



# Verified Carbon Standard

## 21.8 MW WIND POWER PROJECT AT JANGI VANDHIYA, GUJARAT BY POWERICA LIMITED



Document Prepared by EKI Energy Services Limited

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# 1 PROJECT DETAILS

## 1.1 Summary Description of the Implementation Status of the Project

The project activity involves installation and operation of 11 WTGs of 2.0 MW comprising a total capacity of 22.0 MW by utilising the V100 model of WTGs supplied of Vestas. All the WTGs involved in the project are commissioned at Bhachau Taluka of Kutch district of Gujarat.

The project activity is a Greenfield project for generation of electrical energy using wind which is a renewable source of energy. In wind energy generation, the wind turns two or three propeller-like blades around a rotor. The rotor is connected to the main shaft, which spins a generator to create electricity. Since power is generated from wind energy, no emissions are attributed to the project emissions and due to that equivalent amount of fossil-fuel dominated grid can be displaced due to the project activity.

The start date of the project activity is 12-June-2014 which is the date of commissioning of the first phase of the 22 MW wind power project. The project got fully commissioned on 08-July-2014 and has been in continuous operation since then. The detailed commissioning details are mentioned in section 3.1 of this monitoring report.

During the current monitoring period of 01-January-2022 to 31-December-2022, the project has supplied 39,508.66 MWh of electricity to the Indian Grid, and thus contributing to the GHG reductions of 38,520 tCO<sub>2e</sub>.

The audit history of the project is as follows-

Audit Type	Period	Program	WVB Name	Number of years
Validation	25-September-2014	VCS	LGAI Technological Center, S.A. (Applus+ Certification)	NA
Verification 1	12-June-2014 -- 30-September-2018	VCS	LGAI Technological Center, S.A. (Applus+ Certification)	4 years, 3 months and 19 days
Verification 2	01-October-2018 -- 31-December-2019	VCS	LGAI Technological Center, S.A. (Applus+ Certification)	1 year, 3 months
Verification 3	01-January-2020 -- 31-December-2020	VCS	KBS Certification Services Pvt.Ltd.	1 year

<b>Verification 4</b>	01-January-2021 -- 31-December-2021	VCS	LGAI Technological Center, S.A. (Applus+ Certification)	1 year
<b>Verification 5</b>	01-January-2022 -- 31-December-2022	VCS	LGAI Technological Center, S.A. (Applus+ Certification)	1 year
<b>Total</b>	<b>5 verifications-(12-June-2014 – 31-December-2022)</b>	VCS		<b>Total verifications – 8years, 6 months &amp; 19 days</b>

## 1.2 Sectoral Scope and Project Type

Sectoral scope 1: Energy Industries (renewable / non-renewable sources).

Project type: Renewable energy project (Wind).

The project activity is not a grouped project

## 1.3 Project Proponent

<b>Organization name</b>	Powerica Limited
<b>Contact person</b>	Mr. Pradeep Gupta
<b>Title</b>	Director
<b>Address</b>	9th Floor, Godrej Coliseum, Sion (E), Mumbai – 400021, Maharashtra, India
<b>Telephone</b>	+ 91 22 4001 2000
<b>Email</b>	<a href="mailto:pradeep.gupta@powericaltd.com">pradeep.gupta@powericaltd.com</a>

## 1.4 Other Entities Involved in the Project

<b>Organization name</b>	EKI Energy Services Limited
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<b>Role in the Project</b>	Project Consultant
<b>Contact person</b>	Shivangi Tiwari
<b>Title</b>	Project Manager
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## 1.5 Project Start Date

The project start date is 12-June-2014 which is the date of commissioning of the first phase of the 22 MW wind power project.

## 1.6 Project Crediting Period

The crediting period of the project activity is for 10 years (fixed).

Project crediting period: 12-June-2014 to 11-June-2024.

The project is registered under Clean Development Mechanism (CDM) of UNFCCC with 10 years crediting period (Fixed) (Reference No: 10042<sup>1</sup>) on 17-October-2014. The Crediting period of the project under CDM starts on 17-October-2015 and ends on 16-September-2025.

## 1.7 Project Location

The project activity is located at Village – Jangi, Lakhapar, Vadhiya, Lakhdhirdh and Godpar, Taluka – Bhachau, District - Kutch in the state of Gujarat. The geo-coordinates of each WTG are as follows:

Sr. No.	WTG No.	Village	Latitude	Longitude
1	JW04	Jangi	23° 12' 41.3" N	70° 34' 28.8" E
2	JW11	Jangi	23° 13' 05.5" N	70° 32' 15.6" E
3	VW33	Lakhapar	23° 12' 46.6"N	70° 38' 00.0" E
4	VW41	Vadhiya	23° 12' 18.3" N	70° 35' 59.7" E
5	VW50	Lakhdhirdh	23° 14' 52.2" N	70° 35' 41.2" E

<sup>1</sup> <https://cdm.unfccc.int/Projects/DB/RWTUV1411994965.49/view>

6	VW52	Godpar	23° 13' 06.3" N	70° 36' 58.4" E
7	VW53	Lakhdhargadh	23° 14' 49.6" N	70° 34' 59.9" E
8	VW60	Lakhdhargadh	23° 14' 26.6" N	70° 35' 07.8" E
9	VW68	Lakhdhargadh	23° 15' 10.3" N	70° 35' 56.3" E
10	VW69	Vadhiya	23° 14' 23.1" N	70° 36' 26.9" E
11	VW72	Vadhiya	23° 14' 24.5" N	70° 37' 02.3" E



(a)



(b)

Fig.1. (a) Project location in India map (b) Location Map of the WTGs at Kutch

## 1.8 Title and Reference of Methodology

Methodology: ACM0002 ver. 15.0<sup>2</sup>

Methodology Title: “Grid-connected electricity generation from renewable sources”

The methodology also refers to the latest approved versions of:

- Tool 01: Tool for the demonstration and assessment of additionality, Version 07.0.0<sup>3</sup>
- Tool 02: Combined tool to identify the baseline scenario and demonstrate additionality, Version 05.0.0<sup>4</sup>
- Tool 03: Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel combustion, Version 02.0<sup>5</sup>

<sup>2</sup> <https://cdm.unfccc.int/UserManagement/FileStorage/52FDLM8C49Q3TBSOIJYPVH16ER0UAW>

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

<sup>4</sup> <http://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-02-v5.0.0.pdf>

<sup>5</sup> <http://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-03-v2.pdf>

- Tool 07: Tool to calculate the emission factor for an electricity system, Version 04.0<sup>6</sup>

## 1.9 Participation under other GHG Programs

The project activity has also been registered with UNFCCC under Clean Development Mechanism (CDM) program. The registration reference number for the same is 10042<sup>7</sup>. The project proponent has provided undertaking that it will not claim any GHG credits for UNFCCC CDM during the current monitoring period. There are no CERs claimed under CDM mechanism.

Details of credits issued are mentioned below-

Monitoring Period	Mechanism
12-June-2014 -- 30-September-2018	VCS
01-October-2019 -- 31-December-2019	VCS
01-January-2020 -- 31-December-2020	VCS
01-January-2021 -- 31-December-2021	VCS
01-January-2022 -- 31-December-2022	VCS

## 1.10 Other Forms of Credit and Supply Chain (Scope 3) Emissions

- **Emission Trading Programs and Other Binding Limits:** The project is registered under CDM and UNFCCC Registration ID 10042<sup>8</sup>. The project proponent (PP) has submitted undertaking that they will not claim same GHG emission reductions of the project from CDM and VCS. PP would not use net GHG emission reductions by the projects for compliance with emission trading program to meet binding limits on GHG emissions.
- **Other Forms of Environmental Credit:** The Project Proponent has also submitted undertaking for not availing other forms of environmental credit for the same crediting period under consideration.
- **Supply Chain (Scope 3) Emissions:** Since scope 3 emissions are not accounted for this project, hence it is not applicable.

<sup>6</sup> <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v4.0.pdf>

<sup>7</sup> <https://cdm.unfccc.int/Projects/DB/RWTUV1411994965.49/view>

<sup>8</sup> <https://cdm.unfccc.int/Projects/DB/RWTUV1411994965.49/view>

## 1.11 Sustainable Development Contributions

This project activity is a 22.0 MW wind power project, harnessing wind energy to generate renewable electricity. This involves installation and operation of state-of-art wind turbine generators (WTGs) of Vestas make. It comprises 11 wind turbine generators (WTGs), each with a capacity of 2.0 MW. The project site is located in the villages of Jangi, Lakhapar, Vadhiya, Lakhdhargadh, and Godpar within Gujarat's Kutch district.

The electricity produced by the project is supplied to the INDIAN grid, through transporting it to Gujarat Urja Vikas Nigam Limited (GUVNL). The implementation of these new technologies will help in increasing reliability of renewable energy generation and encourage development of even better technology in the future.

The project activity contributes to the sustainable development of the region in addition to the generation of renewable electricity. The following indicators for sustainable development (as given by the Ministry of Environment and Forest, (Government of India) are considered:

For **SDG- 7**: Through this project activity, it has contributed towards SDG-7 i.e., Affordable and Clean Energy by setting up of 22 MW Wind Power Project.

For **SDG- 8**: The project activity has resulted in providing both short-term and long-term employment to the local people, as well as providing adequate trainings for improving their efficiency; hence contributing for SDG-8.

For **SDG- 13**: Powerica Ltd. is committed to work for mitigation of climate change by generating electricity using clean energy sources. In this current monitoring period, project has achieved GHG emission reductions of 38,520 tCO<sub>2e</sub>.

Table 1: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1)	7.2	7.2.1: Renewable energy share in the total final energy consumption	Implemented activities to increase	About <b>39,508.66 MWh</b> renewable electricity has been supplied to Indian grid during the reported period that helps to increase the renewable energy share.	Overall <b>386,055.87 MWh</b> (209,025 + 55,822 + 39,078.99 + 42,621.22 + 39,508.66) renewable electricity has been supplied to Indian grid throughout the project lifetime that helps to increase the renewable energy share in the energy mix
2)	8.5	8.5.1: Average hourly earnings of employees, by sex, age, occupation and persons with disabilities	Implemented activities to increase	The project is expected to employ about 2 people per year, while giving 6 trainings to the employees.	About 2 people with average hourly earnings of female and male employees, by occupation, age and persons with disabilities, are recruited over the entire project period. A total of 6 trainings have been given over the project lifetime.
3)	13.0	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	By supplying 39,508.66 MWh of clean electricity to Indian grid, the project avoided release of <b>38,520 tCO<sub>2</sub>e</b> in to the atmosphere during the reporting period.	Overall prevented the release of <b>376,387 tCO<sub>2</sub>e</b> (203,799 + 54,419 + 38,094 + 41,555 + 38,520) into the atmosphere since project commissioning.

## 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

Project Proponent had invited different stakeholders to a meeting to explain the proposed project activity and benefits associated with it on 10-January-2014.

The stakeholders identified for the project activity are as follows:

1. Local villagers
2. Local Gram Panchayat Members
3. Local School Staffs
4. State Nodal Agency i.e. Gujarat Energy Development Agency (GEDA),
5. Local contractors involved in the project
6. Employees of Powerica Limited

These stakeholders were invited for the meeting through public notice on local paper dated *04-January-2014* and personal invitation also, a week in advance of the meeting. A record of the people attending the meeting was maintained and all comments from the stakeholders received during the meeting were recorded and compiled in the minutes of meeting.

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

Powerica Limited has received all necessary approvals / clearances / permissions from various local bodies which represent the local stakeholders. The stake holder meeting was conducted at the respective project sites and was attended by the office bearers and residents of the nearby village. The stakeholders shared their views on the project activity. Most of them showed positive response. They were hopeful that the proposed project activity will help in the development of the local community, generate more employment and solve the electricity problem without harming their natural surroundings. No adverse comments were received regarding the project activity and all the queries raised were satisfactorily addressed. The stakeholders were very observant and supportive.

As a part of ongoing communication with stakeholders, a dedicated visitor register cum grievance register has been placed at the project site and accessible to stakeholders to provide their feedback on the project. During the current monitoring period, some minor grievances had been received, which were eventually closed. The grievance details are as follows-

Sr. No.	Grievance Date	Nature of Grievance	Resolution of grievance	Status of the grievance
1	23-May-2022	Jangi village people demanding to remove rainwater from their agricultural land	After site visiting, pipes and JCB facility was provided by the PP to resolve the issue.	Closed
2	11-August-2022	Jangi village people demanding for driver job	The villagers were assured after a short meeting that they would be prioritized for the future vacancies, since there was no vacancy till then.	Closed

### 2.3 AFOLU-Specific Safeguards

Not Applicable, since this is not an AFOLU activity.

## 3 IMPLEMENTATION STATUS

### 3.1 Implementation Status of the Project Activity

The project commissioning has been completed and the monitoring equipments were installed to monitor the parameters as described in the registered Project Description (PD). All the WTGs involved in the project activity are already commissioned and operational. The WTGs are under operation since the date of commissioning and no event has been identified which may impact GHG emission reduction. The commissioning dates of all the WTGs are provided as below-

Sr. No.	WTG ID	Capacity (MW)	Commissioning Date
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1	VWT/2000/14-15/3444	2	12-June-2014
2	VWT/2000/14-15/3447	2	12-June-2014
3	VWT/2000/14-15/3448	2	12-June-2014
4	VWT/2000/14-15/3449	2	12-June-2014
5	VWT/2000/14-15/3450	2	12-June-2014
6	VWT/2000/14-15/3445	2	14-June-2014
7	VWT/2000/14-15/3452	2	14-June-2014
8	VWT/2000/14-15/3451	2	14-June-2014
9	VWT/2000/14-15/3442	2	25-June-2014
10	VWT/2000/14-15/3443	2	25-June-2014
11	VWT/2000/14-15/3446	2	08-July-2014

The technical details of the WTGs involved in the project activity are as below-

Parameters	Value
Make	Vestas
Model	V-100
Rated Power	2000 KW
Rotor diameter	100 m
Swept Area	7850 m <sup>2</sup>
Cut in wind speed	3 m/s

Rated wind speed	12 m/s
Cut out wind speed	20 m/s
No. of blades	3
Rotor Speed	14.4 rpm
Hub Height	80 m
Generator Type	4-pole (50 Hz) doubly fed generator, slip rings
Gear Box	Type two planetary stages and one helical stage
Tower Type	tubular steel tower

The project activity WTGs are connected to substation through Vandhiya Line 1 and Vandhiya Line 2, feeder lines. The energy meters are installed at each WTG site and also at substation feeder line.

During this monitoring period 01-January-2022 to 31-December-2022 (inclusive of both start and end dates), total emission reductions achieved are 38,520 tCO<sub>2</sub>e by displacing electricity of 39,508.66 MWh from fossil fuel based electricity grid. The project is running smoothly since commissioning, and underwent normal operation and shut-down for maintenance schedule. The details of plant breakdown are included in Appendix 2 of this document.

## 3.2 Deviations

### 3.2.1 Methodology Deviations

No methodology deviation is applied during the monitoring period.

### 3.2.2 Project Description Deviations

Following are the deviations taken for the project activity-

**Deviation 1.** It should be noted that in the registered CDM-PDD two monitoring parameters are listed in Section B.7.1 i.e  $EG_{\text{facility},y}$  and  $EG_{\text{LCS},y}$ , however in the Monitoring Report only one parameter i.e.  $EG_{\text{facility},y}$  has been mentioned as only this parameter is used for ER calculations. The meters used for the measurement at the substation monitor the export and import value separately and also display the net reading by subtracting the import reading from the export reading. Since the parameter mentioned in Invoice is the net value of the electricity supplied to

the grid, and no separate parameters i.e. export and import of electricity are mentioned in Invoice, the net value mentioned therein has been included in the Monitoring Report and this value has been considered for Emission Reduction calculation. Thus the accuracy of the measurement is not affected.

Since  $EG_{\text{facility},y}$  represents the net value of electricity supplied to the grid and is consistent with the invoice, its selection for ER calculations ensures accuracy, and the omission of  $EG_{\text{LCS},y}$  doesn't matter because it's not utilized in ER calculations. The applicability, additionality, or appropriateness of the baseline scenario are not affected by this deviation. This deviation was taken during the monitoring period 12-June-2014 to 30-September-2018.

**Deviation 2.** As per registered PD, the calibration frequency is once in a year. The calibration of meters is not in control of PP and same is done by state electricity board. The state electricity board does not follow any fixed calibration frequency, hence deviation is requested for change in calibration frequency as once in five years. This calibration frequency is as per CEA notification<sup>9</sup>.

This deviation doesn't affect the fundamental principles of the ACM0002 methodology or the calculations for reducing emissions. It is centered on the calibration process, which, while crucial for accuracy, doesn't alter how the methodology is fundamentally applied. The explanation given and the participation of state electricity board officials in confirming meter accuracy ensure the reliability of emission reduction calculations. This deviation was taken during the monitoring period 01-January-2020 to 31- December-2020.

**Deviation 3.** Accuracy class of energy meters installed at individual WTG yard is 0.5S & accuracy class of energy meters installed at substation end is 0.2S. The energy meters installed and maintained (i.e. calibration/replacement) by state utility (GETCO), and that is not in PP's control. Also, the accuracy class of energy meters installed are follows the technical requirement as per CEA (installation & operation of meters) (Amendment) regulations, 2019<sup>10</sup>. Hence, deviation is requested to accept the accuracy class of the energy meters (0.5S) installed at site against the accuracy class mentioned in registered CDM PDD.

The focus here is on the technical specifications of the meters, which don't change how the baseline scenario is assessed or how the ER calculations are calculated. The deviation accounts for the technical realities of meter installation and maintenance, which is done according to regulatory requirements. This deviation was also taken during the monitoring period 01-January-2020 to 31- December-2020.

### 3.3 Grouped Projects

The project is not a grouped project. Thus, this is not applicable.

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<sup>9</sup> <https://cea.nic.in/regulations-category/metering-regulations/?lang=en>

<sup>10</sup> <https://cea.nic.in/regulations-category/metering-regulations/?lang=en>

## 4 DATA AND PARAMETERS

### 4.1 Data and Parameters Available at Validation

<b>Data / Parameter</b>	<b>EF<sub>grid,OM,y</sub></b>
<b>Data unit</b>	tCO <sub>2</sub> /MWh
<b>Description</b>	Operating margin CO <sub>2</sub> emission factor for NEWNE (Now Indian grid) grid
<b>Source of data</b>	Central Electricity Authority: <a href="#">CO<sub>2</sub> Emission Database CEA CO<sub>2</sub> Baseline database</a> , Version 09.
<b>Value applied</b>	0.9776
<b>Justification of choice of data or description of measurement methods and procedures applied</b>	The operating margin emission factor is a 3-year generation weighted average data, based on the most recent data available on CEA database. Data compiled in CEA CO <sub>2</sub> CDM database is in line with the requirements Version 04.0.0 of “Tool to calculate the emission factor for an electricity system”.
<b>Purpose of Data</b>	Calculation of baseline emissions
<b>Comments</b>	This parameter is calculated ex ante and remains fixed for the entire crediting period.

<b>Data / Parameter</b>	<b>EF<sub>grid,BM,y</sub></b>
<b>Data unit</b>	tCO <sub>2</sub> /MWh
<b>Description</b>	Build margin CO <sub>2</sub> emission factor of grid
<b>Source of data</b>	Central Electricity Authority <a href="#">CO<sub>2</sub> Emission Database CEA CO<sub>2</sub> Baseline database</a> , Version 09.
<b>Value applied</b>	0.9673
<b>Justification of choice of data or description of measurement methods and procedures applied</b>	The build margin emission factor is the most recent data available from CEA CO <sub>2</sub> Baseline database. Data compiled in CEA CO <sub>2</sub> CDM database is in line with the requirements Version 04.0.0 of “Tool to calculate the emission factor for an electricity system”
<b>Purpose of Data</b>	Calculation of baseline emissions
<b>Comments</b>	The build Margin is calculated ex ante and fixed for the entire crediting period.

<b>Data / Parameter</b>	<b>EF<sub>grid,CM,y</sub></b>
<b>Data unit</b>	tCO <sub>2</sub> /MWh
<b>Description</b>	Combined margin CO <sub>2</sub> emission factor for grid

Source of data	Central Electricity Authority: <u>CO<sub>2</sub> Emission Database CEA CO<sub>2</sub> Baseline database</u> , Version 09.
Value applied	0.9750
Justification of choice of data or description of measurement methods and procedures applied	<p>The combined margin emissions factor is calculated as follows:</p> $EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}$ <p>The following default values should be used for <math>w_{OM}</math> and <math>w_{BM}</math>:</p> <p>For Wind power generation project activities: <math>w_{OM} = 0.75</math> and <math>w_{BM} = 0.25</math> for the selected crediting period Data compiled in CEA CO<sub>2</sub> CDM database is in line with the requirements Version 04.0.0 of “Tool to calculate the emission factor for an electricity system”</p>
Purpose of Data	Calculation of baseline emissions
Comments	The Combined Margin is calculated ex ante and fixed for the crediting period.

## 4.2 Data and Parameters Monitored

Data / Parameter	<b>EG<sub>facility, y</sub></b>
Data unit	MWh/year
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	Monthly Certificate for share of electricity generated by Wind farm issued by GETCO
Description of measurement methods and procedures to be applied	<p>Measured and Calculated</p> <p>Energy exported and imported from the project activity is measured &amp; recorded by the energy meter located at the Vandhiya substation.</p> <p><b>Measurement methods and procedures:</b></p> <p>Data Typed: Measured and Calculated (Export - Import)</p> <p>Monitoring: Energy Meter is used for monitoring</p> <p>Meter Calibration Frequency: Once in five years</p> <p>Archiving Policy: Paper &amp; / Electronic</p>
Frequency of monitoring/recording	Continuous measurement and at least monthly recording
Value monitored	39,508.66 MWh

**Monitoring equipment**
**Monitoring Equipment:**

Monitored through the main meter (of L & T make, with accuracy class of 0.2S) and check meter readings. Both the energy meters are bi-directional tri-vector meters.

**Monitoring:**

a) At WTG yard: Electrical Energy Meters which are electronic tri-vector meters of Secure make with accuracy class 0.5s.

b) At substation: Electrical Energy Meters which are bidirectional electronic tri-vector ABT meter of L & T make with accuracy class 0.2s

The meters are calibrated once in five year as per CEA notification and deviation requested. Please refer section 3.2.2 of MR for deviation details.

WTG Unique ID	Meter Serial No.
JW04	GJU65932
JW11	GJU65931
VW33	GJU65934
VW41	GJU65678
VW50	GJU65933
VW52	GJU65935
VW53	GJU65930
VW60	GJU65936
VW68	GJU65937
VW69	GJU65684
VW72	GJU65685

Bulk meters are located at the substation yard (Vandhiya 220 KV – Line 1 & 2), the details of these meters have been given below:

<b>Meter Sr. No.</b>	GJ-2311A	GJ-2363 A
<b>Type</b>	Tri-vector Meter	Tri-vector Meter
<b>Make</b>	L & T	L & T
<b>Accuracy Class</b>	0.2 S	0.2 S

Calibration details mentioned in Appendix 1.

**QA/QC procedures to be applied**

The quantity of net electricity generation from the certificates for share of electricity are cross-checked with the invoices for the sale of power

	by Powerica Limited. The Energy Meters are calibrated once in five years.
<b>Purpose of the data</b>	Calculation of baseline emissions
<b>Calculation method</b>	-
<b>Comments</b>	The Monitored Data to be kept for a minimum of two years after the end of the crediting period or the last issuance whichever is later.

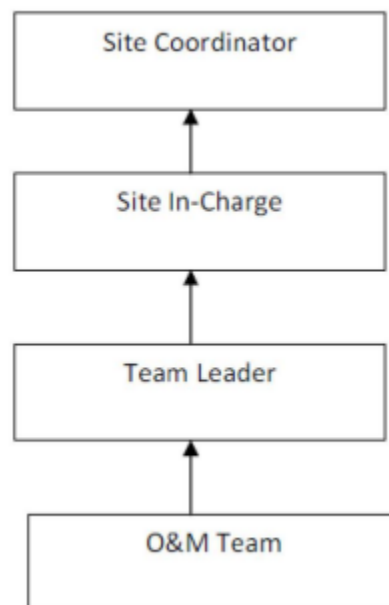
### 4.3 Monitoring Plan

The project activity is in accordance with approved large scale methodology ACM0002, Version 15.0, and therefore, can use the monitoring methodology for the same.

The monitoring methodology specified in the methodology requires that the project-monitoring plan to consist of metering the electricity supplied to the grid by the renewable technology. 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 electricity exported to the grid. The Project is operated and managed by Vestas Wind Technology India Private Limited (Vestas).

Vestas has a designated Site-In-Charge (O&M) on site who is responsible for monitoring the electricity exported from the project activity. The organizational structure of the O&M team by Vestas is as follows:



The roles and responsibilities of the O&M team may be elaborated as follows:

**O&M Team:** The team comprises of site engineers who are directly responsible for carrying out the O & M activity of WTG. They execute the preventive maintenance and attend to break downs as per O&M Manual & Procedures. They respond to breakdown calls and resolve customer complaints. They record all the readings and prepare documentations for Reports, Logs and Daily Generation Reports.

**Team Leader:** He leads the O&M team and is responsible for attending to the unscheduled breakdown of WTGs and for ensuring that WTG should be restored at earliest. He ensures the proper reading, recording and monitoring of the Generation.

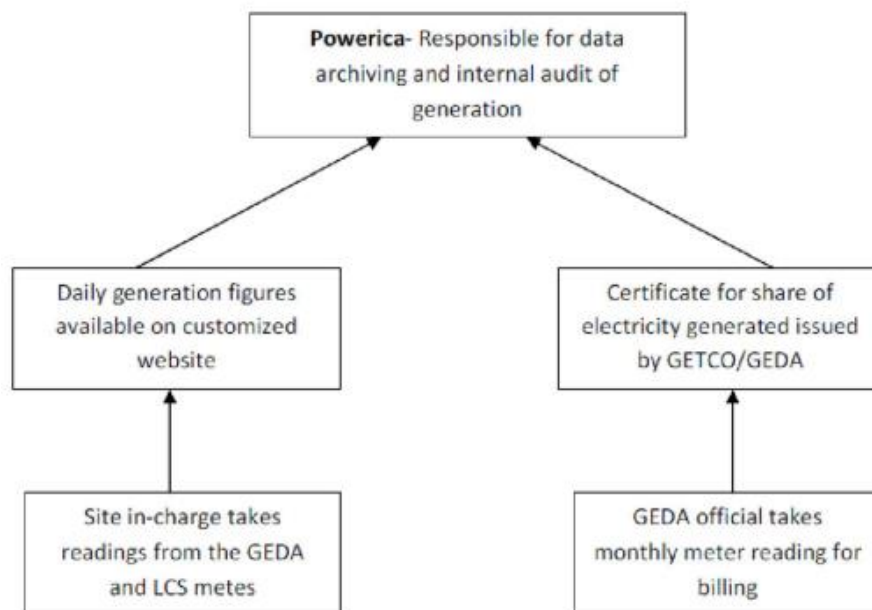
**Site-Incharge:** He is responsible for the entire site. He has to take timely corrective measures/action to ensure that overall performance of site is met and delivered. He is responsible for the individual site. He executes the preventive maintenance and attends to break downs as per O&M Manual & Procedures. He also checks the daily Generation reports for all the WTGs.

**Site Co-ordinator:** He is in-charge of overall O&M activities of site. The responsibilities include ensuring complete documentation of the Generation of the site, on-time service delivery, timely response to breakdowns and efficient manpower management for the site.

Further, all new technicians on site are trained by Vestas. Also, the O&M personnel are trained regularly in order to improve their technical skills.

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

The overall flow of information has been depicted using the following hierarchical structure-



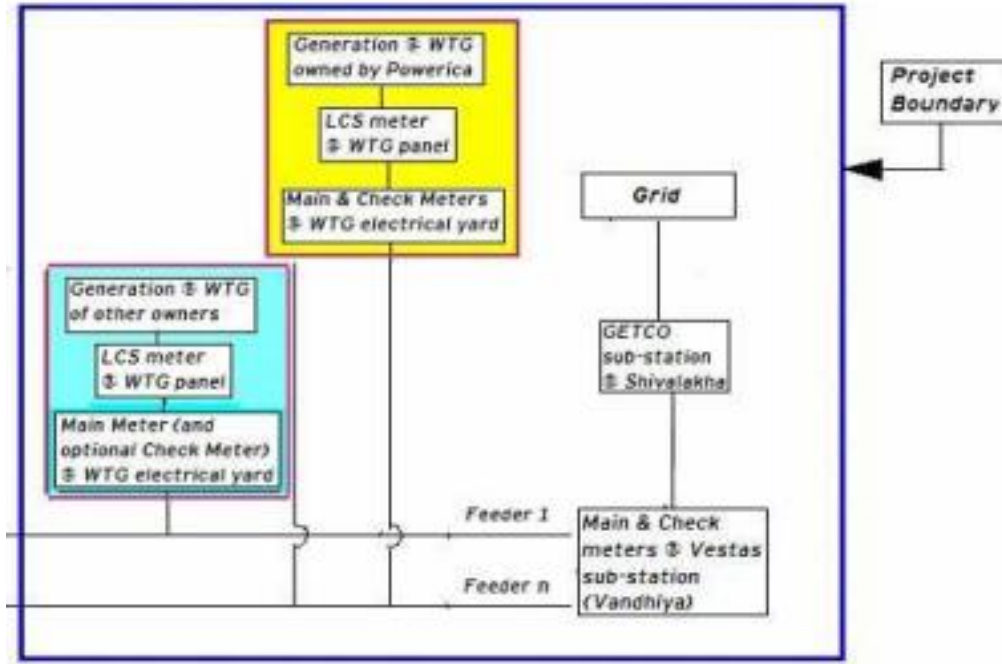
**Monitoring Process at Gujarat Metering of wind power is done as under:**

- Joint meter reading is taken at substation meter by representative of GETCO (Gujarat Electricity Transmission Company) and O&M service provider (on behalf of individual wind farm owners). Let the total generation recorded for particular month is 'X' units in substation meter.
- Joint meter reading is taken at Local Meter-(transformer yard meter of each WTG) by representative of GETCO (Gujarat Electricity Transmission Company) and O&M service provider (on behalf of individual wind farm owners). Let us assume total generation of Powerica recorded for particular month is 'Y1' units.
- Similarly joint meter reading for other wind farm owners is also taken. Let the generation of individual owner recorded for particular month are 'Y2, Y3,...,Yn' units.
- GETCO distributes 'X' to individual wind farm owners using following formula and issues monthly certificates.
- For Powerica, net units calculated for billing =  $X * Y1 / \sum Yn$
- It must be noted here that the meter readings as mentioned above are calculated as the product of meter multiplication factor and the difference of the current and previous meter readings.

Based on the above procedure, the Monthly Wind Energy Certificates are 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 mentioned in monthly wind energy certificates shall be directly used for emission reduction calculation. No other parameters as explained above shall be used and presented in the monitoring report.

**Internal audits & Performance Review:** The records are regularly audited and checked by the senior officials from project proponent basis. The officials monitor readings at site are adequately trained. There are no any discrepancy/inconsistency observed in the values of net electricity supplied to grid value.

**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.



## 5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

### 5.1 Baseline Emissions

The emission factor value has been fixed Ex-ante and the same shall be used for the monitoring period. Net Electricity Generated is obtained by deducting total import (from grid) from total export (to grid). These values are taken from the “Certificate for Share of Electricity Generated by Wind Farm” issued by state electricity board. This statement is issued on a monthly basis.

Baseline emissions are calculated by multiplying the Net electricity exported to the grid with net baseline emission factor, as given in the registered VCS PD.

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \quad \text{(Equation 7, Para 40, ACM0002, Version 15.0)}$$

Where:

$BE_y$  = Emission reductions in year y (tCO<sub>2e</sub>/yr)

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

$EF_{grid,CM,y}$  = Combined margin CO<sub>2</sub> 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”, version 04.0.0 (tCO<sub>2</sub>/MWh)

The project activity is the installation of a new, grid connected renewable power plant (Greenfield project) with no renewable power plant operating prior to the implementation of the project activity, hence,  $EG_{PJ,y}$  has been calculated as:

$$EG_{PJ,y} = EG_{facility,y} \quad (\text{Equation 13, Para 42, ACM0002, Version 15.0})$$

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

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

Therefore,

$$BE_y = EG_{facility,y} \times EF_{grid,CM,y}$$

Where,

$BE_y$  = Baseline Emissions (tCO<sub>2</sub>/year)

$EG_{facility,y}$  = Net Electricity exported to grid (MWh)

$EF_{grid,CM,y}$  = Baseline Emission Factor (Combined margin CO<sub>2</sub> emission factor for grid)

The calculation of yearly baseline emissions is provided below:

$$\begin{aligned} & 39,508.66 \text{ (MWh)} * 0.9750 \text{ (tCO}_2\text{/ MWh)} \\ & = 38,520 \text{ tCO}_2\text{e (the value is rounded down)} \end{aligned}$$

Hence the baseline emission calculated for the reported monitoring period is 38,520 tCO<sub>2</sub> i.e.  $BE_y = 38,520 \text{ tCO}_2\text{e}$ .

## 5.2 Project Emissions

According to para 29 of CDM approved methodology ACM0002 (version 15.0), for most renewable energy power generation project activities,  $PE_y = 0$ . Since, for the project activity, the electricity generation is based on wind resources, which does not involve in combustion or generation of emissions from fossil fuels. Hence, these emission sources are neglected. Thus,  $PE_y = 0$ .

### 5.3 Leakage

According to paragraph 54 of CDM approved methodology ACM0002 (version 15.0), no leakage emissions are considered. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, and transport). These emission sources are neglected. Thus,  $LE_y = 0$ .

### 5.4 Net GHG Emission Reductions and Removals

The formula used to calculate the net emission reduction for the project activity is

$$ER_y = BE_y - PE_y \quad (\text{Equation 13, Para 55, ACM0002, v.15.0})$$

Where,

$ER_y$  = Emission Reduction in t CO<sub>2</sub>/year

$BE_y$  = Baseline emission in t CO<sub>2</sub>/year

$PE_y$  = Project emissions in t CO<sub>2</sub>/year

For the project activity during the current monitoring period, as per section 5.1

$BE_y = 38,520$  t CO<sub>2</sub>

$PE_y = 0$  t CO<sub>2</sub>

Year	Baseline emissions or removals (tCO <sub>2</sub> e)	Project emissions or removals (tCO <sub>2</sub> e)	Leakage emissions (tCO <sub>2</sub> e)	Net GHG emission reductions or removals (tCO <sub>2</sub> e)
01-January-2022 to 31-December-2022	38,520	0	0	38,520
<b>Total</b>	38,520	0	0	38,520

<u>Ex-ante emissions reductions/removals</u>	<u>Achieved emissions reductions/removals</u>	<u>Percent difference</u>	<u>Justification for the difference</u>
50,207 tCO <sub>2</sub>	38,520 tCO <sub>2</sub>	-23.28 %	The actual Emission Reductions of this monitoring period is 23.28% lower than amount estimated ex ante for this monitoring period. The generation of electricity depends upon many other climatic conditions, which are not within the control of the project proponent.

# APPENDIX 1: METER CALIBRATION DETAILS

The calibration details for meters involved in the project activity and available with PP are as below. The calibration is under control of state electricity board and PP do not have any control on it.

WTG ID	Feeder Connection To	Meter Serial No.	Calibration Date	Due Date of Calibration
JW04	Feeder-1	GJU65932	23-March-2019	22-March-2024
JW11	Feeder-11	GJU65931	23-March-2019	22-March-2024
VW33	Feeder-03	GJU65934	23-March-2019	22-March-2024
VW41	Feeder-05	GJU65678	23-March-2019	22-March-2024
VW50	Feeder-06	GJU65933	23-March-2019	22-March-2024
VW52	Feeder-04	GJU65935	23-March-2019	22-March-2024
VW53	Feeder-06	GJU65930	23-March-2019	22-March-2024
VW60	Feeder-06	GJU65936	23-March-2019	22-March-2024
VW68	Feeder-06	GJU65937	23-March-2019	22-March-2024
VW69	Feeder-05	GJU65684	23-March-2019	22-March-2024
VW72	Feeder-03	GJU65685	23-March-2019	22-March-2024

The bulk meters located at the substation-

Meter Sr. No.	GJ-2311 A	GJ-2363 A
Type	Tri-vector Meter	Tri-vector Meter
Make	L & T	L & T
Accuracy Class	0.2 S	0.2 S
Meter Location (Vandhiya 220 KV Substation)	Line-1	Line-2
Date of Calibration	15-October-2018	15- October-2018
Due date of calibration	14- October-2023	14- October-2023

All meters at the WTG yards are of Secure Make and 0.5s accuracy class while those at substation yards are of L&T make and 0.2s accuracy class. Considering five years calibration frequency as per CEA notification and as per deviation request, there is no delay in calibration applicable for the project activity during current monitoring period.

## APPENDIX 2: MAJOR BREAKDOWN DETAILS

Turbine Name	Stop Date	Stop Time	Start Date	Start Time	Duration	Remarks
JW11	04-01-22	20:26:00	12-01-22	18:41:00	190.23	Isolator open by unknown local person (Theft happened -4C x 70 sq.mm Power Cable (33KV), Earthing Cable, Lift Cable
VW33	28-01-22	11:13:00	05-02-22	21:22:00	201.65	Suspected Blade "B" Crack on TE Root End identified.
VW72	06-03-22	10:38:00	09-03-22	00:01:00	61.22	03 Blades LE Root End having Hair Line Crack found
VW53	01-04-22	10:30:00	02-04-22	17:19:00	30.48	WTG Stopped for Blade repairing work by Vestas (Hair Line Crack observed in TE Root End)