 <b>Monitoring report form for CDM project activity (Version 09.0)</b>			
<b>MONITORING REPORT</b>			
<b>Title of the project activity</b>	Nam Phang hydropower project		
<b>UNFCCC reference number of the project activity</b>	4720		
<b>Version number of the PDD applicable to this monitoring report</b>	3.1		
<b>Version number of this monitoring report</b>	1.5		
<b>Completion date of this monitoring report</b>	06/12/2021		
<b>Monitoring period number</b>	First monitoring period		
<b>Duration of this monitoring period</b>	01/01/2012 - 31/12/2018 (both days included) <sup>1</sup>		
<b>Monitoring report number for this monitoring period</b>	N/A		
<b>Project participants</b>	Bac Ha Energy Corporation		
<b>Host Party</b>	Socialist Republic of Viet Nam		
<b>Applied methodologies and standardized baselines</b>	ACM0002 ver. 11 - Consolidated methodology for grid-connected electricity generation from renewable sources		
<b>Sectoral scopes</b>	1 : Energy industries (renewable - / non-renewable sources)		
<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 until 31 December 2020</b>	<b>Amount achieved from 1 January 2021</b>
	0 tCO <sub>2e</sub>	412,146 tCO <sub>2e</sub>	0 tCO <sub>2e</sub>
<b>Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD</b>	496,386 tCO <sub>2e</sub>		

<sup>1</sup> Emission reductions are claimed starting 01/01/2013, details are provided in Section A.1

**SECTION A. Description of project activity**

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

(a) The purpose of the project activity is to generate renewable electricity from a run-of-river hydropower plant. As a run-of-river type and thus is a particularly environmentally friendly solution to growing energy demand in Viet Nam. It offsets the combustion of fossil fuels and, in doing so, helps preserving non-renewable resources by promoting the exploitation and use of renewable resources and technologies.

(b) The project activity has a total installed capacity of 36 MW, made up of 2 units of 18 MW each.

(c) The commercial operation date of the project activity was on 29/10/2012.

The monitoring for emission reductions started on 01/01/2013 to allow for a full month of operation after initial training was conducted for the monitoring team (i.e. on 10/12/2012).

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

The project location is in Lao Cai province in the northern region of Viet Nam. It is situated on the Nam Phang river which is a grade 1 branch of the Chay River. The Nam Phang River has the potential to construct a hydropower project as it starts in a high mountainous area named Khuu Khoi and links to the Chay River.

The co-ordinates of the site are latitude of 22° 25' 15"N to 22° 26' 45"N and longitude of 104° 19' 05"E to 104° 19' 45"E.

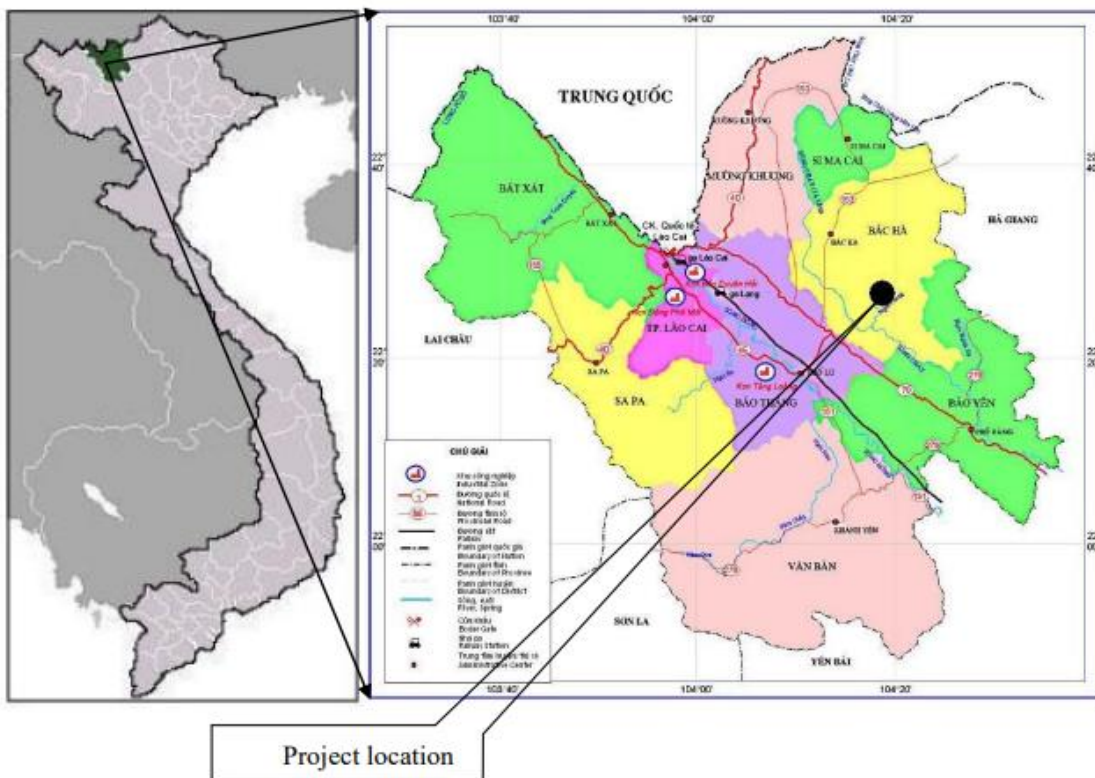


Figure 1 shows the location of the project.

Figure 1: Project Location

**A.3. Parties and project participants**

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Socialist Republic of Viet Nam (host)	Private Entity: Bac Ha Energy Corporation (as the Project Proponent)	No

**A.4. References to applied methodologies and standardized baselines**

Applied methodology: ACM0002, Consolidated Methodology for Grid Connected Electricity Generation from Renewable Sources, Version 11.

Methodological tool: Tool for the demonstration and assessment of additionality (Version 5.2)

Methodological tool: Tool to calculate the emission factor of an electricity system (Version 2)

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

Renewable period: 01/01/2012 – 31/12/2018 (Expired)

**SECTION B. Implementation of project activity**

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

The project has a small run-of-river reservoir and consists of a weir, an intake, a tunnel, a powerhouse (containing turbines and generators) and a tailrace as shown below in Fig. 2.

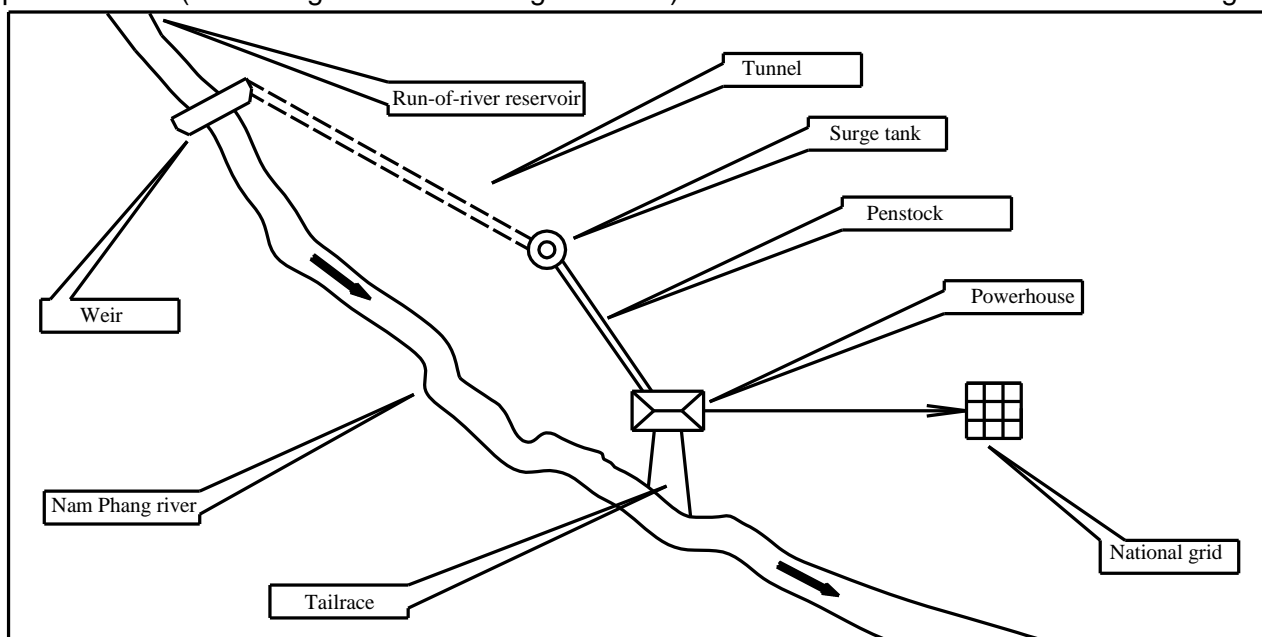


Figure 2: Key components of project

The installed capacity of the project is 36 MW. The specific items of plant employed by the project are listed in Table 1.

	Items	Specification
<b>Turbines</b>	Quantity	2
	Capacity (per unit)	18.557 MW
	Type	HLA351-LJ-155
	Rated speed	600 rpm
	Runaway speed	1060 rpm
<b>Generators</b>	Quantity	2
	Capacity (per unit)	18 MW
	Type	SF18-10/3300
	Cos $\phi$	0.8
	Rated speed	600 rpm

**Table 1: Installed equipment**

The electricity generated by the project is delivered to the Viet Nam national grid via a new 110 kV transmission line.

The project commenced commercial operations on 29/10/2012.

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

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

None

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

None

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

None

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

Not applicable

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

None

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

None

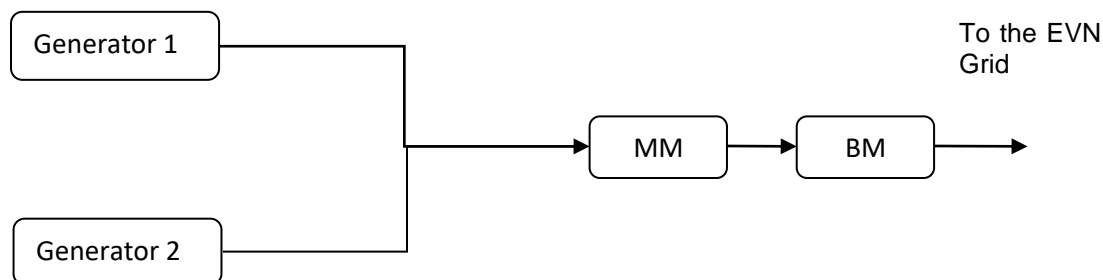
**B.2.7. Changes specific to afforestation or reforestation project activity**

Not applicable

**SECTION C. Description of monitoring system****C.1. Electricity metering system**

The system is composed of 2 energy meters: 1 main and 1 backup located at the connection point belonging to the grid operator EVN and used as the source of data for the calculation of emission reductions.

The location of each instrument is indicated schematically in the monitoring diagram shown in Figure 3:



**Figure 3: Meters location on the electric circuit**

- MM is the main meter. It is used to measure the electricity generation at the hydropower site while taking into account both export and import to/from the national grid. The MM is the source of data for the EVN receipts.
- BM is the backup meter. It is used as record source in case the main meter fails (see section C3).

**C.2. Data treatment and verification**

A verification of the data recorded was performed by the spot check of field instruments by staff and external consultants.

**C.3. Non-conformities and emergency procedures**

Non-conformities are internally defined as any incidents affecting the project's monitoring (e.g.: calibration delay, data loss, instrument malfunction, change in project implementation, etc.) They feature various severities and some of them may lead to data reconstruction (emergency procedure), request for temporary deviation (see section B.2.1) or PDD revision (see sections B.2.5 and B.2.6), whereas some others may not require any particular corrective measures.

In the event that the metering system suffers any failure, damage and unexpected problems, or if any errors in the main metering systems are detected during calibration, the electricity exported will be identified as follows:

- Using the results of the backup system
- Should the backup system also suffer a breakdown, the electricity exported is proposed by reconstructing data by means of trend analysis (taking a conservative approach)

**C.4. Maintenance and calibration of monitoring instruments**

Calibration takes place at least every 2 years to ensure that the monitoring equipment is correctly installed and functioning properly.

**C.5. Monitoring team**

The CDM monitoring team is composed of the following staff:

Report to:	Position
Bac Ha Energy Corporation	Site manager
	Supervisors/Heads of Shift
	Operators
Kyoto Energy Pte Ltd	CDM Consultant/ Project manager

**Table 2: CDM Monitoring Team Details**

#	Tasks description (and frequency)	Operator	Supervisor	Site manager / Project director	CDM consultant Project manager
<b>Monitoring activity</b>					
1	Recording of manual data	✓			
<b>Quality Assurance &amp; Quality Control</b>					
2	Verification of data monitored (consistency and completeness)		✓		
3	Ensuring adequate training of staff		✓		
4	Ensuring adequate maintenance		✓		
	Ensuring calibration of monitoring instruments		✓		
5	Data archiving: ensuring adequate storage of data monitored (integrity and backup): 2 years after the end of the crediting period			✓	
6	Identification of non-conformance and corrective/preventive actions and monitoring plan improvement		✓		
7	Emergency procedures		✓		
8	External audit				✓
<b>Calculation of GHG emission reductions and reporting</b>					
9	Processing of data and calculation of			✓	

#	Tasks description (and frequency)	Operator	Supervisor	Site manager / Project director	CDM consultant Project manager
	emission reductions				
10	Monitoring report: management review of monitoring report (internal audit)			✓	

**Table 3: Allocation of monitoring responsibilities**

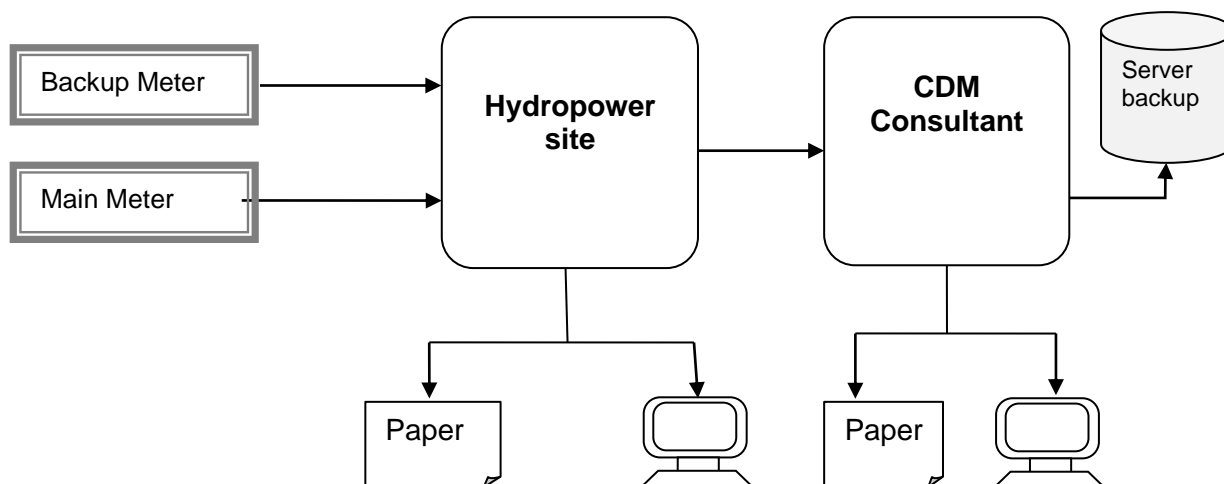
**C.6. Adequate training of staff**

The monitoring plan is made available to each member of staff involved in the project’s monitoring. A training session was organised on 12/12/2012 to introduce / give refresher training to the staff with respect to the monitoring plan requirements. Background information was also given about the impacts of the CDM project and the importance of monitoring. During the training, the staff signed a training attendance list. All training records are retained inclusive of training attendance, and training materials. Following this, periodic retraining has been conducted on a regular basis.

Records of training will be kept for at least 2 years after the crediting period.

**C.7. Data archiving**

The log files are kept for a minimum of 2 years after the end of the last crediting period by using paper documents and electronic files. The log files are stored on various media (CD-ROM and hard disks) at several locations (plant, headquarters and CDM consultant server).



**Figure 3: Monitoring data flow chart**

**SECTION D. Data and parameters****D.1. Data and parameters fixed ex ante**

<b>Data/Parameter</b>	<b>EF<sub>grid,CM,y</sub></b>
Unit	tCO <sub>2</sub> /MWh
Description	CO2 emission factor in year y Combined margin CO2 emission factor for grid connected power generation in year y calculated using "Tool to calculate the emission factor for an electricity system" (version 01).
Source of data	As per the "Tool to calculate the emission factor for an electricity system"
Value(s) applied	0.5764
Choice of data or measurement methods and procedures	As per methodology
Purpose of data/parameter	Baseline emissions
Additional comments	

**D.2. Data and parameters monitored**

<b>Data/Parameter</b>	<b>EG<sub>facility</sub> (EG<sub>y</sub>)</b>
Unit	MWh
Description	Quantity of electricity generation supplied by the project plant/unit to the grid in crediting period
Measured/calculated/default	Measured
Source of data	Project site – main meter
Value(s) of monitored parameter	715,034



Monitoring equipment	Main Meter	
	Type	E650
	Accuracy Class	0. 2S
	Serial No.	97815743
	Calibration frequency	2 years
	Date of calibration and due date of next calibration	20/09/2012; 20/09/2014 24/10/2014 <sup>2</sup> ; 23/10/2016 03/10/2016; 02/10/2018 29/12/2017; 28/12/2019
	Backup Meter	
	Type	E650
	Accuracy Class	0. 5S
	Serial No.	97815937
	Calibration frequency	2 years
	Date of calibration and due date of next calibration	31/08/2012; 31/08/2014 24/10/2014 <sup>3</sup> ; 24/10/2016 03/10/2016; 03/10/2018 29/12/2017; 29/12/2019
Measuring/reading/recording frequency	Continuous measurement and at least monthly recording	
Calculation method (if applicable)	N/A	
QA/QC procedures	Cross check measurement results with records for sold electricity Calibration of meters to be done as per manufacturer specifications or at least once every two years	
Purpose of data/parameter	To calculate emission reductions	
Additional comments		

<b>Data/Parameter</b>	Cap <sub>PJ</sub>
Unit	MW
Description	Installed capacity of the hydro power plant after the implementation of the project activity
Measured/calculated/default	Not Applicable
Source of data	Project site, equipment name plates
Value(s) of monitored parameter	36
Monitoring equipment	Not applicable
Measuring/reading/recording frequency	Yearly (any changes documented)
Calculation method (if applicable)	N/A

<sup>2</sup> Calibration was delayed by 34 days and a penalty has been applied to the whole months of September and October 2014 for the sake of conservatism.

<sup>3</sup> Calibration was delayed by 54 days, however there is no impact on emission reductions.

QA/QC procedures	N/A
Purpose of data/parameter	Calculation of Project Emissions
Additional comments	-

Data/Parameter	A <sub>PJ</sub>
Unit	m <sup>2</sup>
Description	Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full
Measured/calculated/default	Measured from topographical surveys, maps, satellite pictures, etc
Source of data	Project site
Value(s) of monitored parameter	224,000
Monitoring equipment	Not applicable
Measuring/reading/recording frequency	Yearly (any changes documented)
Calculation method (if applicable)	N/A
QA/QC procedures	N/A
Purpose of data/parameter	Calculation of Project Emissions
Additional comments	-

### D.3. Implementation of sampling plan

N/A – no sampling of data is proposed.

## SECTION E. Calculation of emission reductions or net anthropogenic removals

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

The Baseline emissions are calculated as follows:

$BE_y = EG_y * EF_{grid,CM,y}$			
Where:	Description	Units	Value
$BE_y$	Baseline Emissions	tCO <sub>2</sub>	412,146
$EG_y$	Net quantity of electricity generated and delivered to the grid by the hydropower project in period y	MWh	715,034
$EF_{grid,CM,y}$	CO <sub>2</sub> emission factor in period y	tCO <sub>2</sub> /MWh	0.5764

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

Since the power density of the project is 160.7 W/m<sup>2</sup> (greater than 10 W/m<sup>2</sup>), hence as per the methodology, there are no project emissions for this project activity.

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

As per the applied methodology and the registered PDD, the project does not need consider leakage.

Therefore:

$$LE_y = 0$$

**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 until 31/12/2020	From 01/01/2021	Total amount
<b>Total</b>	412,146	0	0	0	412,146	0	412,146

**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 <sub>2</sub> e)	Amount estimated ex ante for this monitoring period in the PDD (t CO <sub>2</sub> e)
412,146	496,386

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

The annual amount of emission reductions ex-ante was based on predicted annual net generation of 143,531 MWh resulting in emission reductions of 82,731 tCO<sub>2</sub>e.

The monitoring of emission reductions commenced on 01/01/2013 and ended on 31/12/2018 which is a period of 6 years. Over this period, the ex ante emission reductions would be 496,386.

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

There is no increase – rather there was underperformance, which can be attributed to climatic climactic conditions..

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

Not applicable.

## Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
09.0	8 October 2021	Revision to: <ul style="list-style-type: none"> <li>• Ensure consistency with version 03.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN).</li> </ul>
08.0	6 April 2021	Revision to: <ul style="list-style-type: none"> <li>• Reflect the “Clarification: Regulatory requirements under temporary measures for post-2020 cases” (CDM-EB109-A01-CLAR).</li> </ul>
07.0	31 May 2019	Revision to: <ul style="list-style-type: none"> <li>• Ensure consistency with version 02.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN);</li> <li>• Add a section on remarks on the observance of the scale limit of small-scale project activity during the crediting period;</li> <li>• Add "changes specific to afforestation or reforestation project activity" as a possible post-registration changes;</li> <li>• Clarify the reporting of net anthropogenic GHG removals for A/R project activities between two commitment periods;</li> <li>• Make editorial improvements.</li> </ul>
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.

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

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