Monitoring report form (Version 03.2)

Monitoring report

Title of the project activity	EOLO Wind Power Project
Reference number of the project activity	6143
Version number of the monitoring report	1.0
Completion date of the monitoring report	07/02/2014
Registration date of the project activity	18/06/2012
Monitoring period number and duration of this monitoring period	1 01/01/2013 – 31/12/2013
Project participant(s)	1. EOLONICA, S.A.- Sucursal Nicaragua 2. Eolo de Nicaragua S.A.
Host Party(ies)	Nicaragua
Sectoral scope(s) and applied methodology(ies)	Sectoral scope: 1 – Energy industries (renewable/non-renewable sources). Project type: Renewable Energy "ACM0002: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (Version 12.3.0 – 2 March 2012)"
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	110,054 t CO_2e[1]
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	121,457 t CO_2e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period up to 31 December 2012(if applicable)	0 t CO_2e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period from 1 January 2013 onwards (if applicable).	121,457 t CO_2e

[1] Equivalent to 12 months, as per the length of the monitoring period.

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The Eolo Wind Power Project (hereafter, the "Project") involves using renewable wind power to provide affordable electrical energy to Nicaragua´s grid. The wind farm is located on the southwest coast of Lake Nicaragua, in the Department of Rivas, Republic of Nicaragua.

The main purpose of the Project is to provide electricity to the growing requirement in Nicaragua, using a sustainable and competitive resource: the wind. For this purpose, the Project makes use of 22 GAMESA G90 – 2MW wind turbines for a total capacity of 44 MW. The estimated net power production established in the PDD was 162.32 GWh per year.

Eolo de Nicaragua S.A., a special purpose vehicle established in Nicaragua is the original company formed to develop the Project.

An EPC Agreement was signed with GAMESA on 31/12/2011. Construction works began in January of 2012 and the Project began commercial operations in December 1st 2012 and has been operating continuously since that date.

The following table summarizes the Project's main milestones:

Milestones	Date
EPC Agreement signing	**December 2011**
Construction Works start date	**January 2012**
Commercial operations start date	**December 2012**

The total amount of emission reductions achieved in this monitoring period is summarized in the table below:

Monitoring period	Net electricity production	Total emission reductions
01/01/2013 – 31/12/2013	**179,148.51 MWh**	**121,457 tCO_{2eq}**

A.2. Location of project activity

Nicaragua
City of Rivas
Province of Rivas

The project is located at approximately kilometer 123 along the Pan-American Highway. The site is located on the south west coast of the Lake of Nicaragua.

The geographical coordinates of the Project area are the following:

Table 1: Project Coordinates (UTM)

Longitude	Latitude
0636020 E	1256863 N

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 if the Party involved wishes to be considered as project participant (Yes/No)
Nicaragua (Host Party)	EOLONICA, S.A.- Sucursal Nicaragua (Private Entity)	No
Nicaragua (Host Party)	Eolo de Nicaragua S.A. (Private Entity)	No

A.4. Reference of applied methodology

1. The baseline and monitoring methodology applied is ACM0002: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (Version 12.3.0 – 2 March 2012)
2. The tool for demonstration and assessment of additionality used is: "Tool for the demonstration and assessment of additionality" (Version 06.0)
3. The tool for calculation the emission factor for an electricity system used is: "Tool to calculate the emission factor for an electricity system" (Version 2.2.1)
4. "Guidelines on the assessment of investment analysis" (Version 5)

Reference to the UNFCCC CDM web site:

http://cdm.unfccc.int/methodologies/DB/UB3431UT9I5KN2MUL2FGZXZ6CV71LT

A.5. Crediting period of project activity

Type: 7 years renewable crediting period.

The first crediting period of the project activity is from 01/01/2013 to 31/12/2019.

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

EOLO signed a PPA with DISNORTE and DISSUR on June 2nd 2011. On December 31st, 2011, an EPC agreement was signed with GAMESA. Later on, construction works began in January of 2012 and the project started commercial operations in December 1st, 2012. The Project Activity was registered as a CDM Project on 18/06/2012 under reference number 6143.

The total capacity of the project is 44 MW, which consists in twenty-two 2 megawatt (MW) Gamesa G90 wind turbines generators. The net power production delivered to the national grid is estimated to be 162.32 GWh per year. The specific Project data is shown in the following table:

Table 2: Project Data

Project Features	**Total Nominal Capacity**	**44 MW**
Turbine Features	**Brand**	**GAMESA**
	Model	**G90**
	Rotor Blade	**Eolica 44.0 m, Class IIA**
	Capacity	**2.0 MW**
Other Data	**Machinery Components**	**Class IIA 50/60 Hz**
	Tubular Steel Tower	**Hub Heights at 67, 78, 100 meters (Class IIA)**
	Electrical Installations and Lightning Protection	**50/60 Hz**
	Design Life	**20 years**

During this monitoring period (1/01/2013 - 31/12/2013), the net electricity supply by the Project to the utility was 179,148,509.78 KWh. The monitoring in the Project is carried out as established in the Monitoring Plan by continuous metering of the received and delivered energy.

Regarding events that may impact the GHG emission reductions during the monitoring period, the following are mentioned:

Table 3: Event Log

Month	Event
January	• Trip in the Blue Power side, 230 KV line. • Clearing of the Power Plant. Solicited by the CNDC
February	• Works in CKTO #1. Due to energization of a cell block. • Clearing of the Power Plant due to installation of the capacitor bank.
March	• Works in CKTO #1. Finishing energization works of a cell block. • Clearing of the Power Plant. Plant due to installation of the capacitor bank.
April	• Failure in 230kV line • Trip in line L9160 Blue Power. Affected 4 aero generators.
May	• Failure in 230kV line • Trip in line L9160 Blue Power. Affected 10 aero generators. • Trip in lines L9170 and L9160 due to overvoltage.
June	• Trip in line CKTO #2, due to overcurrent. • Programmed Clearing of the plant in order to finalize the pending construction works of the SET.
July	• Failure in the DC rectifier in SSAA • Forced Clearing in order to perform corrective maintenance in the DC rectifier. • Closure in the Blue Power side. Affected 8 WTG
August	• Clearing of the 34.5KV circuit in order to make corrective works in the plant. Trip in line L9170. • Trip in line L9170. Failure in 230KV, in the side of Blue Power. • Trip in CKTO #1 due to overcurrent. • Forced clearing due to failure in the voltage rectifier ene sud station.
September	• Trip in CKTO #1 & #2 due to overcurrent. • Failure in line L8090 of 138 KV. Affected 230 KV line. • Clearing solicited by CNDC in order to correct the 138 KV L8090 line. • Failure in L9030 line, in AMAYO's side. Leaves the power plant without voltage.
October	• Trip in lines A9015 & T9010, in SET Eolo.
November	• Trip in CKTO #1 due to a thunderstorm. • Forced clearing solicited by CNDC in order to close the A9015 switch in SET Eolo. • Preventive maintenance of 12 months in SET Eolo.

During this monitoring period there were no major events or situations that affected the applicability of the applied methodology.

B.2. Post registration changes

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

Not applicable

B.2.2. Corrections

Not applicable

B.2.3. Permanent changes from registered monitoring plan or applied methodology

Not applicable

B.2.4. Changes to project design of registered project activity

Not applicable

B.2.5. Changes to start date of crediting period

Not applicable

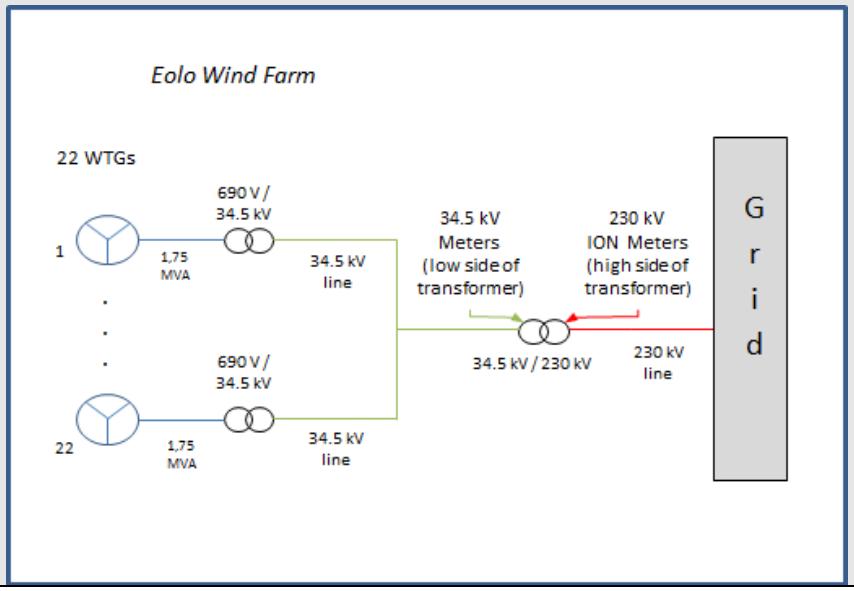
B.2.6. Types of changes specific to afforestation or reforestation project activity

Not applicable

SECTION C. Description of monitoring system

The Eolo wind farm delivers its output to a dedicated substation where two bi-directional meters required for determining the plant's net generation are installed. Figure 1 shows a metering scheme: electricity is determined at the 230 kV substation meters (both for energy delivered to and consumed from the grid). A main meter and a backup meter are in place.

Figure 1: Metering Scheme, dedicated Substation



The main meter used during the period 01/12/2013 to 31/12/2014 was the ZYY01205024300000 (Model ION 8650) and the backup meter used was ZYY01205023900000 (Model ION 8650). The latter explanation is described in the table below:

Table 4: Meters (main and back-up)

PERIOD	MAIN METER (MMED1)	BACKUP METER (MMED2)
01/01/2013 to 31/12/2013	**ZYY01205024300000 Serial Number: MW 1205A 243 01 Model: ION 8650**	**ZYY01205023900000 Serial Number: MW 150A 239 01 Model: ION 8650**

The energy produced by the Project is sold to "Distribuidora de Electricidad del Norte" (DISNORTE) and to "Distribuidora de Electricidad del Sur" (DISSUR) (hereinafter the Distributors). Each Distributor receives 50% of the energy delivered by the Project, as per the PPA signed with both of them.

Personnel of EOLO take remotely readings every 15 minutes, via the ION ENTERPRAY SCADA system. The net energy in the first day of the month is subtracted from the net energy of the last day of the month, the difference obtained. The operator elaborates a record that is signed by the Plant's management and the Department of Coordination of Operations. A constancy and an invoice are developed by EOLO and sent directly to the Distributors.

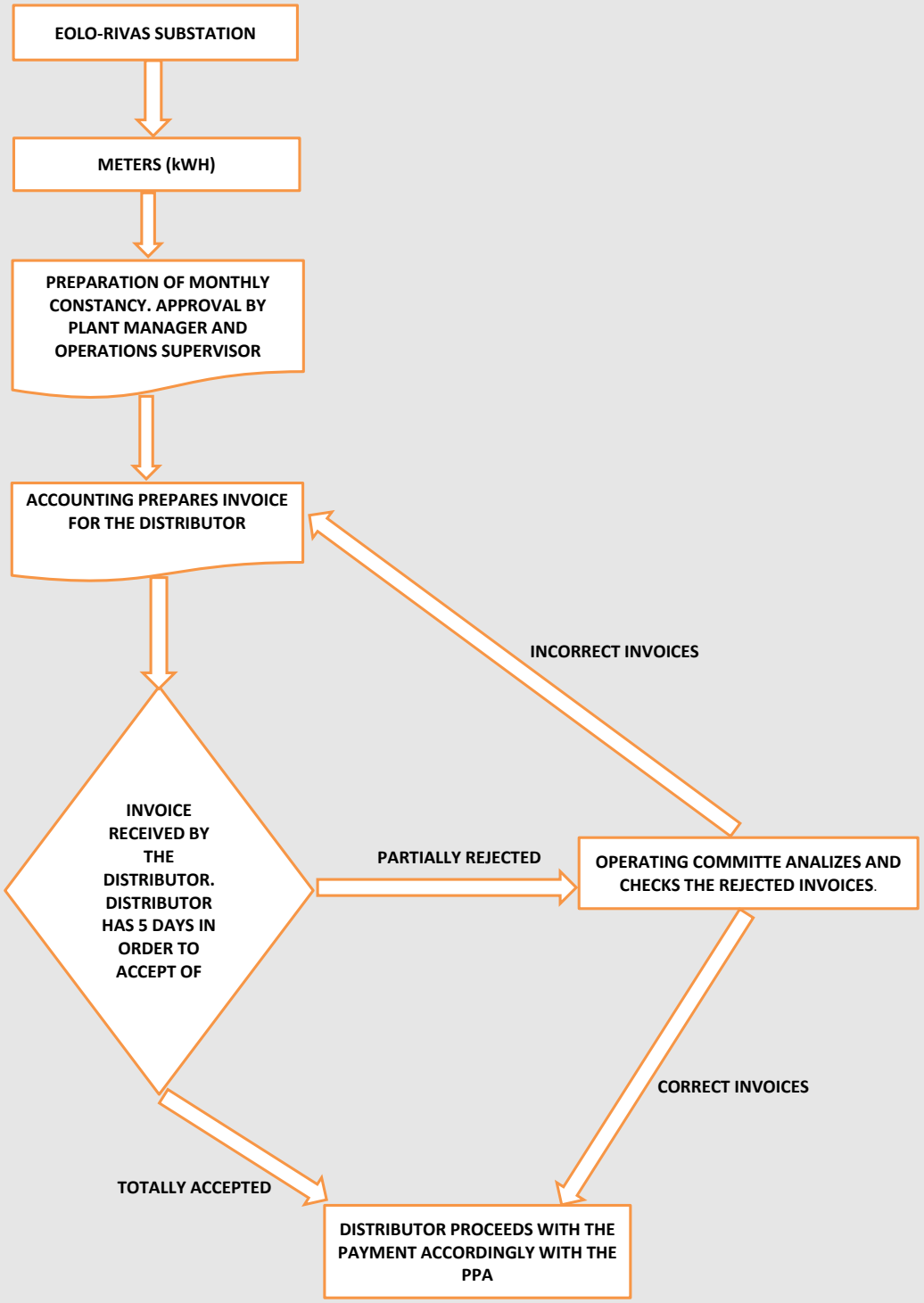
Onsite meters are located at the 34.5 kV side of the substation (of at least +/- 0.5 accuracy level) in case both 230 kV meters at the substation are out. In this case, historical records will be used to account for transmission losses between the 34.5 kV and the 230 kV metering points, if any. The average difference between the readings from the 34.5 kV and the 230 kV meters of the last 3 months will be deducted from the readings obtained from the 34.5 kV meters.

The CNDC (Centro Nacional de Despacho de Carga) takes the energy readings remotely. This data is compared with the invoice and constancy, prepared by personnel of EOLO. At the moment, the Distributors don't have direct access to the commercial meters, however the CNDC give them access, of their readings of the Project´s net electricity.

As the 230 kV meters are the official ones used for billing purposes, any events affecting the latter should be reflected in audit reports prepared by the CNDC. If a different method for determining net electricity is used in these audit reports, the most conservative values will be chosen.

The flowchart of the billing process for the Project is found below:

Figure 2. Information Flow



The Operations department is responsible for ERs monitoring, record keeping and the implementation of proper QA procedures. All the information from this department is consistent and easily verifiable with all the relevant data from other departments in case an external audit should require it.

All Operation and Maintenance procedures will be adapted to include the carbon monitoring component and the adequate accounting of the emission reductions.

Figure 3: Organizational structure of the Project

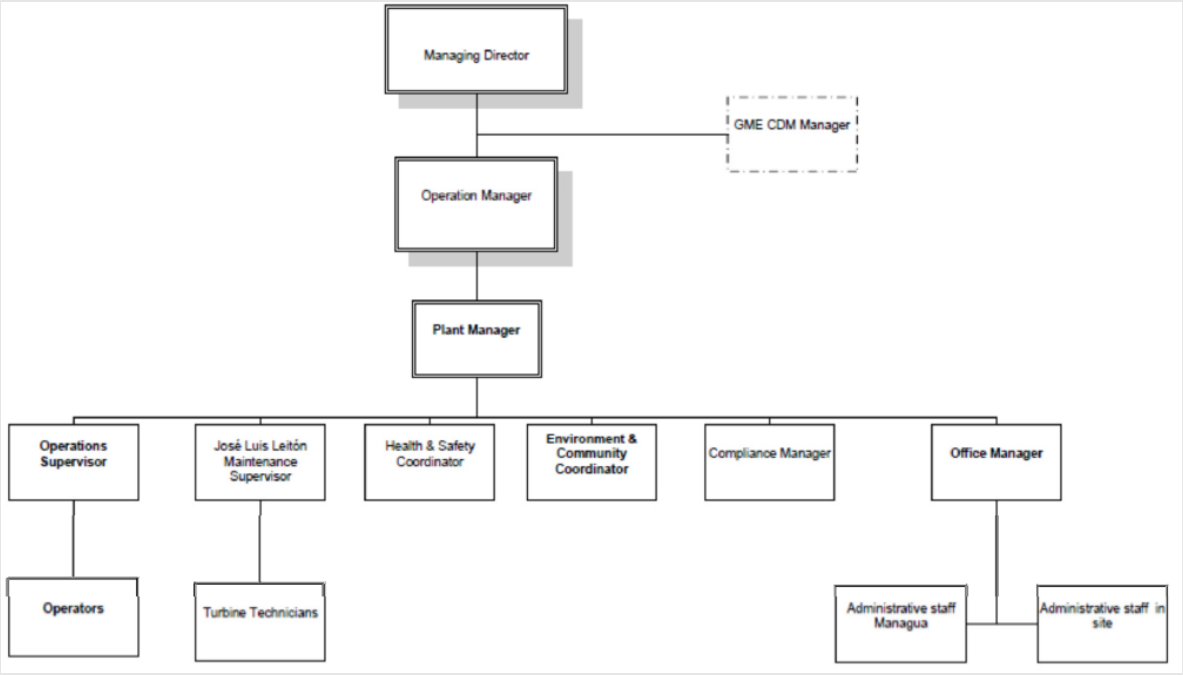


Figure 4: Responsibilities of personnel

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

E = Execute
R = Responsible
I = To be informed

Procedures for handling internal auditing and non-conformities

The following table sets out the data collection procedures in case of extraordinary faults and events:

Table 5: Data collection procedures in case of extraordinary faults and events

Periodicity	Activity	Responsible
Failure in any of the meters (main and backup)	Communicate immediately to the operations management, the dispatch center and the distributors.[2] Register the event in the log. Any replacement or reparation must have its work record. The personnel must ensure the meter's replacement and the installation of the new meter, as well as the correct calibration of the device by a qualified company, as soon as possible.[3].	Coordination of Operations & EOLO's Shift Operator.
In case the turbines need to be stopped, or, the project goes through an interruption of its operations.	Record the hours of the turbine(s)/Project's inactivity as well as the reason(s) of the shutdown and the moment of reactivation.	Coordination of Operations & EOLO's Shift Operator.
Unforeseeable cases	Any event preventing wind project operation should be promptly reported to Plant Management.	Coordination of Operations & EOLO's Shift Operator.

Calibration of Meters and Metering

Meters must be calibrated at least once every two years as per the Commercial ANNEXES of the Operations Normative of Nicaragua. The verification cost must be assumed by EOLO´s management.

The CNDC could ask for a meter checking. If any anomaly is detected, the cost of the auditing will be assumed by EOLO's management.

SECTION D. Data and parameters

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

Data / Parameter:	**EFgrid, CM, 2007, 2008, 2009**
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):	0.6780
Purpose of data:	Calculation of baseline emissions
Additional comment:	This parameter is fixed for the whole crediting period

[2] The Operations Coordination Office is in charge of this process and it's resolution
[3] All notification of installation and certificates calibration will be kept on file.

D.2. Data and parameters monitored

Data / Parameter:	$EG_{facility,y}$
Unit:	MWh/yr
Description:	Quantity of net electricity generation supplied by the Project plant/unit to the grid in year *y*
Measured/ Calculated / Default:	Measured
Source of data:	Electricity meter reading
Value(s) of monitored parameter:	179,148.51 MWh/yr
Monitoring equipment:	The energy is continuously metered at the Delivery Point by two electronic line meters. The ZYY01205024300000 (ION 8650) meter served as the main meter and the ZYY01205023900000 (ION 8650) as the backup meter Period from 01/01/2013 to 31/12/2013 - Main (MMED1) ZYY01205024300000 - Series: MW 1205A243-01 - Brand: ION, Model: 8650 - Calibration date: 22/05/2012, valid until 21/05/2014. - Power Accuracy: 0.1% - Date of meter installation to the plant: 12/11/2012 - Back Up (MMED2) ZYY01205023900000 - Series: MW 1250A239-01 - Brand: ION, Model: 8650 - Calibration date: 23/05/2012, valid until 22/05/2014. - Power Accuracy: 0.1% - Date of meter installation to the plant: 12/11/2012 Calibration frequency of the meters: at least once every 2 years as per the Commercial ANNEXES of the Operations Normative of Nicaragua.
Measuring/ Reading/ Recording frequency:	Two bidirectional meters are installed at the Metering Point in the EOLO's dedicated substation, a main meter and a back-up meter. The bidirectional meters measures both electricity generated that is being imported to the grid (imports) and discount electricity that is consumed by the Project (exports). The data (net electricity supplied to the grid) will be calculated from the readings from the main meter at the Project site (recording both imports and exports that will be deducted to obtain the net electricity). Energy readings are taken every 15 minutes.
Calculation method (if applicable):	N/A
QA/QC procedures:	The CNDC (Centro Nacional de Despacho de Carga) takes the energy readings remotely through a SCADA system Meters will be calibrated according to the Operation´s Normative.
Purpose of data:	Calculation of baseline emissions.

Additional comment:	Data will be archived by means of electronic and paper backup for the full crediting period, plus two year years after the end of the crediting period or the last issuance of CERs, whichever occurs later.

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_v Baseline emissions in year y (tCO_2/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) ($EG_{facibilitv}$)

$EF_{grid.CM.v}$ Combined margin CO_2 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_2/MWh).

y	***$EG_{PJ,v}$*** **(MWh)**	***$EF_{grid.CM.v}$*** **(tCO2 / MWh)**	***BE_v*** **(tCO_2e)**
2013	179.148.51	0.6780	121,457

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

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

E.3. Calculation of leakage

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

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

According to ACM0002, emission reductions are given by:

$$ER_y = BE_y - PE_y$$

Where:

ERy Emission reductions in year y (tCO_2/yr)

BEy Baseline emissions in year y (tCO_2/yr)

PEy Project emission reductions in year y (tCO_2/yr)

Therefore: $ER_v = BE_v$

As there are no project emissions or leakage attributable to wind projects, the total emissions reductions of the Cerro de Hula Wind Project are identical to the estimated baseline emissions.

The total of emission reduction achieved during the monitoring period is 121,457 tCO_2, after rounding down

Item	Baseline emissions or baseline net GHG removals by sinks (t CO_2e)	Project emissions or actual net GHG removals by sinks (t CO_2e)	Leakage (t CO_2e)	Emission reductions or net anthropogenic GHG removals by sinks (t CO_2e)
Total	121,457	0	0	121,457

E.5. Comparison of actual emission reductions or net anthropogenic 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_2e)	110,054	121,457

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

The actual values reached during the whole monitoring period are 11,403 tCO_{2e} higher than what is stated in the registered PDD (Section A.4.4), for the equivalent amount of time (12 months).

Production at wind farms varies greatly from year to year due to changes in weather patterns, frequency distribution of wind speeds and equipment availability. Production estimates used in project models based on studies in which assign probabilities to energy figures through determination of a P50 value. This energy estimate, according to the study, should be above real production approximately 50% of the time and below real production 50% for any given year. Favorable wind conditions (both wind speed and frequency distribution) resulted in greater than estimated production for 2013 by a significant margin, however this variation is not expected to repeat itself routinely an in fact, management expects that in many years the production will be lower than budgeted amounts, in a form consistent with the P50 concept.

E.7. Actual emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Item	Actual values achieved up to 31 December 2012	Actual values achieved from 1 January 2013 onwards
Emission reductions or GHG removals by sinks (t CO_2e)	0	121,457

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Document information

Version	*Date*	*Description*
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 anthropogenic 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.

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