, HSR Layout, Bangalore-560102, India
Telephone	91- 80-49931177
Email	vamsi@kosherclimate.com narendra@kosherclimate.com

1.4 Other Entities Involved in the Project

Organization name	NA
Role in the Project	
Contact person	
Title	
Address	
Telephone	
Email	

1.5 Project Start Date

The project start date for this project is 23-July-2016. This is the day on which the first machine was commissioned.

1.6 Project Crediting Period

23-July-2016 to 22-July-2026 and then for another period of 20 Years (10 years, renewable twice).

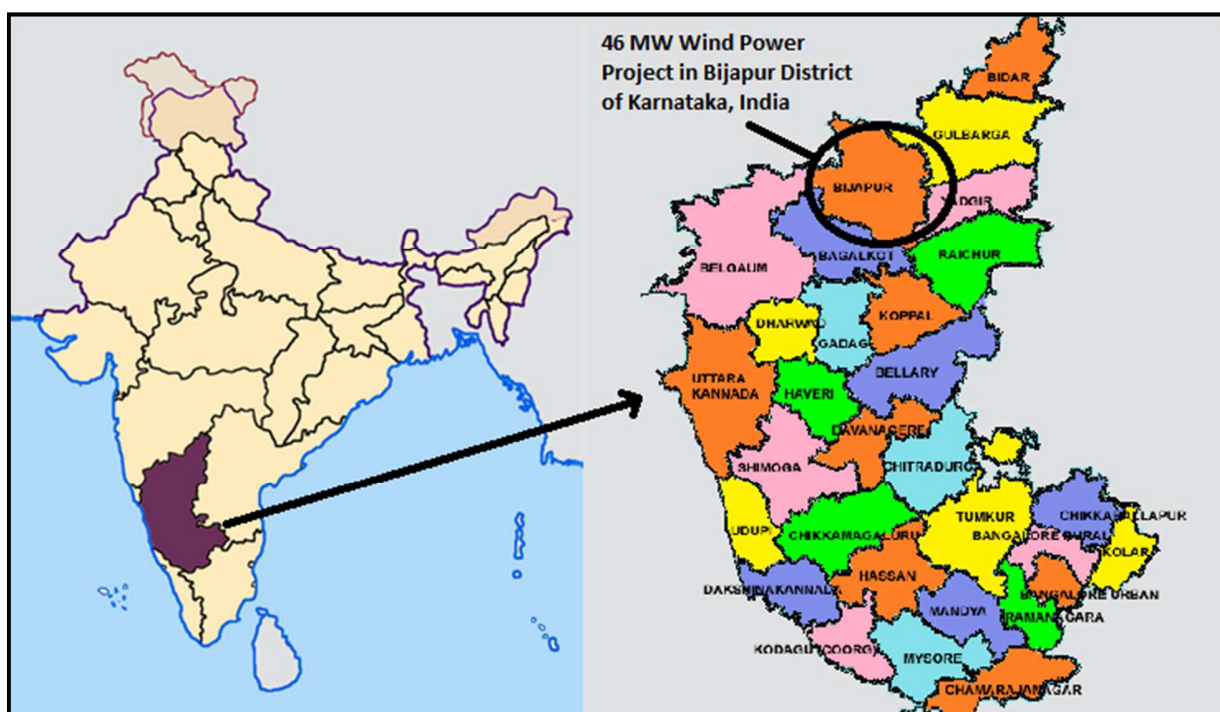
1.7 Project Location

The project activity is located at Bijapur district of Karnataka State, India. The geo-coordinates of the project location are as follows:

S.No	WTG No	Village	Taluk	District	Latitude	Longitude
1	Loc-1	Mangoli	Basavana Bewadi	Bijapur	16.662860	75.840409
2	Loc-2	Mangoli	Basavana Bewadi	Bijapur	16.668194	75.840142
3	Loc-3	Mangoli	Basavana Bewadi	Bijapur	16.670061	75.847783
4	Loc-4	Hegadihala	Bijapur	Bijapur	16.674754	75.845131
5	Loc-5	Mangoli	Basavana Bewadi	Bijapur	16.675373	75.839536
6	Loc-6	Hegadihala	Bijapur	Bijapur	16.676985	75.843378
7	Loc-7	Mangoli	Basavana Bewadi	Bijapur	16.680614	75.842325
8	Loc-8	Mangoli	Basavana Bewadi	Bijapur	16.685977	75.841392
9	Loc-9	Mangoli	Basavana Bewadi	Bijapur	16.695548	75.841743
10	Loc-10	Hegadihala	Bijapur	Bijapur	16.698493	75.844476
11	Loc-11	Mangoli	Basavana Bewadi	Bijapur	16.701300	75.843250
12	Loc-12	Mangoli	Basavana Bewadi	Bijapur	16.688500	75.829933
13	Loc-13	Mangoli	Basavana Bewadi	Bijapur	16.692902	75.825638
14	Loc-14	Mangoli	Basavana Bewadi	Bijapur	16.696307	75.826131
15	Loc-15	Mangoli	Basavana Bewadi	Bijapur	16.701433	75.832728
16	Loc-16	Mangoli	Basavana Bewadi	Bijapur	16.706362	75.832121
17	Loc-17	Hegadihala	Bijapur	Bijapur	16.703868	75.827411

18	Loc-18	Hegadihala	Bijapur	Bijapur	16.709387	75.837377
19	Loc-19	Mangoli	Basavana Bewadi	Bijapur	16.711336	75.849307
20	Loc-20	Mangoli	Basavana Bewadi	Bijapur	16.716030	75.839704
21	Loc-21	Mangoli	Basavana Bewadi	Bijapur	16.715510	75.825088
22	Loc-22	Mangoli	Basavana Bewadi	Bijapur	16.712659	75.826126
23	Loc-23	Mangoli	Basavana Bewadi	Bijapur	16.708829	75.823108

The geographical location of the project site is as shown below:



1.8 Title and Reference of Methodology

The methodology applied for the project is Approved Large Scale Consolidated Methodology: ACM0002 “Grid-connected electricity generation from renewable sources” (Version 19.0, EB100)¹

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

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

- Methodological Tool: Tool to calculate the emission factor for an electricity system - Version 7.0, EB 100, Annex 6².
- Methodological Tool: Tool for the demonstration and assessment of additionality - Version 07.0.0, EB 70 Annex 8³.

1.9 Participation under other GHG Programs

The project is not registered under any other GHG programs

1.10 Other Forms of Credit

The project is not included in any emissions trading program or any other mechanism that includes GHG allowance trading. Hence the net GHG emission reductions or removals generated during this monitoring period have not been used for compliance under programs or mechanisms.

The project has sought or received another form of GHG-related environmental credit, including renewable energy certificates, during this monitoring period.

1.11 Sustainable Development Contributions

The proposed project activity involves the installation of Wind Power Projects in Karnataka State of India. The purpose of the project activity is to generate clean electricity with utilization of wind energy.

The project supplies clean electricity from the wind power plant to the Indian National Grid hence displacing the electricity generated from grid connected fossil fuel power plants and thereby avoiding the equivalent Carbon dioxide which is a green house gas. In the absence of the project activity, there won't be any avoidance of carbon dioxide

During the construction and operation and maintenance of the wind power plant, the project created many direct and indirect new job opportunities mostly to the local people in the project region. In the absence of the project activity, there would be no new jobs created in the project area.

As a part of regional development efforts associated with the project, PP has supported many education, health & infrastructure related needs for local people. These are funded from the revenue generated from the operation of the project activity. In the absence of project activity, there would be no revenue generated from the project and hence the activity would have not occurred in the absence of the project activity.

Projects contributions to UN's SDG are given in the below table:

² http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf/history_view

³ <http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf>

Table 1: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1	3.b	Healthcare services	Implemented activities to increase	PP conducted free health camps in the local villages and about 9921 people benefitted from this during the monitoring period. About 20% of funds from the project revenue has been provided from this project revenue. Hence effectively about 1984 people benefitted from this project	About 1984 people benefitted from free health camps and medical essential distribution since commissioning of this project
2	4.a	Improving school infrastructures	Implemented activities to increase	Distributed tables to local schools that benefitted 100 students	1 School is provided with basic infrastructure since commissioning of the project. 100 students benefitted from this project till this monitoring period.
3	7.2	7.2.1 Renewable energy share in the total final energy consumption	Implemented activities to increase	About 280,599 MWh renewable electricity has supplied to Indian National grid during the reported period that helps to increase the renewable energy share in the energy mix.	Since commissioning, about 778,137 MWh renewable electricity has supplied to Indian National grid till this monitoring that helps to increase the renewable energy share in the energy mix.
4	8.5	Number of employment created	Implemented activities to increase	About 29 employment opportunities s has been created during the current reporting period.	The project has created about 29 employment opportunities since commissioning.
5	8.8	Number of trainings conducted to O&M staff	Implemented activities to increase	About 49 trainings conducted to O&M staffs during the current monitoring period	About 187 trainings conducted to O&M staffs from the commissioning of this project.

5	13.0	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	By supplying 280,599 MWh clean electricity to national grid, the project avoided release of 265,866 tCO ₂ into the atmosphere during the reporting period and contributed to the sustainable development goal 13.	Prevented the release of 737,285 tCO ₂ into the atmosphere since its commissioning.
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2 SAFEGUARDS

2.1 No Net Harm

There were no harm identified from the project and hence no mitigations measures are applicable.

2.2 Local Stakeholder Consultation

The stakeholder consultation meeting was conducted during the social survey as a part of the ESIA study. The consultations were done by identifying the right stakeholders, including, local farmers, villagers, school teachers, government officials, panchayat officials, local NGOs. The stakeholder meeting took place at the gram panchayat of village Mangoli on 18th February-2016.

The purpose of the consultation was to account for the views of the people impacted either directly or indirectly due to the project activity. The objective of the SHC meetings was to inform the stakeholders on the environmental and social impact of the project activity and to discuss their concerns regarding it.

Notices were put up in the local panchayats at least a week in advance of the consultations.

Post consultations the project proponent has also devised an Grievance mechanism to address any concerns of the villagers. A grievance Register with the details of site contact person, Head office HSE person are available at all the panchayat offices in the project location.

No grievances received during the monitoring period

2.3 AFOLU-Specific Safeguards

Not applicable.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

All the WTGs of the project activity were commissioned on 23-July-2016. There is no changes in the project design occurred since the commissioning of the project.

The project consists of 23 numbers of Vestas V110 Wind Turbine Generators (WTGs) of 2.0 MW capacities each. The project WTGs are installed in the villages Mangoli & Hegadihala in Bijapur district of Karnataka in India.

The technical specifications of the WTGs have been provided as below.

Vestas V110	
Rated power	2000 kW
Average Annual Wind speed	7.5 m/s
Turbulence Intensity I15%	18 m/s
Reference 10 minute wind speed for 50 years	37.5 m/s
Survival wind speed	52.5 m/s
POWER	
Rated power	2000 kW
Average Annual Wind speed	7.5 m/s
Turbulence Intensity I15%	18 m/s
Reference 10 minute wind speed for 50 years	37.5 m/s
Survival wind speed	52.5 m/s
GENERATOR	
Type	Doubly-fed with coil rotors and slip rings
Rated power	2.0 MW
Voltage	690 V AC
Frequency	50Hz/60Hz
Protection class	IP 54
Power Factor	0.95 CAP – 0.95 IND throughout the power range
ROTOR	
Diameter	97 m
Swept area	7390 sq.m
Speed range (variable)	9:19 rpm
TOWER AND FOUNDATION	
Hub height	104 m
Design	Tubular, Four sections
Foundation type	Floating foundation
GEAR BOX	
Type	1 Planetary stage & 2 Parallel stage
Ratio	1:106.8 (50 Hz), 1:127.2 (60 Hz)

There is no changes in the project design occurred since the commissioning of the project.

There were only routine operation and maintenance occurred during the monitoring period. There is no major outages that affected the GHG emission reduction during the monitoring period.

3.2 Deviations

2.1.1 Methodology Deviations

There is no methodology deviation applied.

2.1.2 Project Description Deviations

The project proponent name is changed from “Energon KN Wind Power Private Limited” to “Vena Energy KN Wind Power Private Limited”. The certificate of Incorporation pursuant to change of name has been submitted to DOE for verification.

There is no other project description deviation applied.

3.3 Grouped Projects

The project is not a grouped project. Hence, not applicable.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	EF _{OM,y}
Data unit	tCO ₂ /MWh
Description	Operating margin CO ₂ emission factor of INDIAN Grid
Source of data	Central Electricity Authority:CO ₂ Emission Database CEA CO ₂ Baseline database Version 13 ⁴
Value applied	0.9726
Justification of choice of data or description of measurement methods and procedures applied	Calculated in line with “ <i>Tool to calculate the emission factor for an electricity system</i> ” using data from Central Electricity Authority of India’s (CEA) “ <i>Baseline Carbon Dioxide Emission Database Version 13</i> ”. The value used is calculated ex-ante as generation based weighted average of last three years of the operating margin provided in the CEA database. Weighted average = $\sum_{i=1 \text{ to } n} (\text{Net generation in operating margin in year } i * \text{Simple operating margin in year } i) / \sum_{i=1 \text{ to } n} (\text{Net generation in operating margin of year } i)$
Purpose of Data	Baseline Emission calculation

⁴ https://cea.nic.in/wp-content/uploads/baseline/2020/07/user_guide_ver13.pdf

Comments	The operating margin emission factor is a 3-year generation-weighted average (2014-17). The operating Margin is calculated ex ante and fixed during the crediting period
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Data / Parameter	EF _{BM,y}
Data unit	tCO ₂ /MWh
Description	Build margin CO ₂ emission factor of INDIAN grid
Source of data	Central Electricity Authority:CO ₂ Emission Database CEA CO ₂ Baseline database Version 13 ⁵
Value applied	0.8723
Justification of choice of data or description of measurement methods and procedures applied	Calculated in line with “Tool to calculate the emission factor for an electricity system” using data from Central Electricity Authority of India’s (CEA) “Baseline Carbon Dioxide Emission Database Version 13”. The value is calculated ex-ante as most recent build margin provided by the CEA
Purpose of Data	Baseline Emission calculation
Comments	The Build Margin would be calculated ex ante and fixed during the crediting period. For ex ante calculation the most recent data (2016-17) available has been used and the build margin is thus calculated.

Data / Parameter	EF _{grid,CM,y}
Data unit	tCO ₂ /MWh
Description	Combined margin CO ₂ emission factor of INDIAN grid
Source of data	Central Electricity Authority:CO ₂ Emission Database CEA CO ₂ Baseline database Version 13 ⁶
Value applied	0.9475
Justification of choice of data or description of measurement methods and procedures applied	The date has been considered in accordance to the Tool to calculate emission factor of an electricity system. The tool guides to take 75% weightage of EF _{grid,OMsimple} , & 25% weightage of EF _{grid,BM,y} .
Purpose of Data	Baseline Emission calculation
Comments	The combined margin would be calculated ex-ante and fixed for the entire crediting period and the combined margin thus calculated is 0.9475.

⁵ https://cea.nic.in/wp-content/uploads/baseline/2020/07/user_guide_ver13.pdf

⁶ https://cea.nic.in/wp-content/uploads/baseline/2020/07/user_guide_ver13.pdf

4.2 Data and Parameters Monitored

Data / Parameter	EG _{facility,y} ⁷																							
Data unit	MWh/year																							
Description	Calculated (based on the measured values of electricity exported and imported)																							
Source of data	Share Certificate Issued by Vestas and JMR (Joint Meter Reading) by EB																							
Description of measurement methods and procedures to be applied	Net electricity supplied is calculated based on the difference between calculated values of “export”, “import” and “transmission loss” on the EB energy meter at the “evacuation point” and at Government Sub station”. Transmission loss is calculated on pro-rata basis as per the readings of “substation & “primary metering Point”. (Net Electricity = Export – Import – Transmission Loss)																							
Frequency of monitoring/recording	Measurement: Continuous Recording: Monthly Monitoring Method: recording in JMR (Joining Meter Reading) The JMR includes, monthly recording of electricity export, import & transmission loss.																							
Value monitored	254,598																							
Monitoring equipment	Energy meters <table><tr><td>Details</td><td>Main meter</td><td>Check meter</td></tr><tr><td>Meter Number</td><td>18053689</td><td>18053925</td></tr><tr><td>Make</td><td>L&T</td><td>L&T</td></tr><tr><td>Accuracy</td><td>0.2S</td><td>0.2S</td></tr><tr><td>Location</td><td>GSS</td><td>GSS</td></tr></table>			Details	Main meter	Check meter	Meter Number	18053689	18053925	Make	L&T	L&T	Accuracy	0.2S	0.2S	Location	GSS	GSS						
Details	Main meter	Check meter																						
Meter Number	18053689	18053925																						
Make	L&T	L&T																						
Accuracy	0.2S	0.2S																						
Location	GSS	GSS																						
QA/QC procedures to be applied	Net electricity supplied to the grid by the project activity is cross checked with invoices submitted to EB. The meter(s) shall be calibrated and maintained by the state utility as per their own schedule, and this frequency of meter calibration is not within the control of the Project Proponent. Calibration of electricity meters is carried out in-line with the Nation standard⁸ which recommends at least once in 5 year calibration or whenever abnormal difference/inconsistency is observed between main meter and check meter. Calibration Details: <table><tr><td>Meter</td><td>Calibration Date</td><td>Due date</td><td>Calibration agency</td></tr><tr><td rowspan="3">Main meter</td><td>13/06/2018</td><td>12/06/2023</td><td>HESCOM</td></tr><tr><td>15/12/2018</td><td>14/12/2023</td><td>HESCOM</td></tr><tr><td>17/06/2019</td><td>16/06/2024</td><td>HESCOM</td></tr><tr><td rowspan="2">Check meter</td><td>13/06/2018</td><td>12/06/2023</td><td>HESCOM</td></tr><tr><td>15/12/2018</td><td>14/12/2023</td><td>HESCOM</td></tr></table>			Meter	Calibration Date	Due date	Calibration agency	Main meter	13/06/2018	12/06/2023	HESCOM	15/12/2018	14/12/2023	HESCOM	17/06/2019	16/06/2024	HESCOM	Check meter	13/06/2018	12/06/2023	HESCOM	15/12/2018	14/12/2023	HESCOM
Meter	Calibration Date	Due date	Calibration agency																					
Main meter	13/06/2018	12/06/2023	HESCOM																					
	15/12/2018	14/12/2023	HESCOM																					
	17/06/2019	16/06/2024	HESCOM																					
Check meter	13/06/2018	12/06/2023	HESCOM																					
	15/12/2018	14/12/2023	HESCOM																					

⁷ If the project activity is the installation of a Greenfield power plant, then: $EGPJ,y = EG_{facility,y}$

⁸ (Page number 12 of) http://www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf

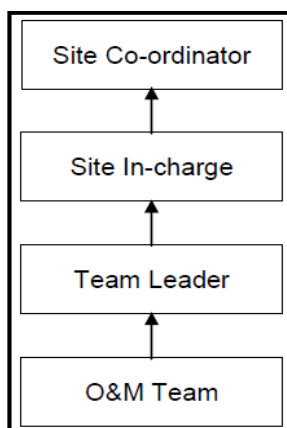
	17/06/2019	16/06/2024	HESCOM
Purpose of the data	Calculation of baseline emissions		
Calculation method	Net electricity = Electricity export – Electricity import		
Comments	-		

4.3 Monitoring Plan

The project proponent has entered into agreement with the WTG Suppliers (Vestas) 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 generation data, major breakdown events and machine availability. Project manager is responsible for recording of monthly meter readings of export and import. Monthly power export and import data is sent regularly to site in charge of each project separately.

Monitoring roles and responsibilities:

The data for the project is compiled by the O&M Contractor and subsequently stored by the PP, the reporting and data flows as per the below mentioned flow chart starting from Site O&M team which monitors day to day operational data and monthly recording. The reporting responsibilities for the project are described as below;



The Site In-charge is responsible for carrying out internal auditing and QA/QC. All the values from generation record is checked with JMR and invoices for consistency. In case there are any non-conformances identified, the Site In-charge investigates the error and revise the record to correct it. In any case where values have slightest of variation in different records the most conservative value will be taken in the project monitoring report.

Personal Training:

The training for operating and maintaining the plant is provided to the O&M team whenever there would be necessity or any technological up gradation

Monitoring Process at project site

Joint monthly meter reading is taken at the Vestas Pooling substation (PSS) meters by representative of DISCOM and O&M team/service provider (on behalf of the project proponent). It must be noted here that the meter readings as mentioned above shall be calculated as the product of meter multiplication factor and the difference of the current and previous meter readings.

Currently, the PSS has only the project WTGs and hence there is no need to calculate transmission losses.

(Net Electricity = Export – Import)

However, in future if there are other WTGs connected to the same feeder in PSS with the project WTGs then O&M contractor (Vestas) shall be responsible for calculation of net electricity and arriving at transmission loss. In such a scenario:

(Net Electricity = Export – Import)

Based on the above procedure, the Monthly JMRs shall be provided to the project proponent. This is to be noted that the detail procedure of monitoring is illustrated here for the sake of understanding; for the preparation of monitoring report during periodic verifications, only the net electricity generation value shall be directly used for emission reduction calculation. No other parameters as explained above shall be used and presented in the monitoring report.

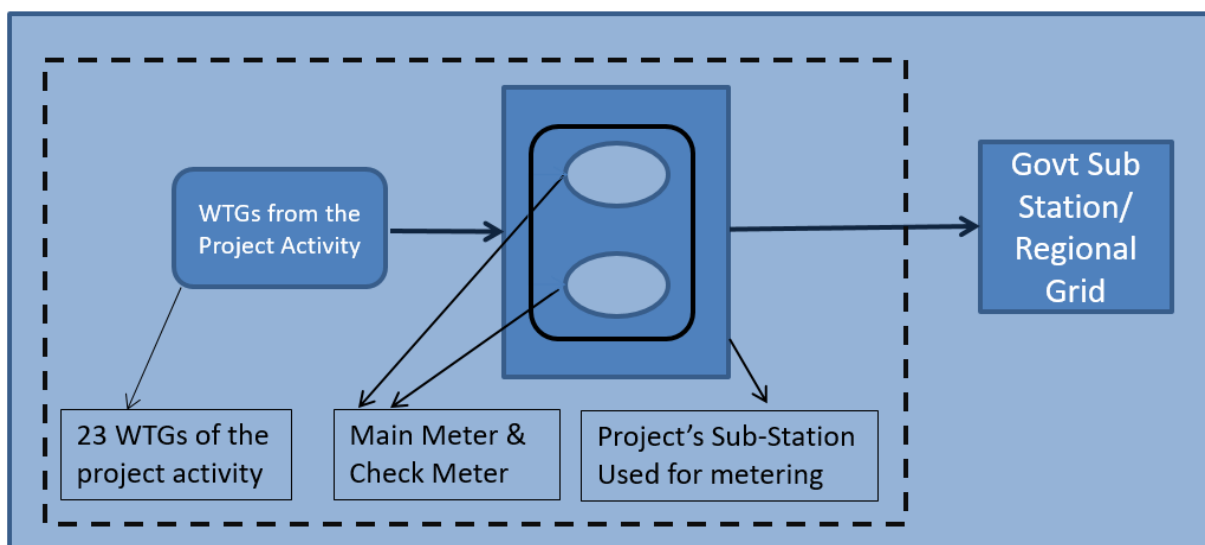
Emergency preparedness:

In case Main meter or Check meter is found to be outside the acceptable limits of accuracy or faulty or not functioning properly, it will 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 will be used for readings

Data recording & archiving: The project proponent shall maintain data both in electronic form and hard copies. The monitored data shall be archived till 2 years after the completion of crediting period.

A schematic diagram indicating the metering system is provided below:

Metering System



5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

As per description earlier under this document:

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

$EF_{grid,CM,y}$ is 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) (i.e, 0. 9475 tCO₂/MWh).

and;

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

Here,

$$BE_y = 280,599.0 \text{ MWh} * 0.9475 \text{ tCO}_2/\text{MWh} = 265,866 \text{ tCO}_2\text{e (Rounded down value)}$$

Year wise summary

Vintage	Baseline Emission (tCO ₂ e)
2019*	7,959
2020	128,233

2021	129,674
Total	265,866

*From 01-December-2019 to 31-December-2019

5.2 Project Emissions

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

5.3 Leakage

No leakage emissions have been considered and hence the leakage emission is zero.

5.4 Net GHG Emission Reductions and Removals

As per the applied methodology, emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$

Where,

ER_y = Emission Reduction in tCO₂e/year

BE_y = Baseline emission in tCO₂/year

PE_y = Project emissions in tCO₂e/year

LE_y = Leakage emission in tCO₂e/year

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)
Year 2019	7,959	0	0	7,959
Year 2020	128,233	0	0	128,233
Year 2021	129,674	0	0	129,674
Total	265,866	0	0	265,866

Comparison between actual emission reduction & estimated emission reduction:

Monitoring period start date	1-Dec-19	
Monitoring period end date	31-Dec-21	
Number of days	762	Days
Annual estimated emission reduction	120,268	tCO ₂ /yr
Estimation for the monitoring period	251,080	tCO ₂ e
Actual Emission Reduction	265,866	tCO ₂ e
Difference	5.9%	

The actual emission reduction is 5.9% higher than the estimated emission reduction which is mainly based on the increase in generation due to high wind availability during the monitoring period. This is not in the control of PP and also the increase is within the sensitivity limit considered in the additionality as specified in the registered PDD. Hence, this change will not affect the additionality of the project.