



Monitoring report form for CDM project activity
(Version 06.0)

MONITORING REPORT

Title of the project activity	Jepirachi Wind Power Project
UNFCCC reference number of the project activity	CDM Project 0194
Version number of the PDD applicable to this monitoring report	9
Version number of this monitoring report	1
Completion date of this monitoring report	07/11/2018
Monitoring period number	2
Duration of this monitoring period	01/01/2013 to 31/12/2017 (both days included)
Monitoring report number for this monitoring report	n/a
Project participants	<ul style="list-style-type: none"> • Colombia: Empresas Publicas de Medellin • (project developer and operator); • Finland: Fortum Corporation, Government of Finland – Ministry of Foreign Affairs of Finland; • France: GDF SUEZ; • Germany: RWE Power AG; • Japan: Chubu Electric Power Co., Inc; The Chugoku Electric Power, Co., Inc; Kyushu Electric Power Co., Inc; Mitsubishi Corporation; Mitsui & Co., Ltd; Shikoku Electric Power Co., Inc; Tohoku Electric Power Co., Inc; The Tokyo Electric Power Co., Inc; Japan International Cooperation Agency (JICA); • Netherlands: Netherlands' Ministry of Infrastructure and the Environment (IenM); Netherlands' Ministry of Economic Affairs, Agriculture and Innovation (EL&I); Electrabel S.A.; • Norway: Norsk Hydro ASA; Government of Norway – Ministry of Foreign Affairs; Statoil ASA; • United Kingdom of Great Britain and Northern Ireland: BP Alternative Energy International Ltd; Deutsche Bank AG; • Sweden: Government of Sweden – Swedish Energy Agency; • Bilateral and Multilateral Funds: Prototype Carbon Fund (PCF) – Managing Company: International Bank for Reconstruction and Development (IBRD) as Trustee of the Prototype Carbon Fund (PCF)

Host Party	Colombia	
Sectoral scopes	Sectoral Scope 1: Energy industries (renewable - / non-renewable sources)	
Applied methodologies and standardized baselines	ACM0002-version 12.1.0 – Consolidated baseline methodology for grid-connected electricity generation from renewable sources	
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 tCO ₂ e	111,079 tCO ₂ e
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	128,155 tCO ₂ e	

SECTION A. Description of project activity

A.1. General description of project activity

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The project consists of the development of a wind-based generation facility with a nominal power capacity rated at 19.5 MW, located in Wayuu Indigenous Territory in the North-eastern region of the Atlantic Colombian coast, within the Municipality of Uribia in the Department of Guajira. Electricity delivered to the grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources.

All equipment in the project uses proven technology that has been successfully applied in similar projects in other regions of the world. The project installed a total of 15 wind generators with a rated capacity of 1.3 MW each, manufactured by Nordex (N60/1300). The Project site is connected to the national grid via an 8km standard transmission line.

All 15 units of the project were commissioned between 30/01/2004 and 30/03/2004. Since then, the wind generators delivered continuously renewable energy to the Colombian National Interconnected System (SIN) under a preferential dispatching scheme.

The total emission reductions achieved during the second monitoring period from 01/01/2013 to 31/12/2017 (both days included) are 111,079 tCO₂e.

A.2. Location of project activity

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The project is located in the area between Cabo de la Vela and Puerto Bolivar, within the municipality of Uribia near Kasiwolin, Arutkajuy and Medialuna Communities, in the Department of Guajira in the northeast region of Colombia. The geographical coordinates of the project are approximately: Latitude + 12.2472 and Longitude: -71.9973.

A.3. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Colombia (host)	Empresas Públicas de Medellín (EPM)	No
Netherlands	The International Bank for Reconstruction and Development as the Trustee of the Prototype Carbon Fund (PCF); Ministry of Infrastructure and the Environment (IenM); Electrabel S.A.; Netherlands' Ministry of Economic Affairs, Agriculture and Innovation (EL&I)	Yes
Finland	Government of Finland -Ministry of Foreign Affairs of Finland; Fortum Corporation	Yes

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Japan	Chubu Electric Power Co.,Inc; Chugoku Electric Power Co., Inc; Kyushu Electric Power Co., Inc.; Mitsubishi Corporation; Tohoku Electric Power Co., Inc.; Tokyo Electric Power Co., Inc.; Shikoku Electric Power Co., Inc; Japan International Cooperation Agency (JICA); Mitsui & Co., Ltd	No
Norway	Government of Norway –Ministry of Foreign Affairs; Norsk Hydro ASA; Statoil ASA	Yes
United Kingdom of Great Britain and Northern Ireland	Deutsche Bank AG; BP Alternative Energy International Ltd	No
Sweden	Government of Sweden -Swedish Energy Agency	Yes
Germany	RWE Power AG	No
France	GDF SUEZ	No

A.4. Reference to applied methodologies and standardized baselines

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The baseline and monitoring methodology applied for the proposed project activity is the approved methodology ACM0002 version12.1.0 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”.

This methodology, as applies in this project activity, also refers to the following tools:

- “Tool to calculate the emission factor of an electricity system”, version 2;
- “Tool for the demonstration and assessment of additionality”, version 5.2.

The methodologies and tools applied to the project activity can be found in the UNFCCC webpage:
<http://cdm.unfccc.int/methodologies/PAmethodologies/approved>

A.5. Crediting period type and duration

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The second crediting period of the project activity, to which this monitored period applies, commenced on 31/01/2011 and runs for 7 years until 30/01/2018 (renewable).

SECTION B. Implementation of project activity

B.1. Description of implemented project activity

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- a) Description of the installed technology, technical processes and equipments;

The project contributes to the transfer of technology, as it is the first wind power generation facility to operate in Colombia on a commercial basis. All equipment utilized in the project uses

proven technology that has been successfully applied in similar projects in other regions of the world. Following a bidding process conducted during the summer of 2003, the nominal total power capacity of 19.5 MW is supplied by a total of 15 wind generators with a rated capacity of 1.3 MW each, manufactured by Nordex (N60/1300) with the following characteristics:

<i>Rotor 1300 kW</i>	
Type	3-bladed, horizontal axis, upwind
Rotor Diameter	60 m
Swept Area	2828 m ²
RPM	19.2/12.8 RPM
Cut in-cut-out-wind	3-4/25 m/s
Nominal Output at velocity	15 m/s
Design conditions in terms of velocity	70 m/s (IEC)
Lifetime of turbine	20 years
<i>Blades</i>	
Manufacturer	LM Dinamarca
Blade Length	29 m
Material	Glass fibre reinforced plastic/epoxy resin
Lightning Protection	Included, receptor in blade tips
<i>Generator</i>	
Nominal Power	1300/250 kW
Type	Asynchronous, liquid cooled
Synchronous speed	1500 / 1000 r.p.m.
Efficiency at 75% load	96.5%
<i>Control</i>	
Tipo	Micro-processor
Connection	Via soft power controller
Remote communication	Included
<i>Towers</i>	
Type	Tubular (cone-shaped)
Hub heights	60 m
Corrosion Protection	Sandblasted and painted with 250 mg epoxy paint

Table 1 Technical characteristics of the wind turbines installed in the project

- b) Information on the implementation and actual operation of the project activity, including relevant dates (e.g. construction, commissioning, continued operation periods, etc.).

All 15 units of the project were commissioned between 30/01/2004 and 30/03/2004 and were declared on commercial operation on 19/07/2004. The project has been operating as planned and described in the registered PDD since 31/01/2004.

- c) Description of events or situations that occurred during the monitoring period that may impact the applicability of the methodology and how the issues resulting from these events or situations are being addressed:

During the monitoring period, there were not major events or situations that affected the applicability of the methodology.

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. The section is left blank intentionally.

B.2.2. Corrections

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Not applicable. The section is left blank intentionally.

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

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Not applicable. The section is left blank intentionally.

B.2.4. Inclusion of monitoring plan

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Not applicable. The section is left blank intentionally.

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. The section is left blank intentionally.

B.2.6. Changes to project design

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Not applicable. The section is left blank intentionally.

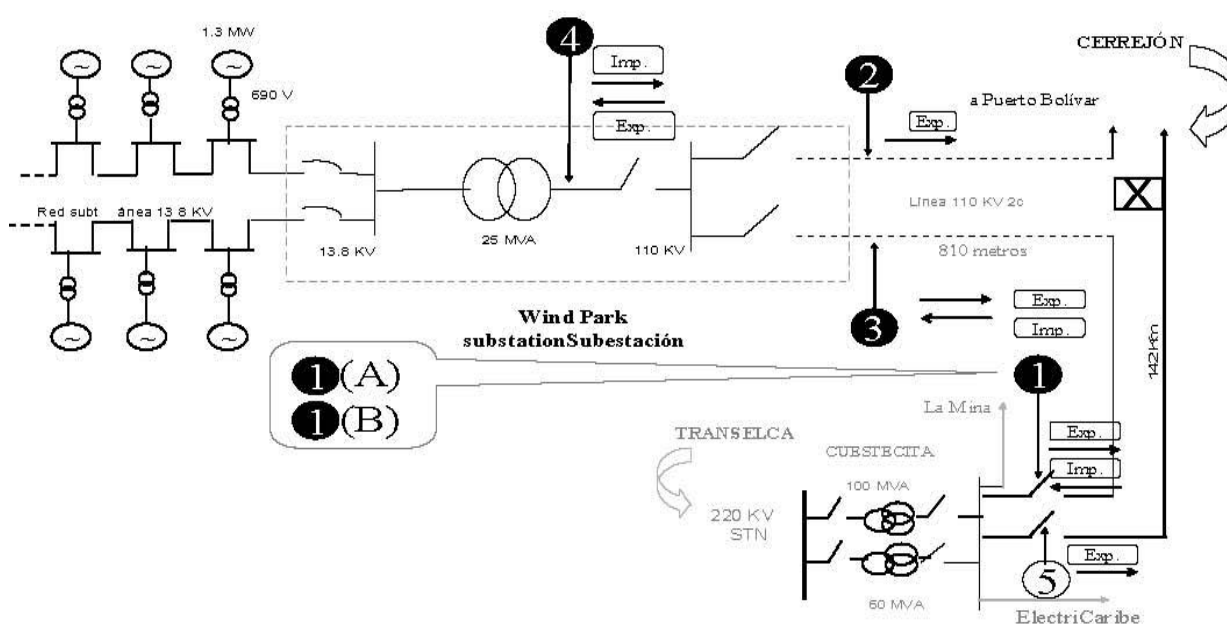
SECTION C. Description of monitoring system

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The following section provides a description of the monitoring system including data collection procedures (information flow including data generation, aggregation, recording, calculation and reporting), organizational structure, roles and responsibilities of personnel, and emergency procedures for the monitoring system.

Empresas Publicas de Medellin (EPM) has formed a multidisciplinary team, coordinated by the Power Operations Department (Sub-Gerencia de Operación y Energía) which is responsible for monitoring the parameters, and recording and analyzing the data obtained.

The following line diagram shows how the project is connected to the national power grid, as well as the main monitoring points: #1 Transformador Jepirach 1(A) & (B), #2 Puerto Bolivar y #3 Puerto Cuestecitas:



As per methodology ACM0002, version 12.1.0, the following parameter should be monitored:

- **Net electricity supplied to the grid by the project activity (EGh);**

Monitoring the electricity generation data is a relatively simple process, as the Colombian interconnected system relies on a highly regulated metering setup, which is required to make payments for electricity possible. This means that for the CDM project the main role for monitoring data is keeping copies of the hourly generation records that the central dispatch center maintains on file.

As per the metering, each of the generating units at Jepirachi is equipped with multi-function electronic metering devices, which register all information that needs to be monitored, such as exported energy, imported energy, power factor, electric voltage and current, etc. The monitoring is based on continuous metering of electricity generation on site using digital measurement equipment (ION 8300) at the substation (interconnection facility to the grid). Such meters are used for commercial, and maintenance purposes, in addition to the CDM reporting requirements. The data is read remotely every 24 hours using tele-measurement technology via the MV-90i software and uploaded to the Commercial Generation Department. This information is backed up by the Informatics Unit of EPM through the Grandes Clientes de Energía database ("Large Energy Consumers") on a daily basis through the SQL Server.

For QA/QC there is a day by day registration of wind speed, power generation, maintenance and special events (binnacle) in an Excel sheet. The data are cross-checked by the SCADA system ("Supervisory Control and Data Acquisition") comparing the generation measured in terminals vs. generation from XM (www.xm.com.co), a non-governmental agency acting as the market administrator, being in charge of the registration of contracts, the settlement and billing of all the transactions that take place in this market. XM is also in charge of the National Dispatch Center (Centro Nacional de Despacho - CND).

The Metering Team (Equipo de Medidas – EM) belongs to the Transmission and Distribution Business Unit (Gerencia de Transmisión y Distribución de Energía) and is in charge of the measurements in all plants. It is independent of the Power Generation Business Unit, and is the only accredited laboratory for power meter calibrations on site. EM is responsible for reporting the generation to XM.

The Power Planning Department keeps a periodical maintenance and calibration program according to the codes approved by law, and following recommendations by the equipment providers. Information recorded by the metering equipment is sent every 24 hours to the Commercial Exchange System (ASIC), operated by the National Dispatch Center. All energy transactions are registered every hour, in the first minute of each hour. EPM transmits every day, the recorded values of the day before. According to that information, the National Dispatch Center processes the bills and payments for all transactions performed in the wholesale market. All this information is available to the market agents and to the system control authorities.

All data for the verification is available at EPM. In addition, records of energy supplied to the grid are publicly available on the website of XM.

In the Power Generation Business Unit at EPM (Gerencia de Generación Energía) there are several areas in charge of the CDM activities, which are responsible for data collection, depending on the phase of the project (Planning, Building, Operating and Marketing). Given that Jepirachi Wind Park has been in commercial operation since 2004, the main CDM activities are related to development actions included in the Monitoring Plan and in the Project Design Document (PDD). The roles and responsibilities for the CDM Project at the Power Generation Business Unit are the following:

- Power planning Department (Area Planeación Generación): It coordinates the different areas of EPM in order to prepare the monitoring report and facilitate the verification audit.
- Research & Development Department (Subdirección Investigación y Desarrollo Generación): It supports the application of the methodology, supervises the calculation of

the emission reduction and has an integrated knowledge of the functioning of the dispatch in the Colombian electric system.

- Commercial Generation Department (Subgerencia Comercial Generación): It collects the raw data from the database of energy and makes the calculations about the real dispatch and summarizes the power generation data.
- Power Operations Department (Subgerencia Operación y Energía): It operates the wind park. It is in charge of metering the energy, the transmission of the data, and support to the following of the environmental and social indicators for monitoring report.
- Metering Team of the Transmission and Distribution Business Unit (Equipo de Medidas): It receives the energy data and transmits it to ASIC; calibration of meters.
- The following actions are part of the emergency procedures applicable to the monitoring system:

ITEM	Action	Executed
1	Daily check-Team Link Jeparachi Measures at 12:00 am via a telephone communication between the supervisor on duty monitoring the wind farm and operator Team Shift Measurements in Medellín	Daily
2	Fault detection in communication Measurement Team. The available night operator, proceeds to review the communication modem, and if it is out of service applies a reset. In case of continuing failure to replace the modem, he must communicate the two parts that remain available at the wind farm, and then perform the functional test with measurement equipment.	Failure
3	Fault detection in the satellite signal and the data channel. If still active voice channel data is transmitted from the wind farm telephone to the Measurement Team. If the channel is simultaneous out of service on voice and data, information is transmitted by the signal from one of the two mobile operators operating in the area. Comcel and Movistar.	Failure
4	Detection of total failure of the satellite signal and the signal from both mobile operators. It uses AVANTEL (other signal operator) or get off the meter data and stored in a file, that is send to a satellite signal independent of Hotel Accommodation Operations Group, or if this channel is also out of service, support is solicited to Cerrejón Company to send the information via microwave. This situation has NOT occurred at the wind farm during its operation	Failure
5	There is a measurement code that protects all the generators that are included on the ASIC.	Failure
6	There is a redundant information of the tele-measurement at XM and ASIC	Failure

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

Data/Parameter	EG _{m,y} and EG _{k,y}
Unit	MWh
Description	Net electricity generated and delivered to the grid by power unit <i>m</i> or <i>k</i> in year <i>y</i>
Source of data	Data recorded, archived and supplied by the Colombian National Dispatch Center (CND)
Value(s) applied	It varies by plant and year. CND keeps records of this variable for its users.
Choice of data or measurement methods and procedures	As per "Tool to calculate the emission factor of an electricity system", version 2;
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	This parameter is used to calculate the grid emission factor as per the "Tool to calculate the emission factor for an electricity system", version 2;

Data/Parameter	$EF_{CO2,i,y}$, $EF_{EL,m,i,y}$, and $EF_{EL,k,i,y}$
Unit	tCO ₂ /GJ
Description	Emission factor of fossil fuel type <i>i</i> for power plant <i>m</i> or <i>k</i> in year <i>y</i>
Source of data	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value(s) applied	Diesel Oil = 72,600 Residual Fuel Oil = 75,500 Natural Gas = 54,300 Subbituminous Coal = 92,800 Other Bituminous Coal = 89,500
Choice of data or measurement methods and procedures	As per “Tool to calculate the emission factor of an electricity system”, version 2;
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	This parameter is used to calculate the grid emission factor as per the “Tool to calculate the emission factor for an electricity system”, version 2;

Data/Parameter	$\eta_{m,y}$ and $\eta_{k,y}$
Unit	GJ/MWh
Description	Average net energy conversion efficiency of power unit <i>m</i> or <i>k</i> in year <i>y</i>
Source of data	XM – National Dispatch Center
Value(s) applied	See Annex 3 of the approved PDD
Choice of data or measurement methods and procedures	As per “Tool to calculate the emission factor of an electricity system”, version 2;
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	This parameter is used to calculate the grid emission factor as per the “Tool to calculate the emission factor for an electricity system”, version 2;

Data/Parameter	$EF_{grid, OM,y}$
Unit	tCO ₂ /MWh
Description	Operation margin CO ₂ emission factor for grid connected power generation in year <i>y</i> calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (version 2)
Source of data	Ex-ante calculations
Value(s) applied	0.4853
Choice of data or measurement methods and procedures	As per “Tool to calculate the emission factor of an electricity system”, version 2;
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	This section has been left blank intentionally

Data/Parameter	$EF_{grid, BM,y}$
Unit	tCO ₂ /MWh
Description	Build margin CO ₂ emission factor for grid connected power generation in year <i>y</i> calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (version 2)
Source of data	Ex-ante calculations
Value(s) applied	0.3206

Choice of data or measurement methods and procedures	As per "Tool to calculate the emission factor of an electricity system", version 2;
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	This section has been left blank intentionally

Data/Parameter	EF_{grid, CM,y}
Unit	tCO ₂ /MWh
Description	Build 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" (version 2)
Source of data	Ex-ante calculations
Value(s) applied	0.4441
Choice of data or measurement methods and procedures	As per "Tool to calculate the emission factor of an electricity system", version 2;
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	This section has been left blank intentionally

D.2. Data and parameters monitored

Data/Parameter	EGPJ, y = EG_{facility, y}
Unit	MWh
Description	Quantity of net electricity supplied by the project plant/unit to the grid in year y
Measured/calculated/default	<p>Measured</p> <p>Electricity generation is measured hourly by EPM using electronic electricity meters. This information is backed up by the Informatics Unit of EPM through the Large Energy Consumers (Grandes Clientes de Energía) database on a daily basis through the SQL Server.</p> <p>The data is read remotely every 24 hours using tele-measurement technology and sent to the National Dispatch Center</p>
Source of data	Data supplied by the National Dispatch Center (CND)
Value(s) of monitored parameter	250,191

Monitoring equipment	<p>Main Electricity meter at measurement Point #1: Transformador Jepirachi Type Electronic electricity meter Accuracy class IEC 60687 1A 0.2S IEC 60687 5A 0.2S ANSI C12.20 Class 20 0.2 ANSI C12.20 Class 2/10 0.2• Manufacturer ION Model 8300 Serial Number PT-0809A455-01 Calibration Frequency Every two years Date of last calibration 02/03/2015</p> <p>Main Electricity meter at measurement Point #1: Transformador Jepirachi Type Electronic electricity meter Accuracy class IEC 60687 1A 0.2S IEC 60687 5A 0.2S ANSI C12.20 Class 20 0.2 ANSI C12.20 Class 2/10 0.2• Manufacturer ION Model 8300 Serial Number PT-0809A455-01 Calibration Frequency Every two years Date of last calibration 02/03/2015</p> <p>Main Electricity meter at measurement Point #2: Puerto Bolivar Type Electronic electricity meter Accuracy class IEC 60687 1A 0.2S IEC 60687 5A 0.2S ANSI C12.20 Class 20 0.2 ANSI C12.20 Class 2/10 0.2• Manufacturer ION Model 8300 Serial Number PS-0511A082-01 Calibration Frequency Every two years Date of last calibration 02/03/2015</p> <p>Back-up Electricity meter at measurement Point #2: Puerto Bolivar Type Electronic electricity meter Accuracy class IEC 60687 1A 0.2S IEC 60687 5A 0.2S ANSI C12.20 Class 20 0.2 ANSI C12.20 Class 2/10 0.2• Manufacturer ION Model 8300 Serial Number PS-0511A083-01 Calibration Frequency Every two years Date of last calibration 02/03/2015</p> <p>Main Electricity meter at measurement Point #3: Puerto Cuestecitas Type Electronic electricity meter Accuracy class IEC 60687 1A 0.2S IEC 60687 5A 0.2S ANSI C12.20 Class 20 0.2 ANSI C12.20 Class 2/10 0.2• Manufacturer ION Model 8300 Serial Number PS-0511A084-01 Calibration Frequency Every two years Date of last calibration 02/03/2015</p>
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	Back-up Electricity meter at measurement Point #3: Puerto Cuestecitas Type Electronic electricity meter Accuracy class IEC 60687 1A 0.2S IEC 60687 5A 0.2S ANSI C12.20 Class 20 0.2 ANSI C12.20 Class 2/10 0.2• Manufacturer ION Model 8300 Serial Number PS-0511A085-01 Calibration Frequency Every two years Date of last calibration 02/03/2015
Measuring/reading/recording frequency	Hourly measurement and monthly recording. Records of energy supplied to the grid are publicly available on the website of XM.
Calculation method (if applicable)	Not applicable
QA/QC procedures	<p>All metering devices used to monitor and measure data follow rules that have been summarized in resolution number 025 of 1995, (<i>Resolución</i> 025 de 1995) from CREG. This resolution specifies the technical characteristics measurement, telecommunications and back-up equipment to meet installation, testing, certification, operation and maintenance procedures.</p> <p>To cross check the metering, the electricity generated is also measured at the plant substation at 13.8 kV, correcting the measure taking into account the transmission losses, estimated based on the technical specifications of the transmission line.</p> <p>Measurements follow Colombian regulations for electricity generation. Power generation of Jepirachi is monitored on site using metering equipment that is installed at the substation at the end of the 115 kV / 0.7 km transmission line that connects the wind park with the national interconnected system (commercial frontier). In Colombia, the measurement code (<i>Código de Medida</i>) establishes mandatory technical standards, reading procedures, registering and recording activities of electricity transactions performed in the energy market. This code is part of the CREG's resolution number 025 of 1995, which specifies the particular technical characteristics that measurement, telecommunications and associated back-up equipment have to meet. Installation, tests, certification, operation and maintenance procedures are specified by this resolution as well.</p> <p>Although ION meters do not require calibration, only verification of their accuracy, the meters are calibrated at least every two years depending on the registration of tendencies variations (error, standard variation), affected by the working conditions. Calibration is conducted by Laboratory of Calibration (Laboratorio de Calibración de equipos de medida de energía y gas), a special department of the Energy Distribution Business Unit that sets up all the meters.</p> <p>Calibration tasks follow national standards and are in accordance with the calibration instructive specified in Colombian standard NTC 4856 for electricity metering devices. EPM is the provider of this type of calibration services for the rest of the country. EPM has adopted its own procedure based on the Colombian technical norm NTC-ISO-IEC 17025 and NTC 4856, under the so-called "Instructive to perform on-site electricity meter proofs with a pattern metering device" (DIS-EM-LE-IN-009-01). This procedure is carried out to verify that the meters are working properly with the corresponding accuracy. They are also checked for alarms.</p> <p>The patterns used to calibrate the electricity meters in-situ could be any of the following:</p> <ul style="list-style-type: none"> • Portable Standard MTE N° 16, 17, 18 (accuracy 0.05) for onsite Calibration

	<ul style="list-style-type: none"> • Calibration Bench LANDIS TALOGYR 6061 for calibration at EPM laboratory • Calibration Bench ZERA ED 6816 for calibration at EPM laboratory <p>The accreditation of the laboratory is achieved by the Secretary of Industry and Commerce of Colombia (<i>Superintendencia de Industria y Comercio de Colombia</i>). All reports of calibration and certifications, readings and data are kept in the headquarters of EPM in Medellin.</p>
Purpose of data/parameter	Baseline
Additional comments	Not applicable

D.3. Implementation of sampling plan

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Not applicable. The section is left blank intentionally.

SECTION E. Calculation of emission reductions or net anthropogenic removals

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

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According to the methodology used in the registered PDD (ACM0002 version 12.1.0), baseline emissions are calculated using the following formula:

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

Where,

- BE_y : Baseline emissions in year “y” (tCO₂e)
- $EG_{PJ,y}$: 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 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*” ver. 2, (tCO₂e/MWh)

Likewise, the CO₂ emission factor of the national connected grid ($EF_{grid, CM, y}$) is calculated ex-ante using the formula for the Combined Margin Emission Factor, consisting of the weighted average Operating Margin emission factor ($EF_{grid, OM, y}$) and Build Margin emission factors ($EF_{grid, BM, y}$), as follows:

$$EF_{grid, CM, y} : W_{OM} * EF_{grid, OM, y} + W_{BM} * EF_{grid, BM, y}$$

The CO₂ emission factor is calculated ex-ante (0.4441 tCO₂e/MWh for the 2nd crediting period) and will be reviewed at the beginning of the next crediting period based on the official and publicly available data.

As can be seen in the following table, the baseline emissions calculated during the monitoring period are:

$$BE_y = 111,079 \text{ tCO}_2\text{e}$$

Jepirachi Wind Power Project.			
Period	EG _y (MWh)	EF _y (tCO ₂ e/MWh)	BE _y (tCO ₂ e)
ene-13	5,711	0.4441	2,536
feb-13	4,933	0.4441	2,190
mar-13	5,219	0.4441	2,317
abr-13	5,595	0.4441	2,484
may-13	4,921	0.4441	2,185
jun-13	6,071	0.4441	2,696
jul-13	6,783	0.4441	3,012
ago-13	4,921	0.4441	2,185
sep-13	2,580	0.4441	1,145
oct-13	3,143	0.4441	1,395
nov-13	2,984	0.4441	1,324
dic-13	4,764	0.4441	2,115
TOTAL 2013	57,625	0.4441	25,584
Period	EG _y (MWh)	EF _y (tCO ₂ e/MWh)	BE _y (tCO ₂ e)
ene-14	5,709	0.4441	2,535
feb-14	5,473	0.4441	2,430
mar-14	6,256	0.4441	2,778
abr-14	6,766	0.4441	3,004
may-14	6,278	0.4441	2,788
jun-14	8,172	0.4441	3,629
jul-14	8,807	0.4441	3,911
ago-14	5,497	0.4441	2,441
sep-14	4,548	0.4441	2,019
oct-14	3,744	0.4441	1,662
nov-14	3,751	0.4441	1,665
dic-14	5,230	0.4441	2,322
TOTAL 2014	70,230	0.4441	31,184
Period	EG _y (MWh)	EF _y (tCO ₂ e/MWh)	BE _y (tCO ₂ e)
ene-15	5,635	0.4441	2,502
feb-15	4,911	0.4441	2,180
mar-15	6,464	0.4441	2,870
abr-15	6,255	0.4441	2,777
may-15	6,378	0.4441	2,832
jun-15	7,106	0.4441	3,155
jul-15	7,168	0.4441	3,183
ago-15	5,932	0.4441	2,634
sep-15	3,940	0.4441	1,749
oct-15	3,652	0.4441	1,622
nov-15	4,272	0.4441	1,897
dic-15	6,665	0.4441	2,960
TOTAL 2015	68,377	0.4441	30,361
Period	EG _y (MWh)	EF _y (tCO ₂ e/MWh)	BE _y (tCO ₂ e)
ene-16	4,924	0.4441	2,186
feb-16	6,010	0.4441	2,668
mar-16	5,608	0.4441	2,490
abr-16	4,125	0.4441	1,831
may-16	4,053	0.4441	1,799
jun-16	5,946	0.4441	2,640
jul-16	7,059	0.4441	3,134
ago-16	5,713	0.4441	2,537
sep-16	3,350	0.4441	1,487
oct-16	1,451	0.4441	644
nov-16	1,081	0.4441	479
dic-16	1,567	0.4441	696
TOTAL 2016	50,887	0.4441	22,591
Period	EG _y (MWh)	EF _y (tCO ₂ e/MWh)	BE _y (tCO ₂ e)
ene-17	-	0.4441	-
feb-17	-	0.4441	-
mar-17	-	0.4441	-
abr-17	446	0.4441	197
may-17	662	0.4441	293
jun-17	218	0.4441	96
jul-17	-	0.4441	-
ago-17	80	0.4441	35
sep-17	138	0.4441	61
oct-17	330	0.4441	146
nov-17	337	0.4441	149
dic-17	862	0.4441	382
TOTAL 2017	3,071	0.4441	1,359
TOTAL	250,191	0.4441	111,079

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

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The proposed CDM project activity is a wind power system that does not generate project GHG emissions according to the methodology. A value of zero emissions is assigned to the project emissions, $PE_y = 0$.

E.3. Calculation of leakage emissions

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The calculation does not need to consider leakage emissions, so $LE_y = 0$

E.4. Calculation of emission reductions or net anthropogenic removals

	Baseline GHG emissions or baseline net GHG removals (t CO ₂ e)	Project GHG emissions or actual net GHG removals (t CO ₂ e)	Leakage GHG emissions (t CO ₂ e)	GHG emission reductions or net anthropogenic GHG removals (t CO ₂ e)		
				Before 01/01/2013	From 01/01/2013	Total amount
Total	111,079	0	0	0	111,079	111,079

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)
111,079	128,155

E.6. Remarks on increase in achieved emission reductions

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The actual emission reductions during the monitoring period are lower than the ones anticipated ex-ante in the CDM-PDD hence there is no need of explanation of any increase.

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Document information

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