



**Monitoring report form
(Version 05.1)**

Complete this form in accordance with the Attachment "Instructions for filling out the monitoring report form" at the end of this form.

MONITORING REPORT

Title of the project activity	Orosí Wind Power Project	
UNFCCC reference number of the project activity	6652	
Version number of the monitoring report	1.0	
Completion date of the monitoring report	28/02/2017	
Monitoring period number and duration of this monitoring period	1 st Monitoring Period 15/01/2015 – 06/09/2015 (inclusive)	
Project participant(s)	Inversiones Eólicas de Orosí Dos, S.A. (IEDO) (Private Entity)	
Host Party	Costa Rica	
Sectoral scope(s)	Energy Industries - Renewable Sources	
Selected methodology(ies)	ACM0002: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (Version 12.3.0)	
Selected standardized baseline(s)	N/A	
Estimated amount of GHG emission reductions or net GHG removals by sinks for this monitoring period in the registered PDD	79,787 tCO ₂ e per year.	
Total amount of GHG emission reductions or net GHG removals by sinks achieved in this monitoring period	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	0	0

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The Orosí Wind Power Project (the "Project") involves using renewable wind power to provide affordable electrical energy to the Costa Rican grid. The Project is located in Costa Rica, in the community of Quebrada Grande, Municipality of Liberia, in Guanacaste Province.

The main purpose of the Project is to provide electricity to the growing requirement in Nicaragua, using a sustainable and competitive resource: the wind. The Project consists on the installation of twenty-five 2 megawatt ("MW") Gamesa series G87s (also known as G9X) wind turbine generators (WTG), for a total capacity of 50 MW. Orosí is expected to provide 226.2 GWh per year to the *Instituto Costarricense de Electricidad* ("Costa Rican Electricity Institute" or "ICE"), which is the national grid's authority in Costa Rica.

The National Electric System has an estimated emission factor of 0.3528 tCO₂e per megawatt hour, which implies that the Project will displace almost 80 thousand tonnes of carbon dioxide per year. This will occur since the wind energy generated by the Project will displace generation required from more carbon intensive plants.

The following table summarizes the Project's main milestones:

Milestones	Date
EPC Agreement signing	22/11/2013
Construction Works start date	11/12/2013
Partial Commercial operations start date (24 WTGs) ¹	07/09/2015
Commercial operations start date (25 WTGs)	02/10/2015

During this monitoring period there were no emission reductions achieved as the project started operations on 07/09/2015, as summarized in the table below:

Monitoring period	Net electricity production	Total emission reductions
15/01/2015 – 06/09/2015	0 MWh	0 tCO _{2eq}

A.2. Location of project activity

Costa Rica

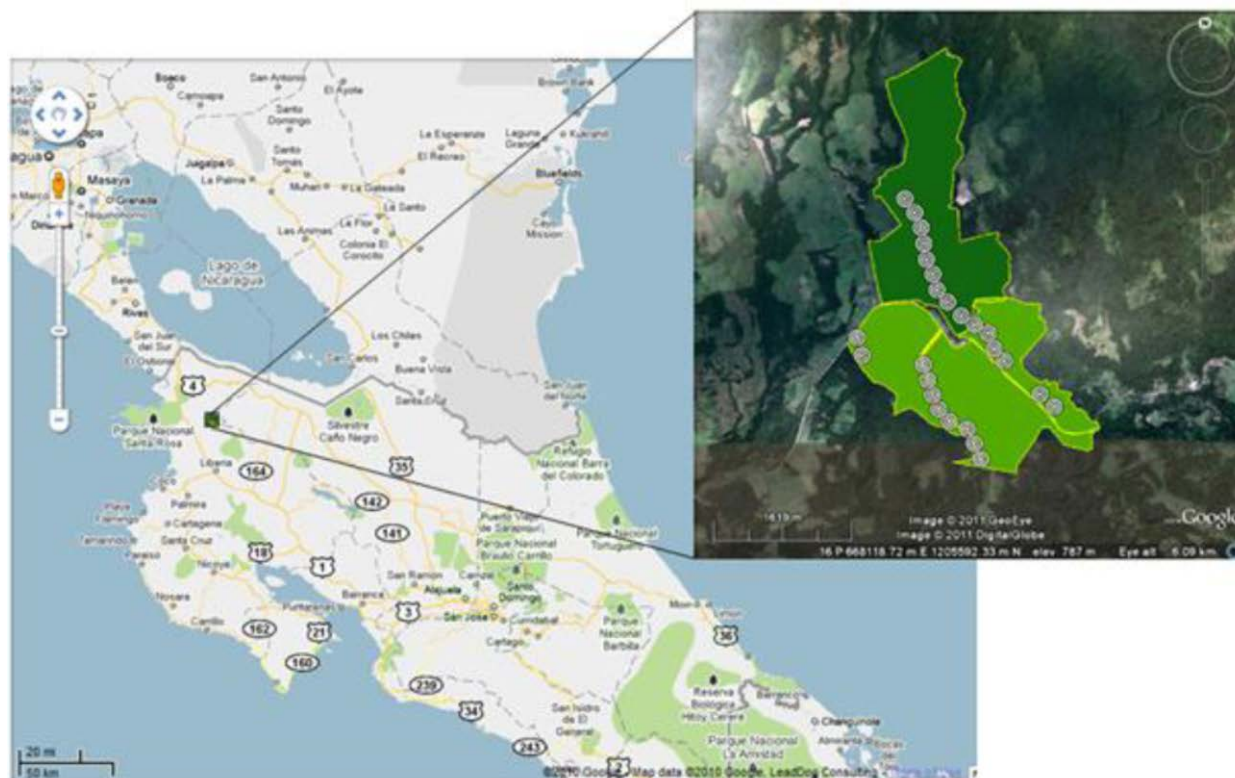
Guanacaste

Community of Quebrada Grande, Municipality of Liberia

The Project is located on the Los Angeles and La Frescura farms, in the community of Quebrada Grande. The geographic coordinates of the proposed location of the Project are 10°52'23.26" N, 85°26'53.88" W, DATUM WGS84.

¹ Partial Commercial Operation with 48 MW (24 WTGs). The AEG-14 was pending to start commercial operations (Note 2015-09-10 - PEO61100-252-2015).

Figure 1 - Project Location



A.3. Parties and project participant(s)

Party involved (host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate whether the Party involved wishes to be considered as project participant (yes/no)
Costa Rica (host)	Inversiones Eólicas de Orosí Dos, S.A. (IEDO) (Private Entity)	No

A.4. Reference of applied methodology and standardized baseline

Approved baseline and monitoring methodology applied:

- ACM0002: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (Version 12.3.0)

The following tools were applied together with the methodology:

- "Tool for the demonstration and assessment of additionality" (Version 06.0.0)
- "Guidelines on the assessment of investment analysis" (Version 05)
- "Tool to calculate the emission factor for an electricity system" (Version 02.2.1)

Reference to the UNFCCC CDM web site:

<http://cdm.unfccc.int/methodologies/DB/8W400U6E7LFHHYH2C4JR1RJWWO4PVN>

A.5. Crediting period of project activity

Type: 7 years renewable crediting period.

The crediting period of the project activity is from 15/01/15 – 14/01/22

Current monitoring period: 15/01/2015 – 06/09/2015

A.6. Contact information of responsible persons/entities

Geo Ingeniería Ingenieros Consultores S.A., based in San José, Costa Rica, completed the CDM-MR-FORM.

- Phone number: +(506) 2290 4656 / Fax: + (506) 2290 5297
- E-mail: scastrro@geoingenieria.co.cr
- Web: www.geoingenieria.co.cr

This entity is not considered as a project participant.

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

The functional layout of the Orosí Project location consists of all the main elements of a wind farm: wind turbines, wind measuring stations, an operations building (with metering equipment), internal roads between turbines and the interconnection to an existing electrical substation ("Las Pailas").

The Project signed a PPA with ICE on August 1st, 2013. On November 22, 2013, an EPC agreement was signed with GAMESA WIND LLC. Later on, construction works began in December of 2013 and the Project started partial commercial operations in September 7th, 2015 and commercial operations with a 100% of the contracting energy on October 2nd, 2015. The Project Activity was registered as a CDM Project on 14/10/2012 under reference number 6652.

The Wind Turbine Generator ("WTG") chosen for the Project activity was the Gamesa G87s, which is 78 meters high. This generator has a generating capacity of 2 MW and 25 units were installed, to provide a total capacity of 50 megawatt. The Project has a net energy production of approx. 226.2 GWh per year.

A SCADA control system will supervise, monitor and control all equipment in the wind farm (i.e. WTGs, meteorological masts, and electrical substation, among others) via a PLC (Programmable Logic Controller). The control system functions in real time to operate individual turbines continuously, and is designed to react to variable wind speed to maximize power output and minimize loads and noise.

The specific Project data is shown in the following table:

Table 1. Project Data

Project Features	Total Nominal Capacity	50 MW
Turbine Features	Brand	GAMESA
	Model	G87s
	Rotor Blade	Gamesa Eólica 42.5 m
	Capacity	2.0 MW
Other Data	Machinery Components	50/60 Hz
	Load Assumptions according to	IEC 61400-1, Class S
	Tubular Steel Tower	Hub Heights at 78 meters
	Electrical Installations and Lightning Protection	50/60 Hz
	Design Life	20 years

During this monitoring period (15/01/2015 – 06/09/2015), there was no net electricity supplied by the Project to the utility. The monitoring in the Project is carried out as established in the Monitoring Plan by continuous metering of the received and delivered energy.

The energy produced by each of the turbines will be delivered to the substation through 34.5 kV circuit collectors. The collector substation consists of a building that will house the system of medium voltage (Metal-Clad), ancillary services and control panels of the medium voltage substation.

The connecting line to the NES has an operating voltage of 230 kV in a single-circuit using the conductor 795 MCM ACSR Drake Code, which has a length of 20 km approximately. The line connects the plant to an input line module in the 230 kV substation “Las Pailas” property of ICE, according to the approved connection point for the project. The bi-directional meters used to determine net electricity provided to the grid will be located at the substation.

The Operations and Maintenance building will be near the Project’s substation. This structure will house the equipment necessary for daily operations of the Project.

There were no events that may impact the GHG emission reductions during this monitoring period, as the project was not in operation yet.

B.2. Post-registration changes

B.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline

Not Applicable

B.2.2. Corrections

Not Applicable

B.2.3. Changes to start date of crediting period

A Post-registration change on the project’s start date was approved on 17 Feb 2015. ORC-6652-001

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

Not applicable

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

Not applicable

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

A Post-registration change on the project’s design was approved on 17 Feb 2015. PRC-6652-001

B.2.7. Types of changes specific to afforestation or reforestation project activity

Not applicable

SECTION C. Description of monitoring system

Determination of net electricity delivered to the grid ($EG_{facility,y}$)

The Orosí Wind Power Project will deliver its output to a dedicated collection substation (Orosí Substation) that is connected through a main 34.5/230 kV transformer and a 230 kV, 19 km transmission line to an existing substation (ST Pailas, 230 kV) owned by the Utility (ICE). The bi-directional meters required for determining the plant's net generation will be installed at the ICE's substation. Figure 2 shows a metering scheme: electricity is determined at the 230 kV Pailas substation Revenue Meters (both for energy delivered to and consumed from the Grid).

The parameter $EG_{facility,y}$ will be determined according to:

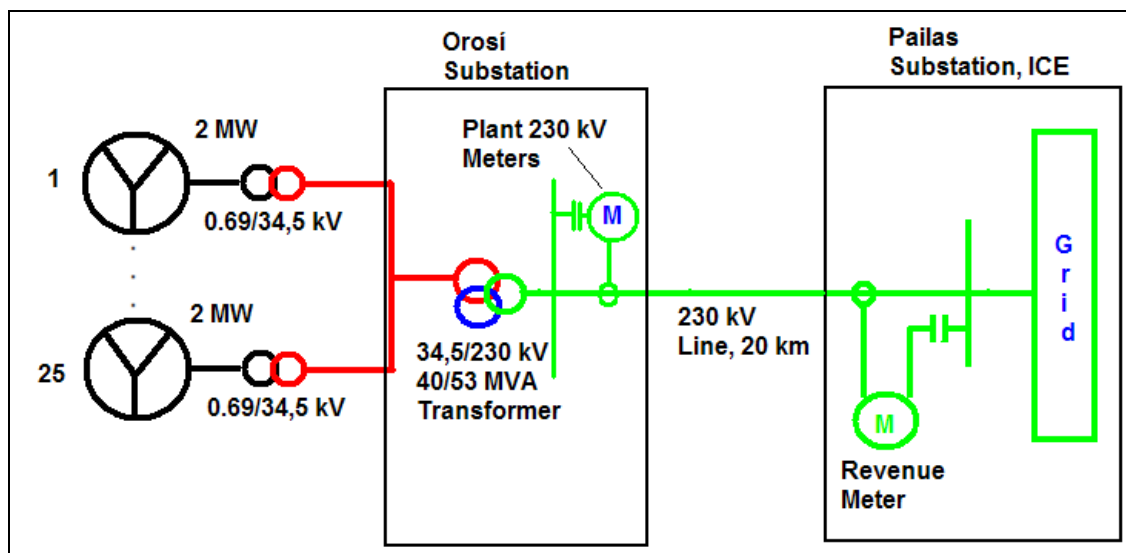
$$(1) \quad EG_{facility,y} = EG_{230kV,y} - EC_{230kV,y}$$

where:

$EG_{230kV,y}$ = Gross electricity delivered to the grid (as measured by the 230 kV meter at Pailas/ICE substation) in period y .

$EC_{230kV,y}$ = Electricity consumption from the grid (as measured by the 230 kV meter at Pailas/ICE substation) in period y .

Figure 2- Metering scheme



The main meter installed during the period 15/01/2015 to 06/09/2015 was the MJ-1402A922-04 (Model ION 7650) and the backup meter used was MJ-1402A920-04 (Model ION 7650). The latter explanation is described in the table below:

Table 2: Meters (main and back-up)

PERIOD	MAIN METER (MMED1)	BACKUP METER (MMED2)
15/01/2015 – 06/09/2015	Part N.: M7650A0E0B6F1A0F Serial Number: MJ-1402A922-04 Model: ION 7650	Part N.: M7650A0E0B6F1A0F Serial Number: MJ-1402A920-04 Model: ION 7650

Emergency procedures

Although main and backup meters will be installed at the Pailas substation, onsite meters of at least +/- 0.5 accuracy level at the 230 kV side are available in case both meters at the Pailas substation are out. In this case, historical records will be used to account for transmission losses of the transmission line. The average difference between the readings from the 230 kV meters located at the Orosí substation and the 230 kV meters of the Pailas substation of last 3 months will be conservatively deducted/added from the readings obtained from the 230 kV meters at Orosí Substation.

As the 230 kV meters located at Pailas substation are the official ones used for billing purposes, any events affecting the latter should be reflected in audit reports prepared by the grid operator (*Centro Nacional de Control de Energía, CENCE*). If a different method for determining net electricity is used in these audit reports, the most conservative values will be chosen.

CDM management

Since the Project Participants have chosen to use *ex-ante* emission factors, there is no need to recalculate each of the latter during the crediting period. Thus, the main variable that requires monitoring is the net amount of electricity that the project delivers to the grid, that is, the amount exported by the project after deducting any electricity imports from the grid that the project uses for auxiliary consumption or plant start-up.

The Project Participants will implement a management structure where monitoring responsibilities will be explicitly defined. The Plant Manager will be responsible for ERs monitoring, record keeping and the implementation of proper QA procedures. All the information from this department will be consistent and easily verifiable with all the relevant data from other departments in case an external audit should require it.

All O&M procedures will be adapted to include the carbon monitoring component and the adequate accounting of the emission reductions. The organizational chart is provided below:

Figure 3 - Organizational chart



The Operations Department (which reports directly to the General Manager) will have a person in charge of the carbon credits monitoring according to the following responsibilities matrix:

Table 3 - Responsibilities matrix

	Plant Manager	Environmental Coordinator	Operations Manager	GME – CDM coordinator
Collect data				
Power delivered to grid	R	E		I
Ensure calibrations and data quality	R	I	E	I
Process data				
Input of raw data in spreadsheet		R	E	
Cross check data and correct		R	E	
Calculate emission reductions		R	E	I
Quality check calculated emission reductions	R/E	I	R/E	I
Reporting and archiving				
Report data gaps and errors	I	R	E	I
Report emission reductions to date	R/E	I	R/E	I
Archiving of procedures and certificates		R	E	
Archiving of data	R	E	E	I

E = Execute; R = Responsible; I = To be informed

Calibration of Meters and Metering

Meters must be calibrated and tested to verify their precision every year, as per the Costa Rican legislation that regulates the energy exchange, as established in the PPA (Section 7.2.4). ICE will cover the testing costs of their meters, presenting the Project copy of the Calibration Reports.

If any anomaly is detected, the cost of the auditing will be assumed by the Project.

The energy meters should have a precision no more than 0.2%, hence should be at least 0.2 class.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

Data/parameter:	EF_{grid}, CM, 2008, 2009, 2010
Unit	tCO ₂ /MWh
Description	Combined Margin Emission Factor of the Grid Calculated with the latest published official statistical data, using the default weights for wind projects $w_{OM} = 0.75$ and $w_{BM} = 0.25$
Source of data	Determined in the registered PDD
Value(s) applied)	0.3528
Choice of data or measurement methods and procedures	Local data from official sources used.
Purpose of data	Calculation of baseline emissions
Additional comments	This parameter is fixed for the whole crediting period

D.2. Data and parameters monitored

Data/parameter:	<i>EG_{facility,y}</i>
Unit	MWh in period y
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in period y
Measured/calculated/default	Measured
Source of data	On-site metering system
Value(s) of monitored parameter	0.00 MWh/year

Monitoring equipment	<p>The energy will be continuously metered at the Delivery Point by two electronic line meters. The MJ-1402A922-04 (ION 7650) meter served as the main meter and the MJ-1402A920-0 (ION 7650) as the backup meter</p> <p>Period from 15/01/2015 to 06/09/2015:</p> <ul style="list-style-type: none"> - Main (MMED1) - Series: MJ-1402A922-04 - Brand: ION, Model: 7650 - Verification date: 22/04/2015, valid until 21/04/2016 - Verification date: 17/05/2016, valid until 16/05/2016. - Power Accuracy: 0.2% - Date of meter installation to the plant: 20/04/2015 - Back Up (MMED2) - Series: MJ-1402A920-04 - Brand: ION, Model: 7650 - Verification date: 22/04/2015, valid until 21/04/2016 - Verification date: 17/05/2016, valid until 16/05/2016. - Power Accuracy: 0.2% - Date of meter installation to the plant: 20/04/2015 <p>Calibration frequency of the meters: at least once every year as per the Costa Rican legislation for the energy exchange, as established in the PPA (Section 7.2.4).</p>
Measuring/reading/recording frequency:	<p>Two bi-directional meters (main and backup) will be installed at the ICE's substation (ST Pailas) for determining the plant's net generation. Hence, electricity will be determined at the 230 kV Pailas substation Revenue Meters (both for energy delivered to and consumed from the Grid). Electricity consumption from the grid (for start-up or auxiliary purposes) will be deducted from gross exports to the latter in order to obtain <i>net</i> electricity supplied to the NES.</p> <p>Data will be continuously metered; generation data will be aggregated monthly for billing purposes.</p>
Calculation method (if applicable):	N/A
QA/QC procedures:	<p>Meters have an accuracy rating of +/- 0.2% and will be calibrated periodically as by entities authorized by the ICE. Data can be cross-checked with the receipts of sales.</p> <p>Data will be archived by means of electronic and paper backup for the full crediting period, plus two years after the end of the crediting period or the last issuance of CERs, whichever occurs later.</p>
Purpose of data:	Calculation of baseline emissions.
Additional comments:	

D.3. Implementation of sampling plan

Not applicable

SECTION E. Calculation of emission reductions or GHG removals by sinks

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

According to ACM0002, the baseline emissions of the project are equal to:

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

Where:

BE_y Baseline emissions in year y (tCO₂/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) ($EG_{facility}$)

$EF_{grid,CM,y}$ Combined margin CO₂ 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" (tCO₂/MWh).

y	$EG_{PJ,y}$ (MWh)	$EF_{grid,CM,y}$ (tCO₂ / MWh)	BE_y (tCO₂e)
2015	0.00	0.3528	0.00
Total	0.00		0.00

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

There are no project emissions attributable to wind projects. Consequently $PE_y = 0$

E.3. Calculation of leakage

There is no leakage attributable to wind projects. Consequently $L_y = 0$.

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

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

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

Item	Values estimated in ex ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO ₂ e)	79,787 (12 months period)	0.00

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

N/A

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

Project participant and/or responsible person/ entity	<input checked="" type="checkbox"/> Project participant <input type="checkbox"/> Person/entity responsible for completing the CDM-MR-FORM
Organization name	TCR Holdings S.A.
Street/P.O. Box	Oficentro El Cedral, San Rafael de Escazú
Building	Edificio 1, Local 111
City	San José
State/region	San José
Postcode	
Country	Costa Rica
Telephone	+506 2228-9300
Fax	+506 2228-9930
E-mail	cdm@mesoamericaenergy.com
Website	www.globeleqmesoamericaenergy.com
Contact person	
Title	Development and CDM Manager
Salutation	Mr.
Last name	Umana
Middle name	NA
First name	Leonel
Department	Development
Mobile	+506 8666-2323
Direct fax	+506 2228-9930
Direct tel.	+506 2228-9300
Personal e-mail	lumana@mesoamericaenergy.com

Project participant and/or responsible person/ entity	<input type="checkbox"/> Project participant <input checked="" type="checkbox"/> Person/entity responsible for completing the CDM-MR-FORM
Organization name	Geo Ingeniería Ingenieros Consultores S.A.
Street/P.O. Box	La Uruca
Building	Centro Palacio
City	San José
State/region	San José
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Country	Costa Rica
Telephone	+506 2290-4656
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E-mail	info@geoingenieria.co.cr
Website	www.geoingenieria.co.cr
Contact person	Sofía Castro Bonilla
Title	Director
Salutation	Mrs.
Last name	Castro
Middle name	-
First name	Sofía
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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: <ul style="list-style-type: none"> • 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.

<i>Version</i>	<i>Date</i>	<i>Description</i>
04.0	25 June 2014	<p>Revisions to:</p> <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 (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: monitoring report		