



Monitoring report form for CDM project activity
(Version 06.0)

MONITORING REPORT

Title of the project activity	9.9 MW Bundled Wind Power Project in Tirupur, Tamilnadu.	
UNFCCC reference number of the project activity	9487	
Version number of the PDD applicable to this monitoring report	04.1	
Version number of this monitoring report	01	
Completion date of this monitoring report	26/11/2018	
Monitoring period number	1 st Monitoring Period	
Duration of this monitoring period	23/09/2013 –31/08/2018 (Inclusive of both the dates)	
Monitoring report number for this monitoring report	01	
Project participants	M/s Vestas Wind Technology India Private Limited	
Host Party	India	
Sectoral scopes	1 : Energy industries (renewable - / non-renewable sources)	
Applied methodologies and standardized baselines	Methodology: (AMS-I.D. Version-17) Grid connected renewable electricity generation Standard baseline - NA	
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
	0	101,727
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	122,400 ¹	

¹ Emission Reduction comparison calculation is provided transparently in ER calculation sheet.

SECTION A. Description of project activity

A.1. General description of project activity

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The purpose of the project activity is to generate electricity by harnessing renewable energy source (Wind) available in Tirupur district of Tamil Nadu with the help of Wind Turbine Generators (WTGs). The generated electricity by the project activity is wheeled through the Indian grid² for captive utilization at project participant (PP) industrial facility. Thus, replacing the equivalent amount of fossil fuel dominated grid electricity consumption at respective industrial plant, thereby contributing in GHG emission reduction.

The project activity involves the installation of 6 numbers of WTGs of 1650 kW each, in Tirupur district of Tamil Nadu state, India. The WTGs (Vestas V82 make) are supplied by Vestas Wind Technology Private Limited.

The project activity is a bundle project. Vestas Wind Technology Private Limited is authorised by all the project participant to act as the sole focal point for communication with National CDM Authority and CDM Executive Board of the UNFCCC.

The first machine under the project activity was commissioned on 21/04/2010 and last machine under the project activity was commissioned on 25/05/2010.

The total emission reductions achieved under this monitoring period (23/09/2013 to 31/08/2018) (inclusive both days) are 101,727 tCO_{2e}.

A.2. Location of project activity

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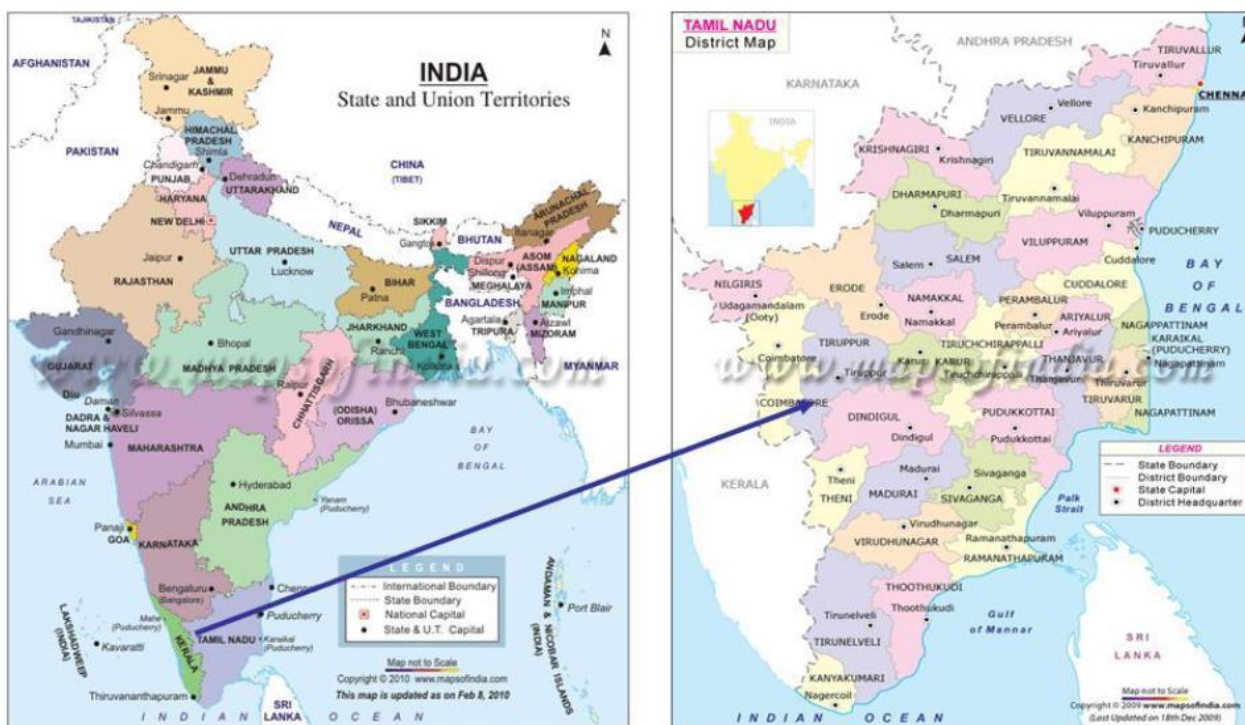
The project activity is located in the Tirupur district in the state of Tamilnadu.

The latitude and longitude details of the individual WEG are as listed in Table 1.

Owner	Survey no.	HTSC	Village	Longitude (°E)	Latitude (°N)
Bannari Amman & Spinning Mills Ltd	6/1 (P)	U-1861	Virugalpatti	77°08'40.48"	10°43'27.93"
	212 (P)	U-1859	Virugalpatti	77°09'18.80"	10°42'49.76"
	255/1 (P)	U-1853	Illuppanagaram	77°11'45.40"	10°43'26.32"
Shiva Tex Yarn Ltd.	94/C(P),95(P)	U-1854	Vagatholuvu	77°10'45.54"	10°44'51.27"
	230/1(P),2(P)	U-1858	Virugalpatti	77°09'37.05"	10°43'02.39"
	168/B1(P)	U-1868	Virugalpatti	77°09'07.10"	10°42'33.21"

² As of 31 December 2013, the Southern grid has also been synchronised with the NEWNE grid, hence forming one unified Indian Grid.

Figure below shows the project location map:



Map not to scale

A.3. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (host Party)	Vestas Wind Technology India Private Limited	No

A.4. Reference to applied methodologies and standardized baselines

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Type I : '**Renewable energy projects**',

Category I.D³. '**Grid Connected Renewable Electricity Generation**' (Version 17)

Sectoral Scope: 01 'Energy industries (renewable/non-renewable sources).

In line with the application of the AMS-I.D. Version 17, the following tools and guidelines are used:

Title: Tool to calculate the emission factor for an electricity system (Version: 02.2.1)

A.5. Crediting period type and duration

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Type: Fixed

Start Date: 23/09/2013

³ <https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK>

End Date: 22/09/2023

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

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The project involves the installation of 6 no's of 1,650 kW (V82/1650 model) rated Wind Electric Generators of Vestas make. These WEGs are ideal for Indian meteorological conditions. The V82/1650 with a rated capacity of 1650 kW is an ACTIVE STALL™ machine with cut-in and cut-out speeds of 2.5 m/s and 32 m/s, respectively. The machines are particularly suitable for the low and medium wind sites available in India. The V82/1650 machines are type tested and certified by DNV, Denmark A/S.

The technical design of the V 82/1650 WEGs is from Vestas Wind Systems A/S, Denmark where a dedicated team of professionals are actively involved in design and testing..

The project uses technology that is environmentally clean and safe⁴ since there are no GHG emissions associated with the electricity generation from the windmills. During the monitoring period there were no events or situations occurred, which may impact the applicability of the methodology.

The Salient features of the technology are as follows:

Description	Specifications
Tower/Rotor Height	78 Meter
Rotor Diameter	82 Meter
Installed electrical output	1,650 kW
Cut-in wind speed	3.5 m/s.
Rated wind speed	7.5 m/s.
Cut-out wind speed	20 m/s. (10 minute average)
Rotor swept area	5,281 sq. meters.
Rotational speed	14.4 rpm
Rotor material /Blades material	Carbon fibre/epoxy/wood/glass
Regulation	Active Stall
Generator	Asynchronous liquid cooled.
Rated output	1,650 kW
Rotational speed at rated power	1,012 rpm
Operating voltage	3 x 690 V
Frequency	50 Hz
Gear Box	One planetary stage, two helical stages
Manufacturer	Vestas
Nominal load Gearbox Mechanical power	1,800 kW
Aerodynamic brake	Full blade pitch
Mechanical brake	Hydraulic disc brake

⁴ No technology transfer is envisaged for the proposed CDM project activity.

B.2. Post-registration changes

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

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Not Applicable.

B.2.2. Corrections

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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 applied standards or tools

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Not Applicable.

B.2.6. Changes to project design

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Not Applicable.

SECTION C. Description of monitoring system

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Monitoring of emission reductions is carried out following the guidance provided in the applicable methodology of the project activity – AMS-I.D. version 17. The monitoring methodology requires that the project-monitoring plan should consist of monitoring quantity of net electricity supplied to the grid in the year y. In order to monitor the mitigation of GHG due to the project activity, the total energy exported needs to be measured. The net energy supplied to grid by the project activity multiplied by emission factor for regional grid, would form the baseline for the project activity.

Since the baseline emission factor is based on an ex-ante determination, monitoring of this parameter is not required. The sole parameter for monitoring is the net electricity exported to the grid.

The measurement of electricity is carried out as per the guidelines of the state electricity board. WEGs in Tamil Nadu have 0.5 accuracy class meters at grid interconnection point to measure the generated electricity. The accuracy of monitoring parameter is ensured by adhering to the calibration and testing procedure as set in wheeling agreement. The energy meters are under the control of TNEB.

The meters installed at the turbine sub-station measure the export and import of electricity continuously. As per the agreement signed with the state electricity board, a representative from the state electricity board and a representative of the operation and maintenance contractor will undertake main meter readings monthly. The final generation statement is issued by TNEB to the project proponent on monthly basis. The copies of such credit report are primary document relating to actual number of units fed to the grid and will be maintained for 10+2 years (crediting+ 2 years) by Enercon.

Calibrations Details of Meters:

The metering equipment's were inspected & calibrated by State Utility once in a year⁵. All the meters are two-way Tri-vector meters capable of recording import and export of electricity. Meter details for the all the meters are as follows:

Customer Care	S. No	HTS C No	Meter Serial No.	Make	Accur acy Class	Calibration Date	Validity
BANNARI AMMAN SPINNING MILLS PVT LTD	1	1853	HT2160884	EDMI	0.2s	15/02/2017	15/02/2020
	2	1859	HT2160882	EDMI	0.2s	15/02/2017	15/02/2020
	3	1861	HT2160883	EDMI	0.2s	15/02/2017	15/02/2020
SHIVA TEX YARN LTD	4	1854	HT2160232	EDMI	0.2s	16/02/2017	16/02/2020
	5	1858	HT2160878	EDMI	0.2s	15/02/2017	15/02/2020
	6	1860	HT2160879	EDMI	0.2s	15/02/2017	15/02/2020

The project activity is operated and managed by O&M (Operations and Maintenance) contractor. For the execution of the project activity a project team has been designated. The project team is delegated with the responsibility to monitor and document the electricity generated and also safe

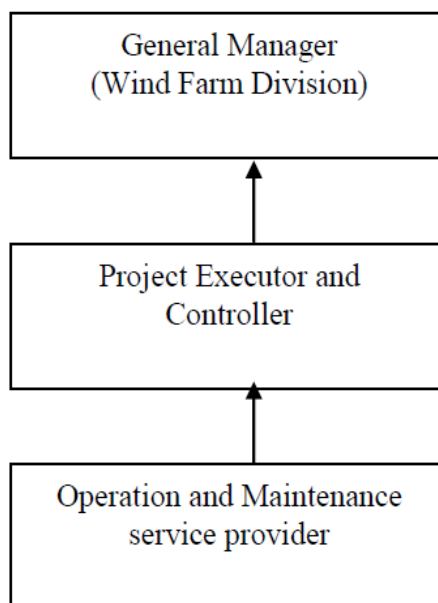
⁵ However, as per the notification of Central Electricity Authority, dated 17th Mar 2006 (http://powermin.nic.in/whats_new/pdf/Metering_Regulations.pdf), Para 18 (1) (b), all interface meters shall be tested at least once in five years. Further as per Para 17 (c) of 'General Guidelines to SSC CDM methodologies' (http://cdm.unfccc.int/methodologies/SSCmethodologies/approved/history/guid_ssc_meth/guid_ssc_v17.pdf), '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 three years'. Based on the above guidelines.

keeping of the recorded data. All the monitoring data is stored/will be recorded and kept under safe custody.

The organizational structure for the monitoring plan for the project is shown below:

Designation	Responsibilities
General Manager (Wind Farm Division)	Holds complete control over monitoring aspects pertaining to the project
Project Executor and Controller	Recording Verification Storage of Data
Operation and Maintenance service provider	Operation and Maintenance Storage of data

Organizational structure for monitoring plan



SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

Data/Parameter	EF _{grid,OM,y}
Unit	tCO ₂ /MWh
Description	The Operating Margin emission factor of southern grid
Source of data	Central Electricity Authority of India (CEA), CO2 Database, Version 6.0
Value(s) applied	0.9863
Choice of data or measurement methods and procedures	The Operating Margin is calculated considering of the average of Operating Margin date for the Southern Regional grid as published by CEA during the recent three years 2006-07, 2007-08 and 2008-09. The average value for the Southern Regional grid is 0.9875 tCO ₂ /MWh
Purpose of data/parameter	Calculation of baseline emission
Additional comments	This parameter is fixed ex-ante.

Data/Parameter	EF _{grid,BM,y}
Unit	tCO ₂ /MWh
Description	The Build Margin emission factor of southern grid
Source of data	Central Electricity Authority of India (CEA), CO2 Database, Version 6.0, March, 2011
Value(s) applied	0.8179
Choice of data or measurement methods and procedures	The build margin considered is for the year 2008-09 for the Southern Regional grid and the value is 0.82 tCO ₂ /MWh.
Purpose of data/parameter	Calculation of baseline emission
Additional comments	This parameter is fixed ex-ante.

Data/Parameter	EF _{grid,CM,y}
Unit	tCO ₂ /MWh
Description	The Emission factor of the Southern Regional grid
Source of data	Calculated
Value(s) applied	0.9442
Choice of data or measurement methods and procedures	Calculated as the weighted average of the build margin emission factor and operating margin emission factor. The weights used are 0.75 and 0.25 for operating margin and build margin respectively.
Purpose of data/parameter	Calculation of baseline emission
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

Data/Parameter	EG _y (Export)
Unit	MWh/y
Description	Quantity of electricity exported to the grid in year y
Measured/calculated/default	Measured

Source of data	Monthly electricity generation statement issued by state utility - Tamil Nadu Electricity Board (TNEB)
Value(s) of monitored parameter	113,126.5
Monitoring equipment	Please refer section 'C' (Description of monitoring system) for the details of meter type, accuracy class, serial number, calibration frequency, date of last calibration and validity under the heading 'Calibrations Details of Meters
Measuring/reading/recording frequency	Frequency of recording data: Metering equipment's measures the electricity export on continuous basis and recorded by state utility on monthly basis. Refer section C for an illustration of the provisions for measurement methods.
Calculation method (if applicable)	EGy (Export) --TNEB will issue a WEG wise monthly generation statement.
QA/QC procedures	Meter calibration shall be conducted annually by the relevant department of the state electricity board in accordance with the local calibration standards as mentioned in Section C. Meter accuracy: 0.5 of the meter at respective substations that would be used for the exported electricity metering.
Purpose of data/parameter	Calculation of baseline emission
Additional comments	The data will be archived electronically for two years after the crediting period or of the last issuance of CERs of this project activity, whichever later. There can be a slight variation in the LCS reading and the meter reading recorded at the TNEB metering point. This is because of a difference in the time at which the meter readings are taken at the LCS and the TNEB metering point.

Data/Parameter	EG _y (Import)
Unit	MWh/y
Description	Quantity of electricity imported from the grid in year y
Measured/calculated/default	Measured
Source of data	Monthly electricity generation statement issued by state utility - Tamil Nadu Electricity Board (TNEB)
Value(s) of monitored parameter	5,386.975
Monitoring equipment	Please refer section 'C' (Description of monitoring system) for the details of meter type, accuracy class, serial number, calibration frequency, date of last calibration and validity under the heading 'Calibrations Details of Meters
Measuring/reading/recording frequency	Frequency of recording data: Metering equipment's measures the electricity export on continuous basis and recorded by state utility on monthly basis. Refer section C for an illustration of the provisions for measurement methods.
Calculation method (if applicable)	EGy (Import)--TNEB will issue a WEG wise monthly generation statement.
QA/QC procedures	Meter calibration shall be conducted annually by the relevant department of the state electricity board in accordance with the local calibration standards as mentioned in Section B.C. Meter accuracy: 0.5 of the meter at respective substations that would be used for the exported electricity metering.
Purpose of data/parameter	Calculation of baseline emission
Additional comments	The data will be archived electronically for two years after the crediting period or of the last issuance of CERs of this project activity, whichever later. There can be a slight variation in the LCS reading and the meter reading recorded at the TNEB metering point. This is because of a difference in the time at which the meter readings are taken at the LCS and the TNEB metering point.

Data/Parameter	EG _y
Unit	MWh/y
Description	Quantity of net electricity supplied to the grid in year y
Measured/calculated/default	Calculated
Source of data	Monthly electricity generation statement issued by state utility - Tamil Nadu Electricity Board (TNEB)
Value(s) of monitored parameter	107,739.5
Monitoring equipment	Please refer section 'C' (Description of monitoring system) for the details of meter type, accuracy class, serial number, calibration frequency, date of last calibration and validity under the heading 'Calibrations Details of Meters
Measuring/reading/recording frequency	Frequency of recording data: Net electricity supplied to grid (export – import) is measured on continuous basis and data is recorded by state utility on monthly basis. Refer section C for an illustration of the provisions for measurement methods.
Calculation method (if applicable)	EG_y Calculated as the difference between EG_y (export) – EG_y (import)
QA/QC procedures	Meter calibration shall be conducted annually by the relevant department of the state electricity board in accordance with the local calibration standards as mentioned in Section C Meter accuracy: 0.5 of the meter at respective substations that would be used for the exported electricity metering.
Purpose of data/parameter	To calculate emission reduction achieved by project activity
Additional comments	The data will be archived Paper/electronically for two years after the crediting period or of the last issuance of CERs of this project activity, whichever later. There can be a slight variation in the LCS reading and the meter reading recorded at the TNEB metering point. This is because of a difference in the time at which the meter readings are taken at the LCS and the TNEB metering point.

D.3. Implementation of sampling plan

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Not Applicable.

SECTION E. Calculation of emission reductions or net anthropogenic removals

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

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The emission reduction ER_y due to project activity during a given year y is calculated as the difference between baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage (LE_y) as per the formula given below:

$$ER_y = BE_y - PE_y - LE_y$$

Baseline Emissions:

$$BE_y = EG_{BL,y} \times EF_{CO_2}$$

$EG_{BL,y}$ = Quantity of net electricity displaced as a result of the implementation of the CDM project activity in year y (MWh)

$$= BE_{\text{Bannari Amman Spinning Mills Ltd.}} + BE_{\text{Shiva Texyarn Ltd.}}$$

EF_{CO_2} = CO₂ emission factor of the grid in year y = 0.9442 tCO₂/MWh (Fixed Ex-ante)

Baseline Emissions in year y

$$\begin{aligned} BE_y &= 107,739.5 \text{ MWh} \times 0.9442 \text{ tCO}_{2e}/\text{MWh} \\ &= 101,727 \text{ tCO}_{2e} \end{aligned}$$

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

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Since the project activity is a renewable energy project that generates electricity using wind power and hence does not result in project emissions.

$$PE_y = 0 \text{ tCO}_2/y$$

E.3. Calculation of leakage emissions

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No leakage is considered from the project activity as per approved methodology AMS I.D.

$$LE_y = 0 \text{ t CO}_2/y$$

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	Total amount
Total	101,727	0	0	0	101,727	101,727

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 ₂ e)	Amount estimated ex ante (t CO ₂ e)
101,727	122,400

E.6. Remarks on increase in achieved emission reductions

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There is no increase in the emission reductions during the current monitoring period relative to the estimation in the registered CDM-PDD. There is only around 16.89% lesser emission reduction relative to estimation in the registered CDM-PDD for the equivalent duration of the monitoring period. This has happened due to low wind availability leading to low PLF during the current monitoring period.

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Document information

Version	Date	Description
06.0	7 June 2017	Revision to: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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 <i>F-CDM-MR</i> to <i>CDM-MR-FORM</i>; • 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.
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).

<i>Version</i>	<i>Date</i>	<i>Description</i>
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 Document Type: Form Business Function: Issuance Keywords: monitoring report		