



Verified Carbon Standard

10 MW WIND POWER PROJECT BY POWERICA AT BDS - GUJARAT



Document Prepared by EKI Energy Services Limited

Project Title	10 MW wind power project by Powerica at BDS - Gujarat
Version	02
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Project ID	1822
Monitoring Period	01-January-2022 to 31-December-2022 (inclusive of both start and end dates)
Prepared By	EKI Energy Services Limited
Contact	Prince Kumar Email ID: prince.kumar@enkingint.org / registry@enkingint.org Address: Office no. 201, Plot 48, Scheme 78 part 2 Vijay Nagar, Near Brilliant Convention Centre Indore - 452010 (M.P, India), Website www.enkingint.org

¹ <https://registry.verra.org/app/projectDetail/VCS/1822>

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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 a 5 Wind Turbine Generators (WTG s) of total generating capacity of 10 MW. The project activity will utilise V110 model of WTGs supplied of Vestas Wind Technology India Private Limited. The WTGs involved in the project are commissioned in villages, Beraja, Datrana and Samor of Khambaliya Taluka of Devbhoomi Dwaraka district of Gujarat. The project aims at providing electricity to the state of Gujarat by effective utilization of renewable resources. The electricity generated from the project activity is supplied to the national grid of India.

The project activity is a Greenfield project for generation of electrical energy using wind which is a renewable source of energy. Thus, this project actually displaces the electricity grid which is essentially fossil-fuel based.

Start date of the project activity is the earliest date of interconnection with the grid i.e. 04-February-2017. This is the date of commissioning of 4 MW (2 WTGs) capacity of Project activity. The WTGs involved in the project activity were commissioned in two phase - 04-February-2017 (4 MW) and 15-February-2017 (6 MW).

The total emission reductions achieved by this project activity for the monitoring period from 01-January-2022 to 31-December-2022 are 27,140 tCO₂e through displacing 28,643.99 MWh of electricity from fossil-fuel dominated electricity grid with electricity generation using wind energy resources.

The table below shows the description of the previous validation and periodic verifications for the project activity along with this monitoring period. The audit history of the project is as follows-

Audit Type	Period	Program	VVB Name	Number of years
Joint Validation and Verification	04-February-2017 to 30-september-2018	<u>VCS</u>	<u>LGAI Technological Center S.A. (Applus+ Certification)</u>	1 Year, 7 months 27 days
Verification	01-October-2018 to 31-January-2020	<u>VCS</u>	<u>Earthood Services Private Limited (ESPL)</u>	1 Years, 4 Months 0 Days
Verification	01-February-2020 to 31-December-2020	<u>VCS</u>	<u>KBS Certification Services Pvt. Ltd.</u>	0 Years, 11 Months & 0 Days

Verification	01-January-2021 to 31-December-2021	<u>VCS</u>	<u>RINA Service S.p.A (RINA)</u>	1 Years, 0 Months & 0 Days
Verification	01-January-2022 to 31-December-2022	<u>VCS</u>	<u>LGAI Technological Center S.A. (Applus+ Certification)</u>	1 Years, 0 Months & 0 Days
Total	04-February-2017 to 31-December-2022			5 Years, 10 Months & 28 Days

1.2 Sectoral Scope and Project Type

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

Project type: Renewable energy project (Wind)

Project Category: AMS I.D. Grid Connected renewable electricity generation (Version 18.0)

1.3 Project Proponent

Organization name	Powerica Limited
Contact person	Mr. Pradeep Gupta
Title	Head - Wind Energy Division
Address	9th Floor, 'C' Wing, Godrej Coliseum, Sion (E), Mumbai – 400022, Maharashtra, India
Telephone	+91 22 4001 2000
Email	pradeep.gupta@powericaltd.com

1.4 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the Project	Project Consultant
Contact person	Prince Kumar

Title	Project Manager
Address	Office no. 201, Plot 48, Scheme 78 part 2 Vijay Nagar, Near Brilliant Convention Centre Indore - 452010 (M.P, India) Website www.enkingint.org
Telephone	+91 8406982580
Email	prince.kumar@enkingint.org / registry@enkingint.org

1.5 Project Start Date

The project start date is 04-February-2017 which is the date of commissioning of the first phase of the 10 MW wind power project.

1.6 Project Crediting Period

Crediting Period Start date: 04-February-2017

Crediting Period End date: 03- February -2027

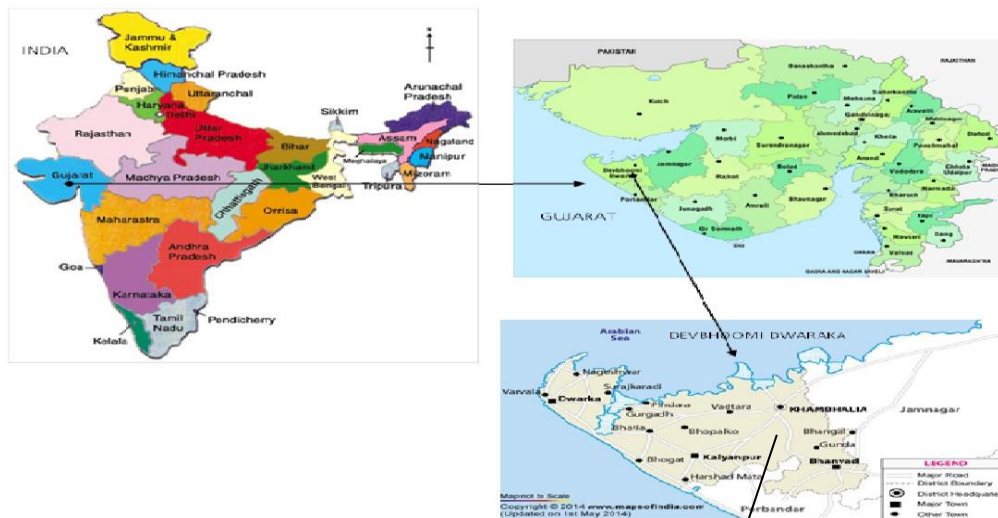
The project activity adopts renewable crediting period of 10 years period which can be renewed for maximum 2 times. This is the date of commissioning of 4 MW (2 WTGs) capacity of Project activity.

1.7 Project Location

The project activity is located at Village –Beraja, Datrana and Samor, Taluka – Jamkhambhaliya, District – Devbhoomi Dwarka in the state of Gujarat.

Google map link: https://www.google.com/maps/d/u/0/edit?mid=1MFNWv99nI6KY4jR_fhkPI-NtI5JOsnIP&usp=sharing

The project location and the wind map are attached in the figure below





The location wise respective co-ordinates are mentioned below-

Serial No.	WTG ID	Village	Latitude	Longitude
1	BRJ 16	Beraja	22° 12' 58.4" N	69° 23' 22.1" E
2	BRJ 17	Beraja	22° 12' 50.1" N	69° 23' 42.8" E
3	DTR 12	Datrana	22° 11' 34.1" N	69° 23' 46.8" E
4	SMR 01	Samor	22° 15' 14.2" N	69° 32' 28.6" E
5	SMR 05	Samor	22° 15' 50.5" N	69° 32' 55.0" E

1.8 Title and Reference of Methodology

Methodology : Grid connected renewable electricity generation²

Reference : AMS I.D. Version 18.0

Project Category : I.D. Grid Connected renewable electricity generation

Version : 18, valid from 28-November-2014. Scope: 01, EB 81, Annex 24

Tools referred with above methodology are:

- Tool to calculate the emission factor for an electricity system - Version 07.0 (EB 100, Annex 04)³
- Demonstration of additionality of small-scale Project activities" Version 12 EB 99 Annex 3⁴
- Investment Analysis - Version-07, EB92 Annex-5⁵

² <https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTFQQOFQQH4SBK>

³ <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v7.0.pdf>

⁴ <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-21-v12.pdf>

⁵ <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-27-v7.0.pdf>

1.9 Participation under other GHG Programs

The project is also listed in UNFCCC under validation in CDM⁶. However, PP is yet to proceed further in registration in CDM of the project. 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
04-February-2017 to 30-september-2018	VCS
01-October-2018 to 31-January-2020	VCS
01-February-2020 to 31-December-2020	VCS
01-January-2021 to 31-December-2021	VCS

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

VCUs used for voluntary carbon market purposes do not require Paris Agreement Article 6 mechanism and other Paris-related program VCU labels, though labeled VCUs may be used for voluntary market transactions if desired. Since for this project activity the VCUs for this monitoring period are only to be used for the voluntary carbon market purposes, so project proponent is not required to demonstrate adherence to any of such requirements.

India is non-annex1 country and there is no compliance with an emission trading program or to meet binding limits on GHG emissions for this project activity.

The emission reductions or removals generated during this monitoring period have not been used for compliance under an emissions trading program or any other mechanism that includes GHG allowance trading (as identified in the project description, or where such programs or mechanisms have subsequently emerged). The Project is not used for compliance with an emission trading program or to meet binding limits on GHG emissions.

PP has submitted undertaking that it would not use net GHG emission reductions by the projects for compliance with emission trading program to meet binding limits on GHG emissions. PP has also submitted undertaking for not availing any other forms of environmental credits e.g. REC for the monitoring period under consideration.

Also, the project is not claiming any benefits from the REC mechanism of India which can be confirmed from the link below –

https://www.recregistryindia.nic.in/index.php/publics/accredited_regens

The Project Activity is a wind power project and does not involve any supply chain involved in the project such as manufacturers, wholesalers, distributors and retailers. So, no indirect upstream

⁶ <https://cdm.unfccc.int/Projects/Validation/DB/OP7BL41FJ56ICWJZVO34VXC0IVVDRM/view.html>

and downstream GHG emissions are not involved in the project activity. Thus, the Scope 3 emissions are not applicable in this project activity.

1.11 Sustainable Development Contributions

Ministry of Environment, Forest and Climate Change (MoEFCC), India's Designated National Authority (DNA) for CDM projects has stipulated economic, social, environment and technological well-being as the four indicators of sustainable development. During the current monitoring period, the project has contributed to sustainable development through the following ways.

Social well-being:

- The project activity has resulted in creating job opportunities for the local population operation of the renewable energy projects. This would result in the improvement in living standards of the local community
- The installation of the renewable energy projects also led to development of basic infrastructure like roads, communication with the nearby cities etc. which also improved in living standards of the local population.

Economic well-being:

- The project activity has created direct and indirect job opportunities to the local community during installation and operation of the renewable energy projects.
- The investment for the project activity instances under grouped project activity has led to the improvement in the economic activity in the local area.

Environmental well-being:

The project activity utilizes renewable energy for generating electricity which otherwise would have been generated through alternate fuel (most likely - fossil fuel) based power plants, contributing to reduction in specific emissions (emissions of pollutant/unit of energy generated) including GHG emissions. As renewable energy projects produce no end products in the form of solid waste (ash etc.), they address the problem of solid waste disposal encountered by most other sources of power. Being a renewable resource, to generate electricity contributes to resource conservation. Thus, the project causes no negative impact on the surrounding environment.

Technological well-being:

The successful operation of project activity has led to promotion of wind power generation and also encourages other entrepreneurs to participate in similar projects.

Sustainable Development Contributions:

According to 2- the VCS Standard Version 4.4 (latest version), it is clearly mentioned that Project Proponent is required to demonstrate contributions to a minimum of three SDGs, effective immediately for all projects registered on or after 20 January 2023. Since this is the 6th Verification of this project and it is registered before 20 January 2023, SDG reporting for 3 SDGs is demonstrated in the table below.

The SDG's considered for the present monitoring period are –

SDG 7: 7.2.1 Renewable energy share in the total final energy consumption

SDG 8: 8.5.2 Unemployment rate, by sex, age and persons with disabilities

SDG 13: Tonnes of greenhouse gas emissions avoided or removed

The project proponent will only use the VCUs for voluntary carbon market purposes, thus the same is not applicable in the context of the Paris agreement. VCUs used for voluntary carbon market purposes do not require Paris Agreement Article 6 mechanism and other Paris-related program VCU labels, though labeled VCUs may be used for voluntary market transactions if desired.

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 28,643.99 MWh renewable electricity has supplied to Indian electricity grid during the reported period that helps to increase the renewable energy share in the energy mix.	Overall, 1,52,329 MWh (26,192 + 40,216.22 + 26,925.42 + 30,351.18 + 28,643.99) renewable electricity has supplied to Indian electricity grid throughout the project lifetime that helps to increase the renewable energy share in the energy mix
2)	8.5	8.5.2 Unemployment rate, by sex, age and persons with disabilities	Implemented activities to decrease unemployment rate	Total - 2 people had employed during this monitoring period. Thus, the project activity is contributing in the reduction of unemployment rate.	2 people had employed annually for this project activity for the current as well as the previous monitoring period. Thus, the project activity is contributing in the reduction of unemployment rate.
3)	13.0	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	By supplying 28,643.99 MWh clean electricity (generated through Wind Power) to Indian electricity grid, the project avoided release of 27,140 tCO ₂ e in to the atmosphere during the reporting period.	Overall Prevented the release of 1,44,318 tCO ₂ e (24,816 + 38,098 + 25,507 + 28,757 + 27,140) into the atmosphere since project commissioning.

2 SAFEGUARDS

2.1 No Net Harm

The project activity does not involve any major construction activity. It primarily requires the installation of the WTGs, interfacing the generators with the State Electricity Board by setting up HT transmission lines and installation of other accessories.

The project will only bring positive impacts on environmental and socio-economic aspects as elaborated in Section 1.11. Since the project activity is a renewable wind power project so no potential negative environmental or socio-economic impacts have been identified for the project, thus the same is not applicable.

2.2 Local Stakeholder Consultation

Project Proponent had conducted local stakeholder consultation extensively during registration of the project through identification of stakeholders, invitation to them for meeting, explanation about the project in details in the meeting and resolution of comments/grievances/suggestions by the stakeholders

The process of local stakeholder consultation is continuous. During the current monitoring period, the project proponent has kept grievance register in plant site office and sought comments/grievances/suggestions from local stakeholders including local community, government agencies and NGOs. Besides, the PP has also kept provision for submitting comments/grievances/suggestions from local stakeholders through direct mail. However, no major comments/grievances/suggestions have been received from the afore mentioned stakeholders during the current monitoring period and all such minor suggestions have been take care by the PP.

Ongoing Stakeholder Consultation: During the current monitoring period, the PP has kept grievance register in plant site office seeking complaints/grievances from local community.

Outcome: During the current monitoring period, no negative comments are received from the local stakeholders. Thus, no mitigations have been applied.

2.3 AFOLU-Specific Safeguards

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

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

It is to be noted that the project activity is a greenfield project for generation of electrical energy using wind which is a renewable source of energy. Thus, this project displaces the electricity grid which is essentially fossil-fuel based.

In wind energy generation, kinetic energy of the wind is converted into mechanical energy and subsequently into electrical energy. Wind turbines capture the wind's energy with three propeller-like blades, which are mounted on a rotor, to generate electricity. The turbines sit high atop towers, taking advantage of the stronger and less turbulent wind. As the wind blows through the blades of the windmill, a pocket of low-pressure air forms on the downwind side of the blade. The low-pressure air pocket then pulls the blade towards it, causing the rotor to spin. The rotor turns the shaft that further spins the connected generator. The spinning of this generator produces the required electricity. Since power is generated from wind energy, no emissions are attributed to the project emissions and emissions due to fossil-fuel based grid has been displaced due to the project activity.

Emission reductions claimed on the net electrical energy that is supplied to grid which metered using meters (Main & Check meters) located at the electrical yard of the respective WTGs. These electrical energy meters are essentially electronic meters of accuracy class 0.2. Since these meters are not designed to measure high voltages and currents as generated in the WTG, the WTG output is connected to these meters via transformers (CT/PT) for stepping down the generated voltage and current to ranges which the meters can record. As such, these meters have a multiplying factor which when multiplied to the meter reading provides the actual amount of electricity generated. The technology providers for the project have additionally installed an LCS meter at the WTG controller. Technical details of the WTGs involved in the project activity are as below-

Parameters	Value/Information
Make	VESTAS
Model	V110
Rated Power	2000 Kw (50 Hz)
Rotor diameter	110 m
Cut in wind speed	3 m/s
Rated wind speed	11.5 m/s
Cut out wind speed	20 m/s
Operating Temperature range standard turbine	- 20° C to 40° C
No. of Blades	3
Rotor diameter	110 m
Swept area	9503 m ²
Rotor Speed	14.4 rpm
Hub Height	78 m
Generator Type	Asynchronous
Insulation	Class F

Generator Type	1 speed Generator, Water Cooled
Gear Box Type	1. Step Planet 2. Step Helical
Gear House Material	Cast
Gear Box Mechanical Power	1800 kW

The WTGs are under operation since the date of commissioning and no event or major break has been identified which may impact GHG emission reduction. The commissioning dates of all the WTGs are provided as below.

WTG Id	WTG No.	Capacity (MW)	Date of commissioning
SMR 01	VWT/2000/16-17/4030	2.0	04-February-2017
SMR 05	VWT/2000/16-17 /4031	2.0	04-February-2017
BRJ 16	VWT/2000/16-17 /4096	2.0	15-February-2017
BRJ 17	VWT/2000/16-17/4097	2.0	15-February-2017
DTR 12	VWT/2000/16-17 /4098	2.0	15-February-2017

There has been no events (e.g. major breakdown) in the current monitoring period that may impact the GHG emission reductions or removals and monitoring.

The total emission reductions achieved by this project activity for the monitoring period from 01-January-2022 to 31-December-2022 are 27,140 tCO₂e through displacing 28,643.99 MWh of electricity from fossil-fuel dominated electricity grid with electricity generation using wind energy resources.

3.2 Deviations

3.2.1 Methodology Deviations

No methodology deviation is applied during the monitoring period.

3.2.2 Project Description Deviations.

No project description deviation is applied during the monitoring period.

3.3 Grouped Projects

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

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	EF _{grid,OM,y}
Data unit	tCO ₂ /MWh
Description	Operating Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA database, Version 13, June 2018 ⁷
Value applied	0.9726
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” as 3-year generation weighted average using data for the years 2014-15, 2015-16 & 2016-17. The data are obtained from “CO ₂ Baseline Database for Indian Power Sector” version 13, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of Data	Calculation of baseline emissions
Comments	The value is fixed and it is same for the entire crediting period

Data / Parameter	EF _{grid,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 13, June 2018 ⁸
Value applied	0.8723
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” as per the latest data available for the most recent year 2016-17. The data is obtained from “CO ₂ Baseline Database for Indian Power Sector” version 13, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of Data	Calculation of baseline emissions
Comments	The value is fixed and it is same for the entire crediting period

⁷ http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver13.pdf

⁸ http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver13.pdf

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO ₂ /MWh
Description	Combined margin CO ₂ emission factor in year y
Source of data	Calculated from CEA database, Version 13, June 2018 ⁹
Value applied	0.9475
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>Where:</p> <p>$EF_{grid,BM,y}$ = Build margin CO₂ emission factor in year y (tCO₂/MWh) $EF_{grid,OM,y}$ = 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%</p>
Purpose of Data	Calculation of baseline emissions
Comments	The value is fixed and it is same for the entire crediting period

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{facility,y}$
Data unit	MWh
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 Firm issued by GEDA/SLDC
Description of measurement methods and procedures to be applied	<p>Monitoring:</p> <p>a) At WTG yard: Electrical Energy Meters which are electronic tri-vector meters of accuracy class 0.5s or above</p> <p>b) At substation: Electrical Energy Meters which are bidirectional electronic tri-vector ABT meter of accuracy class 0.2s or above</p> <p>Data type: Measured & Calculated</p> <p>Archiving: Paper & Electronic</p> <p>Responsibility:</p>

⁹ http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver13.pdf

	<p>a) At WTG yard: The O&M site-in-charge shall be responsible for the regular recording of data.</p> <p>b) At substation: The representatives of the GEDA/SLDC in the presence of O&M team are responsible for taking monthly joint meter reading at the substation.</p> <p>Calibration Frequency: The meters are calibrated at least once in five years period as per CEA notification.</p>																																							
Frequency of monitoring/recording	Continuous monitoring and monthly recording																																							
Value monitored	28,643.99																																							
Monitoring equipment	<p>Monitoring Equipment: Monitored through the main meter and check meter readings. Both the energy meters are bi-directional tri-vector meters.</p> <p>Details of energy meters are given below:</p> <p>Make: Secure</p> <p>Accuracy Class: 0.5s</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th></th> <th>Main Meter</th> <th>Check Meter</th> </tr> <tr> <th>Location</th> <th>Sr. No.</th> <th>Sr. No.</th> </tr> </thead> <tbody> <tr> <td>SMR05</td> <td>XD 550486</td> <td>XD 550501</td> </tr> <tr> <td>SMR01</td> <td>XD 550489</td> <td>XD 550504</td> </tr> <tr> <td>BRJ16</td> <td>XD 532934</td> <td>XD 532935</td> </tr> <tr> <td>BRJ17</td> <td>XD 550490</td> <td>XD 550505</td> </tr> <tr> <td>DTR12</td> <td>XD 550488</td> <td>XD 565857</td> </tr> </tbody> </table> <p>The bulk meters located at the substation:</p> <table border="1" style="margin-left: 40px;"> <tbody> <tr> <td>Meter Sr. No.</td> <td>GJU 67400</td> <td>GJU 67399</td> </tr> <tr> <td>Make:</td> <td>Secure</td> <td>Secure</td> </tr> <tr> <td>Accuracy class:</td> <td>0.2S</td> <td>0.2S</td> </tr> <tr> <td>Meter Location (Kaboladhar 66 KV Substation)</td> <td>Line - 1</td> <td>Line -2</td> </tr> <tr> <td>Date of Calibration</td> <td>19-March-2019</td> <td>19-March-2019</td> </tr> <tr> <td>Next due date</td> <td>18-March-2024</td> <td>18-March-2024</td> </tr> </tbody> </table> <p>Calibration details of energy meters have been mentioned in Appendix -1.</p>		Main Meter	Check Meter	Location	Sr. No.	Sr. No.	SMR05	XD 550486	XD 550501	SMR01	XD 550489	XD 550504	BRJ16	XD 532934	XD 532935	BRJ17	XD 550490	XD 550505	DTR12	XD 550488	XD 565857	Meter Sr. No.	GJU 67400	GJU 67399	Make:	Secure	Secure	Accuracy class:	0.2S	0.2S	Meter Location (Kaboladhar 66 KV Substation)	Line - 1	Line -2	Date of Calibration	19-March-2019	19-March-2019	Next due date	18-March-2024	18-March-2024
	Main Meter	Check Meter																																						
Location	Sr. No.	Sr. No.																																						
SMR05	XD 550486	XD 550501																																						
SMR01	XD 550489	XD 550504																																						
BRJ16	XD 532934	XD 532935																																						
BRJ17	XD 550490	XD 550505																																						
DTR12	XD 550488	XD 565857																																						
Meter Sr. No.	GJU 67400	GJU 67399																																						
Make:	Secure	Secure																																						
Accuracy class:	0.2S	0.2S																																						
Meter Location (Kaboladhar 66 KV Substation)	Line - 1	Line -2																																						
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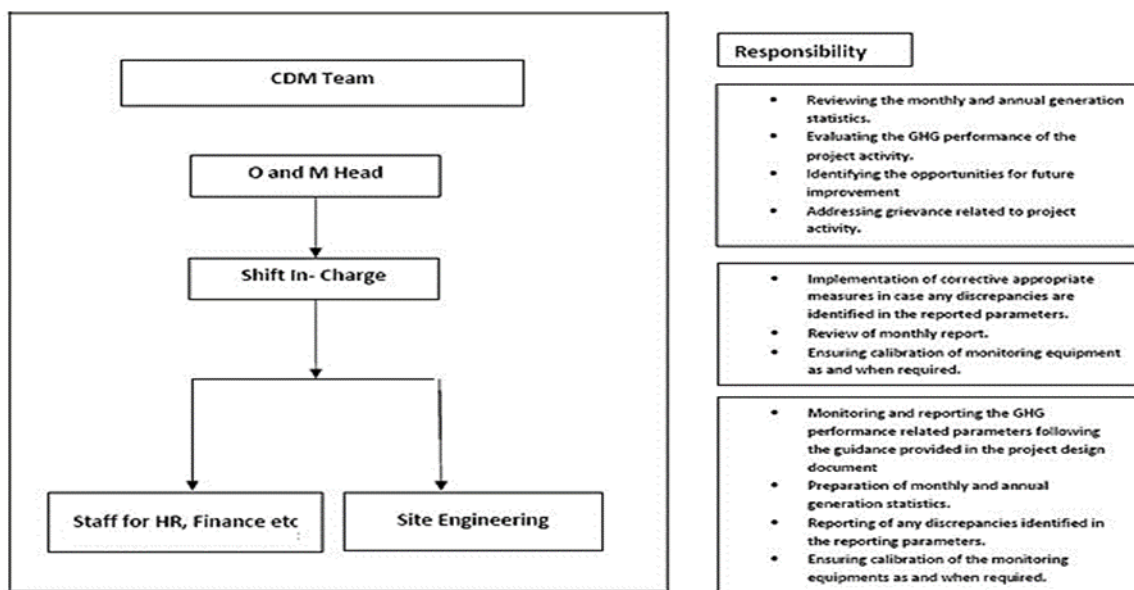
QA/QC procedures to be applied	The Quantity of net electricity generation from the monthly wind energy certificates are cross-checked with the invoices for the sale of power by Powerica Limited. Meter calibration is conducted at least once in a five years period.
Purpose of the data	Calculation of baseline emissions
Calculation method	Thus, Net electricity supplied to the grid by the project plant in a given month = Export (kWh) – Import (kWh). The share certificate mentioned only net electricity supplied to grid, hence single parameter is mentioned as monitoring parameter.
Comments	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 applied methodology, AMS ID, version 18.0 and therefore, can use the monitoring methodology for the same.

The monitoring plan is developed in accordance with the modalities and procedures for CDM project activities and is proposed for grid-connected wind energy project being implemented. The monitoring plan, which will be implemented by the project participant describes about the monitoring organization, parameters to be monitored, monitoring practices, quality assurance, quality control procedures, data storage and archiving.

The authority and responsibility for registration, monitoring, measurement, reporting and reviewing of the data rests with the project participant. PP proposed the following structure for data monitoring, collection, data archiving and calibration of equipment's for this project activity. The team comprises of the following members:



Data Measurement

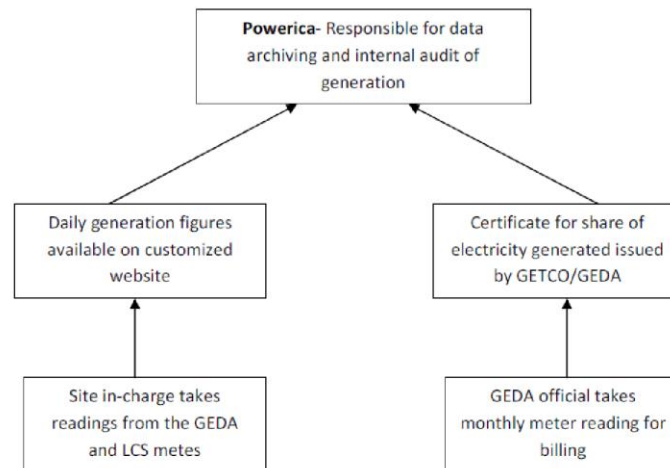
The export and import energy will be measured continuously using above mentioned Main and Check meters located at the substations. Readings of meters shall be taken on monthly basis by authorized officer of SEB in the presence of PP or representative of PP. Based on the Meter Reading Statement to PP, invoices will be raised. These invoices can be used for cross checking the meter readings taken for the respective project activity.

Data collection and archiving

Readings from meters will be collected in the presence of the plant in-charge. Export and Import data would be recorded and stored in logs as well as in electronic form on a daily basis. The records are checked periodically by the Plant Manager and discussed thoroughly with the plant supervisor. The period of storage of the monitored data will be 2 years after the end of crediting period or till the last issuance of VCU for the project activity whichever occurs later.

Personnel training

The training for operating and maintaining the plant will be provided to the O&M team whenever there would be necessity or any technological upgradation. The overall flow of information has been depicted using the following hierarchical structure:



Also, as described in the diagram above the Site In-charge is responsible for the internal periodic inspection of the project for at least once in a year. Also, corrective action for any non-conformities or discrepancies identified during the audit are to be resolved by the site In-charge.

Monitoring Process at project site

Metering of wind power is done as under:

- Joint monthly meter reading shall be taken from substation meter by representative of GEDA/SLDC and O&M team/service provider (on behalf of individual wind mill owners). Let the total generation recorded for particular month is 'X' units in sub-station meter
- Joint daily meter reading shall be taken at Local Meter-(transformer yard meter of each WTG) by representative of O&M team/service provider (on behalf of individual wind farm owners) which is approved by representative of GEDA/SLDC on a monthly basis. Let us assume total approved generation of Powerica Limited recorded for particular month is 'Y1' units.

- Similarly, joint meter reading for other wind farm owners shall also be taken. Let the generation of individual owner recorded for particular month are 'Y2, Y3,.....Yn' units.
- The GEDA/SLDC apportions 'X' to individual wind farm owners using following formula and issues monthly certificates.
- Net units calculated for billing = $X * Y_i / \sum Y_n$
- For Powerica Limited, net units calculated for billing = $X * Y_1 / \sum Y_n$
- 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

Based on the above procedure, the Monthly Wind Energy Certificates 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 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.

Emergency preparedness

The project activity will not result in any unidentified activity that can result in substantial emissions from the project activity. No need for emergency preparedness in data monitoring is visualized.

In the context of the project activity, the meters kept in sealed by GECTO and all maintenance taken up by GECTO only. In case of failure of the main meter, generation value of controller meter would be considered. The previous month's transmission loss between the main meter and controller meter would be taken into account to determine net electricity supplied to grid. There was no any such instance occurred where main meter is failed during current monitoring period. The state electricity board has removed check meters, hence only main meters are part of project activity. The monitoring process is under control of state electricity board and PP do not have any control on it.

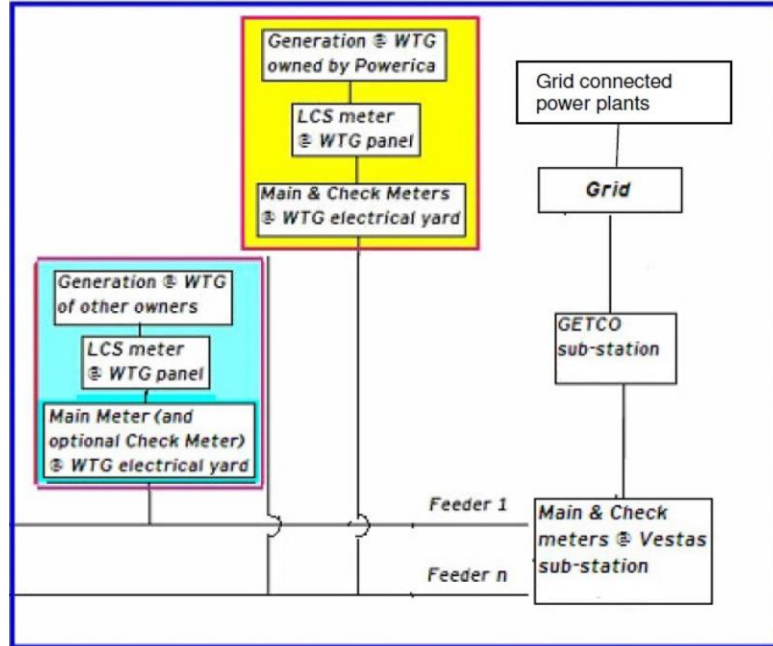
In the event that the main meter, which is used to record the net electricity exported by the project, is found to be faulty it will be repaired or replaced and the data from the check meter will be used in its place. In the unlikely event that the check meter fails it will also be repaired or replaced.

The schematic line diagram of metering point are as below where project activity uses only main meter for determination of net electricity supplied to grid

QA/QC procedures

The energy meters at the feeders are maintained and owned by state electricity board. Neither the project proponent nor the site personnel have any control over it. The records will be crosschecked with the records of sold electricity to state electricity board. The meters are calibrated by state electricity board at-least once in five years.

The schematic line diagram of metering point are as below where project activity uses only main meter for determination of net electricity supplied to grid.



The project promoters have contracted the technology supplier for providing O&M services for the power project. The service provider would be responsible for maintenance of the necessary spare parts and consumables for the maintenance of the WTGs such as anemometers, wind vanes and sensors, oil filters, batteries, auxiliary motors and pumps, WTG controllers, slip rings, limit switches and sensors, detergents & solvents etc. The service provider would also be responsible for supply of necessary main components of the WTG such as main gearboxes, blades, generators, towers, hubs, main shafts & bearings, ground and top controller and hydraulic systems. The service provider would also ensure that occupational health and safety procedures are adhered to during the operation & maintenance activities. Additionally, spare meters would also be kept available at the site for replacement in case of failure of any of the monitoring equipment.

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.

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

Where,

BE_y = Baseline Emissions (tCO₂/year)

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

$EF_{grid,CM,y}$ = Baseline Emission Factor (Combined margin CO₂ emission factor for grid)

The calculation of yearly baseline emissions is provided below:

$$28,643.99 \text{ (MWh)} \times 0.9475 \text{ (tCO}_2\text{/ MWh)} = 27,140 \text{ tCO}_2\text{e (the value is rounded down)}$$

Therefore, Baseline Emissions $BE_y = 27,140 \text{ tCO}_2\text{e}$ (round-down value)

5.2 Project Emissions

No project emissions are applicable to this wind electric power project, since 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. Not Applicable, since emissions from the project activity is zero as per applied methodology AMS-ID (version 18.0).

Hence, project emissions $PE_y = 0 \text{ tCO}_2\text{e}$

5.3 Leakage

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.

Hence leakage $LE_y = 0 \text{ tCO}_2\text{e}$.

5.4 Net GHG Emission Reductions and Removals

The net emission reductions achieved during the current monitoring period are being calculated as per below equation:

$$\begin{aligned} \text{Net Emission Reductions (ER}_y\text{)} &= BE_y - PE_y - LE_y \\ &= 27,140 - 0 - 0 = 27,140 \text{ tCO}_2\text{e (Round down)} \end{aligned}$$

Where,

ER_y = Emission Reduction in tCO₂/year

BE_y = Baseline emission in tCO₂/year

PE_y = Project emissions in tCO₂/year

LE_y = Leakage Emissions in tCO₂/year

The vintage breakup has been tabulated below.

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
01-January-2022 to 31-December-2022	27,140	0	0	27,140
Total	27,140	0	0	27,140

It is to be noted here that the estimated emission reduction to be achieved from the project activity for the current monitoring period (01-January-2022 to 31-December-2022) is 24,816 tCO₂e, whereas actual emission reductions achieved are 27,140 tCO₂e, which is 9.36% higher than the estimated emission reductions which is due to the change in the wind potential and high velocity of wind caused due to the seasonal variation in this monitoring period. The months considered for the monitoring period are April 2022 to September 2022. The higher generation is owing to fact of higher PLF is due to wind flow pattern in the project location and is beyond the control of PP. However, this higher value does not impact the additionality of the project as per Section 2.5 of the registered VCS PD, if the net generation increases by 9.36% than the estimated value.

The table below describes the justification for the percentage difference between the Ex-ante emissions and the achieved emission reductions for the monitoring period 01-January-2022 to 31-December-2022.

<u>Ex-ante emissions reductions /removals</u>	<u>Achieved emissions reductions /removals</u>	<u>Percent difference</u>	<u>Justification for the difference</u>
24,816 tCO ₂ e	27,140 tCO ₂ e	9.36 %	This is due to the change in the wind potential and high velocity of wind caused due to the seasonal variation in this monitoring period.

APPENDIX 1: 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.

Detail of the energy meters:

Make- Secure

Accuracy Class – 0.5s

Location	Main Meter Serial No.	Check Meter Serial No.	Date of calibration	Due date of Calibration
SMR 05	XD 550486	XD 550501	26-April-2021	25-April-2026
SMR 01	XD 550489	XD 550504	26-April-2021	25-April-2026
BRJ 16	XD 532934	XD 532935	26-April-2021	25-April-2026
BRJ 17	XD 550490	XD 550505	26-April-2021	25-April-2026
DTR 12	XD 550488	XD 565857	26-April-2021	25-April-2026

The bulk meters located at the substation:

Meter Sr. No.	GJU 67400	GJU 67399
Make:	Secure	Secure
Accuracy class:	0.2S	0.2S
Meter Location (Kaboladhar 66 KV Substation)	Line - 1	Line -2
Date of Calibration	19-March-2019	19-March-2019
Next due date	18-March-2024	18-March-2024

Considering five years calibration frequency as per CEA notification and pre-calibrated meters installed at time of commissioning, there is no any delay in calibration applicable for the project activity. PP does not have control on the calibration of substation meters and these are under control of state electricity board.