



100 MW GRID CONNECTED WIND POWER PROJECT IN JAMNAGAR GUJARAT, INDIA

Document Prepared by EKI Energy Services Limited



Project Title	100 MW grid connected Wind Power project in Jamnagar Gujarat, India
Version	03
Report ID	VVER 396
Date of Issue	06-October-2022
Project ID	2019
Monitoring Period	21-June-2019 to 31-March-2021 (inclusive both dates)
Prepared By	Tapti Saha Assistant Manager-Operations
Contact	EnKing Embassy, Office no. 201, Plot 48, Scheme 78 Part 2, Vijay Nagar Near Brilliant Convention Centre, Indore – 452010, Madhya Pradesh, India Website: www.enkingint.org Email ID: tapti@enkingint.org T: +91 731 42 89 086, M: +91 9109120940

CONTENTS

1	PROJECT DETAILS	3
1.1	Summary Description of the Implementation Status of the Project	3
1.2	Sectoral Scope and Project Type	3
1.3	Project Proponent	3
1.4	Other Entities Involved in the Project	4
1.5	Project Start Date	4
1.6	Project Crediting Period	4
1.7	Project Location	4
1.8	Title and Reference of Methodology	5
1.9	Participation under other GHG Programs.....	6
1.10	Other Forms of Credit.....	6
1.11	Sustainable Development.....	6
2	SAFEGUARDS	7
2.3	AFOLU-Specific Safeguards	7
3	IMPLEMENTATION STATUS	8
3.1	Implementation Status of the Project Activity	8
3.2	Deviations.....	11
3.3	Grouped Projects	11
4	DATA AND PARAMETERS	11
4.1	Data and Parameters Available at Validation	11
4.2	Data and Parameters Monitored.....	12
4.3	Monitoring Plan.....	14
5	QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS.....	19
5.1	Baseline Emissions	19
5.2	Project Emissions	20
5.3	Leakage	20
5.4	Net GHG Emission Reductions and Removals.....	20
	APPENDIX I: <CALIBRATION DETAIL>	22
	APPENDIX II: <BREAK DOWN DETAIL>	22

1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The project activity is developed by M/s Verdant Renewables Pvt Ltd (VRPL). VRPL is one of the group companies of SITAC RE.

The proposed project activity involves the establishment of a wind farm of 105¹ MW installed capacity enabling generation of electricity by state-of-art 2.1 MW capacity each (50 WTGs * 2.1) Wind Turbine Generators (WTGs) (One of the latest available technologies in the country developed by Vestas) in the state of Gujarat. The electricity generation from this wind farm contributes to annual GHG reductions estimated at 363,796 tonnes of carbon dioxide equivalent. The project activity has generated approximately 388,340 MWh of renewable power annually to the Indian grid through regional GETCO grid substation of Jamnagar district.

In the absence of the project activity, the accordant amount of electricity have been delivered through the grid connected power plants, which to a large extent is fed by fossil sources, leading to carbon dioxide emissions.

Demand for electricity in Gujarat is growing quickly, therefore the additional capacities are necessary. There is a deficit in energy supply and in peak power demand in Gujarat. This supply demand gap is likely to be met through the fossil fueled power stations. PP do not have any prior experience of installation of similar wind mills.

Total GHG emission during current monitoring period (21-June-2019 to 31-March-2021) is 418,185 tCO₂ and 446,399.971 MWh of net electricity has been generated in this monitoring period.

1.2 Sectoral Scope and Project Type

The project activity falls under the following Sectoral scope and project Type:

Sectoral Scope: 01-Energy Industries (renewable/non-renewable sources)

Project Type: I- Renewable Energy Projects

Methodology: ACM0002: Grid-connected electricity generation from renewable sources- Version 19²

1.3 Project Proponent

¹ As per commissioning certificate and PO. Commissioning Details provided under Appendix-1.

²

https://cdm.unfccc.int/filestorage/5/8/l/58IAGB7SZUDEO2VN6LYM30K41HFPRQ/EB100_repan06_ACM0002.pdf?t=OTB8cXZvZGc2fDAbdjeCut37-XA4d1R7UMMU

Organization name	M/s Verdant Renewables Pvt Ltd
Contact person	Mr. Chandresh Ohri
Title	Authorized Signatory
Address	1st Floor, Eastern Wing, Thapar House, 124, Janpath, New Delhi-110001, India
Telephone	+ 91 11 47470100
Email	chandresh.ohri@verdant-re.in

1.4 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the Project	Project Consultant
Contact person	Manish Dabkara
Title	CEO & MD
Address	Office No. 201, Enking Embassy, Plot No. 48, Scheme No. 78, Part II, Vijay Nagar, Indore-452001
Telephone	+91 731 4289086
Email	manish@enkingint.org

1.5 Project Start Date

Project Start Date: 21-June-2019

The Project Start Date is the commissioning date of the first WTG.

1.6 Project Crediting Period

Total number of years: 10 years which shall be renewed twice.

Crediting Period Start date: 21/06/2019 (Commissioning date of first WTG). Crediting Period End Date: 20/06/2029.

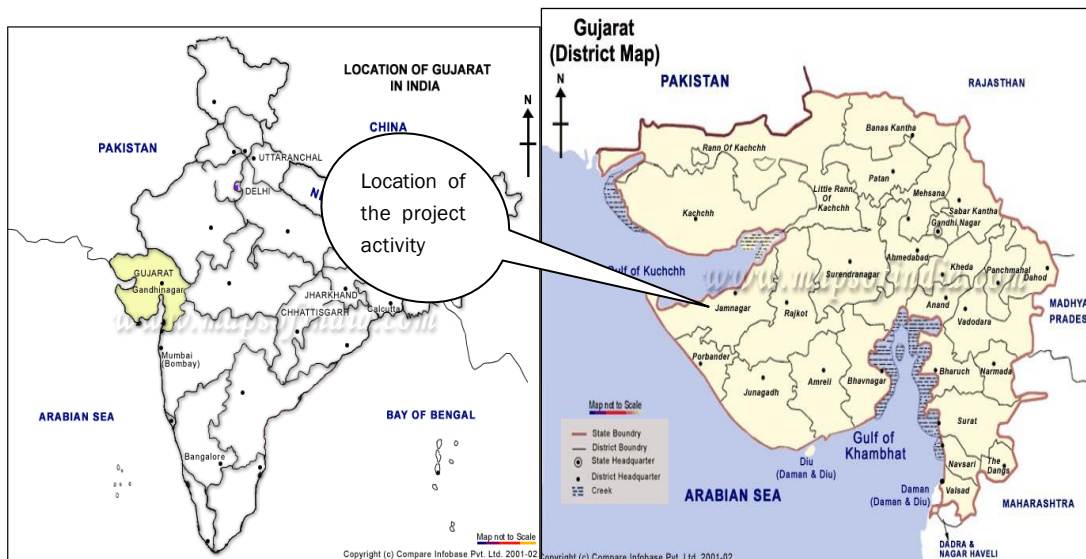
1.7 Project Location

The WTGs installed by the project proponent are distributed across the Jamnagar districts in the villages of Hajamchora, Bhensdad, Mota Garediya, Manekpar, Dudhai, Manamora, Mavapar, Bhadra, Lakhtar, Keshiya, Meghpar, Tarana, Balambha, taluk:Jodiya.

The project WTGs have been commissioned since 21/06/2019. All the WTGs have been commissioned fully by the end of Dec 2019. The details of the commissioned WTGs have been furnished in Section 3.

The coordinates for Jamnagar location are as follows; Latitude 22° 28' 14.52" N, Longitude 70° 3' 27.83" E.

The geographical location of the projects can be depicted from the maps below.



1.8 Title and Reference of Methodology

The approved consolidated baseline and monitoring methodology ACM0002 Version 19³ has been used. The title of the baseline and monitoring methodologies is “Grid-connected electricity generation from renewable sources”.

Methodology:

ACM0002: Grid-connected electricity generation from renewable sources --- Version 19.0, Sectoral Scope: 01, EB 100, Annex 6⁴

The project activity also takes reference from following Tools from the tools prescribed by applied methodology:

1. **Tool for the demonstration and assessment of additionality --- Version 07.0.0, EB 70, Annex 8⁵**

³

https://cdm.unfccc.int/filestorage/5/8/1/58IAGB7SZUDEO2VN6LYM30K41HFPRQ/EB100_repan06_ACM0002.pdf?t=OTB8cXZvZGc2fDAbdjeCut37-XA4d1R7UMMU

⁴ <https://cdm.unfccc.int/methodologies/DB/VJI9AX539D9MLOPXN2AY9UR1N4IYGD>

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

2. Tool to calculate the emission factor for an electricity system --- Version 07.0, EB 100,Annex 4⁶

1.9 Participation under other GHG Programs

This project activity is not registered in any other GHG Programs.

1.10 Other Forms of Credit

Include the following information, as applicable:

- Emission 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.

1.11 Sustainable Development

Legislative:

The project participants obtained all clearances from stakeholders hence no legal risks are anticipated.

(a) Socio-economic well-being:

- Project activity has generated direct and indirect employment for skilled and unskilled manpower during construction phase as well as during operational stage and thus helped in controlling migration from the region and alleviation of poverty.
- The project activity's contribution of power supply towards the Indian grid is helping in the upliftment of the social life of the people by ensuring a sustainable and reliable source of power for the region.
- The Project activity has improved the infrastructural facilities like water availability, road, and medical facilities etc in the region.

(b) Environmental well-being:

- The project activity generates clean and green power thus causing negligible emissions of greenhouse gases. By building and operating the power project, much pollution is avoided. In the absence of the project activity, equivalent power would have been generated based on the fossil fuels resulting in more Green House Gas emissions into the atmosphere.
- The project activity has reduced the dependence on fossil fuels for power generation thus conserving the natural reserves. The project has led to greenhouse gas emission reduction and hence contributed in mitigating climate change.

(c) Technological well-being:

⁶ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf>

The project activity has increased awareness and interest among the private players to make investments in similar areas. The project activity envisages installation of high efficiency turbines and generators and the power will be transmitted at high voltage to ensure low losses. Moreover, the technology being used is well established, most updated and environmentally safe.

2 SAFEGUARDS

2.1 No Net Harm

The project activity has no significant impact on the environment. wind power projects are not included in the Schedule I of the EIA notification S.O.1533 (E) dated 14th September 2006 and thus an EIA is not required. Ministry of Environment & forests vide their OM J-11013/41/2006 - IA II (I) dated 13th May 2011, has re-affirmed this and exempted wind power plants from EIA and Environmental Consent requirement.⁷

Hence, there are no significant environmental impacts due to implementation of the project activity.

2.2 Local Stakeholder Consultation

The local stakeholder meeting was carried out for the project activity and the details of the same can be referred from the registered VCS PD.

As a part of continuous feedback from stakeholders, the PP also placed a grievance register onsite where-in, the stakeholders can put down their complaint and the same if found genuine are addressed immediately.

Some of the inputs about the project/grievances and their resolution dates are shown below

Sl. No	Date of Complaint	Site	Topic	Date of Resolution	Remark from PP
1	10-September-2019	Gujarat	Street lights not working	18-September-2019	Street lights have been changed
2	24-August-2020	Gujarat	Request to repair RO at the primary school	30-August-2020	RO purifier was repaired

2.3 AFOLU-Specific Safeguards

Not Applicable.

⁷ [http://environmentwb.gov.in/pdf/EIA Notification, 2006.pdf](http://environmentwb.gov.in/pdf/EIA%20Notification,%202006.pdf)

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The project activity involves the installation of 50 WTGs of 2.1 MW capacity each at wind farm Keshiya and Tarana project site in Jamnagar district of Gujarat state, India.

Operation of the Project Activity

The project activity was commissioned on 21-June-2019 and the commissioning process ended on 18-December-2019. Commissioning dates of all WTGs are given in the below table.

Sl. No.	WTG ID	Commissioning Date	Feeder Detail
1	GUVNLI/VERDANT/19-20/5573	21-June-2019	33 KV Feeder No. 2
2	GUVNLI/VERDANT/19-20/5574	21-June-2019	33 KV Feeder No. 2
3	GUVNLI/VERDANT/19-20/5575	21-June-2019	33 KV Feeder No. 2
4	GUVNLI/VERDANT/19-20/5576	21-June-2019	33 KV Feeder No. 2
5	GUVNLI/VERDANT/19-20/5577	21-June-2019	33 KV Feeder No. 2
6	GUVNLI/VERDANT/19-20/5578	21-June-2019	33 KV Feeder No. 2
7	GUVNLI/VERDANT/19-20/5579	21-June-2019	33 KV Feeder No. 2
8	GUVNLI/VERDANT/19-20/5580	21-June-2019	33 KV Feeder No. 2
9	GUVNLI/VERDANT/19-20/5581	21-June-2019	33 KV Feeder No. 2
10	GUVNLI/VERDANT/19-20/5582	21-June-2019	33 KV Feeder No. 2
11	GUVNLI/VERDANT/19-20/5583	21-June-2019	33 KV Feeder No. 2
12	GUVNLI/VERDANT/19-20/5585	29-June-2019	33 KV Feeder No. 1
13	GUVNLI/VERDANT/19-20/5587	26-July-2019	33 KV Feeder No. 1
14	GUVNLI/VERDANT/19-20/5589	26-July-2019	33 KV Feeder No. 1
15	GUVNLI/VERDANT/19-20/5590	26-July-2019	33 KV Feeder No. 1
16	GUVNLI/VERDANT/19-20/5591	26-July-2019	33 KV Feeder No. 1
17	GUVNLI/VERDANT/19-20/5592	26-July-2019	33 KV Feeder No. 1
18	GUVNLI/VERDANT/19-20/5680	27-September-2019	33 KV Feeder No. 1
19	GUVNLI/VERDANT/19-20/5682	27-September-2019	33 KV Feeder No. 1
20	GUVNLI/VERDANT/19-20/5683	27-September-2019	33 KV Feeder No. 1
21	GUVNLI/VERDANT/19-20/5684	21-September-2019	33 KV Feeder No. 1
22	GUVNLI/VERDANT/19-20/5685	21-September-2019	33 KV Feeder No. 1
23	GUVNLI/VERDANT/19-20/5686	13-September-2019	33 KV Feeder No. 1
24	GUVNLI/VERDANT/19-20/5681	21-September-2019	33 KV Feeder No. 1
25	GUVNLI/VERDANT/19-20/5688	28-September-2019	33 KV Feeder No. 1
26	GUVNLI/VERDANT/19-20/5809	25-October-2019	33 KV Feeder No. 1
27	GUVNLI/VERDANT/19-20/5808	25-October-2019	33 KV Feeder No. 1
28	GUVNLI/VERDANT/19-20/5811	06-November-2019	33 KV Feeder No. 1
29	GUVNLI/VERDANT/19-20/5817	22-November-2019	33 KV Feeder No. 2 (Tarana)
30	GUVNLI/VERDANT/19-20/5818	22-November-2019	33 KV Feeder No. 2 (Tarana)

31	GUVNL-I/VERDANT/19-20/5819	27-November-2019	33 KV Feeder No. 2 (Tarana)
32	GUVNL-I/VERDANT/19-20/5820	27-November-2019	33 KV Feeder No. 2 (Tarana)
33	GUVNL-I/VERDANT/19-20/5608	26-July-2019	33 KV Feeder No. 2 (Tarana)
34	GUVNL-I/VERDANT/19-20/5609	05-July-2019	33 KV Feeder No. 1
35	GUVNL-I/VERDANT/19-20/5610	05-July-2019	33 KV Feeder No. 1
36	GUVNL-I/VERDANT/19-20/5611	05-July-2019	33 KV Feeder No. 1
37	GUVNL-I/VERDANT/19-20/5612	05-July-2019	33 KV Feeder No. 1
38	GUVNL-I/VERDANT/19-20/5613	05-July-2019	33 KV Feeder No. 1
39	GUVNL-I/VERDANT/19-20/5614	26-July-2019	33 KV Feeder No. 2 (Tarana)
40	GUVNL-I/VERDANT/19-20/5615	05-July-2019	33 KV Feeder No. 1
41	GUVNL-I/VERDANT/19-20/5810	18-November-2019	33 KV Feeder No. 2 (Tarana)
42	GUVNL-I/VERDANT/19-20/5821	27-November-2019	33 KV Feeder No. 2 (Tarana)
43	GUVNL-I/VERDANT/19-20/5848	07-December-2019	33 KV Feeder No. 2 (Tarana)
44	GUVNL-I/VERDANT/19-20/5849	07-December-2019	33 KV Feeder No. 2 (Tarana)
45	GUVNL-I/VERDANT/19-20/5850	07-December-2019	33 KV Feeder No. 2 (Tarana)
46	GUVNL-I/VERDANT/19-20/5851	07-December-2019	33 KV Feeder No. 2 (Tarana)
47	GUVNL-I/VERDANT/19-20/5853	18-December-2019	33 KV Feeder No. 2 (Tarana)
48	GUVNL-I/VERDANT/19-20/5854	18-December-2019	33 KV Feeder No. 2 (Tarana)
49	GUVNL-I/VERDANT/19-20/5855	18-December-2019	33 KV Feeder No. 2 (Tarana)
50	GUVNL-I/VERDANT/19-20/5856	18-December-2019	33 KV Feeder No. 2 (Tarana)

There was no major breakdown which would have impacted the emission reductions achieved from the project activity from the date of commissioning till the last date of current monitoring period. The project activity has been functional continuously from commissioning date to the last date of the monitoring period.

No any events has occurred till now from the commission date that may impact the GHG emission reductions or removals and monitoring.

Description of technology/measure employed:

In wind energy generation, kinetic energy of wind is converted into mechanical energy and subsequently into electrical energy.

Wind has considerable amount of kinetic energy when blowing at high speeds. The kinetic energy passes through the blades of the wind turbines is converted into mechanical energy

and rotates the turbine. When the wind blades rotate, the connected generator rotor also rotates, thereby producing electricity. The technology is a clean technology since there are no GHG emissions associated with the electricity generation.

The project installs Vestas V120 HH120 (WTGs of individual capacity 2.1 MW. The V120-2.1MW HH 120m power curve at air density 1.162kg/m³ was provided by Vestas for EYA calculation.

The technical details of WTG are detailed below in the table:

Parameter	Specifications
Make	Vestas
Model Number:	V120-2.1MW HH 120m
Rotor	
Installed electrical output	2100 kW
Diameter	120 m
Cut-in wind speed	3 m/s
Rated wind speed	14 m/s
Cut-out wind speed	20 m/s
Rotor swept area	11310 m ²
Regulation	Pitch regulated with variable speed
Generator	
Type	Asynchronous, 4 Poles, doubly fed generator, slip rings
Rated output	2100 kW
Frequency	50 Hz
Gear Box	
Type	One planetary stage and two helical stages
Yaw system	
Drive	Active electrical yaw motors
Bearing	Polyamide slide bearing
Safety system	
Aerodynamic brake	3 independent systems with blade pitching
Mechanical brake	Hydraulic disc brake
Technical Life	25 Years

There was no technical changes and deviation in the devices from the day of commissioning till the last day of current monitoring period.

3.2 Deviations

2.3.1 Methodology Deviations

There is no methodology deviation in the project activity during the current monitoring period.

2.3.2 Project Description Deviations

The calibration frequency of the energy meter is once in 5 years as per Central Electricity Authority (CEA). Govt. of India requirement and same is now transparently clarified in the monitoring plan of the project activity.

3.3 Grouped Projects

This is not a grouped project.

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 in year y
Source of data	Calculation from CEA Database, Version 14
Value applied	0.9610(Indian Grid)
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per "Tool to calculate the emission factor for an electricity system, version 07.0" as 3-year generation weighted average using data for the years 2015-16, 2016-17 & 2017-18. The data are obtained from "CO ₂ Baseline Database for Indian Power Sector" version 14.0, published by the Central Electricity Authority, Ministry of Power, Government of India
Purpose of Data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	EF _{BM,y}
Data unit	tCO ₂ /MWh
Description	Build Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA Database, Version 14
Value applied	0.8644 (Indian Grid)
Justification of choice of data or description of	Calculated as per "Tool to calculate the emission factor for an electricity system, version 07.0" as 3-year generation weighted average using data for the years 2017-18. The data are obtained from

measurement methods and procedures applied	“CO2 Baseline Database for Indian Power Sector” version 14.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of Data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	$EF_{CM,y}$
Data unit	tCO ₂ /MWh
Description	Combined Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA Database, Version 14
Value applied	0.9368(Indian Grid)
Justification of choice of data or description of measurement methods and procedures applied	The combined margin emissions factor is calculated as follows: $EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}$ Where: $EF_{grid,BM,y}$ = Build margin CO₂ emission factor in year y (tCO₂/MWh) $EF_{grid,CM,y}$ = Operating margin CO₂ emission factor in year y (tCO₂/MWh) W_{OM} = Weighting of operating margin emissions factor (%) = 75% W_{BM} = Weighting of build margin emissions factor (%) = 25%
Purpose of Data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

4.2 Data and Parameters Monitored

Data / Parameter	EG_y
Data unit	MWh
Description	Electricity supplied to GUVNL
Source of data	Certificate for share of electricity generated by the wind farm
Description of measurement methods and procedures to be applied	Net electricity generated is calculated at the main meter connected to the incoming feeder of GUVNL. The procedures for metering is as per the provisions of the power purchase agreement. The Project WTGs are connected to Keshiya and Tarana wind farm site substation which are further connected to GETCO substations Dhrol and Jamdudhai. Please Refer appendix 1 & 2 for details. The Main meter and Check meter have been installed by GETCO on outgoing 66 kV circuit lines of Keshiya & Tarana site substation. Data monitoring takes place at the individual WTGs through CMS and GETCO meter at the wind farm site substation. The electricity metered at the GETCO meter installed Keshiya and Tarana wind farm site substation is solely for the project WTGs. As no other WTGs (Non-Project WTGs) has been connected to this substation feeders as of now.

	The emission reduction calculations are done on the basis of the GETCO Main meter reading (net electricity exported to the grid) after deducting imports from the grid as mentioned in the share certificate issued on monthly basis. The electricity measurements at CMS and GETCO meter are continuous and recorded on monthly basis.
Frequency of monitoring/recording	Continuous measurement and at least monthly recording
Value monitored	446,399.971
Monitoring equipment	Electricity Meters of 0.2s Class
QA/QC procedures to be applied	Calibration of all the meters will be undertaken at required intervals (Once in 5 years) and faulty meters will be duly replaced immediately. The data will be cross checked with sales receipts/invoices.
Purpose of the data	Calculation of Baseline emission
Calculation method	N/A
Comments	The data will be archived electronically for two years after the end of the last crediting period or the last issuance of VERs for this project activity, whichever occurs later.

Data / Parameter	EG _{WTG}
Data unit	MWh
Description	Electricity generated by each WTG
Source of data	Monthly generation reports provided by Vestas
Description of measurement methods and procedures to be applied	Each WTG is equipped with an integrated electronic meter. These meters are connected to the Central Monitoring Station (CMS) of the entire wind farm through communication cables. The generation data of individual WTG can be monitored as a real-time entity at CMS. This data for each individual WTG will be recorded daily and reported monthly.
Frequency of monitoring/recording	Continuous measurement and at least monthly recording
Value monitored	This data will not be used for the calculation of emission reductions per say but would act as a backup data for the net electricity generated. In case there may be addition of Non-project WTGs in Wind farm site.

Monitoring equipment	The meter is a software-based meter integrated with the control panel of the WEG.
QA/QC procedures to be applied	The meter is a software-based meter integrated with the control panel of the WEG. In case of any fault in the system, the control panel shall shutdown the WTG until the error is rectified. So there is no meter calibration is required either the machine will run or will be shutdown
Purpose of the data	This data will not be used for the calculation of emission reductions per say but would act as a backup data for the net electricity generated from the project activity.
Calculation method	N/A
Comments	The data will be archived electronically for two years after the end of the last crediting period or the last issuance of VERs for this project activity, whichever occurs later.

4.3 Monitoring Plan

The monitoring plan is being devised as per approved consolidated monitoring methodology ACM0002 - “Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources”.

The methodology requires monitoring of the following parameters:

- Electricity generation from the project activity;

Data needed to recalculate the operating margin emission factor, if needed, based on the choice of the method to determine the operating margin (OM), consistent with “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” (ACM0002);

- Data needed to recalculate the build margin emission factor, if needed, consistent with “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” (ACM0002);

For the project activity to establish its creditable emission reduction, it has to record the actual electricity generation, which would displace equivalent units of electricity at the operating and build margin of the grid. Since the simple OM emission factor is calculated based on a 3-year average, based on the most recent statistics available at the time of PDD preparation, its updation based on ex-post monitoring is not required. For BM calculation, option 1 (refer ACM 0002) has been chosen, which is calculated ex-ante based on the most recent information, hence its monitoring is also not required.

Hence, under the monitoring protocol for the project it is required to: Monitor and record the electricity generated and exported by the project WTGs to the National grid.

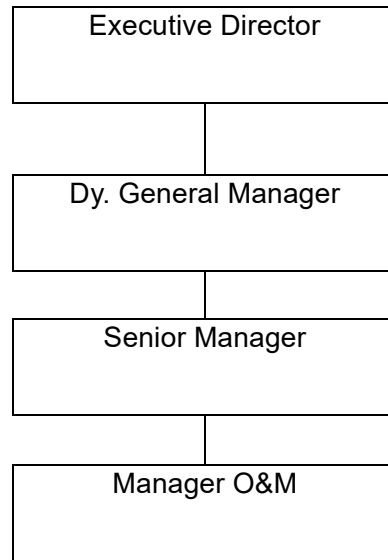
To ensure trouble free operations and efficient generations through all the wind turbines, PP has entered into a comprehensive Operation and Maintenance agreement with the manufactures of the

turbines for a period of 25 years. The contractor Vestas, under the O&M contract with PP would be responsible for the operation and maintenance of the project activity for the entire crediting period.

The authority and responsibility of project management as well as registration, monitoring, measurement and reporting lies with PP.

PP has formulated a Project Team to ensure proper and continuous monitoring of the performance of turbines and generation of power.

The same has been outlined as follows:



(d) Responsibilities

Executive Director: To be responsible for overall project management.

Dy. General Manager: To be responsible for generation data VCS related monitoring, internal verification and presenting the same to the Executive director. To verify if the monitored data is normal. To calculate the emission reductions regularly and write the monitoring report.

Chief Manager: To conduct the monitoring task strictly based on the monitoring manual and registered PDD. To record required monitored parameters. To report the monitoring results to the Dy. General Manager.

Manager O&M. For O&M monitoring and coordinate with the O&M contractor for smooth functioning of the wind farm. To assess regular maintenance of monitoring equipment.

The O&M personnel of are qualified engineers and are well trained.

(e) Metering layout

- a) The pooling meters at Keshiya & Tarana Wind farm site substation of GETCO main meter (M) and check meter (M') are installed at 66 KV side at the substation.
- b) The meters at WTG (m) are bidirectional meters recording the electricity export and import to the grid. The net electricity exported to the grid is calculated as difference of electricity exported minus the electricity imported and reported as net electricity delivered to grid in the share certificate issued by Gujarat Discom.
- c) Data monitoring takes place at the GETCO main meter at substation (M), GETCO Check meter at substation (M'), and WTGs (m1, m2, m3,.....m50).
- d) As per general practice, GETCO follows the procedure in which the electricity metered at the GETCO meter (M) is proportionally divided among the customers connected to the meter on the basis of the pro-rata readings taken at the individual WTG meter (m). However, in this project activity meters are installed at Wind farm site substation where no other PPs WTGs and non-project WTGs of same PP is connected as of now. The energy meter solely accounts the energy generation from the project WTGs. Hence, apportioning is not required as of now.

As per standard practice, there is a transmission loss between the individual WTGs and the substation. This loss is proportionally divided among the WTGs connected to the meter on the basis of the prorata readings taken at the individual WTG meter (m). The final share certificate issued to the project proponent is based on the electricity generated minus the line losses by GETCO. However, the process of share certificate preparation is solely under control of Gujarat DISCOM and PP has no control over the government proceedings. Hence, the metering and monitoring related procedures will be governed as per the PPA.

1. The procedures for metering will be as per the provisions of the power purchase agreement. The WEGs of a single customer (PP in this case) at a particular site are connected to a feeder that ultimately leads to the main GETCO meter at the site substation maintained by O&M provider. Data monitoring takes place at the CMS for Individual WTGs and GETCO meter at the substation. The electricity metered at the GETCO meter is proportionally divided among the customers connected to the meter on the basis of the prorata readings taken at the individual WTGs end. The emission reduction calculations are done on the basis of the GETCO Main meter reading (net electricity exported to the grid) after deducting imports from the grid as mentioned in the share certificate issued on monthly basis.
2. In case of conspicuous failures like burning of meter and erratic display of metered parameters and when the error found in testing of meter is beyond the permissible limit of error provided in the relevant standard, the meter shall be immediately replaced with a correct meter.
3. Sealing and maintenance of meters:
 - i. The GETCO meter shall be sealed in the presence of representatives of PP / O&M provider, GEDA and GETCO.
 - ii. Any meter seal(s) shall be broken only by the GEDA /GETCO/ representative in the presence of PPs representative whenever the main metering system or the 66kV metering system is to be inspected, tested, adjusted, repaired or replaced.
 - iii. The GETCO meter at the substation will be calibrated once in 5 year.
4. Records: PP will maintain an accurate and up-to-date operating log at the project site with records of:
 - i. 24 Hours logs of real and reactive power generation, frequency, transformer tap position, bus voltage(s), Main meter and other meter readings and any other data mutually agreed.
 - ii. Any unusual conditions found during operation/inspections
 - iii. All the records will be kept for two years after the end of the crediting period or the last issuance of VERs for this project activity, whichever occurs later.
5. The billing will be on monthly basis. PP shall raise invoice and submit to GUVNL for payment based on joint meter reading as certified at the end of each month for the energy supplied

6. The electronic data will be archived for 2 years or up to the end of the crediting period, whichever late.

(f) Billing and meter failure related issues:

- a) The billing will be on monthly basis. PP shall raise invoice and submit to GUVNL for payment based on joint meter reading as certified at the end of each month for the energy supplied
- b) Billing for the failure period:
 - i. In the event that any GETCO meter fails to register or upon being tested is found not to be accurate within $\pm 0.2s$ of the energy injected in the grid, shall for the period be measured on the basis of the value registered by the corresponding meter at the feeder end.
 - ii. In the event that both GETCO meter and the corresponding check meter at the substation fail to register, or upon being tested, be found not to be accurate within ± 0.2 / $0.5s$ the energy injected in the grid, shall for the period be adjusted by immediately restoring and recalibrating the GETCO meter and the corresponding check meter at the substation end and the correction applied to the consumption registered by the GETCO meter.
 - iii. The period referred to in the two points above is the actual period during which inaccurate measurements were made if such period can be determined or, if not readily determinable, the shorter of:
 - The period since the immediately preceding test of the relevant Main meter; or
 - One hundred and eighty (180) days immediately preceding the test at which the relevant Main meter was determined to be defective or inaccurate.

Project activity electricity evacuation SLD is provided under Appendix-2 of the PD.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

As per the various baseline scenarios identified in approved methodology ACM0002 version 19, the emission reductions have been identified using the following steps:

Baseline emissions include only CO₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid- connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

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

Where:

BE_y	=	Baseline emissions in year y (t CO ₂ /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 ₂ emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO ₂ /MWh)

$$BE_y = 446,399.971 \text{ MWh} \times 0.9368 \text{ tCO}_2/\text{MWh}$$

$$= 418,185 \text{ tCO}_2$$

Vintage wise emission reduction details for the current monitoring period:

Year	Net Export (MWh) (EG _y)	Grid Emission Factor (tCO ₂ /MWh) (EG _{grid,CM,y})	Baseline Emission (tCO ₂) (BE _y)
2019 (21-June-2019 to 31-December-2019)	90,736.459	0.9368	85,001

2020 (01-January-2020 to 31-December-2020)	299,916.702	0.9368	280,961
2021(01-January-2021 to 31-March-2021)	55,746.810	0.9368	52,223
Total	446,399.971		418,185

5.2 Project Emissions

The project activity involves harnessing of wind energy and its conversion to electricity. Hence, according to the methodology ACM0002, Version 19.0, there will be no project emissions, i.e. $PE_y = 0$.

5.3 Leakage

As per the methodology ACM0002, Version 19.0, no leakage has been considered, therefore, $LE_y = 0$

5.4 Net GHG Emission Reductions and Removals

The procedure for quantification of net GHG emission reductions and removals including all relevant equations has mentioned in the above section 3.3.

As per para 61 of ACM0002 version19; Emission Reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

Where:

ER_y	=	Emission reductions in year y (t CO ₂ e/yr)
BE_y	=	Baseline emissions in year y (t CO ₂ /yr)
PE_y	=	Project emissions in year y (t CO ₂ e/yr)

Therefore, Net GHG Emission Reductions and Removals are calculated as follows:

$$ER_y = BE_y - PE_y$$

$$ER_y = 418,185 - 0 = 418,185 \text{ tCO}_2$$

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)
2019 (21-June-2019 to 31-December-2019)	85,001	0	0	85,001
2020 (01-January-2020 to 31-December-2020)	280,961	0	0	280,961
2021(01-January-2021 to 31-March-2021)	52,223	0	0	52,223
Total	418,185	0	0	418,185

It is to be noted here that as per the estimated emission reduction to be achieved from the project activity for the current monitoring period is 647,856 tCO₂e, whereas actual emission reductions achieved are 418,185 tCO₂e, which is approximately 35.5% lower than the estimated emission reductions.

For the monitoring period 21-June-2019 to 31-March-2019 (194 days), the estimated ER value is 285,057 tCO₂. However the actual ER value for the monitoring period is 85,001 tCO₂ which is lower than the estimated annual emission reduction.

For the monitoring period 01-January-2020 to 31-December-2020 (366 days), the estimated ER value is 364,793 tCO₂. However the actual ER value for the monitoring period is 280,961 tCO₂ which is lower than the estimated annual emission reduction.

For the monitoring period 01-January-2021 to 31-March-2021 (90 days), the estimated ER value is 89,703 tCO₂. However the actual ER value for the monitoring period is 52,223 tCO₂ which is lower than the estimated annual emission reduction.

APPENDIX I: <CALIBRATION DETAIL>

Dhrol GETCO SS

Meter Sl. No.	Meter Type	Accuracy Class	Date of Calibration	Due Date of Calibration	Calibration Frequency
GJ4187-A	Line-1 (Main)	0.2s	01-May-2019	30-April-2024	Once in 5 Years
GJ4287-A	Line-2 (Check)				

Jamdudhai GETCO SS

Meter Sl. No.	Meter Type	Accuracy Class	Date of Calibration	Due Date of Calibration	Calibration Frequency
GJ4285-A ⁸	Line-1 (Main)	0.2s	01-May-2019	30-April-2024	Once in 5 Years
GJ4612-A	Line-1 (New Main)		03-December-2020	02-December-2025	
XE481384	Line-2 (Check)		01-May-2019	30-April-2024	

Tarana SS

Meter Sl. No.	Meter Type	Accuracy Class	Date of Calibration	Due Date of Calibration	Calibration Frequency
GJ4284-A	Line-1 (Main)	0.2s	01-May-2019	30-April-2024	Once in 5 Years
GJ3571-A	Line-2 (Check)				

Keshiya SS

Meter Sl. No.	Meter Type	Accuracy Class	Date of Calibration	Due Date of Calibration	Calibration Frequency

⁸ There was a change in main meter of Jamdudhai GETCO substation Line-1. The faulty meter GJ4285-A was replaced by GJ4612-A on 3rd December,2020.

GJ4186-A	Line-1 (Main)	0.2s	01-May-2019	30-April-2024	Once in 5 Years
GJ4286-A	Line-2 (Check)				

APPENDIX II: <BREAK DOWN DETAIL>

Gen. Date	Customer Name	State	Site	M W	Breakdown Remark	Formula Parameter	Breakdown Hrs.
30-Jun-2019	Verdant Renewables	Gujarat	Keshiya	105	Grid Down from EB	GF	0.20
03-Jul-2019	Verdant Renewables	Gujarat	Tarana	105	Grid Down from EB	GF	0.20
11-Jul-2019	Verdant Renewables	Gujarat	Keshiya	105	Grid Down from EB	GF	0.20
14-Jul-2019	Verdant Renewables	Gujarat	Tarana	105	Grid Down from EB	GF	0.10
28-Jul-2019	Verdant Renewables	Gujarat	Keshiya	105	Elec Voltage Asymmetry	U	0.30
07-Aug-2019	Verdant Renewables	Gujarat	Tarana	105	Elec Voltage Asymmetry	U	0.20
18-Aug-2019	Verdant Renewables	Gujarat	Keshiya	105	Grid Down from EB	GF	5.60
20-Aug-2019	Verdant Renewables	Gujarat	Tarana	105	Elec Voltage Asymmetry	U	0.20
29-Aug-2019	Verdant Renewables	Gujarat	Keshiya	105	Grid Down from EB	GF	5.60
11-Sep-2019	Verdant Renewables	Gujarat	Tarana	105	Grid Down from EB	GF	12.80
12-Sep-2019	Verdant Renewables	Gujarat	Keshiya	105	FSS Fault	U	2.20
23-Sep-2019	Verdant Renewables	Gujarat	Tarana	105	Grid Down from EB	GF	12.80
12-Oct-2019	Verdant Renewables	Gujarat	Keshiya	105	FSS Fault	U	1.60
15-Oct-2019	Verdant Renewables	Gujarat	Tarana	105	Grid Down from EB	GF	0.10
20-Oct-2019	Verdant Renewables	Gujarat	Keshiya	105	Grid Down from EB	GF	5.00
25-Oct-2019	Verdant Renewables	Gujarat	Tarana	105	Preventive Check	U	0.70
29-Oct-2019	Verdant Renewables	Gujarat	Keshiya	105	FSS Fault	U	1.20
19-Nov-2019	Verdant Renewables	Gujarat	Tarana	105	Grid Down from EB	GF	5.00
20-Nov-2019	Verdant Renewables	Gujarat	Keshiya	105	Grid Down from EB	GF	5.00
27-Nov-2019	Verdant Renewables	Gujarat	Tarana	105	Grid Down from EB	GF	0.40
22-Dec-2019	Verdant Renewables	Gujarat	Keshiya	105	FSS Fault	U	7.20

10-Jan-2020	Verdant Renewables	Gujarat	Tarana	105	Grid Down from EB	GF	0.20
11-Jan-2020	Verdant Renewables	Gujarat	Keshiya	105	Grid Down from EB	GF	2.60
02-Feb-2020	Verdant Renewables	Gujarat	Tarana	105	Monthly Lubrication	S	0.80
13-Feb-2020	Verdant Renewables	Gujarat	Keshiya	105	Elec Voltage Asymmetry	U	0.10
15-Feb-2020	Verdant Renewables	Gujarat	Tarana	105	Grid Down from EB	GF	2.60
10-Mar-2020	Verdant Renewables	Gujarat	Keshiya	105	Monthly Lubrication	S	1.00
13-Apr-2020	Verdant Renewables	Gujarat	Tarana	105	Grid Down from EB	GF	0.40
15-Apr-2020	Verdant Renewables	Gujarat	Keshiya	105	Modification	S	1.70
18-May-2020	Verdant Renewables	Gujarat	Tarana	105	Monthly Lubrication	S	1.00
19-Jun-2020	Verdant Renewables	Gujarat	Keshiya	105	Grid Down from EB	GF	0.10
10-Jul-2020	Verdant Renewables	Gujarat	Tarana	105	Grid Down from EB	GF	0.10
21-Jul-2020	Verdant Renewables	Gujarat	Keshiya	105	Elec Voltage Asymmetry	U	0.20
22-Aug-2020	Verdant Renewables	Gujarat	Tarana	105	Grid Down from EB	GF	1.80
01-Sep-2020	Verdant Renewables	Gujarat	Keshiya	105	Grid Down from EB	GF	1.80
12-Sep-2020	Verdant Renewables	Gujarat	Tarana	105	Elec Voltage Asymmetry	U	0.10
25-Oct-2020	Verdant Renewables	Gujarat	Keshiya	105	Elec Yaw Sensor Err Stop	U	0.40
15-Nov-2020	Verdant Renewables	Gujarat	Tarana	105	Mech Switch Twist CCW End Stop	U	3.50
27-Dec-2020	Verdant Renewables	Gujarat	Keshiya	105	Yaw North Sensor Not Detected	U	0.50
28-Jan-2021	Verdant Renewables	Gujarat	Tarana	105	Grid Down from EB	U	0.50
29-Jan-2021	Verdant Renewables	Gujarat	Keshiya	105	Elec Voltage Asymmetry	U	0.50
30-Jan-2021	Verdant Renewables	Gujarat	Tarana	105	Elec Yaw Sensor Err Stop	U	0.50
31-Jan-2021	Verdant Renewables	Gujarat	Keshiya	105	Mech Switch Twist CCW End Stop	U	0.50
01-Feb-2021	Verdant Renewables	Gujarat	Tarana	105	Yaw North Sensor Not Detected	U	0.50
02-Feb-2021	Verdant Renewables	Gujarat	Keshiya	105	Grid Down from EB	U	0.50
03-Feb-2021	Verdant Renewables	Gujarat	Tarana	105	Elec Voltage Asymmetry	U	0.50