



**Monitoring report form  
(Version 05.1)**

**MONITORING REPORT**

<b>Title of the project activity</b>	Roaring 40s Wind Farms (Khandke) Private Limited - Phase II	
<b>UNFCCC reference number of the project activity</b>	3298	
<b>Version number of the monitoring report</b>	01	
<b>Completion date of the monitoring report</b>	12/12/2016	
<b>Monitoring period number and duration of this monitoring period</b>	Monitoring Period Number: 02 Duration: From 01/01/2012 to 31/12/2012 (Both days inclusive)	
<b>Project participant(s)</b>	CLP Wind Farms (Khandke) Private Limited	
<b>Host Party</b>	India	
<b>Sectoral scope(s)</b>	Sectoral scope 1: Energy Industries (Renewable - /non-renewable sources).	
<b>Selected methodology(ies)</b>	"Consolidated baseline and monitoring methodology for "Grid-connected electricity generation from renewable sources"  Reference: Approved Consolidated baseline methodology ACM0002 (Version 9)	
<b>Selected standardized baseline(s)</b>	NA	
<b>Estimated amount of GHG emission reductions or net GHG removals by sinks for this monitoring period in the registered PDD</b>	33,410	
<b>Total amount of GHG emission reductions or net GHG removals by sinks achieved in this monitoring period</b>	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	37,314	0

## **SECTION A. Description of project activity**

### **A.1. Purpose and 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-II of the project consisting of 24 machines of 800 kW each, amounting to 19.2 MW.

The purpose of the project activity is to development, design, engineering, procurement, finance, construction, operation and maintenance of the project activity, 19.2 MW phase-II 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. Enercon (India) Limited ("Enercon") 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 Enercon 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 Karnataka, diversification of grid supply and reduction of greenhouse gas emissions. The first machine was commissioned on 18/02/2008 and the last machine was commissioned on 28/05/2008. The expected operational lifetime of the project is for 20 years.

The total emission reductions achieved under this monitoring period from 01/01/2012 to 31/12/2012 (including first and last day) are 37,314 tCO<sub>2</sub>.

### **A.2. Location of project activity**

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#### **(a) Host Party (ies);**

India

#### **(b) Region/ State/ Province, etc.;**

Western Region/Maharashtra State in India

#### **(c) City/ Town/ Community, etc.;**

The Project is spread across Ratadgaon, Agadgaon, Ranjani, Agadgaon, Balewadi and Pimpalgaon Ghat villages in Khandke Taluk of Ahmednagar District of Maharashtra state in India.

#### (d) Physical/ Geographical location

The project area extends between latitude 19°, 6' to 19°, 11' North and longitude 74°, 49.5' to 74°, 57.5 East. The Project is connected to the EIL 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	Name of Village	Feeder No	Latitude	Longitude
105	R 40s K-22	Agadgaon	2	N19 08 50.9	E74 52 34.6
106	R 40s K-23			N19 08 43.1	E74 52 38.4
107	R 40s K-24			N19 08 42.9	E74 52 23.8
108	R 40s K-25	Ratadgaon		N19 08 41.8	E74 52 05.5
109	R 40s K-26			N19 08 34.0	E74 52 07.8
111	R 40s K-27			N19 08 28.2	E74 52 20.2
114	R 40s K-28			N19 07 57.6	E74 52 37.4
116	R 40s K-29			N19 07 51.9	E74 51 52.9
117	R 40s K-30			N19 07 44.9	E74 51 58.6
98	R 40s K-31	Agadgaon		N19 09 40.0	E74 52 49.0
225	R 40s K-32	Ranjani		N19 10 26.6	E74 55 07.5
226	R 40s K-33			N19 10 24.7	E74 54 36.2
21	R 40s K-34	Ratadgaon	3	N19 07 46.6	E74 49 59.9
217	R 40s K-35	Balewadi	1	N19 08 45.2	E74 56 00.1
218	R 40s K-36			N19 08 36.7	E74 56 04.7
219	R 40s K-37			N19 08 30.7	E74 56 00.3
220	R 40s K-38			N19 08 19.5	E74 55 53.8
146	R 40s K-39	Pimpalgaon Ghat		N19 07 56.2	E74 56 43.2
147	R 40s K-40			N19 07 41.4	E74 56 55.3
148	R 40s K-41			N19 07 41.4	E74 56 55.3
149	R 40s K-42			N19 07 36.8	E74 57 04.1
150	R 40s K-43			N19 07 32.6	E74 57 08.1
151	R 40s K-44			N19 07 19.4	E74 57 05.6

WEG Loc No.	Unique Identification of WECs	Name of Village	Feeder No	Latitude	Longitude
152	R 40s K-45			N19 07 05.3	E74 57 43.5

**A.3. Parties and project participant(s)**

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate whether the Party involved wishes to be considered as project participant (yes/no)
India (host)	CLP Wind Farms (Khandke) Pvt. Ltd. (Private entity)	No

**A.4. Reference of applied methodology and standardized baseline**

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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 9)

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 of project activity**

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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 04/12/2010 and length of crediting period is 10 year (from 04/12/2010 – 03/12/2020).

**A.6. Contact information of responsible persons/entities**

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Mr. Mahesh Makhija

Director – Business Development – Renewables

CLP Wind Farms (Khandke) Private Limited is the project participant in this project. Detailed contact information are mentioned in Appendix-1

**SECTION B. Implementation of project activity****B.1. Description of implemented registered 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 24-wind energy converters (WECs) of Enercon 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 up to 33 kV. The Project can operate in the frequency range of 47.5–51.5 Hz and in the voltage range of 400 V  $\pm$  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 Enercon India Ltd. 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 18/02/2008 and the last machine was commissioned on 28/05/2008. The project activity consists of 24 machines of 800kW each amounting to a total of 19.2 MW. The commissioning schedule is provided below:

WEG Loc No.	Unique Identification of WECs	Date of Commissioning
105	R 40s K-22	18-Feb-08
106	R 40s K-23	18-Feb-08
107	R 40s K-24	18-Feb-08
108	R 40s K-25	18-Feb-08
109	R 40s K-26	18-Feb-08
111	R 40s K-27	18-Feb-08
114	R 40s K-28	18-Feb-08
116	R 40s K-29	18-Feb-08
117	R 40s K-30	18-Feb-08
98	R 40s K-31	31-Mar-08
225	R 40s K-32	12-May-08
226	R 40s K-33	12-May-08
21	R 40s K-34	23-May-08
217	R 40s K-35	31-Mar-08
218	R 40s K-36	31-Mar-08
219	R 40s K-37	31-Mar-08
220	R 40s K-38	31-Mar-08
146	R 40s K-39	12-May-08
147	R 40s K-40	28-May-08
148	R 40s K-41	23-May-08
149	R 40s K-42	12-May-08
150	R 40s K-43	12-May-08
151	R 40s K-44	31-May-08
152	R 40s K-45	28-May-08

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 Enercon 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 registered monitoring plan, applied methodology or applied standardized baseline**

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Not applicable

**B.2.2. Corrections**

&gt;&gt;

Not applicable

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

&gt;&gt;

Not applicable

**B.2.4. Inclusion of a monitoring plan to the registered PDD that was not included at registration**

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Not applicable

**B.2.5. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline**

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Not applicable

**B.2.6. Changes to project design of registered project activity**

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Not applicable

**B.2.7. Types of 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 9 - 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 2 & feeder 3 at main (feeder 1, feeder 2 and feeder 3) 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 2 & feeder 3 at main (feeder 1, feeder 2 and feeder 3) at 33 kV.

- Net Electricity supplied to the grid by the WECs of the project activity connected to feeder 1, feeder 2 & feeder 3.
- Energy Breakup Report certified by MSEDCL. (Net Electricity supplied to the grid is summation of net electricity supplied to the grid by the WECs of the project activity connected to feeder 1 ( $EG_{f1,y}$ ), feeder 2 ( $EG_{f2,y}$ ) and feeder 3 ( $EG_{f3,y}$ ) 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 Enercon. Enercon is an ISO 9001:2000 certified Quality Management system. Enercon 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 will adhere to all the mandatory regulatory and statutory requirements at the state as well as national level.

Enercon is Operation and Maintenance contractor for the project activity and provides the daily generation report to the Project proponent. The project proponent 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 will adhere to all the mandatory regulatory and statutory requirements at the state as well as national level. Enercon is Operation and Maintenance contractor for the project activity and provides the daily generation report to the Project proponent. The project proponent also maintains the records of daily generation report and joint meter report.

### **Calibration Details**

The metering equipment 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	04880812 (Main Meter)	0.2s	02/09/2011	01/09/2012
		14796486 (Main Meter)	0.2s	07/08/2012	06/08/2013
2	FEEDER -2	04880814 (Main Meter)	0.2s	02/09/2011	01/09/2012



Sl. No.	Transformer No	Meter Identification No	Accuracy Class	Calibration Date	Calibration Validity Date
		14796488 (Main Meter)	0.2s	10/08/2012	09/08/2013
3	FEEDER -3	04880816 (Main Meter)	0.2s	02/09/2011	01/09/2011
		14796497 (Main Meter)	0.2s	10/08/2012	09/08/2013

### **Monitoring Information**

- **Metering:** Electricity supplied to the grid is metered by MSEDCL in the presence of representatives of Enercon (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:** 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 Enercon, O&M contractor, on behalf of CLPWFK. The Joint meter reading contains the value of energy imported and exported and the net export to the grid during the recording period. This Joint meter reading is certified by the Executive engineer of the utility and by Enercon Officials. The procedure for calculating net electricity supplied to the grid is described below. The net electricity supplied to the grid can be cross verified from the Energy Breakup Report certified by MSEDCL.
- **Inspection of Energy Meters:** All the main and check energy meters (export and import) and all associated instruments, transformers installed at the Project 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 check and main meter for each 33 kV bay. The Main meter will be tested for accuracy, with a portable standard meter, by the MSEDCL's Testing Division. The MSEDCL will carry out the calibration, periodical testing, sealing and maintenance of meters. All the meters will be tested at the Metering Point. The MSEDCL will provide 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 Enercon 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 during a monitoring period connected to feeder 1 ( $EG_{f1,gross,y}$ ), feeder-2 ( $EG_{f2,gross,y}$ ) and feeder 3 ( $EG_{f3,gross,y}$ ) is noted from central monitoring system database by Enercon as:

$$\begin{array}{ccccc} N_{f1} & \text{And} & N_{f2} & \text{And} & N_{f3} \\ \sum_{y=0} EG_{f1,gross,y} & & \sum_{y=0} EG_{f2,gross,y} & & \sum_{y=0} EG_{f3,gross,y} \end{array}$$

Where

- $N_{f1}$  = Number of Turbines comprising the Project activity connected to the feeder 1
- $N_{f2}$  = Number of Turbines comprising the Project activity connected to the feeder 2
- $N_{f3}$  = Number of Turbines comprising the Project activity connected to the feeder 3
- $EG_{f1,gross,y}$  = Electricity generation from other Turbines connected to feeder 1
- $EG_{f2,gross,y}$  = Electricity generation from other Turbines connected to feeder 2
- $EG_{f3,gross,y}$  = Electricity generation from other Turbines connected to feeder 3

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

$$\begin{array}{ccccc} M_{f1} & \text{And} & M_{f2} & \text{And} & M_{f3} \\ \sum_{y=0} EG_{f1,gross,x} & & \sum_{y=0} EG_{f2,gross,x} & & \sum_{y=0} EG_{f3,gross,x} \end{array}$$

Where

- $M_{f1}$  = Number of Turbines that are not part of the project activity but are connected to the feeder 1
- $M_{f2}$  = Number of Turbines that are not part of the project activity but are connected to the feeder 2
- $M_{f3}$  = Number of Turbines that are not part of the project activity but are connected to the feeder 3

## • 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 2 and feeder 3 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 Enercon (the O&M contractor) & the state electricity utility (MSETCL). The JMR gives both the “export” and “import” of the electricity to/ from the grid, which forms the basis on which the utility makes the payment to the project proponent. Electricity export and import for feeder 1, feeder 2 and feeder 3 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 2:  $EG_{f2,JMR,export}$

Electricity Import from feeder 2:  $EG_{f2,JMR,import}$

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

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

### 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.

This apportioning activity is carried out by Enercon, the O&M contractor. Operation and maintenance personnel from Enercon prepare a monthly report on generation and consumption. This report contains details of power exported/imported to/from the grid by each of the wind turbines connected to the feeder.

$EG_{f1,export}$  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 2,  $EG_{f1,export}$ ,  $EG_{f1,import}$  and  $EG_{f1,y}$ , is calculated as follows:

$EG_{f2,export}$  is the electricity supplied to the grid by turbines of the project activity connected to feeder 2 is calculated as follows:

$$EG_{f2,export} = \frac{EG_{f2,JMR, export} \times \sum_{y=0}^N EG_{f2,gross,y}}{\sum_{y=0}^N EG_{f2,gross,y} + \sum_{y=0}^M EG_{f2,gross,y}}$$

$EG_{f2,import}$  is the electricity drawn from the grid by turbines of the project activity connected to feeder 2 is calculated as follows:

$$EG_{f2,import} = \frac{EG_{f2,JMR, import} \times \sum_{y=0}^N EG_{f2,gross,y}}{\sum_{y=0}^N EG_{f2,gross,y} + \sum_{y=0}^M EG_{f2,gross,y}}$$

$EG_{f2,y}$  is the net electricity supplied to the grid by Turbines of the project activity connected to feeder 2, is calculated as follows:

$$EG_{f2,y} = EG_{f2,export} - EG_{f2,import}$$

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:

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

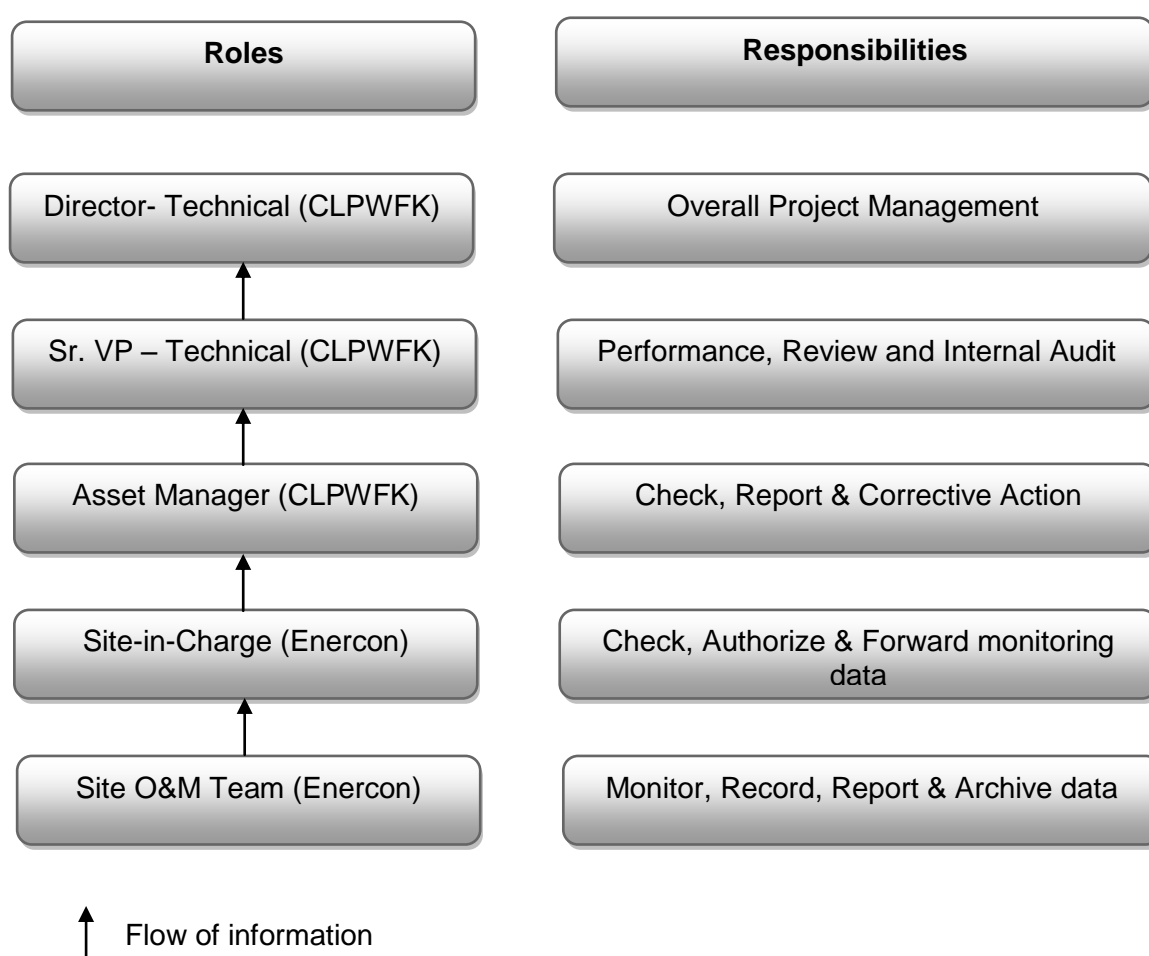
Net electricity exported to the grid by the project activity is calculated as:

$$EG_y = EG_{f1, y} + EG_{f2, y} + EG_{f3, y}$$

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.

Enercon operates an ISO 9001:2000 certified Quality Management system from Germanischer Lloyd. Enercon 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 will adhere to all the mandatory regulatory and statutory requirements at the state as well as national level. Enercon is Operation and Maintenance contractor for the project activity and provides the daily generation report to the Project proponent. The project proponent also maintains the records of daily generation report and joint meter report.

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 Enercon'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 Enercon Training Academy provides need-based training to meet the training requirements of Enercon 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 or at renewal of crediting period

Data/parameter:	$EF_{OM,y}$
Unit	tCO <sub>2e</sub> /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 <a href="http://www.cea.nic.in">www.cea.nic.in</a>
Value(s) applied)	0.99455
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	To calculate Baseline Emissions Factor
Additional comments	The value is calculated on ex-ante basis and it will remain same throughout the crediting period.

<b>Data/parameter:</b>	$EF_{BM,y}$
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 <a href="http://www.cea.nic.in">www.cea.nic.in</a>
Value(s) applied)	0.77722
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	To calculate Baseline Emissions Factor
Additional comments	The value is calculated on ex-ante basis and it will remain same throughout the crediting period.

<b>Data/parameter:</b>	$EF_y$ 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 <a href="http://www.cea.nic.in">www.cea.nic.in</a>
Value(s) applied)	0.94022
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 <a href="http://www.cea.nic.in">www.cea.nic.in</a>
Purpose of data	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**

<b>Data/parameter:</b>	$EG_{f1,JMR,export}$ , $EG_{f2,JMR,export}$ and $EG_{f3,JMR,export}$
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 2 & feeder 3 at main (feeder 1, feeder 2 and feeder 3) at 33 kV
Measured/calculated/default	Measured
Source of data	Monthly Joint Meter Reading (JMR)
Value(s) of monitored parameter	Feeder 1: 25,415.96 Feeder 2: 45,253.95 Feeder-3: 35,101.62
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 is carried out on first day of every month in presence of the representatives of the Enercon (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 is carried out on first day of every month in presence of the representatives of the Enercon (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 will be calibrated by MSEDCL (distribution wing of Maharashtra state electricity board) on annual basis.
Purpose of data:	This value will not be 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.

<b>Data/parameter:</b>	$EG_{f1,JMR,Import}$ , $EG_{f2,JMR,Import}$ and $EG_{f3,JMR,Import}$
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 2 & feeder 3 at main (feeder 1, feeder 2 and feeder 3) at 33 kV.
Measured/calculated/default	Measured
Source of data	Monthly Joint Meter Reading (JMR)



Value(s) of monitored parameter	Feeder 1: 7.93 Feeder 2: 11.08 Feeder-3: 9.57
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 is carried out on first day of every month in presence of the representatives of the Enercon (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 is carried out on first day of every month in presence of the representatives of the Enercon (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 will be calibrated by MSEDCL (distribution wing of Maharashtra state electricity board) on annual basis.
Purpose of data:	This value will not be 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.

<b>Data/parameter:</b>	$EG_{f1,y}$ , $EG_{f2,y}$ and $EG_{f3,y}$
Unit	MWh
Description	Net Electricity supplied to the grid by the WECs of the project activity connected to feeder 1, feeder 2 & feeder 3.
Measured/calculated/default	<p>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 2 &amp; feeder 3.</p> <p>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.</p> <p>The apportioning will be done based on LCS meters readings of all WTGs connected to feeder 2 and 3. 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.</p>

	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.
Source of data	Energy Breakup Report certified by MSEDCL
Value(s) of monitored parameter	Feeder 1: 19,668.22 Feeder 2: 18,233.27 Feeder-3: 1,785.93
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 is carried out on first day of every month in presence of the representatives of the Enercon (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 is carried out on first day of every month in presence of the representatives of the Enercon (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 will be calibrated by MSEDCL (distribution wing of Maharashtra state electricity board) on annual basis.
Purpose of data:	This value would be used to calculate baseline emission.
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.

<b>Data/parameter:</b>	EGy
Unit	MWh
Description	Net electricity supplied to the grid by the Project activity
Measured/calculated/default	The net electricity exported by the project activity is determined by apportioning of aggregate electricity exports and imports (recorded by the main or check meter, as applicable). The allocation is done by O&M contractor (Enercon) and apportioned values for energy export and import are certified by the MSEDCL in the Energy Breakup Report.
Source of data	Energy Breakup Report certified by MSEDCL
Value(s) of monitored parameter	39,687.42

Monitoring equipment	Refer section C for an illustration of the provisions for measurement methods
Measuring/reading/recording frequency:	<p>This is calculated parameter based on parameters which are measured continuously.</p> <p>Frequency of recording data: Monthly</p> <p><b>Recording:</b> The values of Net Electricity Exported to the grid by the project are sourced from monthly billing records given by Electricity Board. This record provides data for entire project WECs.</p>
Calculation method (if applicable):	Not Applicable
QA/QC procedures:	<p>Joint Meter Reading of the billing energy meter is carried out on first day of every month in presence of the representatives of the Enercon (the O&amp;M contractor) &amp; MSEDCL (distribution wing of Maharashtra state electricity board).</p> <p>It can be cross checked against sales invoices raised to state electricity utility by CLPWFK.</p> <p>Electricity meters will be calibrated by MSEDCL (distribution wing of Maharashtra state electricity board) on annual basis.</p>
Purpose of data:	This value would be used to calculate baseline emission.
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 GHG removals by sinks

### E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

>>

The baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO<sub>2e</sub>/kWh) calculated in a transparent and conservative manner as the weighted average emissions (in kg CO<sub>2e</sub>/kWh) as described in registered PDD.

$$BE_y = EG_y * EF_y$$

Where,

BE is baseline emissions in year y, tCO<sub>2e</sub>

EG<sub>y</sub> 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 (0.94022 tCO2e/MWh fixed ex-ante).

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

Duration			EG <sub>f1,JMR,export</sub>	EG <sub>f2,JMR,export</sub>	EG <sub>f3,JMR,export</sub>
Start		End	MWh	MWh	MWh
01/01/2012	To	31/01/2012	806.00	1,781.20	1,493.60
31/01/2012	To	29/02/2012	740.60	1,771.60	1,570.80
29/02/2012	To	31/03/2012	1,054.40	2,197.20	1,944.80
31/03/2012	To	30/04/2012	1,493.40	2,799.80	2,377.00
30/04/2012	To	31/05/2012	2,829.60	6,062.40	4,272.20
31/05/2012	To	30/06/2012	3,813.40	6,295.40	4,529.00
30/06/2012	To	31/07/2012	4,826.00	8,257.20	5,648.00
31/07/2012	To	31/08/2012	4,140.00	6,858.00	5,103.60
31/08/2012	To	01/10/2012	2,986.80	3,828.00	2,886.00
01/10/2012	To	31/10/2012	792.00	1,526.40	1,675.20
31/10/2012	To	30/11/2012	998.40	2,062.80	1,891.20
30/11/2012	To	31/12/2012	935.36	1,813.95	1,710.22
Total			25,415.96	45,253.95	35,101.62

Duration			EG <sub>f1,JMR,import</sub>	EG <sub>f2,JMR,import</sub>	EG <sub>f3,JMR,import</sub>
Start		End	MWh	MWh	MWh
01/01/2012	To	31/01/2012	0.80	1.40	1.20
31/01/2012	To	29/02/2012	0.20	0.40	0.60
29/02/2012	To	31/03/2012	0.60	0.60	0.40
31/03/2012	To	30/04/2012	0.60	1.00	1.20
30/04/2012	To	31/05/2012	0.20	0.20	0.00
31/05/2012	To	30/06/2012	0.60	1.00	0.80
30/06/2012	To	31/07/2012	0.40	0.40	0.40
31/07/2012	To	31/08/2012	1.20	1.20	0.00
31/08/2012	To	01/10/2012	1.20	1.20	0.00
01/10/2012	To	31/10/2012	0.00	1.20	2.40
31/10/2012	To	30/11/2012	1.20	1.20	1.20
30/11/2012	To	31/12/2012	0.93	1.28	1.37
Total			7.93	11.08	9.57

Duration			EG <sub>f1,y</sub>	EG <sub>f2,y</sub>	EG <sub>f3,y</sub>	EG <sub>PJ,y</sub>
Start		End	MWh	MWh	MWh	MWh
01/01/2012	To	31/01/2012	636.01	834.61	74.89	1,545.51
31/01/2012	To	29/02/2012	503.77	836.56	80.99	1,421.31

Duration			EG <sub>f1,y</sub>	EG <sub>f2,y</sub>	EG <sub>f3,y</sub>	EG <sub>PJ,y</sub>
Start		End	MWh	MWh	MWh	MWh
29/02/2012	To	31/03/2012	817.15	1,047.18	97.77	1,962.09
31/03/2012	To	30/04/2012	1,146.90	1,330.34	134.83	2,612.07
30/04/2012	To	31/05/2012	2,121.01	2,744.56	246.50	5,112.07
31/05/2012	To	30/06/2012	2,987.64	2,735.45	213.44	5,936.53
30/06/2012	To	31/07/2012	3,764.00	1,359.68	266.33	5,390.01
31/07/2012	To	31/08/2012	3,206.09	3,113.01	247.76	6,566.85
31/08/2012	To	01/10/2012	2,355.18	1,680.26	125.43	4,160.87
01/10/2012	To	31/10/2012	610.72	738.91	92.72	1,442.35
31/10/2012	To	30/11/2012	780.92	998.86	107.66	1,887.43
30/11/2012	To	31/12/2012	738.86	813.85	97.62	1,650.33
<b>Total</b>			<b>19,668.22</b>	<b>18,233.27</b>	<b>1,785.93</b>	<b>39,687.42</b>

Baseline Emission (BE<sub>y</sub>) = 39,687.42 MWh \* 0.94022 tCO<sub>2</sub>/MWh  
= 37,314.00 tCO<sub>2</sub> (after rounding down)

## E.2. Calculation of project emissions or actual net GHG removals by sinks

>>

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

$$PE_y = 0$$

## E.3. Calculation of leakage

>>

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

$$L_y = 0$$

## E.4. Summary of calculation of emission reductions or net GHG removals by sinks

Item	Baseline emissions or baseline net GHG removals by sinks (t CO <sub>2</sub> e)	Project emissions or actual net GHG removals by sinks (t CO <sub>2</sub> e)	Leakage (t CO <sub>2</sub> e)	GHG emission reductions or net GHG removals by sinks (t CO <sub>2</sub> e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
<b>Total</b>	37,314	0	0	37,314	0	37,314

## E.5. Comparison of actual emission reductions or net GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex ante calculation of registered PDD	Actual values achieved during this monitoring period
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Item	Values estimated in ex ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO <sub>2</sub> e)	33,319	37,314

**E.6. Remarks on difference from estimated value in registered PDD**

&gt;&gt;

The actual emission reduction achieved during this monitoring period is 11.69% 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.

## Appendix 1. Contact information of project participants and responsible persons/entities

<b>Project participant and/or responsible person/ entity</b>	<input checked="" type="checkbox"/> Project participant <input checked="" type="checkbox"/> Person/entity responsible for completing the CDM-MR-FORM
<b>Organization name</b>	CLP Wind Farms (Khandke) Private Limited
<b>Street/P.O. Box</b>	15th Floor
<b>Building</b>	Oberoï Commerz, Off. Western Express Highway, Goregaon (E)
<b>City</b>	Mumbai
<b>State/region</b>	Maharashtra
<b>Postcode</b>	400 063
<b>Country</b>	India
<b>Telephone</b>	+ 91 22 6758 8888
<b>Fax</b>	+ 91 22 6758 8811
<b>E-mail</b>	<a href="mailto:carbon@clpindia.in">carbon@clpindia.in</a>
<b>Website</b>	<a href="http://www.clpindia.in">www.clpindia.in</a>
<b>Contact person</b>	
<b>Title</b>	Director
<b>Salutation</b>	Mr.
<b>Last name</b>	Makhija
<b>Middle name</b>	
<b>First name</b>	Mahesh
<b>Department</b>	Business Development– Renewables
<b>Mobile</b>	
<b>Direct fax</b>	+ 91 22 6758 8811
<b>Direct tel.</b>	+ 91 22 6758 8888
<b>Personal e-mail</b>	<a href="mailto:carbon@clpindia.in">carbon@clpindia.in</a>

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**Document information**

<i>Version</i>	<i>Date</i>	<i>Description</i>
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: <ul style="list-style-type: none"> <li>• Include provisions related to delayed submission of a monitoring plan;</li> <li>• Provisions related to the Host Party;</li> <li>• Remove reference to programme of activities;</li> <li>• Overall editorial improvement.</li> </ul>
04.0	25 June 2014	Revisions to: <ul style="list-style-type: none"> <li>• Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0));</li> <li>• Include provisions related to standardized baselines;</li> <li>• Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1;</li> <li>• Change the reference number from <i>F-CDM-MR</i> to <i>CDM-MR-FORM</i>;</li> <li>• Editorial improvement.</li> </ul>
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.
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 (EB70, 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	28 May 2010	EB 54, Annex 34. Initial adoption.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: monitoring report		