



Verified Carbon Standard

WIND GROUPED PROJECT BY HERO FUTURE ENERGIES PRIVATE LIMITED (EKIESL-VCS-AUG-16-03)



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 a 50 Wind Turbine Generators (WTG s) of total generating capacity of 100 MW, located Dhar district of Madhya Pradesh, India. This is a grouped project activity with Hero Future Energies Private Limited as the project proponent. In order to implement wind power projects, Hero Future Energies Private Limited acting as a parent company formed different SPV (Special Purpose Vehicles) and projects are developed by name of SPVs.

Following are the SPV's in this project:

SPV Name	Capacity (MW)	Village	District	State	Date of Commissioning
Clean Wind Power (Ratlam) Private Limited	100	Shergadh, Gandh wada, Borjhadi, Indrawal, Panda, Khiedi, Kisanpura,	Dhar	Madhya Pradesh	29-March-2016

The project activity utilizes 50 Gamesa made G97 WTGs each with capacity of 2.0 MW.

This is a Greenfield project activity and the electricity generated by this wind power project displaces an equivalent amount of electricity from the grid, which is fed mainly by fossil fuel fired power plants. Hence, it results in reduction of GHG emissions. Electricity supply from grid is considered as the baseline scenario of this project.

The total actual GHG Emission reductions generated in current monitoring period 01-April-2021 to 30-June-2022 are 271,146 tCO₂e through displacing 277,331.40 MWh of electricity from fossil-fuel dominated electricity grid with electricity generation using wind energy resources.

Audit Type	Period	Program	VVB Name	Number of years
Validation and Verification	29-March-2016 to 01-April-2017	<u>VCS</u>	<u>Carbon Check (India) Private Ltd.</u>	01 Years 00 Months 02 Days
Verification	02-April-2017 to 31-July-2020	<u>VCS</u>	<u>Applus Certification</u>	03 Years 03 Months 28 Days
Verification	01-August-2020 to 31-March-2021	<u>VCS</u>	<u>Applus Certification</u>	00 Years 07 Months 28 Days

Verification	01-April-2021 to 30-June-2022	<u>VCS</u>	<u>Applus Certification</u>	01 Years 02 Months 28 Days
Total	<u>29-March-2016 to 30-June-2022</u>	<u>VCS</u>	<u>Carbon Check (India) Private Ltd. / Applus Certification</u>	06 Years 03 Months 30 Days

1.2 Sectoral Scope and Project Type

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

Project type: Renewable energy project (Wind)

The project activity is a grouped project activity.

The project activity under consideration is a grouped project activity. The project activity instances as part of the grouped project have following parameters:

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

Project Type: I - Renewable Energy Projects

Project Category:

Each project activity instances applied only Wind technology. However, each project activity instances are large scale.

1.3 Project Proponent

Organization name	Hero Future Energies Private Limited
Contact person	Mr. Vijay Anand
Title	Assistant General Manager - HSE
Address	Unit No 89/1101A, Hemkunt Chambers, Nehru Place, Delhi, New Delhi111019
Telephone	+91 11 4335 5683
Email	vijay.anand@herofutureenergies.com

1.4 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the Project	Project Consultant
Contact person	Shital Patil
Title	Project Manager
Address	Office No 201, Plot No 48, Scheme 78, Vijay Nagar Part- II, Indore 452010, India
Telephone	+91-9109120945
Email	shital.patil@enkingint.org / registry@enkingint.org

1.5 Project Start Date

The first project activity instance of the grouped project under consideration was commissioned and power generation started on 29-March-2016. This project activity instance by Hero Future Energies Private Limited having installed capacity of 100 MW. Hence the project start date is defined as follows:

Project start date: 29-March-2016

1.6 Project Crediting Period

Project crediting period for grouped project activity is taken as 10 years renewable twice. Accordingly, the start date of the first crediting period is 29-March-2016 and end date is 28-March-2026.

Crediting period is from 29-March-2016 to 28-March-2026

1.7 Project Location

All the project activity instances in the grouped project activity located within geographical boundaries of Republic of India. Thus, geographical area of grouped project is India.

The geographical boundary is delineated in the form of extreme geographic coordinates as follows:

The geographical boundary is delineated in the form of extreme geographic coordinates of India country as follows

Latitude - 8° 4' to 37° 6' N

Longitude - 68° 7' to 97° 25' E

Project locations along with the WTG Ids are shown in below tables and figure:

Locations (geo-coordinates) of all the WTGs:

Project Company Name	WTG Id.	Geo-coordinates	
		Latitude (N)	Longitude (E)
Clean Wind Power (Ratlam) Private Limited	BD-01	22° 51' 43.9308"	75° 07' 56.6296"
	BD-02	22° 51' 38.6892"	75° 08' 06.1345"
	BD-03	22° 51' 30.2616"	75° 08' 12.1269"
	BD-04	22° 51' 24.8472"	75° 08' 27.7371"
	BD-05	22° 51' 16.4232"	75° 08' 29.8690"
	BD-06	22° 51' 07.9128"	75° 08' 17.1575"
	BD-07	22° 50' 59.1576"	75° 08' 27.2545"
	BD-08	22° 50' 51.9504"	75° 08' 13.1062"
	BD-09	22° 50' 47.4756"	75° 08' 34.3303"
	BD-10	22° 50' 42.0324"	75° 08' 48.1143"
	BD-11	22° 50' 27.9456"	75° 09' 26.5198"
	BD-12	22° 50' 21.3684"	75° 09' 34.0208"
	BD-13	22° 50' 11.9544"	75° 09' 16.2562"
	BD-14	22° 50' 11.9544"	75° 09' 16.2562"
	BD-15	22° 50' 04.2828"	75° 09' 47.9649"
	BD-16	22° 49' 47.7840"	75° 09' 25.9122"
	BD-17	22° 49' 37.4448"	75° 09' 24.2514"
	BD-18	22° 49' 19.2036"	75° 09' 20.1610"
	BD-19	22° 49' 04.2456"	75° 09' 16.2149"
	BD-20	22° 49' 26.7780"	75° 08' 10.3897"
	BD-21	22° 49' 17.8608"	75° 08' 18.5901"
	BD-22	22° 49' 17.8644"	75° 08' 17.2920"
	BD-23	22° 48' 51.5052"	75° 09' 41.8092"
	BD-24	22° 48' 04.4676"	75° 09' 20.9881"
	BD-25	22° 48' 13.3848"	75° 09' 15.0701"
	BD-26	22° 48' 20.3796"	75° 09' 47.1044"
	BD-27	22° 47' 49.6896"	75° 10' 37.9280"
	BD-28	22° 48' 26.2908"	75° 10' 23.9439"
	BD-29	22° 48' 15.7212"	75° 10' 23.4395"
	BD-30	22° 48' 07.2540"	75° 10' 03.5400"
	BD-31	22° 47' 57.8508"	75° 10' 07.5974"
	BD-32	22° 47' 37.5720"	75° 10' 26.4428"
	BD-33	22° 47' 34.2780"	75° 10' 03.7803"
	BD-34	22° 47' 23.8380"	75° 09' 32.0955"
	BD-35	22° 47' 14.7552"	75° 09' 42.5720"
	BD-36	22° 50' 38.1444"	75° 09' 40.2509"
	BD-37	22° 46' 49.4976"	75° 09' 31.8804"
	BD-38	22° 46' 49.4832"	75° 09' 45.2778"
	BD-39	22° 46' 39.1044"	75° 09' 50.3157"
	BD-40	22° 46' 27.1128"	75° 09' 41.7443"
	BD-41	22° 46' 20.1360"	75° 09' 58.1837"
	BD-42	22° 46' 16.2552"	75° 09' 37.3478"
	BD-43	22° 45' 47.7108"	75° 09' 59.0913"
	BD-44	22° 45' 37.6632"	75° 09' 25.9061"
	BD-45	22° 45' 37.6632"	75° 09' 25.9061"
	BD-46	22° 45' 37.6632"	75° 09' 25.9061"
	BD-47	22° 45' 20.2968"	75° 09' 59.0931"
	BD-48	22° 45' 09.9360"	75° 08' 37.5553"
	BD-49	22° 45' 00.0180"	75° 08' 36.8436"
	BD-50	22° 45' 03.7332"	75° 09' 36.7372"

Location of WTGs (village, taluka, district and state):

Sl No.	Project Owner	WTG id	Village	Tauka	District	State
1		BD-01	Shergadhd	Badnawar	Dhar	Madhya Pradesh

SI No.	Project Owner	WTG id	Village	Tauka	District	State
2	Clean Wind Power (Ratlam) Pvt. Ltd	BD-02	Shergadh	Badnawar	Dhar	Madhya Pradesh
3		BD-03	Shergadh	Badnawar	Dhar	Madhya Pradesh
4		BD-04	Shergadh	Badnawar	Dhar	Madhya Pradesh
5		BD-05	Shergadh	Badnawar	Dhar	Madhya Pradesh
6		BD-06	Shergadh	Badnawar	Dhar	Madhya Pradesh
7		BD-07	Shergadh	Badnawar	Dhar	Madhya Pradesh
8		BD-08	Shergadh	Badnawar	Dhar	Madhya Pradesh
9		BD-09	Shergadh	Badnawar	Dhar	Madhya Pradesh
10		BD-10	Shergadh	Badnawar	Dhar	Madhya Pradesh
11		BD-11	Shergadh	Badnawar	Dhar	Madhya Pradesh
12		BD-12	Shergadh	Badnawar	Dhar	Madhya Pradesh
13		BD-13	Shergadh	Badnawar	Dhar	Madhya Pradesh
14		BD-14	Shergadh	Badnawar	Dhar	Madhya Pradesh
15		BD-15	Gandhwada	Gandhwada	Dhar	Madhya Pradesh
16		BD-16	Shergadh	Badnawar	Dhar	Madhya Pradesh
17		BD-17	Gandhwada	Gandhwada	Dhar	Madhya Pradesh
18		BD-18	Gandhwada	Gandhwada	Dhar	Madhya Pradesh
19		BD-19	Kisanpura	Badnawar	Dhar	Madhya Pradesh
20		BD-20	Chandoriya	Begamganj	Dhar	Madhya Pradesh
21		BD-21	Chandoriya	Begamganj	Dhar	Madhya Pradesh
22		BD-22	Chandoriya	Begamganj	Dhar	Madhya Pradesh
23		BD-23	Borjhadi	Badnawar	Dhar	Madhya Pradesh
24		BD-24	Indrawal	Badnawar	Dhar	Madhya Pradesh
25		BD-25	Indrawal	Badnawar	Dhar	Madhya Pradesh
26		BD-26	Indrawal	Badnawar	Dhar	Madhya Pradesh
27		BD-27	Shergadh	Badnawar	Dhar	Madhya Pradesh
28		BD-28	Indrawal	Badnawar	Dhar	Madhya Pradesh
29		BD-29	Indrawal	Badnawar	Dhar	Madhya Pradesh
30		BD-30	Indrawal	Badnawar	Dhar	Madhya Pradesh
31		BD-31	Indrawal	Badnawar	Dhar	Madhya Pradesh
32		BD-32	Indrawal	Badnawar	Dhar	Madhya Pradesh
33		BD-33	Indrawal	Badnawar	Dhar	Madhya Pradesh
34		BD-34	Indrawal	Badnawar	Dhar	Madhya Pradesh
35		BD-35	Indrawal	Badnawar	Dhar	Madhya Pradesh
36		BD-36	Indrawal	Badnawar	Dhar	Madhya Pradesh
37		BD-37	Panda	Badnawar	Dhar	Madhya Pradesh
38		BD-38	Panda	Badnawar	Dhar	Madhya Pradesh
39		BD-39	Panda	Badnawar	Dhar	Madhya Pradesh
40		BD-40	Panda	Badnawar	Dhar	Madhya Pradesh
41		BD-41	Panda	Badnawar	Dhar	Madhya Pradesh
42		BD-42	Panda	Badnawar	Dhar	Madhya Pradesh
43		BD-43	Phuledi	Badnawar	Dhar	Madhya Pradesh
44		BD-44	Khiledi	Badnawar	Dhar	Madhya Pradesh
45		BD-45	Khiledi	Badnawar	Dhar	Madhya Pradesh

SI No.	Project Owner	WTG id	Village	Tauka	District	State
46		BD-46	Khiledi	Badnawar	Dhar	Madhya Pradesh
47		BD-47	Phuledi	Badnawar	Dhar	Madhya Pradesh
48		BD-48	Khiledi	Badnawar	Dhar	Madhya Pradesh
49		BD-49	Khiledi	Badnawar	Dhar	Madhya Pradesh
50		BD-50	Khiledi	Badnawar	Dhar	Madhya Pradesh



Figure 1. National Boundary



Figure 2. Image showing project locations

1.8 Title and Reference of Methodology

Methodology: Grid-connected electricity generation from renewable sources
 Reference: ACM0002. Version 17.0¹ EB 89, Annex 1)

¹ <https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQCOIWPGW8ED5PG>

Tools referred with above methodology are:

- Tool for the demonstration and assessment of additionality (Version 07.0.0)²
- Tool to calculate emission factor for an electricity system (Version 05.0)³

1.9 Participation under other GHG Programs

The grouped project activity is neither registered nor seeking registration in any GHG programs other than that under VERRA.

The initial project activity instances are neither registered nor seeking registration in any GHG program other than that under VERRA.

Project proponent has also provided undertaking that in order to avoid double accounting it will not claim GHG credits in any GHG program other than that in VERRA in the current monitoring period.

1.10 Other Forms of Credit

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. 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 including REC benefits for the current monitoring period.

1.11 Sustainable Development Contributions

The Contribution to sustainable development:

Ministry of Environment, Forest and Climate Change (MoEFCC), has stipulated economic, social, environment and technological well-being as the four indicators of sustainable development. The project contributes to sustainable development using the following ways.

Social well-being:

- The project activity instances under grouped project activity have resulted in creating job opportunities for the local population on temporary and permanent basis. Manpower is required both during erection and operation of the renewable energy projects. This 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:

² <http://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-01-v7.0.0.pdf>

³ <http://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v5.0.pdf>

- The project activity instances under grouped project activity have 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

Technological well-being: The successful operation of project activity has led to promotion of wind power generation and encouraged other entrepreneurs to participate in similar projects

Environmental well-being:

The project activity instances under grouped 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.

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 277,331.40 MWh renewable electricity has been supplied to Indian grid during the reported period that helps to increase the renewable energy share in the energy mix.	Overall (163,712.36 +699,886.99+111,163.40+277,331.40) 1,252,094.15 MWh renewable electricity has supplied to Indian grid throughout the project lifetime that helps to increase the renewable energy share in the energy mix.
2)	13.0	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	By supplying 277,331.40 MWh clean electricity (generated through wind project) to Indian grid, the project avoided release of 271,146 tCO _{2e} in to the atmosphere during the reporting period.	Overall prevented the release of (160,061+684,278+108,683+271,146) 1,224,168 tCO _{2e} into the atmosphere during reporting period.
3)	8.6	8.6.1 Proportion of youth (aged 15-24 years) not in education, employment or training	Implemented activities to increase	The Project organize 01 training/ year for the staff on the monitoring of the plant operation, and the emergency and safety procedures.	Overall, 02 trainings are provided during the reporting period

2 SAFEGUARDS

2.1 No Net Harm

The grouped project activity and the initial project activity instance being wind power project, it does not involve any potential negative environmental and socio-economic impacts. And hence this criterion is not applicable to this project activity.

2.2 Local Stakeholder Consultation

During the current monitoring period, the PP has kept a grievance register at project site office seeking comments/feedbacks/grievances from the stakeholders. Besides, the provision of submitting grievances through mail has also been a way of receiving feedback from local stakeholders. However, no major comments/grievances have been received through either of the ways.

Being wind renewable technology, EIA is not required for any project activity instances as per EIA notification.

For initial project activity instances being included in grouped project activity, local stakeholder consultation is not mandatory, hence this is not mentioned in VCS PD. The DOE validation contract is already signed prior to 19-April-2017.

2.3 AFOLU-Specific Safeguards

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

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The project has been completed and the monitoring equipment's 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 and connected to Khiledi-Phuledi substation.

Table 2 Technical details of Gamesa G97 WTG

Rated power	2.0 MW
Cut-out speed	25 m/s
Cut-in speed	3 m/s
Rotor diameter	97m

Swept area	7390m ²
Control	Variable pitch and speed
Generator type	Doubly-fed generator

All the 50 WTGs were commissioned on 29-March-2016.

The total actual GHG Emission reductions generated in current monitoring period 01-April-2021 to 30-June-2022 are 271,146 tCO₂e through displacing 277,331.40 MWh of electricity from fossil-fuel dominated electricity grid with electricity generation using wind energy resources.

The WTGs are under operation including scheduled shutdowns during the current monitoring period and no major breakdown/ event has been identified which may impact GHG emission reduction. The details of plant breakdowns in the current monitoring period are provided in APPENDIX 2.

3.2 Deviations

3.1.1 Methodology Deviations

No methodology deviation is applied during the monitoring period.

3.1.2 Project Description Deviations

No deviation in project description has taken place for the project activity.

3.3 Grouped Projects

No new project activity instance has been included in the grouped project activity during the current monitoring period.

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 11, April 2016
Value applied	0.9941
Justification of choice of data or description of	Calculated as per “Tool to calculate the emission factor for an electricity system, version 05.0” as 3-year generation weighted average using data for the years 2012-13, 2013-14 and 2014-15.

measurement methods and procedures applied	The data are obtained from “CO ₂ Baseline Database for Indian Power Sector” version 11, 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 11, April 2016
Value applied	0.9285
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 05.0” as 3-year generation weighted average using data for the years 2012-13, 2013-14 and 2014-15. The data are obtained from “CO ₂ Baseline Database for Indian Power Sector” version 11, 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, 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 11, April 2016
Value applied	0.9777
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 05.0.0”. The data is obtained from “CO ₂ Baseline Database for Indian Power Sector” Version 11, April 2016, 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

4.2 Data and Parameters Monitored

Data / Parameter	EG _{facility, y}
Data unit	MWh

Description	Quantity of net electricity supplied (MWh) to the grid as a result of the implementation of the project activity instances in year y									
Source of data	Credit Report /JMR as per Monthly Generation Report									
Description of measurement methods and procedures to be applied	<p>Data Type: Measured</p> <p>Monitoring equipment: Energy Meters are used for monitoring</p> <p>Recording Frequency: Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually</p> <p>Archiving Policy: Paper & Electronic</p> <p>Calibration frequency: One in five years</p> <p>Electricity exported/imported to the grid is in kWh. However for the calculation purpose electricity exported is converted in MWh.</p> <p>The Net electricity supplied to the grid by the project activity is calculated as a difference of electricity exported to the grid, electricity imported from the grid obtained from joint meter reading certificates/credit notes issued by state electricity board as per below equation:</p> $EG_{\text{facility,y}} = EG_{\text{Export}} - EG_{\text{Import}}$ <p>The joint reading at metering point is carried out once in a month in presence of O&M officials and state electricity board personnel. The calculations/measurement of net electricity supplied to grid is under purview of state electricity board and the PP/Project activity Instance owner has no role on it. PP/Project activity Instance owner received value of net electricity supplied to grid and hence this parameter is mentioned as a part of monitoring plan.</p> <p>Cross Checking: Quantity of net electricity supplied to the grid is cross checked from the invoices raised by the PP to the State Electricity Board or invoices with third party</p>									
Frequency of monitoring/recording	Continuous monitoring and monthly recording									
Value monitored	<table border="1"> <thead> <tr> <th>Year</th> <th>EG_{facility,y} (MWh)</th> </tr> </thead> <tbody> <tr> <td>2021</td> <td>167,924.20</td> </tr> <tr> <td>2022</td> <td>109,407.20</td> </tr> <tr> <td>Total</td> <td>277,331.40</td> </tr> </tbody> </table>		Year	EG _{facility,y} (MWh)	2021	167,924.20	2022	109,407.20	Total	277,331.40
Year	EG _{facility,y} (MWh)									
2021	167,924.20									
2022	109,407.20									
Total	277,331.40									
Monitoring equipment	Monitoring equipment is the energy meters installed at each of the project activity instance site. Readings are cross checked with back up meter. The accuracy class of meters, calibration frequency of meters is totally under purview of state electricity									

	board and PP do not have any control on it. Details of energy meters have been provided in APPENDIX 1.
QA/QC procedures to be applied	The calibration of all the meters is undertaken once in five years and faulty meters will be duly replaced immediately. The meters are of accuracy class 0.5s or higher. The meter accuracy class and calibration interval is under purview of state electricity board and PP/Project Activity Instances owner do not have any control on it. It is also noted that apportioning procedure (if applicable for project activity instances) is under control of state electricity board and PP do not have any control on it. The available parameter to PP/project activity instance owner is the net electricity supplied to grid and same parameter is mentioned as monitoring parameter.
Purpose of the data	Calculation of baseline emissions
Calculation method	This is a measured parameter and if any calculation is required, the calculation is based on measured parameters.
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.

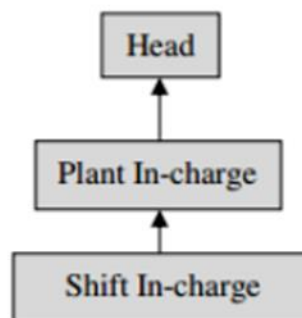
4.3 Monitoring Plan

The monitoring plan, which is implemented by the project proponent 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 on the project proponent.

Project proponent follows the structure for data monitoring, collection, data archiving and calibration of equipment for this project activity instances as given below:

The team comprises of the following members:

Organisational Structure for Monitoring



Project proponent has assigned the responsibility of operation and maintenance of project activity instances with relevant and authorized O&M contractors. The Plant In-charge and Shift In-Charge are deployed by O&M contractors.

Responsibilities of Head: Overall functioning and maintenance of the data.

Responsibilities of Plant In-charge: Responsibility for Maintaining the data records, to ensure completeness of data and reliability of data (calibration of equipment).

Responsibilities of Shift In-charge: Responsibility for day-to-day data collection and maintains day-to-day log book for monitored data.

In the event when the individual verification period dates and billing cycle dates of the project activity do not coincide, then the electricity export is apportioned based on number of days. The ratio of number of days under monitoring period and total number of days under billing cycle is multiplied to total electricity export to billing cycle.

In general wind projects do not involve common metering, however for project activity instances which involves wind projects with common metering, apportioning is followed to determine net electricity export to grid. The apportioning procedure is not under control of PP, thus value of net electricity supplied to grid is available to PP and same is mentioned as monitoring parameter. The value of net electricity supplied to grid is used for ER calculations. It is to be noted that the metering arrangement, accuracy class of meters, feeder arrangements, calibration frequency of meters are under control of state electricity board and PP do not have any control on it. Thus, any deviation at actual site or during verification is accepted.

QA & QC Procedures to be followed

Necessary check meters as required are installed, to operate in standby mode or when the main meters are not working. All meters are calibrated at least once in five year as per CEA notification. Records of calibration certificates are maintained for verification. Hence, high quality is ensured with the above parameters. The calibration of meters is under purview of state electricity board and CME/ project activity instances owner do not have any control on it.

Data Recording and Storage

For measuring the net energy supplied to grid by the project activity instances at the interconnection point, one set of Main meter and Check Meter is provided. Representatives of both project activity instances owner and state utility are present to record the monthly meter readings. The state utility prepares the credit report for the net energy supplied to the grid and same is used as a basic document for monitoring and verification of the net energy supplied to the grid. Based on the monthly credit report, the project activity instances owner raises an invoice to the utility. Utility pays to the project activity instances Owner based on this document.

The above document is kept at safe storage for verification of emission reductions generated from the project activity. The period of data storage is 2 years beyond crediting period.

Emergency preparedness

The project activity does not result in any unidentified activity that can result in substantial emissions from the project activity. However, in case monitoring equipment get failed or found faulty, these are replaced with calibrated meters as quickly as possible. In case main meter get failed or found faulty, the reading of check meter will be considered.

Personnel training

In order to ensure a proper functioning of the project activity instances and a properly monitoring of emission reductions, the staff are trained. The Shift In-charge and Plant In-charge are trained in equipment operation, data recording, operation and maintenance and emergency procedures in compliance with the monitoring plan.

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 is 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 is used for readings.

Procedures for internal audit of compliance with monitoring procedures

- An internal audit team comprising of the VCS Head, Shift In-charge, and other members (if needed by the VCS Head) are independently conduct internal audit of monitored data. The internal audit is conducted at least once every year and more than once if required by the VCS Head.
- The internal audit team is reviewing all the records pertaining to energy generation, exports, imports. The team is also checking the monitoring equipment's for accuracy and whether calibration was performed.
- The VCS Head in association with the Shift – in – charge is answering all the queries raised by the internal audit team
- The internal audit team has communicated to the VCS Head and Shift-in-charge(s) about the non-compliances (if any) with the monitoring plan. The internal audit team are also suggesting corrective actions and indicate areas of improvement to the personnel involved in monitoring the data.
- VCS Head is close the non-conformances prior to the verification visit by the DOE.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

The baseline emission calculation for the project activity instances is attributable to the CO₂ Emission that could have been produced by the fossil fuel based power plants in absence of the proposed project activity. Therefore the amount electricity supplied to the Indian grid has been multiplied by the grid emission factor of Indian grid to calculate the baseline emissions reduced by the proposed project activity.

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

Where,

BE_y = Baseline Emissions (tCO₂/year)

$EG_{\text{facility}, y}$ = Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)

$EF_{\text{grid}, CM, y}$ = CO₂ emission factor of the grid in year y (tCO₂/MWh)

The calculation of yearly baseline emissions is provided in the table below:

Year	Net Electricity Export(MWh)	Baseline Emission Factor(tCO ₂ /MWh)	Baseline Emissions(tCO ₂)
2021	167,924.20	0.9777	164,179
2022	109,407.20	0.9777	106,967
Total	277,331.40		271,146

Hence the baseline emission calculated for the reported monitoring period is 271,146 tCO₂ i.e. $BE_y = 271,146$ tCO₂e (round down value)

5.2 Project Emissions

As per methodology, for renewable energy projects, there is no project emissions occurred. Hence, $PE_y = 0$ tCO₂e

5.3 Leakage

As per methodology ACM0002, Version 17.0, no Leakage emissions are considered. The main emission potentially giving rise to leakage in the context of electrical sector projects is emission arising due to activities arising such as power plant construction and upstream emission from fossil fuel use (e.g. extraction, processing, and transport). These emission sources are neglected.

As per methodology, for renewable energy projects, there is no any leakage emissions occurred. Hence, $LE_y = 0$

5.4 Net GHG Emission Reductions and Removals

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

$$ER_y = BE_y - PE_y$$

Where,

ER_y = Emission Reduction in tCO₂/year

BE_y = Baseline emission in tCO₂/year

PE_y = Project emissions in tCO₂/year

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

$$BE_y = 271,146 \text{ tCO}_2$$

$$PE_y = 0 \text{ tCO}_2$$

$$LE_y = 0 \text{ tCO}_2$$

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)
01-April-2021 to 31-December-2021	164,179	0	0	164,179
01-January-2022 to 30-June-2022	106,967	0	0	106,967
Total	271,146	0	0	271,146

The actual VER is about 26.70 % higher than the estimated VER. This variation is majorly due to the variations in wind flow pattern, grid availability and other parameters which are not in the control of PP.

However, this higher value does not impact the additionality of the project – as per Section 2.5 of the registered VCS Joint PD & MR, if the PLF (20.0%) increases by 65.30% than the assumed

value, the project IRR breaches the benchmark; but in this case, the actual PLF exceeds value by about 26.7 % so the project IRR does not breach the benchmark and it does not have any impact on project additionality.

Period	<u>Ex-ante emissions reductions /removals</u>	<u>Achieved emissions reductions /removals</u>	<u>Percent difference</u>	<u>Justification for the difference</u>
01-April-2021 to 31-December-2021	129,056	164,179	27.22 %	This variation is majorly due to the variations in wind flow pattern, grid availability and other parameters which are not in the control of PP. However, this higher value does not impact the additionality of the project – as per Section 2.5 of the registered VCS Joint PD & MR, if the PLF (20.0%) increases by 65.30% than the assumed value, the project IRR breaches the benchmark; but in this case, the actual PLF exceeds value by about 27.22 % so the project IRR does not breach the benchmark and it does not have any impact on project additionality.
01-January-2022 to 30-June-2022	84,942	106,967	25.93 %	This variation is majorly due to the variations in wind flow pattern, grid availability and other parameters which are not in the control of PP. However, this higher value does not impact the additionality of the project – as per Section 2.5 of the registered VCS Joint PD & MR, if the PLF (20.0%) increases by 65.30% than the assumed value, the project IRR breaches the benchmark; but in this case, the actual PLF exceeds value by about 25.93 % so the project IRR does not breach the benchmark and it does not have any impact on project additionality.

APPENDIX 1: METER CALIBRATION DETAILS

Meter Details	Main meter	Check meter
Meter serial number	MPC74061	MPC74060
Meter make	Secure	Secure
Accuracy class	0.2s	0.2s
Calibration date	13-March-2016	13-March-2016
Due date of calibration	12-March-2021	12-March-2021
Calibration date	03-January-2020	03-December-2019
Due date of calibration	02-January-2025	02-December-2024

APPENDIX 2 : BREAKDOWN DETAILS

Site Name	SPV NAME	WTG	Stop Date	Start Date
Badnawar	CWP Ratlam Pvt. Ltd	BD47	02-June-2022	06-August-2022