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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Project Title	Wind Grouped project by Hero Future Energies Private Limited (EKIESL-VCS-Aug-16-03)
Version	02
Report ID	1582
Date of Issue	17-October-2020
Project ID	1582
Monitoring Period	02-April-2017 to 31-July-2020 (inclusive of both start and end dates)
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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, Gandhwada, 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 of 02-April-2017 to 31-July-2020 are 684,278 tCO_2e through displacing 699,886.99 MWh of electricity from fossil-fuel dominated electricity grid with electricity generation using wind energy resources.

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 not a grouped project

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

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

Project Type: I - Renewable Energy Projects

Project Category:

Each project activity instances will apply only Wind technology. However each project activity instances will be 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	Mr. Souvik Mitra
Title	Project Manager
Address	Office No 201, Plot No 48, Scheme 78, Vijay Nagar Part- II, Indore 452010, India
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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 will be 28-March-2026.

First 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 would be 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

Please refer below web link for the range of co-ordinates

https://en.wikipedia.org/wiki/Geography_of_India

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)	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”

Private Limited	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	Shergadh	Badnawar	Dhar	Madhya Pradesh
2		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	Clean Wind Power (Ratlam) Pvt. Ltd	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
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 17.0[1] EB 89, Annex 1)
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] https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQC0PIWPGWDN8ED5PG

[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

1.9 Participation under other GHG Programs

The grouped project activity has not been registered and is not seeking registration at moment under any other GHG programs.

The initial project activity instances are neither registered nor seeking registration in any other GHG program.
PP 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

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 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 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 would encourage 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.

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.

2.2 Local Stakeholder Consultation

Project Proponent had invited different local stakeholders, duly identified to a meeting to explain the project and to know the comments/feedbacks/grievances from them during the registration of the grouped project.

Local stakeholder consultation is a continuous process. 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.

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 equipments were installed to monitor the parameters as described in the registered Project Description (PD). All the WTGs involved in the project activity are already commissioned and operational.

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 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

3.2.1 Methodology Deviations

No methodology deviation is applied during the monitoring period.

3.2.2 Project Description Deviations

No deviation is 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 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.
k 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

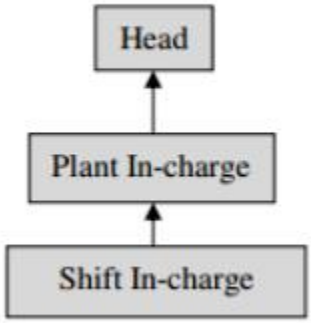
Data / Parameter	$EG_{facility,y}$
Data unit	MWh
Description	Quantity of net electricity supplied (MWh) to the grid as a result of the implementation of the project activity instances in year y
Source of data	Credit Report /JMR as per Monthly Generation Report
Description of measurement methods and procedures to be applied	Data Type: Measured Monitoring equipment: Energy Meters are used for monitoring Recording Frequency: Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually Archiving Policy: Paper & Electronic Calibration frequency: One in five years Electricity exported/imported to the grid is in kWh. However for the calculation purpose electricity exported is converted in MWh. 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: $EG_{facility,y} = EG_{Export} – EG_{Import}$ 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 will get value of net electricity supplied to grid and hence this parameter is mentioned as a part of monitoring plan. 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

Frequency of monitoring/recording	Continuous monitoring and monthly recording
Value monitored	699,886.99
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 PP 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 results with the PP. PP proposed the following structure for data monitoring, collection, data archiving and calibration of equipment for this project activity instances. The team comprises of the following members:

Organisational Structure for Monitoring



PP 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 would be deployed by O&M contractors.

Responsibilities of Head: Overall functioning and maintenance of the data.
Responsibilities of Plant In-charge: Responsibility for Maintains the data records, ensures 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 will be apportioned based on number of days. The ratio of number of days under monitoring period and total number of days under billing cycle will multiplied to total electricity export to billing cycle.

In general wind projects does not involve common metering, however for project activity instances which involves wind projects with common metering, apportioning will be 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 would be installed, to operate in standby mode or when the main meters are not working. All meters will be calibrated at least once in five year as per CEA notification. Records of calibration certificates will be 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 shall be provided. Representatives of both project activity instances Owner and State Utility will be present to record the monthly meter readings. The state utility will prepare the credit report for the net energy supplied to the grid and same will be 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 shall raise an invoice to the utility. Utility will pay to the project activity instances Owner based on this document.

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

Emergency preparedness
The project activity will 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, they shall be 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 will be trained. The Shift In-charge and Plant In-charge will be trained in equipment operation, data recording, operation and maintenance and emergency procedures in compliance with the monitoring plant.

Emergency preparedness:
In case Main meter or Check meter is found to be outside the acceptable limits of accuracy or faulty or not functioning properly, it will be repaired, recalibrated or replaced as soon as possible. In the event that the Main meter is not in service as a result of maintenance, repairs or testing, the Check meter will be used for readings.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

The baseline emission calculation for the project activity instances is attributable to the CO_2 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 will be multiplied by the grid emission factor of Indian grid to calculate the baseline emissions reduced by the proposed project activity.

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

Where,

BE_y = Baseline Emissions (tCO_2/year)

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

$EF_{grid, CM, y}$ = CO_2 emission factor of the grid in year y (tCO_2/MWh)

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

Year	Net Electricity Export(MWh)	Baseline Emission Factor(tCO2/MWh)	Baseline Emissions(tCO_2)
2017	160,874.53	0.9777	157,287
2018	204,357.26	0.9777	199,800
2019	210,666.80	0.9777	205,968
2020	123,988.40	0.9777	121,223
Total	**699,886.99**		**684,278**

Hence the baseline emission calculated for the reported monitoring period is 684,277 tCO_2 i.e. BE_y = 684,278 tCO_2e

5.2 Project Emissions

As per methodology, for renewable energy projects, there is no project emissions occurred. Hence, PE_y= 0 tCO_2e

5.3 Leakage

As per methodology ACM0002, Version 17, 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 tCO_2/year

BE_y = Baseline emission in tCO_2/year

PE_y = Project emissions in tCO_2/year

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

BE_y = 684,278 tCO_2

PE_y = 0 tCO_2

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
2017	157,287	0	0	157,287
2018	199,800	0	0	199,800
2019	205,968	0	0	205,968
2020	121,223	0	0	121,223
Total	684,278	0	0	684,278

The actual VER is about 19.8 % 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 19.8% so the project IRR does not breach the benchmark and it does not have any impact on project additionality.

APPENDIX 1: ENERGY METER CALIBRATION DETAILS

Main Meter Details		Check Meter Details		Initial Meter Calibration Date	Due date of Calibration
Make	Secure	**Make**	Secure	13-March-2016	13-March-2021
Meter Serial No.	MPC74061	**Meter Serial No.**	MPC74060		
Accuracy class	0.2s	**Accuracy class**	0.2s		

APPENDIX 2: BREAKDOWN DETAILS

Date	Feeder No.	Shutdown or Trip	From	To	Duration (Hours)	Reason
18-Jul-17	220 KV	EHV Trip	16:05	16:53	0:48	220KV LINE TRIPPED
02-Sep-17	220 KV	EHV Trip	21:29	23:24	1:55	220 Kv Line zone-1 trip due to Y-ph earth fault
12-Sep-17	220 KV	EHV Trip	14:56	15:40	0:44	220 Kv Line zone-1 trip due to R-ph earth fault
20-Nov-17	220 KV	External S/D	15:30	18:48	3:18	SHUTDOWN TAKEN BY VEPL FOR ANNUAL TESTING IN 220 Kv line
21-Nov-17	220 KV	External S/D	12:38	18:44	6:06	SHUTDOWN TAKEN BY VEPL FOR ANNUAL TESTING IN 220 Kv line
23-Nov-17	220 KV	External S/D	12:46	18:49	6:03	SHUTDOWN TAKEN BY VEPL FOR ANNUAL TESTING IN 220 Kv line
01-Feb-18	220 KV	Internal S/D	13:07	14:42	1:35	220KV Line-01 Shutdown taken by 'M/s.ABB for Civil work at Transformer fire Wall
23-Jul-18	220 KV	Internal S/D	12:44	15:01	2:17	220KV Line-01 Shutdown taken by 'M/s.HFE to install PMU Meter.
11-Oct-18	220 KV	EHV Trip	11:09	11:48	0:39	220kV Line 'Fault at Rajgargh Zone-01
05-Dec-18	220 KV	External S/D	9:27	17:50	8:23	SHUTDOWN TAKEN BY VEPL FOR ANNUAL TESTING IN 220 Kv line
07-Dec-18	220 KV	External S/D	11:21	17:49	6:28	SHUTDOWN TAKEN BY VEPL FOR ANNUAL TESTING IN 220 Kv line
08-Dec-18	220 KV	External S/D	11:12	17:19	6:07	SHUTDOWN TAKEN BY VEPL FOR ANNUAL TESTING IN 220 Kv line
02-Jan-20	220 KV	External S/D	8:36	17:26	8:50	SHUTDOWN TAKEN BY VEPL FOR ANNUAL TESTING IN 220 Kv line
03-Jan-20	220 KV	External S/D	9:01	18:08	9:07	SHUTDOWN TAKEN BY VEPL FOR ANNUAL TESTING IN 220 Kv line
04-Jan-20	220 KV	External S/D	10:59	18:28	7:29	SHUTDOWN TAKEN BY VEPL FOR ANNUAL TESTING IN 220 Kv line
10-Jun-20	220 KV	EHV Trip	16:45	17:07	0:22	220KV LINE TRIPPED