



**Verified Carbon
Standard**

WIND ENERGY PROJECT IN HARAPANAHALLI, KARNATAKA



Document Prepared by CLP Wind Farms (India) Private Limited

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

CLP Wind Farms (India) Private Limited (CLPWFPL) has implemented a wind power project of capacity 39.6 MW comprising of 24 number of Wind Turbine Generators (WTGs), each with rated capacity of 1650 kW. The project area is spread across 4 villages - Harakanalu, Arsanahalu, Hyarada, Dasanahalli which are part of Harapanahalli Taluk of Davangere District in the State of Karnataka. The electricity generated from the Project activity is sold to the local electricity distribution company in the state.

The Project activity is a new facility (Greenfield) and it utilises wind energy to generate electricity and supply it to distribution licensee which is a part of the Southern Grid of India now integral part of Integrated Indian Grid. In the absence of Project activity, quantity of the electricity that would be delivered by the Project activity to the Southern grid would be sourced from the existing grid-connected power plants and future capacity additions to meet the growing electricity requirements. Hence, generation mix of Southern grid is considered as the baseline scenario.

The first WTG under this project was commissioned on 21-January-2011 and has been under operation since then except for regular shutdowns considering O&M requirements. A comprehensive list of WTGs commissioning dates in section 1.7.

The total GHG emission reductions or removals generated in this monitoring period, i.e. 02- February-2020 to 20-January-2021 (inclusive both days) is 75,873 tCO₂.

1.2 Sectoral Scope and Project Type

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

Project Type : I, Renewable energy project

Methodology :ACM0002 - Consolidated baseline methodology for grid-connected electricity generation from renewable sources (Version 12.3.0)

ACM0002 draws upon the following tools which have been used in the project:

- Tool to calculate the emission factor for an electricity system – Version 02
- Tool for the demonstration and assessment of additionality – Version 6.0.0

The project is not a grouped project.

1.3 Project Proponent

Organization name	CLP Wind Farms (India) Private Limited
Contact person	Sandip Saha
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Email	Sandip.saha@clpindia.in

1.4 Other Entities Involved in the Project

Organization name	NA
Role in the Project	NA
Contact person	NA
Title	NA
Address	NA
Telephone	NA
Email	NA

1.5 Project Start Date

The project start date for this project is 21-January-2011. This is the day on which the first WTG was commissioned under the Project activity.

1.6 Project Crediting Period

Project has begun generating GHG emission reductions from 21-January-2011. Hence, crediting period for VCS begins on 21-January-2011 and ends on 20-January-2021 i.e. 10 years crediting period which can be renewed for maximum 2 times.

1.7 Project Location

The project activity is located at Karnataka State of India. The project is implemented in Villages Harakanalu, Arsanahalu, Hyarada, Dasanahalli of Taluka Harapanahalli in District Davangere of Karnataka State in India. The geo- coordinates and commissioning date of WTG under the project activity are provided below:

Serial No	WTG ID	Commissioning date	Latitude	Longitude
1	H 28	21-January-2011	14°50' 00.1" N	75°48' 46.3" E
2	H 29	21-January-2011	14°50' 17.2" N	75°48' 37.5" E
3	H 30	21-January-2011	14°50' 26.2" N	75°48' 44.1" E
4	H 31	21-January-2011	14°50' 37.6" N	75°48' 37.3" E
5	H 32	21-January-2011	14°50' 42.2" N	75°48' 22.1" E
6	H 33	21-January-2011	14°50' 50.3" N	75°48' 17.2" E
7	H 34	21-January-2011	14°50' 47.4" N	75°48' 35.7" E
8	H 35	21-January-2011	14°51' 00.5" N	75°48' 33.2" E
9	H 15	25-February-2011	14°48' 20.5" N	75°50' 36.5" E
10	H 16	25-February-2011	14°48' 31.6" N	75°50' 25.8" E
11	H 17	25-February-2011	14°48' 42.6" N	75°50' 21.2" E
12	H 18	25-February-2011	14°48' 50.1" N	75°50' 24.4" E
13	H 19	25-February-2011	14°48' 36.9" N	75°49' 47.5" E
14	H 20	25-February-2011	14°48' 47.8" N	75°49' 43.2" E
15	H 21	25-February-2011	14°49' 07.4" N	75°49' 42.0" E
16	H 22	25-February-2011	14°49' 16.4" N	75°49' 46.1" E
17	H 23	25-February-2011	14°49' 24.1" N	75°49' 42.5" E
18	H 24	25-February-2011	14°49' 19.3" N	75°49' 22.7" E
19	H 25	25-February-2011	14°49' 37.0" N	75°49' 14.7" E
20	H 26	25-February-2011	14°49' 50.4" N	75°49' 12.6" E
21	H 27	25-February-2011	14°49' 43.7" N	75°48' 50.4" E
22	H 36	25-February-2011	14°51' 13.9" N	75°48' 08.0" E
23	H 37	25-February-2011	14°51' 24.7" N	75°47' 59.6" E
24	H 38	25-February-2011	14°51' 33.0" N	75°47' 54.5" E

1.8 Title and Reference of Methodology

The methodology applied for the project is ACM0002 of version 12.3.0 titled "Grid-connected electricity generation from renewable sources" ACM0002 draws upon the following tools which have been used in the VCS PD:

- Tool to calculate the emission factor for an electricity system (Version 02.2.1)
- Tool to calculate the emission factor for an electricity system (Version 06)

- c. Tool for demonstration and assessment of additionality (Version 6.0.0)

1.9 Participation under other GHG Programs

The project has participated as CDM projects titled “Wind Energy Project in Harapanahalli, Karnataka” and UNFCCC No: 6390. The project link is: <http://cdm.unfccc.int/Projects/DB/LRQA%20Ltd1339417262.04/view>

However, CLPWFPL has not claimed any CERs from the CDM project activity from project registration to till date. CLPWFPL has claimed the carbon credits from only one GHG programme during a monitoring period which would ensure that there will be no double counting of emission reductions.

1.10 Other Forms of Credit

- Emission Trading Programs and Other Binding Limits: The project has not participated in any Emissions Trading Programs. The emission reductions generated for this duration of periodic verification would not be claimed under any other GHG programs
- Other Forms of Environmental Credit: The project proponent hereby confirms that the project has not sought or received any other GHG related environmental credit except CDM and submitted a declaration to DoE that CLPWFPL wouldn't claim any form of environmental credit except VCU for the said duration

1.11 Sustainable Development

The National CDM Authority (NCDNA) which is the Designated National Authority (DNA) for the Government of India (GoI) in the Ministry of Environment and Forests (MoEF) has stipulated four indicators for sustainable development in the interim approval guidelines for Clean Development Mechanism (CDM) projects from India¹. The contribution of this project activity towards in terms of these four indicators is provided below:

1. Social Well Being:

- The project activity has led to the development of supporting infrastructure such as road network etc., in the wind park location, which also provides access to the local population.
- The project activity leads to alleviation of poverty by establishing direct and indirect benefits through employment generation and improved economic activities by strengthening of local grid of the state electricity utility.
- Use of a renewable source of energy reduces the dependence on imported fossil fuels and associated price variation thereby leading increased energy security.

2. Environmental Well Being:

¹ http://cdmindia.nic.in/host_approval_criteria.htm

- The project activity involves use of renewable energy source for electricity generation instead of fossil fuel based electricity generation which would have emitted gaseous, liquid and/or solid effluents/wastes.
- Being a renewable resource, using wind energy to generate electricity contributes to resource conservation. Thus, the project causes no negative impact on the surrounding environment contributing to environmental well-being.

3. **Economic Well Being:**

- The project activity requires temporary and permanent, skilled and semi-skilled manpower at the wind park; thus, project activity has created additional employment opportunities.
- The generated electricity is being fed into the Western regional grid through local grid, thereby improving the grid frequency and availability of electricity to the local consumers (villagers & sub-urban habitants) which has provided new opportunities for industries and economic activities to be setup in the area thereby resulting in greater local employment, ultimately leading to overall development.

4. **Technological Well Being:**

- The Project activity has utilized gearless synchronous generator based Vestas WTGs for generation, which are designed for conditions specific to India. Thus, the project activity is propagating the latest technology, which is comparable with best practices in the renewable wind based energy sector anywhere in the world. Hence the project leads to technological well-being.

The project activity is generating electricity through a technology that is environmentally safe and sound.

2 SAFEGUARDS

2.1 No Net Harm

In line with Ministry of Environment Forest and Climate Change, Govt. of India, Environmental Impact Assessment (EIA) is not mandatory for wind energy project. However, as per CLP's internal governance system, EIA is mandatory for all projects. Thus, EIA has been conducted before project installation and found that this project does not have any negative environmental and socio-economic impacts. Thus, this is not applicable for this project activity.

2.2 Local Stakeholder Consultation

The local stakeholder meetings were carried out in each sites of the project activity and the details of the same can be referred from the registered VCS PD. As a part of continuous feedback from stakeholders, along with the 3rd party O&M contractor, CLP has also

appointed independent Asset Managers at every site. These assets managers are responsible for site supervision and continuous day-to-day interaction with the local stakeholders e.g. local villagers, local govt. authorities and others. Based on the local requirements, CLP has initiated several CSR/sustainable development activities in the project catchment area. Further, CLP has also placed a grievance register onsite where-in, the stakeholders can put down their request/complaint/requirements. Same is continuously monitored and appropriate action are also being taken by management. Furthermore, CLP has also placed a notice board on site to communicate any necessary information/updates to local stakeholders. CLP has found this two-way communication with local stakeholders is very effective towards sustainability of the project in long run. Since this is the 6th periodic verification of the project activity, hence, local stakeholders' consultation details are not applicable in this project activity.

2.3 AFOLU-Specific Safeguards

This section is not applicable for this project activity as the project is not a AFOLU project

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The Project Activity envisages implementation of a 39.6 MW wind power project consisting of 24 Wind Turbine Generators (WTGs) of individual capacity 1.65 MW in Karnataka state of India by CLP Wind Farms (India) Private Limited. Entire project has been commissioned and commissioning dates are provided in section 1.7.

The project has been under operation since commissioning without any major breakdowns. Though normal breakdowns due to O&M measures are continuously being worked upon by the dedicated O&M contractor for the project's WTGs. There have been no events that may have an impact on the GHG emissions or removals during the current monitoring period.

Further, there are no changes to the project participant for the project activity during the monitoring period.

3.2 Deviations

2.3.1 Methodology Deviations

There are no deviations related to methodology.

2.3.2 Project Description Deviations

No project deviation has been considered in this verification period. However, following two deviations have been considered in previous periodic verifications for this project activity:

- 1) In this project scenario, the Haraknal sub-station monitors only 24 WTGs which are belongs the CLPWFPL only. Thus, the energy exported and imported monitored by Hara-1 energy meter represent the energy exported and imported by the entire project activity only and invoice has been raised considering the meter reading monitored by Hara-1 energy meter. Thus, CLPWFPL has considered this deviation – ‘to use only Hara -1 main and check meter for monitoring of energy exported or imported by Project activity’ - in registered monitoring plan of the project, until new capacity addition takes place at this site.
- 2) According to the registered PD, proposed calibration frequency was once three months and state regulatory body is responsible to conduct the calibration in stipulated frequency. However, as the calibration of energy meters is beyond the control of CLPWFPL and there are instances when state regulatory body has not performed the calibration checks within the due date of the next calibration. Thus, CLPWFPL has considered this deviation to – ‘calibrate main and check meters once in six months instead of once in three months’.

Following deviation has been considered in current periodic verification:

During registration, calibration frequency has been considered once in three months. However, state utility conducted the accuracy check of all interface meters once in six months for last few years. Thus, a deviation has also considered in previous verification. Further, now state utility is following the accuracy check frequency of all interface meters once in five years in line with para 18.1.b of the notification dated 17/03/2006 published by Central Electricity Board, Govt. of India (www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf). These meters also tested whenever the energy and other quantities recorded by the meter are abnormal or inconsistent with electrically adjacent meters. Testing and calibration has been done by state utility which is beyond the control of Project Participant. Thus, CLPWFPL has considered this deviation to – ‘calibrate main and check meters once in five years instead of once in six months’.

The above mentioned deviations do not impact the applicability of the methodology, additionality or the appropriateness of the baseline scenario, and the project remains in compliance with the applied methodology i.e. ACM0002 version 12.3.0.

3.3 Grouped Projects

The project is not a grouped project.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	W_{OM}
Data unit	%
Description	Weightage of operating margin emissions factor
Source of data	"Tool to calculate the emission factor for an electricity system" (Version 2)
Value applied	0.75
Justification of choice of data or description of measurement methods and procedures applied	Default values used as per the "Tool to calculate the emission factor for an electricity system" Version 2
Purpose of Data	Baseline Emission calculation
Comments	-

Data / Parameter	W_{BM}
Data unit	%
Description	Weightage of build margin emissions factor
Source of data	"Tool to calculate the emission factor for an electricity system" (Version 2)
Value applied	0.25
Justification of choice of data or description of measurement methods and procedures applied	Default values used as per the "Tool to calculate the emission factor for an electricity system" Version 2
Purpose of Data	Baseline Emission calculation
Comments	-

4.2 Data and Parameters Monitored

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO ₂ /MWh
Description	Combined CO ₂ emission factor of Southern Grid

Source of data	Central Electricity Authority: CO ₂ Emission Database CEA CO ₂ Baseline database Version 15.0 ²	
Description of measurement methods and procedures to be applied	Calculated as per “Tool to calculate the emission factor for an electricity system, version 07”. The data are obtained from “CO ₂ Baseline Database for Indian Power Sector” version 15.0 published by the Central Electricity Authority, Ministry of Power, Government of India.	
Frequency of monitoring/recording	Annually	
Value monitored	Operating margin CO ₂ emission factor (tCO ₂ /MWh)	0.9622
	Build margin CO ₂ emission factor (tCO ₂ /MWh)	0.8811
	Weighted Average (tCO ₂ /MWh)	= 0.9622* 0.75 + 0.8811 *0.25 = 0.9419
Monitoring equipment	Not applicable	
QA/QC procedures to be applied	The data are obtained from “CO ₂ Baseline Database for Indian Power Sector” version 15.0, published by the Central Electricity Authority, Ministry of Power, Government of India.	
Purpose of the data	Calculation of Baseline emissions	
Calculation method	Calculated as per “Tool to calculate the emission factor for an electricity system, version 07”	
Comments	The data will be archived both in electronic and paper format for crediting period + 2 years.	

Data / Parameter	EF _{grid,OM,y}
Data unit	tCO ₂ /MWh
Description	Operating margin CO ₂ emission factor of Southern Grid
Source of data	Central Electricity Authority: CO ₂ Emission Database CEA CO ₂ Baseline database Version 15.0
Description of	Calculated as per “Tool to calculate the emission factor for an

² <http://cea.nic.in/tpeandce.html>

measurement methods and procedures to be applied	electricity system, version 07". The data are obtained from "CO2 Baseline Database for Indian Power Sector" version 15.0, published by the Central Electricity Authority, Ministry of Power, Government of India.			
Frequency of monitoring/recording	Annually			
Value monitored		2016-17	2017-18	2018-19
	Net Generation in Operating Margin (GWh)	9,16,278	9,60,693	9,95,957
	Simple Operating Margin (tCO ₂ /MWh)	0.96363	0.95434	0.96853
	Wt. Average (tCO ₂ /MWh)	0.9622		
Monitoring equipment	Not applicable			
QA/QC procedures to be applied	The data are obtained from "CO2 Baseline Database for Indian Power Sector" version 15.0, published by the Central Electricity Authority, Ministry of Power, Government of India.			
Purpose of the data	Calculation of Baseline emissions			
Calculation method	Calculated as per "Tool to calculate the emission factor for an electricity system, version 07"			
Comments	The data will be archived both in electronic and paper format for crediting period + 2 years.			

Data / Parameter	EF _{grid,BM,y}
Data unit	tCO ₂ /MWh
Description	Build margin CO2 emission factor of Southern grid
Source of data	Central Electricity Authority: CO2 Emission Database CEA CO ₂ Baseline database Version 15.0
Description of measurement methods and procedures to be applied	Calculated as per "Tool to calculate the emission factor for an electricity system, version 07". The data are obtained from "CO ₂ Baseline Database for Indian Power Sector" 15.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Frequency of monitoring/recording	Annually
Value monitored	0.8811

Monitoring equipment	Not applicable
QA/QC procedures to be applied	The data are obtained from “CO ₂ Baseline Database for Indian Power Sector” version 15.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of the data	Calculation of Baseline emissions
Calculation method	Calculated as per “Tool to calculate the emission factor for an electricity system, version 07”
Comments	The data will be archived both in electronic and paper format for crediting period + 2 years.

Data / Parameter	EG _{facility,y}									
Data unit	MWh/year									
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y									
Source of data	Form-B of Karnataka Power Transmission Corporation Limited (KPTCL)									
``Description of measurement methods and procedures to be applied	These values were monitored through the main meter readings at two outgoing feeders Archiving: Paper/Electronic Responsibility: The plant management was responsible for the regular recording of data. This parameter accounts for the project imports and export, hence showing the net (export – import) electricity supplied to the grid.									
Frequency of monitoring/recording	Continuous monitoring and monthly recording									
Value monitored	<table><tr><th>Vintage Period</th><th>Net Electricity Export (MWh)</th></tr><tr><td>2020 (02-Feb-20 to 01-Jan-21)</td><td>76,235.00</td></tr><tr><td>2021 (02-Jan-21 to 20-Jan-21)</td><td>4,316.13</td></tr><tr><td>Total</td><td>80,551.13</td></tr></table>		Vintage Period	Net Electricity Export (MWh)	2020 (02-Feb-20 to 01-Jan-21)	76,235.00	2021 (02-Jan-21 to 20-Jan-21)	4,316.13	Total	80,551.13
Vintage Period	Net Electricity Export (MWh)									
2020 (02-Feb-20 to 01-Jan-21)	76,235.00									
2021 (02-Jan-21 to 20-Jan-21)	4,316.13									
Total	80,551.13									
Monitoring equipment	The main and check meters have been calibrated and maintained by BESCOM as per their own schedule and this frequency of meter calibration is not within the control of the Project Proponent. Accuracy class of Main meter and Check meter: 0.2 Frequency of testing: Once in five years									

QA/QC procedures to be applied	Cross check measurement results with records for sold electricity (Invoices raised by CLPWFIPPL)
Purpose of the data	Baseline Emissions calculations
Calculation method	The net electricity generated by the project is calculated as the difference between export and import values as recorded at the metering points.
Comments	The data will be archived both in electronic and paper format for crediting period + 2 years.

4.3 Monitoring Plan

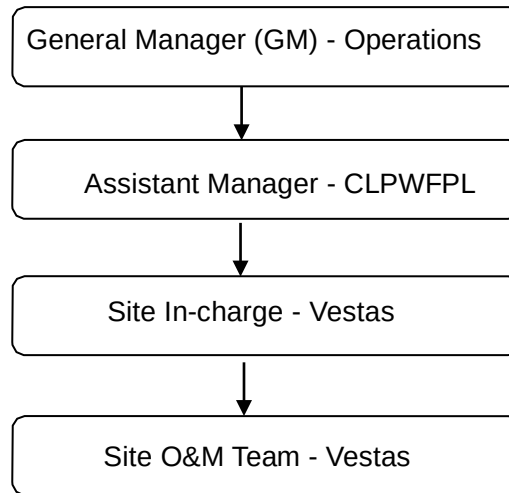
Vestas Wind Technology India Private Limited is the O&M contractor for the project activity. O&M contractor is responsible for the maintaining all the monitoring data on behalf of state utility in respect of the project activity.

The Monitoring and Verification procedures define a project specific standard against which the project's performance (i.e. GHG emissions) and compliance with all relevant criteria will be monitored and verified. It includes developing suitable data collection methods and techniques for data interpretation, for monitoring and verifying GHG emissions with specific focus on technical/efficiency/performance parameters. It also allows scope for review, scrutiny and benchmarking against established norms for monitoring and verification.

The Monitoring & Verification protocol provides a range of data estimation, measurement and collection options and techniques, in each case indicating preferred options consistent with good practice to allow Asset Manager, Site In-charge and the Site O&M team to apply the most practical and cost-effective measurement approaches to the proposed project activity. The aim is to enable this project to have clear, credible and accurate monitoring, evaluation and verification procedures.

The operation and management structure implemented by the project proponent for the purpose of the project activity is illustrated below:

s



In present project activity, the electricity being generated by 24 wind turbines is monitored at the dedicated Haraknal substation located at Harapanahalli. In the substation, there are two meters namely- Main Meter and Check Meter (static type Trivector meter, Accuracy class: 0.2).

Every month BESCOM Official visits the substation in the presence of O&M team of wind turbine supplier (Vestas) and the main meter reading is taken jointly and recorded by BESCOM. The said meter readings are reported by the Field Officer to the concerned distribution circle who in turn informs to the consumption circle, which is authorized to prepare the Bill and give the credit for the energy generated by the wind turbines.

Currently the Haraknal sub-station handles only 24 WTGs which are owned by CLPWFPL. The meter readings are taken at the sub-station every 24 hours. A 33 kV reference meter is also present which is generally used by KPTCL for comparison. Since the capacity of the wind farm is higher, there is a possibility of more machines (WTGs) being installed and hence the bulk meter may have (in future) more machines connected to it. If this scenario occurs, the following apportioning mechanism will be used:

Apportioning Mechanism

The net electricity recorded at the substation is apportioned to individual WTGs based on the generation at the WTG as per the formula given below:

Electricity exported by WTG to Grid, $EG_{exp,y} = (\% \text{ generation of individual WTG connected to feeder}) \times (\text{Electricity Export recorded at substation}),$

Where,

$\% \text{ generation of individual WTG connected to feeder} = (\text{Controller reading @ Individual WTG}) / (\text{Sum of Controller reading of all WTGs connected on feeder})$

Similarly, electricity imported by the WTG from the grid, $EG_{imp,y} = (\% \text{ generation of individual WTG connected to feeder}) \times (\text{Electricity Import recorded at substation})$

$$EG_{facility,y} = EG_{exp,y} - EG_{imp,y}$$

Emergency Preparedness

In case of Main meter failure or errors, the grid officials would immediately replace the meter with a calibrated meter. There will be two meters provided at the pooling station: a Main Meter and a Check Meter.

Specific Calculation Procedure (For the time period during start and end of each crediting period): For the time period during start and end of each crediting period, the following apportioning formula would be used to estimate the electricity generation for calculating emission reductions:

X = No. of days between start/end date of crediting period and date of BESCO's billing cycle

Y = Total no. of days in a particular month for which Form B reading has been taken

Z = No. of units as per Form B for that particular month

$$\text{Electricity Generation} = (X/Y) * Z$$

OR alternatively the daily readings taken by the technology supplier at the site will be referred for calculating the generation for X days.

Meter Test Checking:

All the main and check meters shall be tested for accuracy once in every five years with reference to a portable standard meter which shall be of an accuracy class of 0.1. The portable standard meter shall be owned by the BESCO at its own cost and expense and tested and certified at least once every year against an accepted laboratory standard meter in accordance with electricity standards. The meters shall be deemed to be working satisfactorily if the errors are within specifications for meters of 0.2 accuracy class. The consumption registered by the main meters alone will hold good for the purpose of billing as long as the error in the main meter is within the permissible limits.

- i) If during the tests, the main meter is found to be within the permissible limit of error and the corresponding check meter is beyond the permissible limits, then billing will be as per the main meter as usual. The check meter shall however, be calibrated immediately.

- ii) If during the tests, the main meter is found to be beyond permissible limits of error, but the corresponding check meter is found to be within permissible limits of error, then the billing for the month up to the date and time of such test shall be as per the check meter. There will be a revision in the bills for the period from the previous calibration test up to the current test based on the readings of the check meter. The main meter shall be calibrated immediately and billing for the period thereafter till the next monthly meter reading shall be as per the calibrated main meter.
- iii) If the during tests, both main meters and the corresponding check meters are found to be beyond the permissible limits of error, both the meters shall be immediately calibrated and the correction applied to the reading registered by the main meter to arrive at the correct reading of energy supplied for billing purposes for the period from the last month's meter reading up to the current test. Billing for the period thereafter till the next monthly meter reading shall be as per the calibrated main meter.
- iv) If during any of the monthly meter readings, the variation between the main meter and the check meter is more than that permissible for meters of 0.2% accuracy class, all the meters shall re-tested and calibrated immediately.

The O&M 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.

Calibration Details of billing meters for the project activity are provided in the Appendix 1.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

As per para 38 of ACM0002 version 12.3.0, Baseline emissions include only CO₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due

to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

$$BE_y = EGP_{J,y} * F_{grid,CM,y}$$

Where

BE_y = Baseline emissions in year y (tCO₂)

$EGP_{J,y}$ = 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)

$EF_{grid,CM,y}$ = Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (tCO₂/MWh)

Baseline Emissions

As per the equation 6 of the methodology ACM0002 (Version 12.3.0),

$$BE_y = EGP_{J,y} * EF_{grid,CM,y} \quad (1)$$

Where:

BE_y : Baseline emissions in year y (tCO₂e/yr)

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

$EF_{grid,CM,y}$: Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (tCO₂e/MWh)

Thus, $BE_y = EGP_{J,y} * EF_{grid,CM,y}$

Duration ³			Break-up of Energy		Net Electricity Export (MWh)
			Electricity Export (kWh)	Electricity Import (kWh)	
02-Feb-2020	To	01-Mar-2020	4,500,000.00	30,000.00	4,470.00

³ There are no double accounting of emission reduction despite of end date of previous month is the start date of consequent month. The reason for the same is that meter reading is taken at a particular time of the day (i.e. 12:00 noon). For example, generation for the period 01/04/2020 to 01/05/2020 would denote reading till that time of 01/05/2020. These dates are also reflected in the Joint Meter Reading prepared by State Utility based on which ER calculation is done. Hence, it is clear that there would not be any double accounting of emission reduction.

Duration ³			Break-up of Energy		Net Electricity Export (MWh)
			Electricity Export (kWh)	Electricity Import (kWh)	
01-Mar-2020	To	01-Apr-2020	2,835,000.00	60,000.00	2,775.00
01-Apr-2020	To	01-May-2020	3,575,000.00	45,000.00	3,530.00
01-May-2020	To	01-Jun-2020	5,830,000.00	35,000.00	5,795.00
01-Jun-2020	To	01-Jul-2020	11,115,000.00	15,000.00	11,100.00
01-Jul-2020	To	01-Aug-2020	8,830,000.00	20,000.00	8,810.00
01-Aug-2020	To	01-Sep-2020	13,410,000.00	5,000.00	13,405.00
01-Sep-2020	To	01-Oct-2020	6,025,000.00	25,000.00	6,000.00
01-Oct-2020	To	01-Nov-2020	3,700,000.00	50,000.00	3,650.00
01-Nov-2020	To	01-Dec-2020	7,435,000.00	5,000.00	7,430.00
01-Dec-2020	To	01-Jan-2021	9,280,000.00	10,000.00	9,270.00
01-Jan-2021	To	20-Jan-2021 ⁴	4,325,806.45	9,677.42	4,316.13
Total			80,860,806.45	309,677.42	80,551.13

Baseline Emission (BE_y):

Vintage Period	Net Electricity Export (MWh)	Emission Factor ⁵ (tCO ₂ /MWh)	Baseline Emissions (tCO ₂) ⁶
2020 (02-Feb-20 to 01-Jan-21)	76,235.00	0.9419	71,808.00
2021 (02-Jan-21 to 20-Jan-21)	4,316.13	0.9419	4,065.00
Total	80,551.13		75,873.00

5.2 Project Emissions

The project activity involves harnessing of wind energy and its conversion to electricity. Hence according to ACM0002 Version 12.3.0, there will be no project emissions in the project activity PE_y = 0

5.3 Leakage

As per ACM0002 Version 12.3.0, no leakage has been considered for the calculation of emission factor.

⁴ Due to end of crediting period, monitoring period restricted to 20-Jan-21

⁵ Emission Factors considered financial year basis, as mentioned in respective CEA database (CEA CO₂ Database, ver 15.0)

⁶ After rounding down

5.4 Net GHG Emission Reductions and Removals

According to the approved methodology ACM0002 (Version 12.3.0) Emission Reductions are calculated as

$$ER_y = BE_y - PE_y$$

Thus,

$$\begin{aligned} ER_y &= 75,873 - 0 \text{ tCO}_2\text{e} \\ &= 75,873 \text{ tCO}_2\text{e} \end{aligned}$$

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)
2020 (02-Feb-20 to 01-Jan-21)	71,808.00	0.00	0.00	71,808.00
2021 (02-Jan-21 to 20-Jan-21)	4,065.00	0.00	0.00	4,065.00
Total	75,873.00	0.00	0.00	75,873.00

The actual emission reductions for the current monitoring period are 7.41% higher than estimated emission reductions which are mainly due to below two conditions:

- **Change in Emission factor**

During project registration combined margin emission factor was considered as 0.8970 tCO₂/MWh and during this verification period combined margin emission factor for grid was 0.9419 tCO₂/MWh.

- **Better wind availability at site**

Wind availability is a natural phenomenon which is beyond the control of CLP. Further, higher generation was already considered during validation in the sensitivity analysis and breakeven point due to higher generation is 39.9%. Thus, project is still additional considering higher PLF.

APPENDIX 1: CALIBRATION DETAILS

Calibration details of the relevant monitoring point in the project activity are as follows:-

Meter Identification No	Calibration Date	Calibration Validity
1) Main Meter: RR No: HARA-01; Sr. No: 11068937 Make - L & T Class - 0.2s	12/11/2019	11/11/2024
2) Check Meter RR No: HARA-01; Sr. No: 11068943 Make - L & T Class - 0.2s		