



**Verified Carbon
Standard**

WIND POWER PROJECT IN MAHARASHTRA, INDIA – ANDHRA LAKE PHASE - II



Document Prepared by CLP Wind Farms (India) Private Limited

Project Title	Wind power project in Maharashtra, India – Andhra Lake Phase - II
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Monitoring Period	01-Jun-2017 to 31-Jan-2020 (both days inclusive)
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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

CLP Wind Farms (India) Private Limited (CLPWF) has developed a green-field wind based electricity generation project at Andhra Lake, Pune District, in the State of Maharashtra. The project activity involves installation of 63 number of Wind World (India) Limited (formerly known as Enercon (India) Limited (EIL)) make E-53 Wind Turbine Generators (WTGs) to generate electrical power for export to the distribution licensee. Wind World (India) Limited (WWIL) is the equipment supplier and the operations and maintenance contractor for the Project. The Project is owned by CLP Wind Farms (India) Private Limited and WWIL is responsible for operation and maintenance of the wind farm.

Total capacity of the project is 50.4 MW. In the baseline scenario, the similar quantum of electricity would have been generated by the operation of grid- connected power plants and by the addition of new generation sources that would have led to emission of Green House Gases (GHGs).

The first WEG under this project has started commissioning since 19-Aug-2011 and has been under operation since then except for regular shutdowns considering O&M requirements. A comprehensive list of WEGs commissioning dates are provided under section 1.7. The expected operational lifetime of the project is for 20 years.

During this monitoring period the project activity has exported 298,258.68 MWh of net energy to the NEWNE Grid of India. The total emission reductions achieved during the monitoring period from 01-Jun-2017 to 31-Jan-2020 (both days inclusive) is 282,956 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 02.2.1

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
Title	Deputy Manager – Carbon & Sustainability
Address	7 th Floor, FULCRUM, Sahar Road, Andheri (East), Mumbai – 400 099. India
Telephone	+ 91 22 6758 8888
Email	carbon@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 start date for this project is 19-Aug-2011. This is the day on which the first WEG was commissioned under the Project activity.

1.6 Project Crediting Period

Project has begun generating GHG emission reductions from 19-Aug-2011. Hence, crediting period for VCS begins on 19-Aug-2011 and ends on 18-Aug-2021 i.e. 10 years crediting period which can be renewed for maximum 2 times.

1.7 Project Location

The Project activity is located in the Khed and Maval taluk of Pune district in Maharashtra. The nearest airport and railway station is in Pune city. The coordinates of individual WEGs of this site are as below:

Sr. No.	Location No.	Date of WEC commissioning	Latitude (N)			Longitude (E)		
			Deg.	Minutes	Second	Deg.	Minutes	Second
1	19	07-Jan-12	18	51	3.1	73	38	32
2	20	07-Jan-12	18	51	12.8	73	38	32.3
3	21	07-Jan-12	18	51	17.5	73	38	29.6
4	22	07-Jan-12	18	51	23	73	38	33.7
5	23	07-Jan-12	18	51	22.8	73	38	22.5
6	24	07-Jan-12	18	51	29	73	38	22.3
7	25	07-Jan-12	18	51	33.6	73	38	22
8	26	07-Jan-12	18	51	41.4	73	38	28.7
9	27	07-Jan-12	18	51	45.9	73	38	27.7
10	28	07-Jan-12	18	51	53.6	73	38	30.6
11	29	07-Jan-12	18	51	59.9	73	38	24.9
12	30	07-Jan-12	18	52	5.1	73	38	21.9
13	31	07-Jan-12	18	52	7.8	73	38	20.3
14	32	07-Jan-12	18	52	15.6	73	38	18.2
15	33	07-Jan-12	18	52	20.8	73	38	16.9
16	34	07-Jan-12	18	52	25.6	73	38	14.5
17	35	09-Feb-12	18	52	32.7	73	38	10.9
18	36	09-Feb-12	18	52	33.6	73	38	1.3
19	96	19-Aug-11	18	58	1.3	73	31	58.1
20	97	19-Aug-11	18	58	7.4	73	31	55.6
21	107	07-Jan-12	18	59	39.2	73	35	7.4
22	108	07-Jan-12	18	59	29	73	35	13.5
23	109	07-Jan-12	18	59	24.1	73	35	17
24	110	07-Jan-12	18	59	20.1	73	35	21.7
25	111	07-Jan-12	18	59	14.1	73	35	25.9
26	112	07-Jan-12	18	59	10.8	73	35	29.5
27	113	07-Jan-12	18	59	7.9	73	35	33.4
28	115	07-Jan-12	18	59	1.5	73	35	47.3
29	116	07-Jan-12	18	58	57.8	73	35	53
30	117	07-Jan-12	18	58	51.7	73	36	1.2

Sr. No.	Location No.	Date of WEC commissioning	Latitude (N)			Longitude (E)		
			Deg.	Minutes	Second	Deg.	Minutes	Second
31	118	07-Jan-12	18	58	47.8	73	36	4.2
32	119	07-Jan-12	18	58	43	73	36	8.1
33	120	07-Jan-12	18	58	37.9	73	36	10
34	121	07-Jan-12	18	58	34.2	73	36	13.9
35	122	07-Jan-12	18	58	29	73	36	19.1
36	123	09-Feb-12	18	58	25.6	73	36	21.7
37	124	09-Feb-12	18	58	21.6	73	36	26.8
38	190	13-Feb-12	18	48	24	73	33	38.2
39	191	13-Feb-12	18	48	28.9	73	33	36.1
40	193	13-Feb-12	18	48	40.6	73	33	42.7
41	194	13-Feb-12	18	48	47.5	73	33	46.3
42	195	13-Feb-12	18	48	48	73	33	35.5
43	196	13-Feb-12	18	48	54.2	73	33	34.1
44	197	13-Feb-12	18	48	58.5	73	33	31.1
45	198	13-Feb-12	18	49	4.1	73	33	30.6
46	199	22-Mar-12	18	49	8	73	33	27.4
47	200	22-Mar-12	18	49	12.9	73	33	26.3
48	201	03-Mar-12	18	49	17.8	73	33	27.2
49	202	22-Mar-12	18	49	24.1	73	33	26.8
50	203	22-Mar-12	18	49	29.2	73	33	24.9
51	204	03-Mar-12	18	49	31.5	73	33	16.4
52	205	03-Mar-12	18	49	36.5	73	33	14.4
53	206	03-Mar-12	18	49	41.8	73	33	16.2
54	207	03-Mar-12	18	49	48.1	73	33	16.8
55	208	03-Mar-12	18	49	52.8	73	33	16.1
56	209	03-Mar-12	18	49	58.3	73	33	16.4
57	210	22-Mar-12	18	50	4	73	33	14.1
58	211	22-Mar-12	18	50	6.4	73	33	9.2
59	212	22-Mar-12	18	50	9.9	73	33	4.4
60	213	22-Mar-12	18	50	14.7	73	32	58.2
61	214	22-Mar-12	18	50	20.2	73	32	52.8

Sr. No.	Location No.	Date of WEC commissioning	Latitude (N)			Longitude (E)		
			Deg.	Minutes	Second	Deg.	Minutes	Second
62	500	07-Jan-12	18	50	54.4	73	38	29.4
63	511	12-Dec-11	18	59	33.3	73	35	10.3

The Location no. 190, 191, 193-198, 200, 201, 199 are connected to feeder 1, Location no. 202, 203, 204-209, 210-214 are connected to feeder 2, Location no. 19-34, 35, 36, 500 are connected to feeder 3, Location no. 107-113, 115-124, 511 are connected to feeder 5 and Location no. 96-97 are connected to feeder 8.

1.8 Title and Reference of Methodology

The methodology applied for the project is ACM0002 of version 12.3.0 titled “Consolidated Baseline Methodology for grid connected electricity generation from renewable sources”. It has been referred from the list of approved methodologies for CDM project activities on the UNFCCC CDM website (<http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html>).

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

- Version 06.0.0 (EB 65, Annex 21, 25th November 2011) of the “Tool for the demonstration and assessment of additionality”; and
- Version 02.2.1 (EB 63, Annex 19, 29th September 2011) of the “Tool to calculate the emission factor for an electricity system”
- Guidance on assessment of investment analysis (Annex 05, EB 62)

1.9 Participation under other GHG Programs

The Project is a CDM registered Project activity and its CDM details are as follows”

Project Title: Wind power project in Maharashtra, India – Andhra Lake Phase - II

CDM Registration Number: 7491

Crediting Period Start Date: 30-Sept-2013

Emission Reduction Claimed Till Date: No claim made till date

Further, the net GHG Emission reductions or removals generated by the project activity will not be used for compliance with an emission trading program or to meet binding limits on GHG Emissions.

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 CLPWFIPPL 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:**

- 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.

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

4. Technological Well Being:

- The Project activity has utilized gearless synchronous generator based WWIL make E-53 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

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

Since this is the third 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

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

Andhra Lake Ph-II envisages implementation of a 50.4 MW wind power project consisting of 63 Wind Electric Generators (WEGs) of individual capacity 0.8 MW by CLP Wind Farms (India) Private Limited. Total capacity of 50.4 MW has been commissioned. The first WEG under this project has commissioned on 19-Aug-2011 and last WEG has been commissioned on 03-Mar-2012. Thus, the project is now operation to its full operational capacity of 50.4 MW. A comprehensive list of WEGs commissioning dates are provided under section 1.7.

The project activity has been implemented as per the description in the registered VCS PD. The Project is owned by CLP Wind Farms (India) Private Limited and WWIL is responsible for operation and maintenance of the wind farm. 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 projects WEGs. There has 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

There are no deviations related to Project Description.

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	EF _{OM,y}
Data unit	tCO ₂ /MWh
Description	Operating Margin emission factor for NEWNE grid
Source of data	Referred from CO ₂ Baseline Database for the Indian Power Sector prepared by Central Electricity Authority, Version 6.0.
Value applied	0.9942
Justification of choice of data or description of measurement methods and procedures applied	Data is taken as per the methodology, guidelines and tools mentioned in section 1.8 of this monitoring report
Purpose of Data	Baseline Emission calculation
Comments	Operating margin emission factor is fixed ex-ante throughout the crediting period.

Data / Parameter	EF _{BM, y}
Data unit	tCO ₂ /MWh
Description	Build Margin emission factor for NEWNE grid
Source of data	Referred from CO ₂ Baseline Database for the Indian Power

	Sector prepared by Central Electricity Authority, Version 6.0.
Value applied	0.8123
Justification of choice of data or description of measurement methods and procedures applied	Data is taken as per the methodology, guidelines and tools mentioned in section 1.8 of this monitoring report
Purpose of Data	Baseline Emission calculation
Comments	Build margin emission factor is fixed ex-ante throughout the crediting period.

Data / Parameter	EF _{grid, CM, y}
Data unit	tCO ₂ /MWh
Description	Combined Margin CO2 emission factor for NEWNE grid
Source of data	Data is taken as per the methodology, guidelines and tools mentioned in section 1.8 of this monitoring report.
Value applied	0.9487 tCO ₂ /MWh
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per CEA sourced data with 3 years vintage data and option of ex ante calculation based on 75% of OM and 25% of BM values approach. Computed once during PDD finalization.
Purpose of Data	Baseline Emission calculation
Comments	Build margin emission factor is fixed ex-ante throughout the crediting period.

4.2 Data and Parameters Monitored

Data / Parameter	EG _{export,y}
Data unit	MWh/yr
Description	Quantity of electricity exported by the Project to the grid in year y
Source of data	Joint Meter Reading Sheets and generation reports issued by Maharashtra State Electricity Distribution Co. Ltd. (MSEDCL) for all the feeders to which WTGs of the project activity are connected. EG _{export,y} is the summation of readings of individual Joint Meter Reading Sheets
Description of measurement methods and procedures to be applied	CLPWF has duly installed the approved ABT meters with accuracy class of 0.2s with online metering features at the metering point (Main Meter). CLPWF has also installed Check meter with separate CT/PT of class 0.2s. Quantity of electricity exported by the Project to the

	grid has been calculated using the sum of readings taken at the main/check meter installed at the interconnection points. Data monitoring is being taking place at the substation on a continuous basis and recorded on at least monthly basis. On the basis of these readings taken, a generation report has also been issued by MSEDCL												
Frequency of monitoring/recording	Monthly												
Value monitored	<table> <tr> <th>Vintage</th><th>Quantity of electricity exported by the Project to the grid in year y (MWh)</th></tr> <tr> <td>2017 (01/06/2017 to 31/12/2017)</td><td>73,457.21</td></tr> <tr> <td>2018 (01/01/2018 to 31/12/2018)</td><td>115,396.63</td></tr> <tr> <td>2019 (01/01/2019 to 31/12/2019)</td><td>105,266.57</td></tr> <tr> <td>2020 (01/01/2020 to 31/01/2020)</td><td>4,289.29</td></tr> <tr> <td>Total</td><td>298,409.70</td></tr> </table>	Vintage	Quantity of electricity exported by the Project to the grid in year y (MWh)	2017 (01/06/2017 to 31/12/2017)	73,457.21	2018 (01/01/2018 to 31/12/2018)	115,396.63	2019 (01/01/2019 to 31/12/2019)	105,266.57	2020 (01/01/2020 to 31/01/2020)	4,289.29	Total	298,409.70
Vintage	Quantity of electricity exported by the Project to the grid in year y (MWh)												
2017 (01/06/2017 to 31/12/2017)	73,457.21												
2018 (01/01/2018 to 31/12/2018)	115,396.63												
2019 (01/01/2019 to 31/12/2019)	105,266.57												
2020 (01/01/2020 to 31/01/2020)	4,289.29												
Total	298,409.70												
Monitoring equipment	CLPWF has duly installed the approved ABT meters with accuracy class of 0.2s with online metering features at the metering point (Main Meter). CLPWF has also installed Check meter with separate CT/PT of class 0.2s. Quantity of electricity exported by the Project to the grid has been calculated using the sum of readings taken at the main/check meter installed at the interconnection points. Data monitoring is being taking place at the substation on a continuous basis and recorded on at least monthly basis. On the basis of these readings taken, a generation report has also been issued by MSEDCL. For Type, Accuracy Class, Serial numbers of energy meters kindly refer Annexure 01.												
QA/QC procedures to be applied	The readings from main and check meters installed at the interconnection point have been checked every month at the time of metering of electricity generation. In case the meters are found to be operating beyond the permissible limits, it shall be immediately sent for calibration. The frequency of meter testing is once in 5 years. It would be prudent to note that the meter testing and calibration is not within the control of the Project Proponent.												
Purpose of the data	Baseline Emissions calculation												
Calculation method	Measured Value												
Comments	The data will be kept for two years after the end of the crediting period or the last issuance of VERs for this Project activity, whichever occurs later.												

Data / Parameter	EG _{import,y}												
Data unit	MWh/yr												
Description	Quantity of electricity imported by the Project from the grid in year y												
Source of data	Joint Meter Reading Sheets and generation reports issued by Maharashtra State Electricity Distribution Co. Ltd. (MSEDCL) for all the feeders to which WTGs of the project activity are connected. EG _{import,y} is the summation of readings of individual Joint Meter Reading Sheets.												
Description of measurement methods and procedures to be applied	Quantity of electricity imported by the Project to the grid is calculated using the sum of readings taken at the main/check meter installed at the interconnection points. Data monitoring has been done at the substation on continuous basis and recorded on at least a monthly basis. On the basis of these readings taken, a generation report is issued by MSEDCL.												
Frequency of monitoring/recording	Monthly												
Value monitored	<table border="1"> <thead> <tr> <th>Vintage</th><th>Quantity of electricity imported by the Project to the grid in year y (MWh)</th></tr> </thead> <tbody> <tr> <td>2017 (01/06/2017 to 31/12/2017)</td><td>34.26</td></tr> <tr> <td>2018 (01/01/2018 to 31/12/2018)</td><td>49.88</td></tr> <tr> <td>2019 (01/01/2019 to 31/12/2019)</td><td>59.50</td></tr> <tr> <td>2020 (01/01/2020 to 31/01/2020)</td><td>7.38</td></tr> <tr> <td>Total</td><td>151.02</td></tr> </tbody> </table>	Vintage	Quantity of electricity imported by the Project to the grid in year y (MWh)	2017 (01/06/2017 to 31/12/2017)	34.26	2018 (01/01/2018 to 31/12/2018)	49.88	2019 (01/01/2019 to 31/12/2019)	59.50	2020 (01/01/2020 to 31/01/2020)	7.38	Total	151.02
Vintage	Quantity of electricity imported by the Project to the grid in year y (MWh)												
2017 (01/06/2017 to 31/12/2017)	34.26												
2018 (01/01/2018 to 31/12/2018)	49.88												
2019 (01/01/2019 to 31/12/2019)	59.50												
2020 (01/01/2020 to 31/01/2020)	7.38												
Total	151.02												
Monitoring equipment	CLPWF has duly installed the approved ABT meters with accuracy class of 0.2s with online metering features at the metering point (Main Meter). CLPWF has also installed Check meter with separate CT/PT of class 0.2s. Quantity of electricity imported by the Project to the grid has been calculated using the sum of readings taken at the main/check meter installed at the interconnection points. Data monitoring is being taking place at the substation on a continuous basis and recorded on at least monthly basis. On the basis of these readings taken, a generation report has also been issued by MSEDCL. For Type, Accuracy Class, Serial numbers of energy meters kindly refer Annexure 01.												
QA/QC procedures to be applied	The readings from main and check meters installed at the interconnection point have been checked every month at the time of metering of electricity generation. In case the meters are found to												

	be operating beyond the permissible limits, it shall be immediately sent for calibration. The frequency of meter testing is once in 5 years. It would be prudent to note that the meter testing and calibration is not within the control of the Project Proponent.
Purpose of the data	Baseline Emissions calculation
Calculation method	Measured Value
Comments	The data will be kept for two years after the end of the crediting period or the last issuance of VERs for this Project activity, whichever occurs later.

Data / Parameter	EG _{facility,y}												
Data unit	MWh/yr												
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y												
Source of data	Joint Meter Reading Sheets and generation reports issued by Maharashtra State Electricity Distribution Co. Ltd. (MSEDCL) for all the feeders to which WTGs of the project activity are connected.												
Description of measurement methods and procedures to be applied	Net electricity supplied by the project is calculated as the difference of electricity exported to and imported from the grid measure using the readings taken at the main/check meter installed at the interconnection point. $EG_{\text{facility},y} = EG_{\text{export},y} - EG_{\text{import},y}$ Joint Meter Reading Sheets and generation report issued by Maharashtra State Electricity Distribution Co. Ltd. (MSEDCL) on a monthly basis is used for this purpose.												
Frequency of monitoring/recording	Monthly												
Value monitored	<table border="1"> <thead> <tr> <th>Vintage</th><th>Quantity of net electricity exported by the Project to the grid in year y (MWh)</th></tr> </thead> <tbody> <tr> <td>2017 (01/06/2017 to 31/12/2017)</td><td>73,422.95</td></tr> <tr> <td>2018 (01/01/2018 to 31/12/2018)</td><td>115,346.75</td></tr> <tr> <td>2019 (01/01/2019 to 31/12/2019)</td><td>105,207.07</td></tr> <tr> <td>2020 (01/01/2020 to 31/01/2020)</td><td>4,281.91</td></tr> <tr> <td>Total</td><td>298,258.68</td></tr> </tbody> </table>	Vintage	Quantity of net electricity exported by the Project to the grid in year y (MWh)	2017 (01/06/2017 to 31/12/2017)	73,422.95	2018 (01/01/2018 to 31/12/2018)	115,346.75	2019 (01/01/2019 to 31/12/2019)	105,207.07	2020 (01/01/2020 to 31/01/2020)	4,281.91	Total	298,258.68
Vintage	Quantity of net electricity exported by the Project to the grid in year y (MWh)												
2017 (01/06/2017 to 31/12/2017)	73,422.95												
2018 (01/01/2018 to 31/12/2018)	115,346.75												
2019 (01/01/2019 to 31/12/2019)	105,207.07												
2020 (01/01/2020 to 31/01/2020)	4,281.91												
Total	298,258.68												
Monitoring equipment	Not applicable as it is a calculated value												
QA/QC procedures to be	The value of this parameter can be cross checked with all the												

applied	invoices generated for the sold electricity during the year y.
Purpose of the data	Baseline Emissions calculation
Calculation method	Measured value
Comments	The data will be kept for two years after the end of the crediting period or the last issuance of VERs for this Project activity, whichever occurs later.

Data / Parameter	EG _{All_controller,i,y}													
Data unit	MWh													
Description	Sum of Electricity generation measured by controllers of project and non-project WTGs connected to feeder i during period y													
Source of data	Controllers meter readings of individual WTGs monitored at the Central Monitoring Station (CMS)													
Description of measurement methods and procedures to be applied	This parameter is used for calculation of EG_{facility,y} in cases where there are other (non-project) WTGs connected to the same feeder and also in cases when the start/end dates of monitoring period do not match with the start/end dates of Joint Meter Reading Sheets / Generation reports issued by MSEDCL. This parameter is the sum of electricity generated by WTGs connected to a particular feeder and will be measured by the inbuilt controller meters (also called LCS meters) located in each WTGs on a continuous basis. The readings has been recorded at the Central Monitoring Station (CMS) on a daily basis. O&M contactor is the responsible authority of monitoring this parameter.													
Frequency of monitoring/recording	Continuous monitoring and monthly compilation													
Value monitored	<table><tr><th>Vintage</th><th>Sum of Electricity generation measured by controllers of project and non-project WTGs connected to feeder i during period y (MWh)</th></tr><tr><td>2017 (01/06/2017 to 31/12/2017)</td><td>18,627.84</td></tr><tr><td>2018 (01/01/2018 to 31/12/2018)</td><td>27,483.00</td></tr><tr><td>2019 (01/01/2019 to 31/12/2019)</td><td>29,003.67</td></tr><tr><td>2020 (01/01/2020 to 31/01/2020)</td><td>1,735.79</td></tr><tr><td>Total</td><td>76,850.30</td></tr></table>		Vintage	Sum of Electricity generation measured by controllers of project and non-project WTGs connected to feeder i during period y (MWh)	2017 (01/06/2017 to 31/12/2017)	18,627.84	2018 (01/01/2018 to 31/12/2018)	27,483.00	2019 (01/01/2019 to 31/12/2019)	29,003.67	2020 (01/01/2020 to 31/01/2020)	1,735.79	Total	76,850.30
Vintage	Sum of Electricity generation measured by controllers of project and non-project WTGs connected to feeder i during period y (MWh)													
2017 (01/06/2017 to 31/12/2017)	18,627.84													
2018 (01/01/2018 to 31/12/2018)	27,483.00													
2019 (01/01/2019 to 31/12/2019)	29,003.67													
2020 (01/01/2020 to 31/01/2020)	1,735.79													
Total	76,850.30													
Monitoring equipment	LCS meters													
QA/QC procedures to be	The LCS meters do not require calibration as the energy readings of													

applied	electricity generated at the LCS meter is cross verified by the energy calculated by inverting system installed in the WTGs. In case there is any mismatch in the energy values recorded by the LCS meter and the energy values calculated by the inverting system; the machine will stop working and generate the error report. The project proponent does not have any control over the LCS meter readings of other project developers and therefore the values certified by the MSEDCL will be directly used for the purpose of calculating the electricity exports to the grid.
Purpose of the data	Baseline emissions calculations
Calculation method	Measured value
Comments	The data will be kept for two years after the end of the crediting period or the last issuance of VERs for this Project activity, whichever occurs later.

Data / Parameter	EG _{WTG_controller,i,y}							
Data unit	MWh							
Description	Sum of Electricity generation measured by controllers of all the project WTGs that are connected to feeder i during period y							
Source of data	Controllers meter readings of project activity WTGs monitored at the Central Monitoring Station (CMS)							
Description of measurement methods and procedures to be applied	This parameter is used for calculation of EG_{facility,y} in cases where there are other (non-project) WTGs connected to the same feeder and also in cases when the start/end dates of monitoring period do not match with the start/end dates of Joint Meter Reading Sheets / Generation reports issued by MSEDCL. This parameter is the sum of electricity generated by project WTGs connected to a particular feeder i and measured by the inbuilt controller meters (also called LCS meters) located in each WTGs on a continuous basis. The readings is recorded at the Central Monitoring Station (CMS) on a daily basis. O&M contactor is the responsible authority to monitor this parameter.							
Frequency of monitoring/recording	Continuous monitoring and monthly compilation							
Value monitored	<table><tr><th>Vintage</th><th>Sum of Electricity generation measured by controllers of all the project WTGs that are connected to feeder i during period y (MWh)</th></tr><tr><td>2017 (01/06/2017 to 31/12/2017)</td><td>2,333.89</td></tr><tr><td>2018 (01/01/2018 to 31/12/2018)</td><td>3,242.48</td></tr></table>		Vintage	Sum of Electricity generation measured by controllers of all the project WTGs that are connected to feeder i during period y (MWh)	2017 (01/06/2017 to 31/12/2017)	2,333.89	2018 (01/01/2018 to 31/12/2018)	3,242.48
Vintage	Sum of Electricity generation measured by controllers of all the project WTGs that are connected to feeder i during period y (MWh)							
2017 (01/06/2017 to 31/12/2017)	2,333.89							
2018 (01/01/2018 to 31/12/2018)	3,242.48							

	2019 (01/01/2019 to 31/12/2019)	4,069.44
	2020 (01/01/2020 to 31/01/2020)	253.41
	Total	9,899.21
Monitoring equipment	LCS meters	
QA/QC procedures to be applied	The LCS meters do not require calibration as the energy readings of electricity generated at the LCS meter is cross verified by the energy calculated by inverting system installed in the WTGs. In case there is any mismatch in the energy values recorded by the LCS meter and the energy values calculated by the inverting system; the machine will stop working and generate the error report. The project proponent does not have any control over the LCS meter readings of other project developers and therefore the values certified by the MSEDCL will be directly used for the purpose of calculating the electricity exports to the grid.	
Purpose of the data	Baseline emissions calculations	
Calculation method	Measured value	
Comments	The data will be kept for two years after the end of the crediting period or the last issuance of VERs for this Project activity, whichever occurs later.	

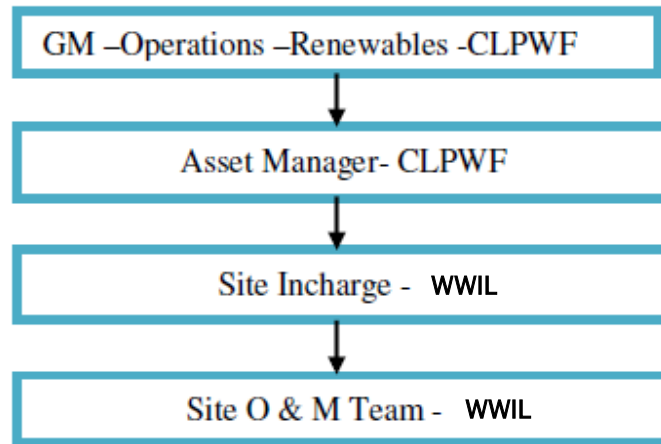
4.3 Monitoring Plan

The approved large scale methodology ACM0002 (Version 12.3.0), stipulates the monitoring of the net electricity generation supplied by the project plant/unit to the grid.

The monitoring plan has been formulated according to the approved consolidated monitoring methodology in ACM0002 Version 12.3.0.

CLPWF has entered into a comprehensive Operation and Maintenance agreement with the manufactures of the WTGs for a period of 10 years, which is extendable at renegotiated terms. The contractor WWIL, under the O&M contract with CLPWF is responsible for the operation and maintenance of the Project activity for the entire crediting period. The O&M personnel are qualified engineers and are trained at the WTG manufacturing facility of WWIL for operating and ensuring best performance of the WTGs.

The authority and responsibility of project management as well as registration, monitoring, measurement and reporting lies with the CLPWF. CLPWF has formulated a Project Team to ensure proper and continuous monitoring of the performance of turbines and generation of power. The operation and management structure implemented by the PP for the purpose of the Project activity is illustrated below:



The Project activity essentially involves generation of electricity from wind, the employed WTG can only convert wind energy into electrical energy and cannot use any other input fuel for electricity generation.

Frequency of meter reading: The meters installed at the metering point will have 15 minutes block online reading. However, the main/check meter reading at the metering point will be undertaken jointly by the representative of the MSEDCL and authorized officials of the PP on 1st day of every month for the preceding month.

Data archiving

Data has been archived electronically. The data would be archived two years after crediting period or last issuance whichever is later.

Calibration of Meters

The readings from main and check meters installed at the interconnection point have been checked every month at the time of metering of electricity generation. In case the meters are found to be operating beyond the permissible limits, it shall be immediately sent for calibration. The frequency of meter testing will be once in 5 years.

Apportioning of electricity:

In case dates of monitoring period do not match with the dates of Joint Meter Reading Sheets / Generation reports issued by Maharashtra State Electricity Distribution Co. Ltd. (MSEDCL)

Apportioning has been carried out based on ratio of generation data recorded using LCS meters installed at the WTG. The LCS meters do not require calibration as the energy readings of electricity generated at the LCS meter is cross verified by the energy calculated by inverting system installed in the WTGs.

The emission reductions of that particular period (from the date of registration of the project till the end of the month) will be calculated based on percentage generation of that particular

period at WTG using LCS data multiplied with the total units generated in the month as per the Joint Meter Reading Sheets / Generation report issued by Maharashtra State Electricity Distribution Co. Ltd. (MSEDCL).

The sample calculation is furnished below:

Generation from CLPWF WTGs for the monitoring period = A (From LCS data) Generation from CLPWF WTGs for the billing period = B (From LCS data)

Net energy exported from CLPWF WTGs for the billing period = C (JMR/Generation share report by MSEDCL)

Net energy export used for calculation of emission reduction for the monitoring period = $(C * A/B)$

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:

$$BE_y = EG_{PJ,y} * F_{grid,CM,y}$$

Where

BE_y = Baseline emissions in year y (tCO₂)

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

$EF_{grid,CM,y}$ = 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

Baseline emissions include only CO₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The baseline emissions for the monitoring period are calculated as follows:

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

Where:

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

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

$EF_{grid,CM,y}$: Combined margin 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,

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

Duration			Quantity of electricity exported by the Project to the grid	Quantity of electricity imported by the Project from the grid	Quantity of net electricity generation supplied by the project plant/unit to the grid
			$EG_{export,y}$	$EG_{import,y}$	$EG_{facility,y}$
			MWh	MWh	MWh
01-Jun-2017	To	30-Jun-2017	13,226.99	3.06	13,223.93
01-Jul-2017	To	31-Jul-2017	24,948.05	0.56	24,947.48
01-Aug-2017	To	31-Aug-2017	15,231.40	0.30	15,231.10
01-Sep-2017	To	30-Sep-2017	3,960.79	9.20	3,951.59
01-Oct-2017	To	31-Oct-2017	3,140.79	9.38	3,131.41
01-Nov-2017	To	30-Nov-2017	4,596.28	6.63	4,589.65
01-Dec-2017	To	31-Dec-2017	8,352.91	5.13	8,347.78
01-Jan-2018	To	31-Jan-2018	2,619.85	9.21	2,610.64
01-Feb-2018	To	28-Feb-2018	2,986.56	5.80	2,980.76
01-Mar-2018	To	31-Mar-2018	4,244.40	5.23	4,239.17
01-Apr-2018	To	30-Apr-2018	6,288.33	6.25	6,282.08
01-May-2018	To	31-May-2018	8,451.13	2.57	8,448.56
01-Jun-2018	To	30-Jun-2018	13,607.37	1.80	13,605.57

Duration			Quantity of electricity exported by the Project to the grid	Quantity of electricity imported by the Project from the grid	Quantity of net electricity generation supplied by the project plant/unit to the grid
			EG _{export,y}	EG _{export,y}	EG _{facility,y}
			MWh	MWh	MWh
01-Jul-2018	To	31-Jul-2018	26,717.88	0.81	26,717.07
01-Aug-2018	To	31-Aug-2018	25,939.28	0.22	25,939.06
01-Sep-2018	To	30-Sep-2018	8,622.99	2.13	8,620.86
01-Oct-2018	To	31-Oct-2018	5,085.45	5.43	5,080.02
01-Nov-2018	To	30-Nov-2018	4,784.64	4.87	4,779.77
01-Dec-2018	To	31-Dec-2018	6,048.75	5.55	6,043.20
01-Jan-2019	To	31-Jan-2019	3,581.66	7.76	3,573.90
01-Feb-2019	To	28-Feb-2019	3,833.77	6.76	3,827.01
01-Mar-2019	To	31-Mar-2019	5,049.70	4.04	5,045.66
01-Apr-2019	To	30-Apr-2019	7,246.09	4.95	7,241.14
01-May-2019	To	31-May-2019	7,486.11	1.04	7,485.07
01-Jun-2019	To	30-Jun-2019	11,032.39	2.37	11,030.02
01-Jul-2019	To	31-Jul-2019	20,060.22	5.21	20,055.01
01-Aug-2019	To	31-Aug-2019	17,417.93	0.30	17,417.63
01-Sep-2019	To	30-Sep-2019	11,716.44	2.94	11,713.50
01-Oct-2019	To	31-Oct-2019	7,641.59	9.04	7,632.55
01-Nov-2019	To	30-Nov-2019	4,759.78	5.27	4,754.51
01-Dec-2019	To	31-Dec-2019	5,440.90	9.84	5,431.06
01-Jan-2020	To	31-Jan-2020	4,289.29	7.38	4,281.91
Total			298,409.70	151.02	298,258.68

Baseline Emission (BE_y):

Vintage Period	Net Electricity Export (MWh)	Emission Factor (tCO ₂ /MWh)	Baseline Emissions (tCO ₂)
2017 (01/06/2017 to 31/12/2017)	73,422.95	0.9487	69,656
2018 (01/01/2018 to 31/12/2018)	115,346.75	0.9487	109,429
2019 (01/01/2019 to 31/12/2019)	105,207.07	0.9487	99,809

Vintage Period	Net Electricity Export (MWh)	Emission Factor (tCO ₂ /MWh)	Baseline Emissions (tCO ₂)
2020 (01/01/2020 to 31/01/2020)	4,281.91	0.9487	4,062
Total	298,258.68		282,956.00

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.

5.4 Net GHG Emission Reductions and Removals

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

$$ER_y = BE_y - PE_y$$

Where:

ER_y Emission reductions in year y (tCO₂e/yr)

BE_y Baseline Emissions in year y (tCO₂e/yr)

PE_y Project Emissions in year y (tCO₂e/yr)

Thus,

$$ER_y = 282,956 - 0 \text{ tCO}_2\text{e}$$

$$= 282,956 \text{ tCO}_2\text{e}$$

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)
2017 (01-Jun-17 to 31-Dec-17)	69,656.00	0.00	0.00	69,656.00
2018 (01-Jan-18 to 31-Dec-18)	109,429.00	0.00	0.00	109,429.00

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2019 (01-Jan-19 to 31-Dec-19)	99,809.00	0.00	0.00	99,809.00
2020 (01-Jan-20 to 31-Jan-20)	4,062.00	0.00	0.00	4,062.00
Total	282,956.00	0.00	0.00	282,956.00

The actual emission reductions for the current monitoring period are 39.35% higher than estimated emission reductions which are mainly due better availability of wind at site. Wind availability is a natural phenomenon which is beyond the control of CLP. Further, sensitivity analysis mentioned in registered project document shows that the equity IRR would cross the benchmark at 43.8% increase in PLF. Thus, same increase in generation for this periodic verification is in line with registered project document.

APPENDIX 1: CALIBRATION DETAILS

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

Main Meter

Feeder No.	Meter identification-SI No.	Meter Make	Accuracy Class	Date of Calibration	Valid Till
1	13099002	Elster	0.2s	17/02/2017	16/02/2022
2	13098999	Elster	0.2s	17/02/2017	16/02/2022
3	13099003	Elster	0.2s	17/02/2017	16/02/2022
5	13098998	Elster	0.2s	17/02/2017	16/02/2022
8	13098996	Elster	0.2s	17/02/2017	16/02/2022

Check Meter

Feeder No.	Meter identification-S No.	Meter Make	Accuracy Class	Date of Calibration	Valid Till
1	13099006	Elster	0.2s	17/02/2017	16/02/2022
2	13099007	Elster	0.2s	17/02/2017	16/02/2022
3	13099000	Elster	0.2s	17/02/2017	16/02/2022
5	13099001	Elster	0.2s	17/02/2017	16/02/2022
8	13098997	Elster	0.2s	17/02/2017	16/02/2022