



**Monitoring report form for CDM project activity  
(Version 09.0)**

*Complete this form in accordance with the instructions attached at the end of this form.*

**MONITORING REPORT**

<b>Title of the project activity</b>	Asahan 1 Hydroelectric power Plant 2 x 90 MW		
<b>UNFCCC reference number of the project activity</b>	4118		
<b>Version number of the PDD applicable to this monitoring report</b>	Version 7		
<b>Version number of this monitoring report</b>	4		
<b>Completion date of this monitoring report</b>	07/12/2021		
<b>Monitoring period number</b>	5		
<b>Duration of this monitoring period</b>	01/04/2017 – 28/02/2018 ((first and last days included))		
<b>Monitoring report number for this monitoring period</b>	Not applicable as not a batch project/monitoring report		
<b>Project participants</b>	PT Bajradaya Sentranusa Agasco Limited		
<b>Host Party</b>	Indonesia		
<b>Applied methodologies and standardized baselines</b>	ACM0002 Version 11 – Consolidated baseline methodology for grid-connected electricity generation from renewable sources		
<b>Sectoral scopes</b>	Sectoral scope 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>	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013 until 31 December 2020	Amount achieved from 1 January 2021
	0	806,212 tCO <sub>2</sub> e	0
<b>Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD</b>	798,877 tCO <sub>2</sub> e		

## SECTION A. Description of project activity

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

Purpose of the project activity and the measures taken for GHG emission reductions or net anthropogenic GHG removals by sinks; Asahan 1 Hydroelectric Power Plant 2 x 90 MW (hereafter referred to as "the Project") is a run-of-river hydroelectric power project in North Sumatera Province in Indonesia. The objective of this Project is to supply zero emission energy to Sumatera Grid (hereafter referred to as the "Grid"), a grid with relatively carbon-intensive electricity supply that is located in Sumatera island and currently has no interconnection with the grid in other islands e.g. Java, Kalimantan.

The total installed capacity of the Project is 180 MW (2x90MW). The Project uses hydro power generation technology for electricity generation and transmission.

Relevant dates for the project activity Commissioning started: 28/06/2010; Continuous operation started: 18/01/2011.

Total GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period 806,212 tCO<sub>2</sub>e

### A.2. Location of project activity

Indonesia

Medan, North Sumatera

Sub District of Parmaksian and Pintu Pohan Meranti, Region of Toba Samosir

Village of Siruar (Siantar Utara), Ambar Halim and Simorea. The GSP coordinates of the powerhouse are 2°30'45"N, 99°15'33"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)
Indonesia (Host Party)	PT Bajradaya Sentranusa	No
Australia	Agasco Limited	No

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

ACM0002 Version 11 - Consolidated baseline methodology for grid-connected electricity generation from renewable sources

[https://cdm.unfccc.int/filestorage/H/G/Y/HGY3TLRFPQVM016WA4I7XCZD92KE5S/EB52\\_repan07\\_ACM0002\\_ver11.pdf?t=Q098cXh4YzMwfDAed1L7\\_OtxBcxGjurTS075](https://cdm.unfccc.int/filestorage/H/G/Y/HGY3TLRFPQVM016WA4I7XCZD92KE5S/EB52_repan07_ACM0002_ver11.pdf?t=Q098cXh4YzMwfDAed1L7_OtxBcxGjurTS075)

“Tool for demonstration and assessment of additionality” (Version 05.2)

<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf>

“Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel combustion” (Version 2)

<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf>

“Tool to calculate the emission factor for an electricity system” (Version 2)

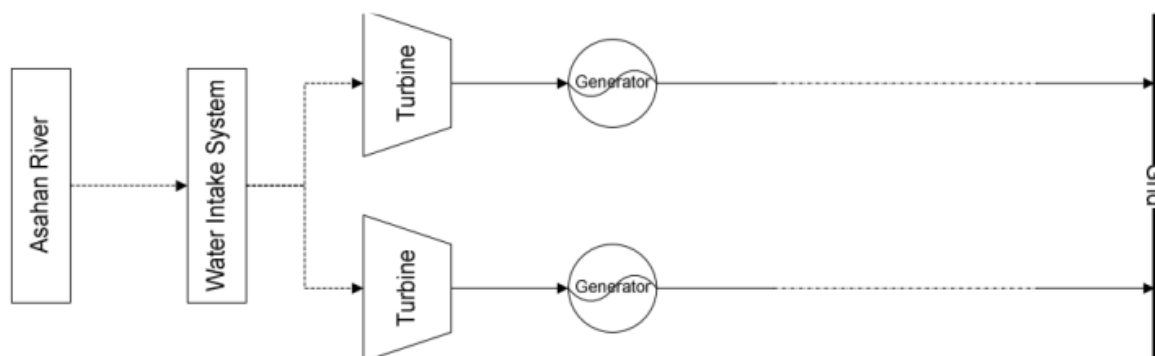
<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.pdf>

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

The first crediting period: 01/03/2011 - 28/02/2018 (Renewable).

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

The Project is a run-of-river hydroelectric power plant with capacity of 180 MW, consisting of 2x90 MW turbines, located upstream of Asahan 2 Power Station (Siguragura Dam). In general, the principal features in the Project are the Intake, Headrace Tunnel, Surge Tank, Penstock, Tailrace, Powerhouse, Switchyard and transmission lines of double-circuit line. Due to the topographical and geological conditions, the whole waterway, headrace and penstock have been designed as pressure tunnel and placed underground. The electricity was sent to step-up transformers and transmitted to PLN Grid System (Sumatera Grid). A technology diagram of the site is included below:



2. Implementation and actual operation of the project activity during this monitoring period The Project consists of one site only and the implementation is not phased. The Project started commission on 28/06/2010.

3. Events affecting the applicability of the methodology No events occurred that affected the applicability of the methodology.

4. Request for prior approval by the Board of changes to the registered CDM project activity No request for prior approval by the Board of changes to the registered CDM project activity has been made.

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

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

There are no temporary deviations during this monitoring period.

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

No corrections are applied in this monitoring period. However, please refer to the PRC PDD Version 7 completion date 06/09/2021 submitted under the issuance track of the 3<sup>rd</sup> Monitoring Period (PRC-4118-005) and approved on 07 Dec 2021.

[CDM: Asahan 1 Hydroelectric Power Plant 2 x 90 MW \(unfccc.int\)](http://unfccc.int)

The following changes are corrections to project information of a registered clean development mechanism (CDM) project activity that do not affect the design of the project activity. Category 2(a) Corrections that have been approved by the Board as applicable from the period prior to this monitoring period:

A correction was made to section B.3. table as blank fields were found in the registered PDD.

Corrections are also made to the PDD based on newly available information:

- Agasco Limited has been added as a project participant and hence included in the PRC PDD. Contact information revised based on latest MOC.
- Type of crediting period' in section C.3.1 is updated to mention 'first crediting period' in line with latest PDD template guidelines
- The start date of the crediting period has also been revised in line with actual start date which is 01/03/2011.

As detailed, all of the above changes are fully in compliance with the applied methodology and thus do not have any impact on the applicability of the methodology. Moreover, the changes do not impact the accuracy and completeness of the monitoring procedure.

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

No request for changes to start date of crediting period.

### **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**

No permanent changes are applied in this monitoring period. However, please refer to the PRC PDD Version 7 completion date 06/09/2021 submitted under the issuance track of the 3<sup>rd</sup> Monitoring period (PRC-4118-005) and approved on 07 Dec 2021.

[CDM: Asahan 1 Hydroelectric Power Plant 2 x 90 MW \(unfccc.int\)](http://unfccc.int)

The following changes are category 2 (a) 'Changes that have been approved by the Board as applicable from the period prior to this monitoring period'

a) The calibration of the electricity meters will be performed annually. In the registered PDD applicable to the first crediting period, the calibration frequency was set to performed semi-annually.

- Calibration is performed by laboratories approved by the national accreditation committee (Komite Akreditasi Nasional) who apply a calibration validity to each certificate based on national regulations. Certifications indicate the required calibration frequency e.g. one year from previous calibration.
- Additionally, the revised calibration frequency for the electricity meters brings calibration in line with manufacturer's specifications.

b) The monitoring parameter  $FC_y$ : Quantity of fuel combusted in the generator during the year y is not considered for the project activity.

- This revision is in line with Paragraph 36 and 38 of the applied methodology. These state that for most renewable energy power generation project activities,  $PE_y = 0$  and that for all renewable energy power generation project activities, emissions due to the use of fossil fuels for the backup generator can be neglected.
- Under the project activity, the only use of any fossil fuels will be for the backup generator.

c)  $EG_{import,y}$ : Quantity of electricity imported from the grid in year y is not considered under monitoring parameter.

- The electricity meters installed for the monitoring of the electricity generation measures both the export and import of electricity and therefore directly provides a net export figure which is used in the calculation of emissions reductions.
- Net electricity supplied to grid is measured by Meter 1 and Meter 2 installed in 275kV switchyard and during the first crediting period the electricity imported was measured by Meter 3. This meter and connection was discontinued by PLN in July 2015.

As detailed, all of the above changes are fully in compliance with the applied methodology and thus do not have any impact on the applicability of the methodology. Moreover, the changes do not impact the accuracy and completeness of the monitoring procedure.

Changes that have been approved by the Board as applicable from the period prior to this monitoring period;

PRC Red: PRC-4118-005  
Approved 07 December 2021

PRC Ref: PRC-4118-002  
Approved 10 February 2015

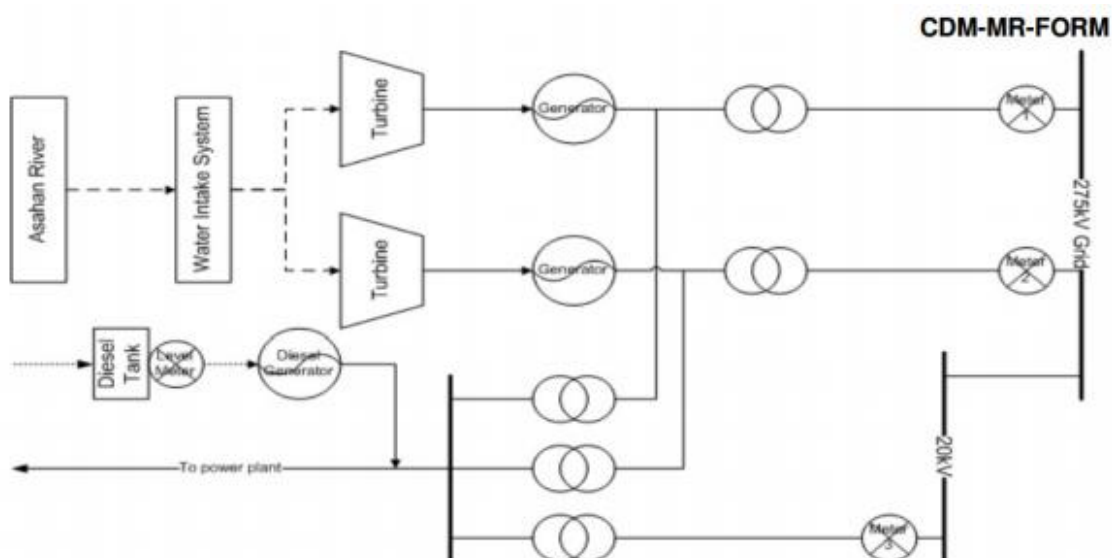
### **B.2.6. Changes to project design**

No request for changes for project design of registered project activity has been made.

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

Not applicable.

## SECTION C. Description of monitoring system



**Monitoring points:** The net electricity supplied to grid is measured by Meter 1 and Meter 2 installed in 275kV switchyard. Meter 3 (internal 20 kV) used as emergency backup and it was stopped per request from PLN on 01/07/2015 due to insufficient electricity generation on those area.

### Quality assurance and quality control system

The accuracy of the monitoring results are in conformity with recording frequency and quality assurance and quality control procedures stated in the monitoring plan. Please refer to Section D.2.

### Data collection procedures

*Data generation:* The net electricity supplied to grid and the electricity imported is measured by the meters mentioned by Section D.2.

*Data recording:* The project developer records manually the meter readings at the end of each month and the grid company will confirm the readings to transact the electricity supplied to the grid.

*Calculation:* see section D.2. and section E. Export and import per month is the difference between the cumulative values on the electricity meters. The net electricity supplied to the grid is electricity export minus electricity import. The net electricity supplied to the grid minus the electricity imported and then multiplied by emission factor is emission reductions. As the meters are bi-directional, it is possible to record only the net export figure.

*Reporting:* The calculated values are included in the Spreadsheet and reported in the CDM-MR.

### Organizational structure, roles and responsibilities

The CDM monitoring team is comprised of a CDM manager, operating manager, operating staff and technicians. The CDM manager has been appointed and trained and is responsible for the CDM monitoring system. Relevant roles and responsibility have been defined to fully implement data collection, archiving and data quality assurance and quality control etc.

### Emergency procedures for the monitoring system

The operating manager will notify the grid company in case there is doubt about the correct functioning of the revenue meters mentioned in the monitoring plan. In that case, the grid company and the operator will check and where necessary replace the meters. If the problem can be solved quickly, no CERs are claimed for the period during which the meter was not functioning correctly. If the problem cannot be solved quickly the grid company and the operator estimate the net electricity supplied to the grid using the data from the backup meters installed along with the revenue meters. No emergencies occurred during this monitoring period.

## SECTION D. Data and parameters

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

<b>Data/Parameter</b>	$EF_{grid,OM,y}$
Unit	tCO <sub>2</sub> /MWh
Description	Operating Margin emission factor of Sumatera
Source of data	Calculation from BPPT
Value(s) applied	0.906
Choice of data or measurement methods and procedures	BPPT calculated according to Tool to calculate the emission factor for an electricity system following the Simple Operating Margin approach – version 02 (see Annex 3)
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	No additional comments

<b>Data/Parameter</b>	$EF_{grid,BM,y}$
Unit	tCO <sub>2</sub> /MWh
Description	Build Margin emission factor of Sumatera
Source of data	Calculation from BPPT
Value(s) applied	0.581
Choice of data or measurement methods and procedures	BPPT calculated according to Tool to calculate the emission factor for an electricity system following the Simple Operating Margin approach – version 02 (see Annex 3)
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	No additional comments

<b>Data/Parameter</b>	$EF_{grid,CM,y}$
Unit	tCO <sub>2</sub> /MWh
Description	Combined Margin emission factor of Sumatera
Source of data	Calculation from BPPT
Value(s) applied	0.743
Choice of data or measurement methods and procedures	BPPT calculated according to Tool to calculate the emission factor for an electricity system following the Simple Operating Margin approach – version 02 (see Annex 3)
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	No additional comments

<b>Data/Parameter</b>	$W_{OM}$
Unit	%
Description	Weighting of operating margin emissions factor
Source of data	Tool to calculate the emission factor for an electricity system
Value(s) applied	50
Choice of data or measurement methods and procedures	-
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	No additional comments

<b>Data/Parameter</b>	$W_{BM}$
Unit	%
Description	Weighting of operating margin emissions factor
Source of data	Tool to calculate the emission factor for an electricity system
Value(s) applied	50
Choice of data or measurement methods and procedures	-
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	No additional comments

## D.2. Data and parameters monitored

Data/Parameter	EG <sub>facility,y</sub>				
Unit	MWh				
Description	Quantity of net electricity generation supplied by the project plant to the grid in year y				
Measured/calculated/default	Measured				
Source of data	Monthly records of the meters installed in 275kV switchyard				
Value(s) of monitored parameter	1,085,084.83				
Monitoring equipment	Continuous bidirectional electricity meters. The calibration frequency is annually as per manufacturers specifications. Please see detailed calibration information below.				
	Meter	SERIAL NO.	CALIBRATION DATE	Validity	ACCURACY
	Main Meter 1	214654186	23/04/2016	1 Year	0.2 S
			21/05/2017		
	Main Meter 2	214654187	23/04/2016	1 Year	0.2 S
			21/05/2017		
Applying decrease of the maximum permissible error (0.2%) to the measured values according to GUIDELINES FOR ASSESSING COMPLIANCE WITH THE CALIBRATION FREQUENCY REQUIREMENTS due to delayed calibration, in which the error is stated to be smaller than the maximum permissible error.					
Measuring/reading/recording frequency	Continuous measurement, monthly recording				

Calculation method (if applicable)	N.A.
QA/QC procedures	<p>Meters were calibrated periodically by PLN, and inspection will be performed by PLN as deemed necessary according to the agreed PPA. Data was recorded monthly and cross-checked with the invoices.</p> <p>The monitoring plan in the PDD states that the check meter measurement shall be used when the measurement of primary meter does not satisfy the applicable accuracy standard. Since the primary meters did satisfy the applicable accuracy standard during the monitoring period, the cross check meter measurements did not need to be used. Check Meters are 0.2s accuracy class meters, with serial numbers 211308780 and 211308781.</p>
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	No additional comments

### D.3. Implementation of sampling plan

Not applicable.

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

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

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$$

Where:

$BE_y$  = Baseline emissions in year y (tCO<sub>2</sub>e/yr)

$EG_{PJ,y}$  = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)

$EF_{grid,CM,y}$  = Combined margin CO<sub>2</sub> emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO<sub>2</sub>/MWh)

Example (Apr 2016)

$$BE_y = 86,929.90 \times 0.743 = 64,588 \text{ tCO}_2\text{e (round down)}$$

The project activity is installation of a new grid-connected renewable power plant at a site where no renewable power plant was operated prior to the implementation of the project activity, thus:

$$EG_{PJ,y} = EG_{facility,y}$$

Where:

$EG_{PJ,y}$  = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)

$EG_{facility,y}$  = Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)

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

As per the registered PDD, there are no significant project emissions sources.

$$PE_y = 0 \text{ tCO}_2\text{e}$$

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

The project activity is run of hydro power plant, so no leakage emissions are considered.

$$LE_y = 0 \text{ tCO}_2\text{e}$$

**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>	806,212	0.00	0	0	806,212	0	806,212

**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)
806,212	798,877

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

Estimated PDD Emission reduction per year: 873,025 tCO<sub>2</sub>e

Total days for 01/04/2017 – 28/02/2018 = 334 days

$$873/265 \times 334 = 798,877$$

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

During this monitoring period achieved emissions reductions were 0.92% higher than the estimated ERs in the PDD. The PDD estimate was based upon a predicted power production of 1,175,000 MWh per annum (PPA). Therefore, during this monitoring period estimated production based on 334 days was 1,075,205, however actual production was 1,085,084.83 MWh. PT PLN requested the project to increase operating hours and electricity supply to deal with increased demand in the North Sumatera region.

Year	Production (MWh)		Operation Hours (Hours)	
	Actual	PDD Estimation	Actual	PDD Estimation
01/04/2017 - 28/02/2018 (11 months)	1,085,084.83	1,077,083	8,016	7,678

Additional electricity was purchased by PLN as ‘secondary energy’ or Non-TOPE. As described in the PDD the tariff paid for this energy is not as high as that for the primary energy.

The project remains additional despite the increase during this monitoring period. The registered PDD applied a sensitivity analysis to see the impact of an increase in electricity generation on the IRR and concluded that a 19% increase is required to cross the benchmark (IRR). An increase of 0.92% in a monitoring period of 11 months does not cross this threshold.

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

Not applicable to large-scale project activities.

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**Document information**

<i>Version</i>	<i>Date</i>	<i>Description</i>
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.

<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.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: monitoring report		