Monitoring report form for CDM project activity
(Version 08.0)

MONITORING REPORT			
Title of the project activity	Roaring 40's Wind Farms (Khandke) Private Limited – Phase III		
UNFCCC reference number of the project activity	3611		
Version number of the PDD applicable to this monitoring report	4.0		
Version number of this monitoring report	01		
Completion date of this monitoring report	23/05/2021		
Monitoring period number	Monitoring Period Number: 05		
Duration of this monitoring period	From 30/03/2019 to 17/09/2020 (Both days inclusive)		
Monitoring report number for this monitoring period	Not Applicable		
Project participants	CLP Wind Farms (Khandke) Private Limited		
Host Party	India		
Applied methodologies and standardized baselines	Consolidated baseline and monitoring methodology for "Grid-connected electricity generation from renewable sources" Reference: Approved Consolidated baseline methodology ACM0002 (Version 10) Standardized Baselines: NA		
Sectoral scopes	Sectoral scope 1: Energy Industries (Renewable - /non-renewable sources)		
Amount of GHG emission reductions or net anthropogenic GHG removals achieved by the project activity in this monitoring period	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013 until 31 December 2020	Amount achieved from 1 January 2021
	0 tCO_2	36,944 tCO_2	0 tCO_2
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	35,500 tCO_2		

SECTION A. Description of project activity

A.1. General description of project activity

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CLP Wind Farms (Khandke) Pvt. Ltd. (CLPWFK), formerly known as Roaring 40s wind Farms (Khandke) Pvt. Limited, has developed a 50.4 MW wind farm in the state of Maharashtra, India in three phases (Phase-I, II & III). The project activity under consideration is Phase-III of the project consisting of 18 machines of 800 kW each, amounting to 14.4 MW.

The purpose of the project activity is to development, design, engineering, procurement, finance, construction, operation and maintenance of the project activity, 14.4 MW phase-III wind power project ("Project") in the Indian state of Maharashtra to provide reliable, renewable power to the Maharashtra state electricity grid. The project activity replaces anthropogenic emissions of greenhouse gases (GHG's) into the atmosphere by displacing the equivalent amount of electricity generation through the operation of existing fuel mix in the grid comprising mainly fossil fuel based power plants and future capacity expansions connected to the grid. In the absence of the project activity the equivalent amount of electricity would have been generated from the connected/ new power plants in the grid, which are predominantly based on fossil fuels.

The Project harnesses renewable resource (wind) in the region, and thereby displacing electricity generation by non-renewable natural resources and hence ultimately leading to sustainable economic and environmental development. 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 (Khandke) Private Limited and WWIL is responsible for operation and maintenance of the wind farm.

The generated electricity is being supplied to Maharashtra State Electricity Distribution Company Limited ("MSEDCL") under a long-term power purchase agreement (PPA) and thereby marginally contributing towards reduction in the energy demand supply gap in the state of Maharashtra, diversification of grid supply and reduction of greenhouse gas emissions. The first machine was commissioned on 30/03/2009 and the last machine was commissioned on 12/06/2009. The expected operational lifetime of the project is for 20 years.

The total emission reductions achieved under this monitoring period from 30/03/2019 to 17/09/2020 (including first and last day) are 36,944 tCO_2.

A.2. Location of project activity

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The Project is spread across Mathani, Ranjani, Baradari, Sonewadi, Sarolabaddi and Madadgaon villages in Khandke Taluka of Ahmednagar District of Maharashtra state in India. The project area extends between latitude 19^o, 6' to 19^o, 11' North and longitude 74^o, 49.5' to 74^o, 57.5 East. The Project is connected to the WWIL substation (to be owned by MSETCL) at Village Mehekari (near 33kV Mehekari S/S), Ahmednagar district. The project activity is located at a distance of 120 km from Pune by road. The nearest big railway station is at Pune.

The details of the physical location of the project activity are presented below:

WEG Loc No.	Unique Identification of WECs	Feeder No	Latitude	Longitude
137	R 40s K-46	3	N19 04 13.1	E74 51 54.4
138	R 40s K-47	3	N19 04 04.7	E74 51 57.0
136	R 40s K-48	3	N19 04 18.5	E74 51 48.0
139	R 40s K-49	3	N19 03 58.4	E74 52 03.7
53	R 40s K-50	4	N19 10 55.5	E74 50 55.8
54	R 40s K-51	4	N19 11 04.0	E74 51 18.0
55	R 40s K-52	4	N19 11 11.8	E74 51 30.0
213	R 40s K-53	1	N19 09 09.4	E74 55 34.6
214	R 40s K-54	1	N19 09 00.8	E74 55 37.3
215	R 40s K-55	1	N19 08 53.2	E74 55 42.1
1	R 40s K-56	3	N19 04 50.4	E74 51 00.7
2	R 40s K-57	3	N19 04 54.8	E74 50 56.1
133	R 40s K-58	3	N19 04 43.2	E74 51 14.0
134	R 40s K-59	3	N19 04 34.5	E74 51 28.9
135	R 40s K-60	3	N19 04 29.2	E74 51 38.1
140	R 40s K-61	3	N19 04 48.2	E74 51 05.6
3	R 40s K-62	3	N19 05 02.4	E74 50 56.4
4	R 40s K-63	3	N19 05 05.2	E74 50 52.8

A.3. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Government of India (host)	CLP Wind Farms (Khandke) Private Limited (Private entity)	No

A.4. References to applied methodologies and standardized baselines

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Title: "Consolidated baseline and monitoring methodology for "Grid-connected electricity generation from renewable sources"

Reference: Approved consolidated baseline methodology ACM0002 (Version 10)

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

- Tool to calculate the emission factor for an electricity system – Version 02
- Tool for the demonstration and assessment of additionality – Version 5.2

Further information with regards to the methodology/ tools can be obtained at http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

A.5. Crediting period type and duration

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The length of the Crediting period of the project activity as per registered PDD is 10 years (fixed). The crediting period start date is 18/09/2010 and length of crediting period is 10 year (18/09/2010 – 17/09/2020).

SECTION B. Implementation of project activity

B.1. Description of implemented project activity

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Wind turbines produce electricity by using the natural power of wind to drive a generator. Wind has a considerable amount of kinetic energy when blowing at high speeds. When this kinetic energy passes over the blades of the wind turbines, it is converted into mechanical energy and rotates the wind blades. When the wind blades rotate, the connected generator also rotates, thereby producing electricity. The electricity thus produced using wind leads to displacement of electricity produced by the grid which is primarily coal based and thus results in significant reduction of carbon dioxide emissions which is the main emission source being displaced by the implementation of the proposed project activity.

The Project involves 18 wind energy converters (WECs) of WWIL make (800 kW E-48) with internal electrical lines connecting the Project with local evacuation facility. The WECs generate 3-phase power at 400V, which is stepped upto 33 kV. The Project can operate in the frequency range of 47.5–51.5 Hz and in the voltage range of 400 V ± 12.5%. The average life time of the WEC is around 20 years as per the industry standards. The salient features of the state-of-art-technology are:

- Gearless Construction - Rotor & Generator Mounted on same shaft eliminating the Gearbox.
- Variable speed function – has the speed range of 18 to 33 RPM thereby ensuring optimum efficiency at all times.
- Variable Pitch functions ensuring maximum energy capture.
- Near Unity Power Factor at all times.
- Minimum drawl (less than 1% of kWh generated) of Reactive Power from the grid.
- No voltage peaks at any time.
- Operating range of the WEC with voltage fluctuation of -20 to +20%.
- Less Wear & Tear since the system eliminates mechanical brake, which are not needed due to low speed generator, which runs at maximum speed of 33 rpm and uses Air Brakes.
- Three Independent Braking Systems.
- Generator achieving rated output at only 33 rpm.
- Incorporates lightning protection system, which includes blades.
- Starts Generation of power at wind speed of 3 m/s.

These turbines are supplied by WWIL and are designed for Indian wind conditions. The technology for the same is environmentally safe and sound. Further, there is no technology transfer involved in the project activity. The WECs under the project activity were commissioned phase wise. Commissioning dates of the WEGs are mentioned below:

The first machine in this project activity was commissioned on 30/03/2009 and the last machine was commissioned on 12/06/2009. The project activity consists of 18 machines of 800 kW each amounting to a total of 14.4 MW. The commissioning schedule is provided below:

WEG Loc No.	Unique Identification of WECs	Date of Commissioning
137	R 40s K-46	30/03/2009
138	R 40s K-47	31/03/2009
136	R 40s K-48	17/04/2009
139	R 40s K-49	17/04/2009
53	R 40s K-50	28/05/2009
54	R 40s K-51	28/05/2009
55	R 40s K-52	28/05/2009
213	R 40s K-53	28/05/2009
214	R 40s K-54	28/05/2009
215	R 40s K-55	28/05/2009
1	R 40s K-56	03/06/2009
2	R 40s K-57	03/06/2009
133	R 40s K-58	03/06/2009
134	R 40s K-59	03/06/2009
135	R 40s K-60	03/06/2009
140	R 40s K-61	03/06/2009
3	R 40s K-62	12/06/2009
4	R 40s K-63	12/06/2009

The project activity has been implemented as per the description in the registered CDM PDD. The Project is owned by CLP Wind Farms (Khandke) Private Limited and WWIL is responsible for operation and maintenance of the wind farm. All the events are recorded in the log book available at the project site. During the monitoring period considered in this report, there was no major / special event for any of the machines that are included in the project activity. No event or situation has occurred during this monitoring period, which impacts the applicability of the methodology.

B.2. Post-registration changes

B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents

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Not applicable

B.2.2. Corrections

>>
Not applicable

B.2.3. Changes to the start date of the crediting period

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Not applicable

B.2.4. Inclusion of monitoring plan

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Not applicable

B.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

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The monitoring plan of the project activity has been revised to describe the prevailing apportioning procedure conducted at site to estimate the electricity exported and imported by the project activity. The revision for monitoring plan was approved by UNFCCC on 20/08/2013 (Link: http://cdm.unfccc.int/PRCContainer/DB/prcp999212382/view). Same has now been incorporated in revised MR

B.2.6. Changes to project design

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Not applicable

B.2.7. Changes specific to afforestation or reforestation project activity

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Not applicable

SECTION C. Description of monitoring system

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The monitoring plan is being devised as per approved consolidated monitoring methodology ACM0002 Version 10 - Consolidated baseline and monitoring methodology for “Grid-connected electricity generation from renewable sources”. Followings are the monitoring parameters of the project activity:

- Electricity exported by all the WECs (WECs included in the project activity and WECs that are not part of the project activity) connected to feeder1, feeder 3 & feeder 4 at main (feeder 1, feeder 3 and feeder 4) at 33 kV

- Electricity imported by all the WECs (WECs included in the project activity and WECs that are not part of the project activity) connected to feeder1, feeder 3 & feeder 4 at main (feeder 1, feeder 3 and feeder 4) at 33 kV.

- Net Electricity supplied to the grid by the WECs of the project activity connected to feeder 1, feeder 3 & feeder 4.

- Net electricity supplied to the grid by the Project activity

Net Electricity supplied to the grid by the project activity is summation of net electricity supplied to the grid by the WECs of the project activity connected to feeder 1 ($EG_{f1,y}$), feeder 3 ($EG_{f3,y}$) and feeder 4 ($EG_{f4,y}$) which are obtained from Energy Breakup Report certified by MSEDCL.)

The Project is operated and managed by CLP Wind Farms (Khandke) Pvt. Ltd. The operational and maintenance contract for the project is with WWIL. WWIL is an ISO 9001:2000 certified Quality Management system. WWIL follows the documentation practices to ensure the reliability and

availability of the data for all the activities as required from the identification of the site, wind resource assessment, logistics, finance, construction, commissioning and operation of the wind power project.

The accuracy of monitoring parameter is ensured by adhering to the calibration and testing procedure. The project has adhered all the mandatory regulatory and statutory requirements at the state as well as national level.

WWIL is Operation and Maintenance contractor for the project activity and provides the daily generation report to CLPWFK. CLPWFK also maintains the records of daily generation report and joint meter report at their corporate office. The data will be maintained in hard and soft format for the crediting period + 2 years.

The accuracy of monitoring parameter is ensured by adhering to the calibration and testing procedure. The project has adhered all the mandatory regulatory and statutory requirements at the state as well as national level. WWIL is Operation and Maintenance contractor for the project activity and provides the daily generation report to CLPWFK. CLPWFK also maintains the records of daily generation report and joint meter report.

Calibration Details

The metering equipments were inspected & calibrated by state utility. Meter calibration details are given in the table below:-

Sl. No.	Transformer No	Meter Identification No	Accuracy Class	Calibration Date	Calibration Validity Date
1	Feeder -1	14796486 (Main Meter)	0.2s	25/07/2017	24/07/2018
			0.2s	28/06/2018	27/06/2019
			0.2s	20/02/2020	19/02/2021
		14796487 (Check Meter)	0.2s	25/07/2017	24/07/2018
			0.2s	28/06/2018	27/06/2019
			0.2s	20/02/2020	19/02/2021
2	Feeder-3	14796497 (Main Meter)	0.2s	25/07/2017	24/07/2018
			0.2s	28/06/2018	27/06/2019
			0.2s	20/02/2020	19/02/2021
		14796478 (Check Meter)	0.2s	25/07/2017	24/07/2018
			0.2s	28/06/2018	27/06/2019
			0.2s	20/02/2020	19/02/2021
3	Feeder-4	14796479 (Main Meter)	0.2s	25/07/2017	24/07/2018
			0.2s	28/06/2018	27/06/2019
			0.2s	20/02/2020	19/02/2021
		14796480 (Main Meter)	0.2s	25/07/2017	24/07/2018
			0.2s	28/06/2018	27/06/2019
			0.2s	20/02/2020	19/02/2021

Note: Calibration of the meters was delayed from 27/06/2019 to 20/06/2020. Hence adjustment of electricity export and import for the delayed calibration period applied for maximum permissible errors in line with the guidance provided under paragraph 366 (a) of VVS-PA version 02.

Monitoring Information

- **Metering:** Electricity supplied to the grid is metered by MSEDCL in the presence of representatives of WWIL (O&M Contractor for the project activity) and MSEDCL.

- **Metering Equipment:** Metering system for the project activity consists of main and check meter. Both the meters are two-way trivector meters capable of recording import and export of electricity and provide output in the form of net electricity supplied to the grid. The metering equipment is maintained in accordance with electricity standards prevalent in Maharashtra.

- **Meter Readings:** Revenue meters are located at high voltage side of each feeder which is connected to project WEGs as well as non-project WEGs which are belongs to other project developer. The net electricity supplied to the grid is recorded by taking a Joint Meter Reading (JMR) in the presence of Officials from off-taking Utility and WWIL on behalf of CLPWFK. The Joint meter reading contains the value of energy imported and exported and the net export to the grid by the project and non-project WEGs connected to same feeder during the recording period. This Joint meter reading is certified by the Executive engineer of the utility and by WWIL Officials. The procedure for calculating net electricity supplied to the grid is described below.

- **Inspection of Energy Meters:** All the main and check energy meters (export and import) installed at the project site are of 0.2% accuracy class. Each meter is jointly inspected and sealed on behalf of the Parties and is not to be interfered with by either Party except in the presence of the other Party or its accredited representatives.

- **Meter Test Checking**: There is a separate main meter check meter for each 33 kV feeder. The Main meter is tested for accuracy, with a portable standard meter, by the MSEDCL's testing division. The MSEDCL is responsible to carry out the calibration, periodical testing, sealing and maintenance of meters. All the meters are tested at the metering point. MSEDCL provides a copy of the test reports. If during any of the monthly meter readings, the variation between the main meter and the check meter is more than the permissible limit, all the meters will be re-tested and calibrated immediately by MSEDCL.

Apportioning Procedure Implemented by WWIL and Certified by MSEDCL

- **STEP 1: Measuring Electricity Generation For Each Turbine**

Electricity generation readings of the LCS meters on each Turbine are recorded on continuous basis and fed to the central monitoring system. Data on generation for each Turbine within the wind farm are accessed and archived electronically in the central monitoring system database.

Electricity generation from the project WEGs which are connected to feeder 1 ($EG_{f1,gross, y}$), feeder-3 ($EG_{f3,gross, y}$) and feeder 4 ($EG_{f4,gross, y}$) is noted from central monitoring system database by WWIL as:

N_{f1} And N_{f2} And N_{f3}

$\sum_{y=0} EG_{f1,gross,y}$ $\sum_{y=0} EG_{f3,gross,y}$ $\sum_{y=0} EG_{f4,gross,y}$

Where

N_{f1} = Number of Turbines comprising the Project activity connected to the feeder 1

N_{f3} = Number of Turbines comprising the Project activity connected to the feeder 3

N_{f4} = Number of Turbines comprising the Project activity connected to the feeder 4

$EG_{f1,gross,y}$ = Electricity generation from other Turbines connected to feeder 1

$EG_{f3,gross,y}$ = Electricity generation from other Turbines connected to feeder 3

$EG_{f4,gross,y}$ = Electricity generation from other Turbines connected to feeder 4

Same data are noted from central monitoring system database by WWIL as:

M_{f1} And M_{f2} And M_{f3}

$\sum_{y=0} EG_{f1,gross,x}$ $\sum_{y=0} EG_{f3,gross,x}$ $\sum_{y=0} EG_{f4,gross,x}$

Where

M_{f1} = Number of Turbines that are not part of the project activity but are connected to the feeder 1

M_{f3} = Number of Turbines that are not part of the project activity but are connected to the feeder 3

M_{f4} = Number of Turbines that are not part of the project activity but are connected to the feeder 4

- **STEP 2: Determining Electricity Exports From The Turbines**

Measuring Aggregate Electricity Exports From The Feeder

Aggregate electricity exports, to the grid, from the turbines connected to feeder 1, feeder 3 and feeder 4 is measured through the main and check meters installed at the 33 kV side of the Substation. There are one set of main and check meter at each feeder. Joint Meter Reading (JMR) of the main and check meter is carried out on first day of every month in presence of the representatives of the WWIL (the O&M contractor) & the state electricity utility (MSETCL). Electricity export and import for feeder 1, feeder 3 and feeder 4 is denoted as:

Electricity Export from feeder 1: $EG_{f1,JMR,export}$

Electricity Import from feeder 1: $EG_{f1,JMR,import}$

Electricity Export from feeder 3: $EG_{f3,JMR,export}$

Electricity Import from feeder 3: $EG_{f3,JMR,import}$

Electricity Export from feeder 4: $EG_{f4,JMR,export}$

Electricity Import from feeder 4: $EG_{f4,JMR,import}$

Determining Electricity Exports From Project Activity

Net electricity exported by individual wind turbines is determined by MSEDCL by apportioning electricity export and electricity import to the project and non-project Turbines in proportion to their generated electricity. As the project WEGs are connected to a common feeder (a common pool where CLP and other project developers feed electricity), state utility (Maharashtra State Electricity Distribution Company Limited, "MSEDCL") apportioned the electricity generation data based on a) individual project WEGs controller reading, b) summation of all controller reading of WEGs (belongs to CLP and other developers) connected with the common feeder and c) joint meter reading (based on billing meter) and issues month wise "Energy Break-up Report" which contains electricity export, import and net export by the project WEGs connected to the same feeder. These values (mentioned in "Energy Break-up Report") are the main source to calculate the baseline emission by this project activity.

$EG_{f1,export}$ the electricity supplied to the grid by WECs of the project activity connected to feeder 1 is calculated as follows:

$$EG_{f1,export} = \frac{EG_{f1,JMR,export} \times \sum_{y=0}^{N_{f1}} EG_{f1,gross,y}}{\sum_{y=0}^{N_{f1}} EG_{f1,gross,y} + \sum_{y=0}^{M_{f1}} EG_{f1,gross,y}}$$

$EG_{f1,import}$ is the electricity drawn from the grid by turbines of the project activity connected to feeder 1 is calculated as follows:

$$EG_{f1,import} = \frac{EG_{f1,JMR,import} \times \sum_{y=0}^{N} EG_{f1,gross,y}}{\sum_{y=0}^{N} EG_{f1,gross,y} + \sum_{y=0}^{M} EG_{f1,gross,y}}$$

$EG_{f1,y}$ is the net electricity supplied to the grid by Turbines of the project activity connected to feeder 1, is calculated as follows:

$EG_{f1,y} = EG_{f1,export} - EG_{f1,import}$

Similarly for feeder 3, $EG_{f3,export}$, $EG_{f3,import}$ and $EG_{f3,}y$, is calculated as follows:

$EG_{f3,export}$ the electricity supplied to the grid by turbines of the project activity connected to feeder 3 is calculated as follows:

$$EG_{f3,export} = \frac{EG_{f3,JMR,export} \times \sum_{y=0}^{N} EG_{f3,gross,y}}{}$$

$$\sum_{y=0}^{N} EG_{f3,gross,y} + \sum_{y=0}^{M} EG_{f3,gross,y}$$

$EG_{f3,import}$ is the electricity drawn from the grid by turbines of the project activity connected to feeder 3 is calculated as follows:

$$EG_{f3,import} = \frac{EG_{3,JMR,\ import} \times \sum_{y=0}^{N} EG_{f3,gross,y}}{\sum_{y=0}^{N} EG_{f3,gross,y} + \sum_{y=0}^{M} EG_{f3,gross,y}}$$

$EG_{f3,y}$ is the net electricity supplied to the grid by Turbines of the project activity connected to feeder 3, is calculated as follows:

$$EG_{f3,y} = EG_{f3,export} - EG_{f3,import}$$

Similarly for feeder 4, $EG_{f4,export}$, $EG_{f4,import}$ and $EG_{f4,}y$, is calculated as follows:

$EG_{f4,export}$ is the electricity supplied to the grid by turbines of the project activity connected to feeder 4 is calculated as follows:

$$EG_{f4,export} = \frac{EG_{f4,JMR,\ export} \times \sum_{y=0}^{N} EG_{f4,gross,y}}{\sum_{y=0}^{N} EG_{f4,gross,y} + \sum_{y=0}^{M} EG_{f4,gross,y}}$$

$EG_{f4,import}$ is the electricity drawn from the grid by turbines of the project activity connected to feeder 4 is calculated as follows:

$$EG_{f4,import} = \frac{EG_{f4,JMR,\ import} \times \sum_{y=0}^{N} EG_{f4,gross,y}}{\sum_{y=0}^{N} EG_{f4,gross,y} + \sum_{y=0}^{M} EG_{f4,gross,y}}$$

$EG_{f4,y}$ is the net electricity supplied to the grid by Turbines of the project activity connected to feeder 4, is calculated as follows:

$$EG_{f4,y} = EG_{f4,export} - EG_{f4,import}$$

Net electricity exported to the grid by the project activity is calculated as:

$EG_y = EG_{f1,y} + EG_{f3,y} + EG_{f4,y}$

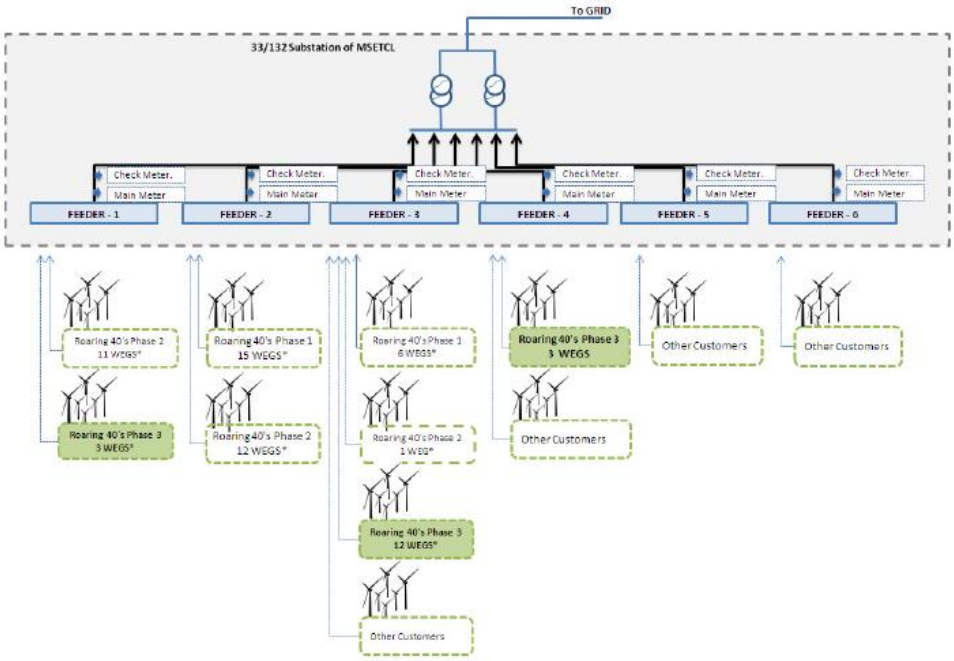
As the project WEGs are connected to a common feeder (a common pool where CLP and other project developers feed electricity), state utility (Maharashtra State Electricity Distribution Company Limited, "MSEDCL") apportioned the electricity generation data based on a) individual project WEGs controller reading, b) summation of all controller reading of WEGs (belongs to CLP and other developers) connected with the common feeder and c) joint meter reading (based on billing meter) and issues month wise "Energy Break-up Report" which contains electricity export, import and net export by the project WEGs connected to the same feeder. These values (mentioned in "Energy Break-up Report") are the main source to calculate the baseline emission by this project activity and same is in line with section B.7.1 of the revised PDD (approved on 20/08/2013 after Post Registration Changes). As the controller reading of WEGs belongs to other project developers (which is required to calculate summation of all controller reading of WEGs connected under the common feeder) are confidential information, hence, MSEDCL is not disclosing the same and this is beyond the control of CLP.

Thus, section B.7.1 of the revised PDD (approved on 20/08/2013) mentioned that Joint meter reading records ($EG_{f1,JMR,export}$, $EG_{f3,JMR,export}$, $EG_{f4,JMR,export}$, $EG_{f1,JMR,Import}$, $EG_{f3,JMR,Import}$ and $EG_{f4,JMR,Import}$) would not be directly used for estimation of emission reduction and the values mentioned in "Energy Breakup Report" would be directly applied for estimation of emission reduction. As the Energy Break-up Report issued by MSEDCL, a state utility, thus, same is the most authentic document to calculate emission reduction calculation. Further, the cross-checking of the net electricity supplied has been done with the tariff invoices raised by the CLP on the State Electricity Utility.

The meter reading from the LCS of each turbine is noted by CMS (Central Monitoring Station) directly in the soft format. 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 Turbines (Turbines). 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.

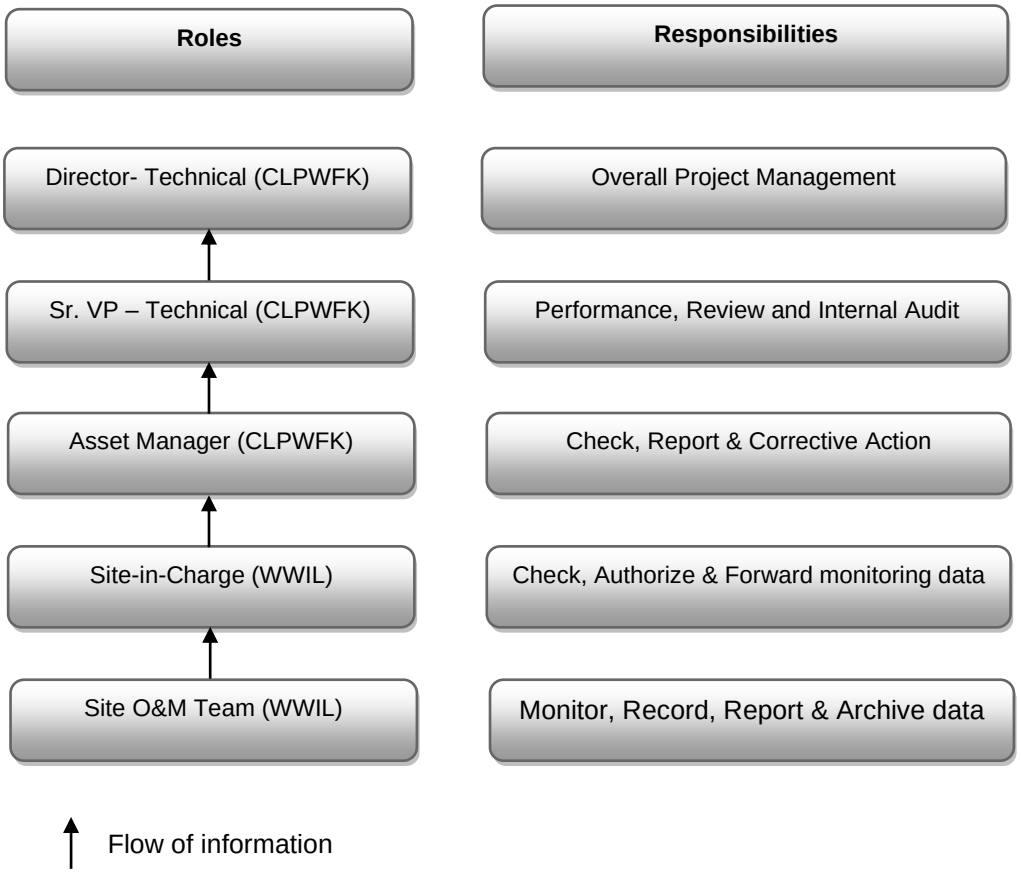
WWIL operates an ISO 9001:2000 certified Quality Management system from Germanischer Lloyd. WWIL follows the documentation practices to ensure the reliability and availability of the data for all the activities as required from the identification of the site, wind resource assessment, logistics, construction, commissioning and operation of the wind power project. The accuracy of monitoring parameter is ensured by adhering to the calibration and testing procedure. The project has adhered all the mandatory regulatory and statutory requirements at the state as well as national level. WWIL is Operation and Maintenance contractor for the project activity and provides the daily generation report to the CLPWFK. CLPWFK also maintains the records of daily generation report and joint meter report.

The schematic representation of metering arrangement is demonstrated below:



The project activity (Phase III) consists of 18 machines which are connected to feeder 1, feeder 3 and feeder 4. The feeder 1 connects 3 machines, feeder 3 connects 12 machines and feeder 4 connects 3 machines of the project activity.

Training on the machine is an essential pre-requisite, to ensure necessary safety of man and machine. Further, in order to maximize the output from the Wind Energy Converters (WECs), it is extremely essential, that the engineers and technicians understand the machines and keep them in good health. In order to ensure, that WWIL's service staffs is deft at handling technical snags on top of the turbine, the necessity of ensuring that they are capable of climbing the tower with absolute ease and comfort has been established. The WWIL Training Academy provides need-based training to meet the training requirements of WWIL projects. The training is contemporary, which results in imparting focused knowledge leading to value addition to the attitude and skills of all trainees. This ultimately leads to creativity in problem solving. The operational and management structure implemented is as follows:



SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

Data/Parameter	$EF_{OM,y}$
Unit	tCO_{2e}/MWh
Description	Operating Margin Emission Factor of Western Regional Electricity Grid, now part of the NEWNE Grid
Source of data	"CO2 Baseline Database for Indian Power Sector" published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO2 Baseline Database for Indian Power Sector" is available at www.cea.nic.in
Value(s) applied	1.0090
Choice of data or measurement methods and procedures	Operating Margin Emission Factor has been calculated by the Central Electricity Authority using the simple OM approach in accordance with ACM0002.
Purpose of data/parameter	To calculate Baseline Emissions Factor
Additional comments	The value is calculated on ex-ante basis and it will remain same throughout the crediting period.

Data/Parameter	$EF_{BM,y}$
Unit	tCO2/MWh
Description	Build Margin emission Factor of Western Regional Electricity Grid, now part of the NEWNE Grid

Source of data	"CO2 Baseline Database for Indian Power Sector" published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO2 Baseline Database for Indian Power Sector" is available at www.cea.nic.in
Value(s) applied	0.5977
Choice of data or measurement methods and procedures	Build Margin emission Factor has been calculated by the Central Electricity Authority using the simple OM approach in accordance with ACM0002.
Purpose of data/parameter	To calculate Baseline Emissions Factor
Additional comments	The value is calculated on ex-ante basis and it will remain same throughout the crediting period.

Data/Parameter	EF_y or $EF_{CM,y}$
Unit	tCO2/MWh
Description	Combined Margin Emission Factor of Western Regional Electricity Grid, now part of the NEWNE Grid
Source of data	Combined Margin Emission Factor ($EF_{CM,y}$) is calculated as the weighted average of Operating Margin Emission Factor ($EF_{OM,y}$) and Build Margin Emission Factor ($EF_{BM,y}$). "CO2 Baseline Database for Indian Power Sector" published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO2 Baseline Database for Indian Power Sector" is available at www.cea.nic.in
Value(s) applied	0.90618
Choice of data or measurement methods and procedures	CEA has calculated it as per ACM0002 with 3 years vintage data and option of ex ante calculation based on "75% of OM and 25% of BM values approach. The "CO2 Baseline Database for Indian Power Sector" is available at www.cea.nic.in
Purpose of data/parameter	To calculate Baseline Emissions Factor
Additional comments	The value is calculated on ex-ante basis and it will remain same throughout the crediting period.

D.2. Data and parameters monitored

(Copy this table for each data or parameter.)

Data/Parameter	$EG_{f1,JMR,export}$, $EG_{f3,JMR,export}$ and $EG_{f4,JMR,export}$
Unit	MWh
Description	Electricity exported by all the WECs (WECs included in the project activity and WECs that are not part of the project activity) connected to feeder1, feeder 3 & feeder 4 at main (feeder 1, feeder 3 and feeder 4) at 33 kV
Measured/calculated/ default	Measured
Source of data	Monthly Joint Meter Reading (JMR)
Value(s) of monitored parameter	Feeder 1: 88,758.38 Feeder 3: 125,727.41 Feeder 4: 151,841.98

Monitoring equipment	Refer section C for an illustration of the provisions for measurement methods
Measuring/reading/recording frequency	Joint Meter Reading of the billing energy meter was carried out on first day of every month in presence of the representatives of the WWIL (the O&M contractor) & MSEDCL (distribution wing of Maharashtra state electricity board). Frequency of recording data: Monthly
Calculation method (if applicable)	Not Applicable
QA/QC procedures	Joint Meter Reading of the billing energy meter was carried out on first day of every month in presence of the representatives of the WWIL (the O&M contractor) & MSEDCL (distribution wing of Maharashtra state electricity board). It can be cross checked against sales invoices raised to state electricity utility by CLPWFK. Electricity meters were calibrated by MSEDCL (distribution wing of Maharashtra state electricity board) on annual basis.
Purpose of data/parameter	This value has not been directly used for estimation of emission reduction.
Additional comments	The data will be electronically archived for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

Data/Parameter	$EG_{f1,JMR,Import}$, $EG_{f3,JMR,Import}$ and $EG_{f4,JMR,Import}$
Unit	MWh
Description	Electricity imported by all the WECs (WECs included in the project activity and WECs that are not part of the project activity) connected to feeder 1, feeder 3 & feeder 4 at main (feeder 1, feeder 3 and feeder 4) at 33 kV.
Measured/calculated/ default	Measured
Source of data	Monthly Joint Meter Reading (JMR)
Value(s) of monitored parameter	Feeder 1: 26.06 Feeder 3: 45.41 Feeder 4: 35.08
Monitoring equipment	Refer section C for an illustration of the provisions for measurement methods
Measuring/reading/recording frequency	Joint Meter Reading of the billing energy meter was carried out on first day of every month in presence of the representatives of the WWIL (the O&M contractor) & MSEDCL (distribution wing of Maharashtra state electricity board). Frequency of recording data: Monthly
Calculation method (if applicable)	Not Applicable

QA/QC procedures	Joint Meter Reading of the billing energy meter was carried out on first day of every month in presence of the representatives of the WWIL (the O&M contractor) & MSEDCL (distribution wing of Maharashtra state electricity board). It can be cross checked against sales invoices raised to state electricity utility by CLPWFK. Electricity meters were calibrated by MSEDCL (distribution wing of Maharashtra state electricity board) on annual basis.
Purpose of data/parameter	This value has not been directly used for estimation of emission reduction.
Additional comments	The data will be electronically archived for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

Data/Parameter	$EG_{f1,y}$, $EG_{f3,y}$ and $EG_{f4,y}$
Unit	MWh
Description	Net Electricity supplied to the grid by the WECs of the project activity connected to feeder 1, feeder 3 & feeder 4.
Measured/calculated/ default	The main and the check meters are connected to the machines of the project activity and other WTGs that are not part of project activity but connected to feeder 1, feeder 3 & feeder 4. The net electricity exported by the project activity is determined by system of apportioning wherein the aggregate electricity exports and imports (recorded by the main or check meter, as applicable) are allocated to project and non-project WECs in proportion to their generated electricity by MSEDCL. The apportioning is done based on LCS meters readings of all WTGs connected to feeder 1, feeder 3 and feeder 4. 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 WECs. 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. CLPWFK does not have any control over the LCS meter readings of other project developers and therefore the values certified by the MSEDCL have been directly used for the purpose of calculating the electricity exports to the grid.
Source of data	Energy Breakup Report certified by MSEDCL
Value(s) of monitored parameter	Feeder 1: 20,031.72 Feeder 3: 67,666.80 Feeder 4: 20,841.42
Monitoring equipment	Calculated from monitored parameters
Measuring/reading/recording frequency	Monthly (Calculated).
Calculation method (if applicable)	Refer to Section C
QA/QC procedures	The net electricity supplied to the grid can be verified from the Energy

	Breakup Report certified by MSEDCL and same can be cross checked against sales invoices raised to state electricity utility by CLPWFK.
Purpose of data/parameter	This value has been used to calculate baseline emission calculations.
Additional comments	The data will be electronically archived for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

Data/Parameter	EG_y
Unit	MWh
Description	Net electricity supplied to the grid by the Project activity
Measured/calculated/ default	Net Electricity supplied to the grid is calculated based on the net electricity supplied to the grid by the Turbines of the project activity connected to feeder 1 ($EG_{f1,y}$), feeder 2 ($EG_{f2,y}$) and net electricity supplied to the grid by the Turbines of the project activity connected to feeder 3 ($EG_{f3,y}$).
Source of data	Energy Breakup Report certified by MSEDCL
Value(s) of monitored parameter	40,769.39
Monitoring equipment	Calculated from monitored parameters
Measuring/reading/recording frequency	Monthly (Calculated)
Calculation method (if applicable)	Refer to Section C
QA/QC procedures	The net electricity supplied to the grid can be verified from the Energy Breakup Report certified by MSEDCL and same can be cross checked against sales invoices raised to state electricity utility by CLPWFK.
Purpose of data/parameter	This value has been used to calculate baseline emission calculations.
Additional comments	The data will be electronically archived for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

D.3. Implementation of sampling plan

>>
Not Applicable for this project activity

SECTION E. Calculation of emission reductions or net anthropogenic removals

E.1. Calculation of baseline emissions or baseline net removals

>>
The baseline is the electricity produced by the renewable generating unit multiplied by an emission coefficient (measured in tCO_{2e}/MWh) calculated in a transparent and conservative manner as the weighted average emissions (in tCO_{2e}/MWh) as described in registered PDD.

BEy = EGy * EFy

Where,

BE is baseline emissions in year y, tCO2e

EGy is the net electricity supplied to the grid in year y and is applied directly from JMR certified by state utility. This value can also be cross checked from the invoice.

EFy is the CO2 emission factor of the grid (0.90618 tCO2e/MWh fixed ex-ante).

The details of electricity generation during the monitoring period are presented below:

Duration			$EG_{f1,y}$	$EG_{f3,y}$	$EG_{f4,y}$	EG_y
			MWh	MWh	MWh	MWh
30-Mar-19	To	1-Apr-19	18.07	57.66	14.46	90.18
1-Apr-19	To	1-May-19	443.04	1,642.40	344.37	2,429.81
1-May-19	To	1-Jun-19	579.39	1,803.83	500.95	2,884.17
1-Jun-19	To	1-Jul-19	661.67	1,838.11	617.27	3,117.06
1-Jul-19	To	1-Aug-19	970.73	2,881.66	1,032.82	4,885.21
1-Aug-19	To	1-Sep-19	752.44	2,352.93	914.87	4,020.25
1-Sep-19	To	1-Oct-19	215.96	1,452.36	542.27	2,210.59
1-Oct-19	To	1-Nov-19	87.52	823.64	256.80	1,167.96
1-Nov-19	To	1-Dec-19	54.80	681.80	233.42	970.02
1-Dec-19	To	1-Jan-20	62.51	708.49	289.02	1,060.02
1-Jan-20	To	1-Feb-20	194.72	756.17	235.13	1,186.02
1-Feb-20	To	1-Mar-20	195.96	917.92	259.01	1,372.90
1-Mar-20	To	1-Apr-20	246.26	913.11	248.39	1,407.76
1-Apr-20	To	1-May-20	297.51	1,113.16	230.71	1,641.38
1-May-20	To	1-Jun-20	553.19	1,591.65	455.43	2,600.26
1-Jun-20	To	1-Jul-20	457.59	1,125.04	377.44	1,960.07
1-Jul-20	To	1-Aug-20	579.34	1,137.17	518.84	2,235.35
1-Aug-20	To	1-Sep-20	1,153.59	2,703.96	1,096.18	4,953.72
1-Sep-20	To	17-Sep-20	138.68	317.20	120.76	576.64
Total			**7,662.98**	**24,818.28**	**8,288.13**	**40,769.39**

Baseline Emission (BEy) = 40,769.39 MWh * 0.90618 tCO_2/MWh

=36,944 tCO_2 (after rounding down)

E.2. Calculation of project emissions or actual net removals

>>

The project activity uses wind power to generate electricity and hence the emissions from the project activity have been taken as zero.

PEy = 0

E.3. Calculation of leakage emissions

>>

No leakage has been considered from the project activity as per approved methodology ACM0002.

Ly = 0

E.4. Calculation of emission reductions or net anthropogenic removals

	Baseline GHG emissions or baseline net GHG removals (t CO_2e)	Project GHG emissions or actual net GHG removals (t CO_2e)	Leakage GHG emissions (t CO_2e)	GHG emission reductions or net anthropogenic GHG removals (t CO_2e)			
				Before 01/01/ 2013	From 01/01/ 2013 until 31/12/ 2020	From 01/01/ 2021	Total amount
Total	36,944	0	0	0	36,944	0	36,944

E.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the registered PDD

Amount achieved during this monitoring period (t CO_2e)	Amount estimated ex ante for this monitoring period in the PDD (t CO_2e)
36,944	35,500

E.5.1. Explanation of calculation of "amount estimated ex ante for this monitoring period in the PDD"

>>

Start Date of Monitoring Period	:30/03/2019
End Date of Monitoring Period	:17/09/2020
No. of Days in Monitoring Period (Including both days)	:538 days
Estimated ER per year as per Registered PDD:	: 24,085 tCO2
Estimated ER for the Monitoring Period	= 24,085 * 538/365 tCO2
	= 35,500 tCO2

E.6. Remarks on increase in achieved emission reductions

>>

The actual emission reduction achieved during this monitoring period is 4.07% higher than the estimated value as per registered PDD which is due to higher wind availability at site. Wind availability is a natural phenomenon which is beyond the control of PP. However, higher electricity generation (±10%) was already considered during validation in the sensitivity analysis and the incremental generation of (4.07%) electricity is within the limit of sensitivity analysis.

E.7. Remarks on scale of small-scale project activity

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NA

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Document information

Version	*Date*	*Description*
08.0	6 April 2021	Revision to: • Reflect the “Clarification: Regulatory requirements under temporary measures for post-2020 cases” (CDM-EB109-A01-CLAR).
07.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN); • Add a section on remarks on the observance of the scale limit of small-scale project activity during the crediting period; • Add "changes specific to afforestation or reforestation project activity" as a possible post-registration changes; • Clarify the reporting of net anthropogenic GHG removals for A/R project activities between two commitment periods; • Make editorial improvements.
06.0	7 June 2017	Revision to: • Ensure consistency with version 01.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN); • Make editorial improvements.
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.
04.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from *F-CDM-MR* to *CDM-MR-FORM*; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.

Version	*Date*	*Description*
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB 70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01.0	28 May 2010	EB 54, Annex 34. Initial adoption.

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