



**Monitoring report form for CDM project activity  
(Version 06.0)**

**MONITORING REPORT**

|   |  |  |
|---|--|--|
| <b>Title of the project activity</b>  | 8.75 MW Wind Power Project in Gujarat  |  |
| <b>UNFCCC reference number of the project activity</b>  | 0776 <sup>1</sup>  |  |
| <b>Version number of the PDD applicable to this monitoring report</b>   | 1.1  |  |
| <b>Version number of this monitoring report</b>   | 01   |  |
| <b>Completion date of this monitoring report</b>  | 19/09/2018   |  |
| <b>Monitoring period number</b>   | 04 <sup>th</sup>   |  |
| <b>Duration of this monitoring period</b>   | 01/07/2011 to 31/12/2012 (both first & last date included)                                     |  |
| <b>Monitoring report number for this monitoring report</b>  | Not Applicable   |  |
| <b>Project participants</b>   | M/s Rolex Rings Private Limited<br>Mitsubishi Corporation<br>Emergent Ventures India Pvt. Ltd. |  |
| <b>Host Party</b>   | India  |  |
| <b>Sectoral scopes</b>  | 1 : Energy industries (renewable / non-renewable sources)                                      |  |
| <b>Applied methodologies and standardized baselines</b>   | AMS-I.D. ver. 9- Grid connected renewable electricity generation                               |  |
| <b>Amount of GHG emission reductions or net anthropogenic GHG removals achieved by the project activity in this monitoring period</b> | <b>Amount achieved before 1 January 2013</b>   | <b>Amount achieved from 1 January 2013</b> |
|   | 13,273 tCO <sub>2</sub> e  | 0 tCO <sub>2</sub> e                       |
| <b>Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD</b>    | 23,118 tCO <sub>2</sub> e  |  |

<sup>1</sup> <http://cdm.unfccc.int/Projects/DB/RWTUV1163765609.51/view>

## SECTION A. Description of project activity

### A.1. General description of project activity

This is a wind energy project of capacity 8.75 MW comprising 7 Wind Turbine Generators (WTG's) of 1.25 MW each. The WTG's are located at sites Bhogat, Lamba and Mandvi. The project activity is executed in a phased manner during March 2003 to March 2005.

The project conceptualizes wheeling of electricity, produced at wind energy farms, using state grid to the investing company for its internal use. Rolex Rings Private Limited, referred to as RRPL hereafter, has business interests in the area of auto component manufacturing. RRPL generates electrical power using wind energy at their wind farms in Gujarat. Power is wheeled to the forging and component manufacturing plant at Rajkot, Gujarat. Gujarat State Electricity Board grid (part of Western Regional (WR) grid in India) network is used for transmission of power to RRPL plant.

The table below contains the commissioning dates for WTGs. These are also the start date of operation of WTGs respectively:

| Capacity | Unique ID | Location | Commissioning Date |
|----------|-----------|----------|--------------------|
| 1.25 MW  | B1        | Bhogat   | 27/03/2003         |
| 1.25 MW  | B2        | Bhogat   | 29/07/2003         |
| 1.25 MW  | B4        | Bhogat   | 29/07/2003         |
| 1.25 MW  | W06       | Lamba    | 01/06/2005         |
| 1.25 MW  | V09       | Vanku    | 29/04/2006         |
| 1.25 MW  | V10       | Vanku    | 18/04/2006         |
| 1.25 MW  | V18       | Vanku    | 29/04/2006         |

Total emission reductions achieved in the monitoring period are 13,273 tCO<sub>2</sub>e.

### A.2. Location of project activity

The project sites are located in the State of Gujarat.

| Capacity | Unique ID | Location | Latitude/Longitude                  |
|----------|-----------|----------|-------------------------------------|
| 1.25 MW  | B1        | Bhogat   | 21° 57' 26.28"N, 69° 13' 19.5594"E  |
| 1.25 MW  | B2        | Bhogat   | 21° 57' 41.76"N , 69° 13' 30.72"E   |
| 1.25 MW  | B4        | Bhogat   | 21° 57' 48.5994"N, 69° 13' 23.52"E  |
| 1.25 MW  | W06       | Lamba    | 21° 51' 53.2794"N, 69° 19' 27.12"E  |
| 1.25 MW  | V09       | Vanku    | 23° 6' 51.8394"N, 68° 49' 59.8794"E |
| 1.25 MW  | V10       | Vanku    | 23° 6' 38.88"N, 68° 49' 59.8794"E   |
| 1.25 MW  | V18       | Vanku    | 23° 6' 40.6794"N, 68° 50' 27.9594"E |



### 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 Party) | Rolex Rings Private Limited (RRPL) | No   |
| Government of Japan              | Mitsubishi Corporation             | No   |
| Government of Switzerland        | Emergent Ventures India Pvt. Ltd.  | No   |

### A.4. Reference to applied methodologies and standardized baselines

**Methodology:** AMS I.D. 'Grid connected renewable electricity generation', Version 09, 28 July 2006/Scope 1

**Reference:** Appendix B of the simplified modalities & procedures for small-scale CDM-project Activities

### A.5. Crediting period type and duration

**Start date of crediting period:** 11/02/2007

**Choice of crediting period:** Fixed crediting period for 10 years

**SECTION B. Implementation of project activity****B.1. Description of implemented project activity**

The project is a Renewable Energy project with maximum output capacity of 8.75 MW. WTGs installed in the project activity are of 1.25 MW capacities. The details are given in table below –

|                                    |   |
|------------------------------------|---|
| <b>Wind Turbine Generator Type</b> | <b>1.25 MW</b>  |
| Make                               | Suzlon  |
| <b>Rotor</b>                       |   |
| Rotor Diameter                     | 64 m  |
| Number of rotor blades             | 03  |
| Orientation                        | Upwind / Horizontal axis                                      |
| Hub Height                         | 65 m  |
| Swept Area                         | 3217 square meter   |
| Rotational Speed                   | 13.8 / 20.7 rpm   |
| Rotational Direction               | Clockwise   |
| Rotor Blade Material               | GRP   |
| Regulation                         | Pitch –regulated  |
| <b>Operational Data</b>            |   |
| Cut in wind speed                  | 3 m/s   |
| Rated wind speed                   | 14 m/s  |
| Cut off wind speed                 | 25 m/s  |
| <b>Gear Box</b>                    |   |
| Type                               | Integrated 3 Stage 1 planetary & 2 helical                    |
| Manufacturer                       | Flender - Winergy   |
| Nominal load                       | 1390 kW   |
| Type of cooling                    | Oil cooling system, Forced lubrication                        |
| Gear ratio                         | 1: 74.917   |
| <b>Generator</b>                   |   |
| Type                               | Asynchronous 4/6 pole   |
| Rotational Speed                   | 1006/1506 RPM   |
| Rated output                       | 250/1250 kW   |
| Rated Voltage                      | 690 V   |
| Frequency                          | 50 Hz   |
| Insulation                         | Class “H”   |
| Enclosure class                    | IP 56   |
| Cooling system                     | Air cooled  |
| <b>Operating Brakes</b>            |   |
| Aerodynamic brake                  | 3 Independent systems with blade pitching                     |
| Mechanical brake                   | Spring powered disc brakes, hydraulically released, fail safe |
| <b>Yaw Drive</b>                   |   |
| Method of operation                | 4 active electrical yaw motors                                |
| Bearing type                       | Polyamide slide bearing                                       |

**Diagram showing technical detail of the WTG:**



All WTGs part of the project activity have been commissioned and are operating. The commissioning details of all the WTGs are mentioned in section A.1 of the Monitoring Report.

## **B.2. Post-registration changes**

### **B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies or standardized baselines**

Not applicable, as there is no temporary deviations from the registered monitoring plan, applied methodologies or standard baselines, during the current Monitoring Period.

### **B.2.2. Corrections**

Not applicable, as there are no corrections, during the current Monitoring Period.

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

Not applicable, as there is no change to the start date of the crediting period.

### **B.2.4. Inclusion of monitoring plan**

Not applicable, as there is no inclusion of monitoring plan, during the current Monitoring Period.

### **B.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other applied standards or tools**

Not applicable, as there are no permanent changes, during the current Monitoring Period.

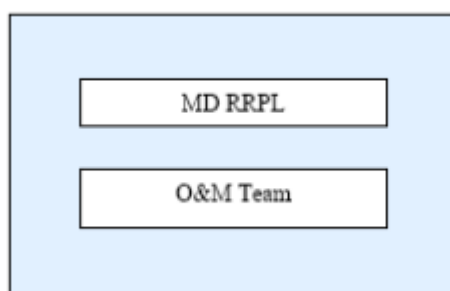
### **B.2.6. Changes to project design**

Not applicable, as there is no change to the project design.

## **SECTION C. Description of monitoring system**

As per the registered PDD, following monitoring systems has been implemented in the project activity.

### **Organizational structure, roles and responsibilities**



The WTGs are owned by RRPL and the machines are under contract for the turnkey operation and maintenance by the manufacturer itself. The responsibility of WTG maintenance (usual and preventive as well), daily WTG wise power generation data collection & reporting, monthly joint meter reading of common meter with SEB personnel are with manufacturer itself. WTG manufacturer is an ISO certified company and has standard procedures for O&M, training, emergency situations, meter calibration etc.

### **Data Monitoring**

The methodology requires monitoring of the following:

- Actual Electricity generation from the project activity

### **Completeness**

For Electricity generation data: There is tower wise meter, which is used to monitor tower wise power generation data. O&M team contracted by Rolex Rings Private Limited (RRPL) maintains this meter. A daily generation report is prepared which is sent to RRPL. Overall plant electricity generation is monitored using GEB meter. GEB takes reading of power generation every month; this data is used for billing purposes. This meter is maintained by GEB.

O&M team maintains a daily log about issues related to power generation (tower shutdown, grid failure etc). A monthly MIS is prepared based on this data and is reviewed by RRPL.

### **Calibration of Meters**

Tower wise meter is of high accuracy level, and is checked for accuracy on a regular basis. GEB personnel maintain GEB meter and calibration is done periodically. If there are problems found with performance of the meter, necessary actions are taken by GEB.

As per para 8 of EB 52 annex 60, "Guidelines for Assessing Compliance With The Calibration Frequency Requirements (Version 01), *"In cases where neither the monitoring methodology, nor the monitoring plan specify any requirements for calibration frequency for measuring equipments, the DOE shall ensure that the equipments are calibrated either in accordance with the specifications of the local/national standards, or as per the manufacturer specification. If local/national standards or the manufacturer specification is not available, international standards may be used"*.

**For substation meters**

The PP has used the calibration approach, for substation meters, as per the available local standards (GETCO - Gujarat Energy Transmission Corporation Ltd.). As per this GETCO guideline, the substation meters would be tested once in three years.

**For energy meters other than substation**

In the project case, calibration frequency of meter is not specified either in monitoring methodology or in monitoring plan of registered CDM-SCC-PDD. Calibration frequency for the project case is considered as per national standard, CEA Regulation on *"Installation and operation of meters"* Para 18 (3). As per this regulation energy meters require to be calibrated once in five years. However, taking the conservative approach, PP has considered the guidance on calibration of meters for small scale projects which prescribes calibration of meters at least once in 3 years, As per para 12 (c) of EB 35 Annex 35 *"Measuring equipment should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in 3 years"*. However the PP has considered the errors for non-calibrated periods considering the frequency of calibration of energy meters as one year. This is conservative.

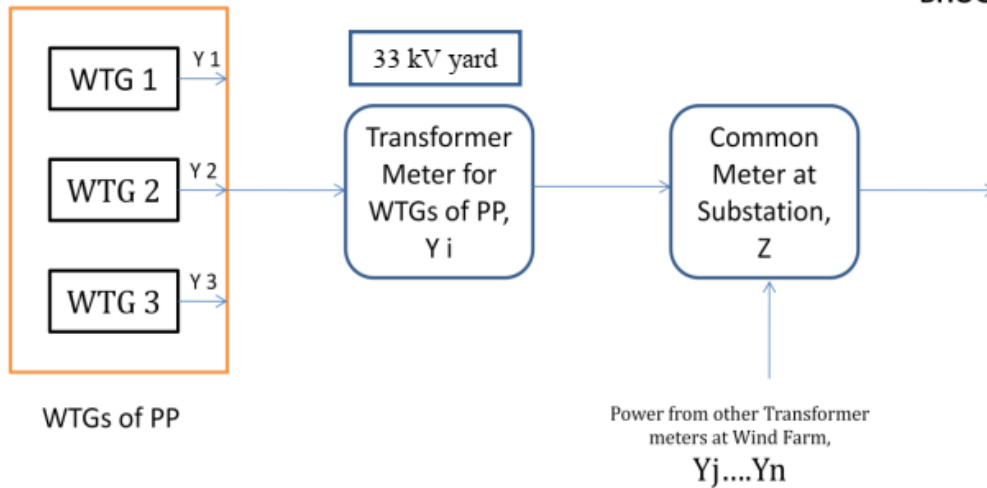
**Data reading frequency**

O&M team collects electricity generation data daily. GEB meter reading is done every month by GEB.

**Emergency procedures for the monitoring system**

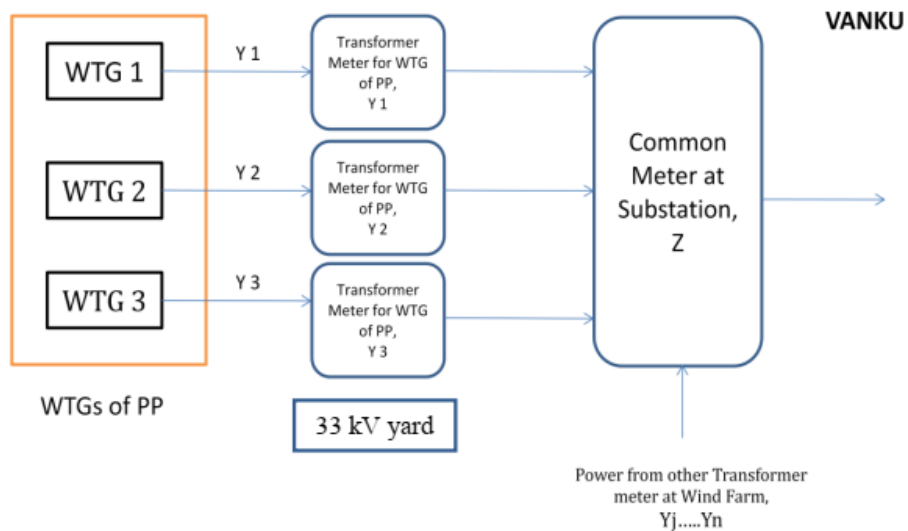
If there are problems found with performance of the meter, necessary actions are taken by Gujarat electricity Board GEB (GETCO). The Installation of meters and their maintenance is under the control of the GEB and the PP has no control over the same. However, in case of meter failure, the affected period will not be considered for the emission reduction calculation.

Line diagrams, showing relevant monitoring points, are provided below.



Net Electricity apportioned to WTGs of PP (WTGs 1, 2 & 3) =  $Y_i \times Z / (Y_i + Y_j + \dots + Y_n)$

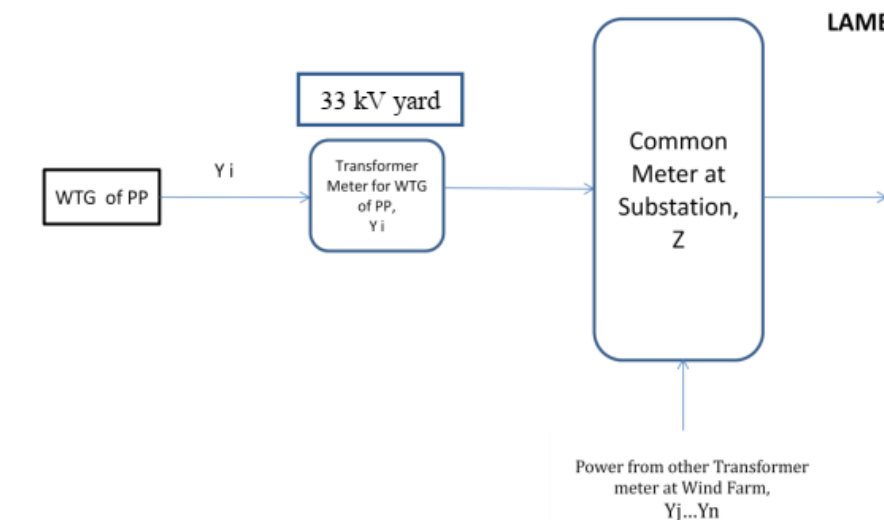
Both Transformer meter and Common meter are calibrated at regular intervals.



Net Electricity apportioned to WTG of PP (WTG 1) =  $Y_1 \times Z / (Y_1 + Y_2 + Y_3 + \dots + Y_n)$

Transformer meters and Common meter are calibrated at regular intervals.





Net Electricity apportioned to WTG of PP (WTG 1) =  $Y_i \times Z / (Y_i + \dots + Y_n)$

Transformer meters and Common meter are calibrated at regular intervals.

## SECTION D. Data and parameters

### D.1. Data and parameters fixed ex ante

| Data/Parameter                                       | NA |
|--|----|
| Unit   | -  |
| Description  | -  |
| Source of data                                       | -  |
| Value(s) applied                                     | -  |
| Choice of data or measurement methods and procedures | -  |
| Purpose of data/parameter                            | -  |
| Additional comments                                  | -  |

Note - Since there is no any ex-ante parameter involved for the project activity, the above table is kept as blank.

### D.2. Data and parameters monitored

| Data/Parameter                  | GEN <sub>i,y</sub>  |
|---------------------------------|---|
| Unit                            | kWh   |
| Description                     | Electricity generated in Wind Energy Generator (i) i.e. delivered to grid |
| Measured/calculated/default     | Measured  |
| Source of data                  | Energy meter  |
| Value(s) of monitored parameter | 16,591,495.65 KWh   |

|                                       |  |
|---------------------------------------|--|
| Monitoring equipment                  | The energy meters are used to measure the electricity generated and delivered to grid  |
| Measuring/reading/recording frequency | <b>Measuring frequency:</b> Continuous<br><b>Recording frequency:</b> Continuous<br><b>Reading frequency:</b> Monthly  |
| Calculation method (if applicable)    | Monthly GEDA share of electricity certificate is used for this variable. The reading from common meter as well individual meters is used by GEDA personnel to calculate share of each WTG on Pro-rata basis.   |
| QA/QC procedures                      | The data is very accurately measured. Tower wise electricity generation is measured using WTG meter. Electricity exported to grid is measured using SEB meter installed on uploading station, this reading is taken monthly by joint team of O&M team at wind farm and SEB personnel. The meter at the uploading station is a two-way meter and is in custody of State electricity board.<br><br>GEDA issues monthly certificate for actual power exported by each WTG on the wind farm. This reading is derived using above meters.<br><br>Reading recorded in this certificate is used for actual estimations. |
| Purpose of data/parameter             | This parameter is used to determine baseline emissions   |
| Additional comments                   | -  |

|                                       |   |
|---------------------------------------|---|
| <b>Data/Parameter</b>                 | <b>EFy</b>  |
| Unit                                  | t CO <sub>2</sub> /MWh  |
| Description                           | CO <sub>2</sub> emission factor of the grid.  |
| Measured/calculated/default           | Calculated  |
| Source of data                        | Latest version of CO2 Baseline Database Version 13, June 2018 Published by Central Electricity Authority (CEA) <sup>2</sup>   |
| Value(s) of monitored parameter       | 0.78 for year 2011-12<br>0.81 for year 2012-13  |
| Monitoring equipment                  | Not applicable  |
| Measuring/reading/recording frequency | <b>Frequency:</b> Yearly  |
| Calculation method (if applicable)    | Calculated as emission factor pertaining to current generation mix, i.e. the year in which generation from project activity takes place. The values are taken from CO2 Baseline Database Version 13, June 2018 published by Central Electricity Authority of India. |
| QA/QC procedures                      | Not required  |
| Purpose of data/parameter             | This parameter is used to determine baseline emissions  |
| Additional comments                   | -   |

### D.3. Implementation of sampling plan

Not Applicable.

<sup>2</sup> [http://www.cea.nic.in/reports/others/thermal/tpece/cdm\\_co2/user\\_guide\\_ver13.pdf](http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver13.pdf)

**SECTION E. Calculation of emission reductions or net anthropogenic removals****E.1. Calculation of baseline emissions or baseline net removals**

Baseline emissions are calculated as:

$$BE_y = \sum GEN_i \times EF_y / 1000$$

Where:

$BE_y$  - Baseline emissions in year y, tCO<sub>2</sub>e

$GEN_i$  – Net power wheeled to the grid from wind mill i, kWh

$EF_y$  - Grid emission factor calculated ex-post for year y, kg CO<sub>2</sub>e/MWh

Sample calculation for the month of August 2011

$$\begin{aligned} BE_y &= 1256323 \text{ (kWh)} \times 0.8 \text{ (tCO}_2\text{/MWh)} / 1000 \\ &= 1005.0584 \text{ (tCO}_2\text{e)} \end{aligned}$$

Sample calculation for the month of March 2012

$$\begin{aligned} BE_y &= 516691 \text{ (kWh)} \times 0.8 \text{ (tCO}_2\text{/MWh)} / 1000 \\ &= 413.3528 \text{ (tCO}_2\text{e)} \end{aligned}$$

The cumulative baseline emissions for the entire monitored period are:

$$BE_y = 13,273 \text{ (tCO}_2\text{e)}$$

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

Since, the proposed project activity is a renewable energy project, which generates electricity using wind power; no anthropogenic emissions by sources of greenhouse gases within the project boundary are identified. Hence, project emissions are zero.

**E.3. Calculation of leakage emissions**

No anthropogenic greenhouse gases by sources outside the project boundary that are significant, measurable and attributable to the project activity are identified. Hence, no leakage is considered from the project activity.

$$L_y = 0$$

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

|              | Baseline GHG emissions or baseline net GHG removals (t CO <sub>2</sub> e) | Project GHG emissions or actual net GHG removals (t CO <sub>2</sub> e) | Leakage GHG emissions (t CO <sub>2</sub> e) | GHG emission reductions or net anthropogenic GHG removals (t CO <sub>2</sub> e) |                 |              |
|--------------|---|--|---|---|-----------------|--------------|
|              |   |  |   | Before 01/01/2013   | From 01/01/2013 | Total amount |
| <b>Total</b> | 13,273  | 0  | 0   | 13,273  | 0               | 13,273       |

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

| Amount achieved during this monitoring period<br>(t CO <sub>2</sub> e) | Amount estimated ex ante<br>(t CO <sub>2</sub> e) |
|--|---|
| 13,273   | 23,118  |

**E.6. Remarks on increase in achieved emission reductions**

From E.5 above, we can observe that actual emission reduction for the monitoring is lower than estimated emission reductions by 43%. This is due to low PLF during current monitoring period.

## Document information

| <i>Version</i>  | <i>Date</i>     | <i>Description</i>   |
|---|-----------------|--|
| 06.0  | 7 June 2017     | Revision to: <ul style="list-style-type: none"> <li>• Ensure consistency with version 01.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN);</li> <li>• Make editorial improvements.</li> </ul>  |
| 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 (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.   |
| Decision Class: Regulatory<br>Document Type: Form<br>Business Function: Issuance<br>Keywords: monitoring report |                 |  |