




**Verification and certification report form for
CDM project activities
(Version 02.1)**

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

BASIC INFORMATION

Title and UNFCCC reference number of the project activity	Jepirachi Wind Power Project UNFCCC Ref No 0194
Version number of the verification and certification report	5
Completion date of the verification and certification report	22/04/2019
Monitoring period number and duration of this monitoring period	2 nd periodic verification 01/01/2013 to 31/12/2017 (both days included)
Version number of the monitoring report to which this report applies	Version 2
Crediting period of the project activity corresponding to this monitoring period	31/01/2011 to 30/01/2018
Project participants	<p><u>Colombia</u> * Empresas Publicas de Medellín (EPM). (private entity)</p> <p><u>Finland</u> (involved directly) * Fortum Corporation; Government of Finland - Ministry of Foreign Affairs of Finland.</p> <p><u>France</u> (involved indirectly) * GDF SUEZ.</p> <p><u>Germany</u> (involved indirectly) * RWE Power AG.</p> <p><u>Japan</u> (involved indirectly) * Chubu Electric Power Co., Inc. * The Chugoku Electric Power Co., Inc. * Kyushu Electric Power Co., Inc. * Mitsubishi Corporation. * Shikoku Electric Power Co., Inc. * Tohoku Electric Power Co., Inc. * The Tokyo Electric Power Co., Inc. * Japan International Cooperation Agency (JICA). * Mitsui & Co., Ltd.</p>

	<p><u>Netherlands</u> (involved directly)</p> <ul style="list-style-type: none"> * Netherlands" Ministry of Infrastructure and the Environment (IenM). * Netherlands' Ministry of Economic Affairs, Agriculture and Innovation (EL&I). * Electrabel N.V. <p><u>Norway</u> (involved directly)</p> <ul style="list-style-type: none"> * Norsk Hydro ASA. * Government of Norway - Ministry of Foreign Affairs. * Equinor ASA. <p><u>United Kingdom of Great Britain and Northern Ireland</u> (involved indirectly)</p> <ul style="list-style-type: none"> * BP Alternative Energy International Ltd. * Deutsche Bank AG. <p><u>Sweden</u> (involved directly)</p> <ul style="list-style-type: none"> * Government of Sweden - Swedish Energy Agency. <p>Bilateral and Multilateral Funds</p> <ul style="list-style-type: none"> * International Bank for Reconstruction and Development (IBRD) as Trustee of the Prototype Carbon Fund (PCF).)
Host Party	Colombia
Applied methodologies and standardized baselines	ACM0002: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" 12.1.0.
Mandatory sectoral scopes linked to the applied methodologies	Sectoral scope: 01
Conditional sectoral scope(s) linked to the applied methodologies	--
Estimated amount of GHG emission reductions or GHG removals for this monitoring duration in the registered PDD	128,155 tCO ₂ e
Certified amount of GHG emission reductions or GHG removals for this monitoring period	111,077 tCO ₂ e
Name and UNFCCC reference number of the DOE	Lloyd's Register Quality Assurance Limited (LRQA)
Name, position and signature of the approver of the verification and certification report	 Ketan S. Deshmukh, Decision Maker CDM Quality Manager 03 May 2019

SECTION A. Executive summary

Lloyd's Register Quality Assurance Limited has been contracted by International Bank for Reconstruction and Development (IBRD) as Trustee of the Prototype Carbon Fund (PCF), representing the project participants (PP), to undertake the (second periodic) verification (second crediting period) of the registered project activity, "Jepirachi Wind Power Project", reference number 0194, covering the monitoring period from 01/01/2013 to 31/12/2017. The verification has been performed by document review based on the Monitoring Report version 2 dated 11/01/2019, on-site assessment and interviews with the stakeholders, resolution of outstanding issues and issuance of the verification report. 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 and the geographical coordinates of the project are approximately: Latitude + 12.2472 and Longitude: -71.9973.

The project is a wind power plant and intends to reduce greenhouse gas (GHG) emissions by using renewable wind energy to generate electricity, which is delivered to the fossil fuel dominated national grid of Colombia. The renewable source based electricity produced avoids CO₂ emissions from electricity generation by fossil fuel power plants.

The fulfilment of the requirements as set forth in the Article 12 of the Kyoto Protocol of the United Nations Framework Convention on Climate Change (UNFCCC), the modalities and procedures for a CDM and relevant decisions of the Conference of the Parties serving as meeting of the Parties to the Kyoto Protocol (COP/MOP) and the Executive Board of the CDM (CDM-EB) has been evaluated and the conformance to the verification requirements were confirmed based on the given information. A risk based approach was taken to conduct the verification, and corrective action requests (CARs) and clarifications (CLs) were issued for relevant actions by the PP.

The verification team identified, through the verification process, 01 CAR.

Table A.1 - Technical data of the project activity

Rotor 1300 kW	N60/1300 kW
Type	3-bladed, horizontal axis, upwind
RPM	19/12.8 RPM
Rotor Diameter	60 m
Swept Area	2,828 m ²
Power regulation Stall	
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
Blades	
Blade Length	29 m
Material	Glass fibre reinforced plastic/epoxy resin
Lightning Protection	Included, receptor in blade tips
Manufacturer	LM Dinamarca
Generator	
Nominal Power	1300/250 kW
Type	Asynchronous, liquid cooled
Synchronous speed	1,500 / 1,000 r.p.m.
Efficiency at 75% load	96.5%

Control	
Type	Micro-processor
Connection	Via soft power controller
Remote communication	Included
Towers	
Type	Tubular (cone-shaped)
Hub heights	60 m
Corrosion Protection	Sandblasted and painted with 250 mg epoxy paint

SECTION B. Verification team, technical reviewer and approver

B.1. Verification team member

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk/document review	On-site inspection	Interviews	Verification findings
1.	Team Leader	EI	San Valero	Vicente	LRQA Brazil	✓	✓	✓	✓
2.	Sector Expert	EI	San Valero	Vicente	LRQA Brazil	✓	✓	✓	✓

B.2. Technical reviewer and approver of the verification and certification report

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1.	Technical reviewer	IR	Deshmukh	Ketan	LRQA Ltd
2.	Decision Maker	IR	Deshmukh	Ketan	LRQA Ltd

SECTION C. Application of materiality

All the data and information has been checked during verification, thus the concept of materiality has not been applied in the verification.

C.1. Consideration of materiality in planning the verification

No.	Risk that could lead to material errors, omissions or misstatements	Assessment of the risk		Response to the risk in the verification plan and/or sampling plan
		Risk level	Justification	
1.	NA	NA	NA	NA

C.2. Consideration of materiality in conducting the verification

N/A.

SECTION D. Means of verification

D.1. Desk/document review

The verification was performed primarily based on the review of the monitoring report and the supporting documentation. This process included:

- 1) a review of data and information presented to verify their completeness;

2) a review of the MP and monitoring methodology, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the QA/QC procedures;

3) an evaluation of data management and the QA/QC system in the context of their influence on the generation and reporting of ERs.

The monitoring report version 1, dated 07/11/2018 was initially reviewed and LRQA requested the PP to present the supporting information and documents and such additional information and documents that were also reviewed by LRQA. The documents reviewed by LRQA are listed in Appendix 3.

Through the verification process, the revised monitoring report and the supporting documents were evaluated to confirm the actions taken by the PP to address the CAR issued by LRQA. The documents reviewed by LRQA are listed in Appendix 3. LRQA reviewed the final version of the monitoring report, 2 dated 11/01/2019, to confirm that all changes agreed had been incorporated.

D.2. On-site inspection

Duration of on-site inspection: 10/12/2018 to 13/12/2018				
No.	Activity performed on-site	Site location	Date	Team member
1.	Implementation and operation of the project activity as per registered PDD (plant installations, wind turbines-generators, electrical substation/s, electricity generation meters, system control/s). Review of QA/QC procedures to identify possible errors or omissions in the reported monitored parameters (document review and visit to the plant, substation and meters location). Monitoring of data, review of operation flow, aggregating and reporting of monitoring parameters. Interviews with relevant personnel to confirm operational and data collection procedures. Check monitoring equipment's (calibration, management and on-going maintenance, monitoring practices) against PDD/Monitoring Plan and Methodology/Tools.	Jepirachi Wind Power plant site - (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).	11,12/12/2018	Vicente San Valero
2	Cross-check MR info against data from other sources (generation to grid, calibration certificates, etc.). Review of calculations/assumptions to determine GHG data and emission reductions. Review of QA/QC procedures to identify possible errors or omissions in the reported monitored parameters. Monitoring of data, review of operation flow, aggregating and reporting of monitoring parameters. Review of calculations/assumptions to determine GHG data and emission reductions.	EPM Building at Carrera 58 # 42 - 125, Medellín, Antioquia, Colombia	13/12/2018	
3	Social/Environmental matters	EPM Building at Carrera 58 # 42 - 125, Medellín, Antioquia, Colombia	13/12/2018	

D.3. Interviews

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1	Eslava Gallo	Claudia Patricia	Empresas Publicas de Medellín (EPM) (Jepirachi site)	11,12/12/2018	Implementation and operation of the project activity as per registered PDD (plant installations, wind turbines-generators, electrical substation/s, electricity generation meters, system control/s). Review of QA/QC procedures to identify possible errors or omissions in the reported monitored parameters (document review and visit to the plant, substation and meters location). Monitoring of data, review of operation flow, aggregating and reporting of monitoring parameters. Interviews with relevant personnel to confirm operational and data collection procedures. Check monitoring equipment's (calibration, management and on-going maintenance, monitoring practices) against PDD/Monitoring Plan and Methodology/Tools.	Vicente San Valero
2	Giraldo Ospina	Isabel Cristina	Empresas Publicas de Medellín (EPM) (EPM Building)	13/12/2018	Cross-check MR info against data from other sources (generation to grid, calibration certificates, etc.). Review of calculations/assumptions to determine GHG data and emission reductions. Review of QA/QC procedures to identify possible errors or omissions in the reported monitored parameters. Monitoring of data, review of operation flow, aggregating and reporting of monitoring parameters. Review of calculations/assumptions to determine GHG data and emission reductions. Review maintenance schedule and implementation of wind turbines.	
3	Fernández Taborda	Oscar Alonso				
4	Villegas Yepes	Santiago				
5	Londoño Maya	José Enrique				
6	Suárez Zapata	Sara				
7	Calle D'Aleman	Rafael Darío				
8	Echavarria Eusse	Aquiles				
	Correa Giraldo	Luis Fernando				
9	Isaza Vergara	Clara Teresa				

CAR 1 was opened after site visit and interviews.

D.4. Sampling approach

N/A.

D.5. Clarification requests (CLs), corrective action requests (CARs) and forward action requests (FARs) raised

Areas of verification findings	No. of CL	No. of CAR	No. of FAR
Compliance of the monitoring report with the monitoring report form	--	--	--
Compliance of the project implementation and operation with the registered PDD	--	--	--
Post-registration changes	--	--	--
Compliance of the registered monitoring plan with the methodologies including applicable tools and standardized baselines	--	--	--
Compliance of monitoring activities with the registered monitoring plan	--	--	--
Compliance with the calibration frequency requirements for measuring instruments	--	CAR 1	--
Assessment of data and calculation of emission reductions or net removals	--	CAR 1	--
Assessment of reported sustainable development co-benefits	--	--	--
Global stakeholder consultation	--	--	--
Others (please specify)	--	--	--
Total	--	1	--

SECTION E. Verification findings

E.1. Compliance of the monitoring report with the monitoring report form

Means of verification	<p>A monitoring report was submitted to the verification team by the project participants. The DOE has made this report publicly available on 09/11/2018, prior to the start of the verification activities. No comments were received.</p> <p>By means of the UNFCCC website it has been checked whether the latest applicable MR template CDM-MR-FORM has been used.</p> <p>Further it has been checked whether the latest instructions for filling out the MR template have been followed. Every section has been checked against the respective guidance.</p> <p>The following source/s of information have been used:</p> <p>* MR, CDM-MR-FORM - /A 1/.</p>
Findings	No findings have been identified.
Conclusion	The latest instructions for filling out the MR have been followed. The project is in line with the respective requirements.

E.2. Remaining forward action requests from validation and/or previous verifications

No remaining issues were identified from previous validation and/or previous verifications.

E.3. Compliance of the project implementation and operation with the registered project design document

Means of verification	<p>LRQA has determined during the verification process that the implementation and operation of the project activity has been conducted in accordance with the description contained in the revised PDD.</p> <p>LRQA has, by means of a desk review and an on-site visit, assessed that:</p> <ul style="list-style-type: none"> - all physical features of the CDM project activity proposed in the revised PDD are in place; - the project participants have operated the proposed CDM project activity as per the registered PDD. <p>The following sources of information have been used:</p> <p>* MR, CDM-MR-FORM - /A 1/.</p> <p>* Project Design Document (CDM-PDD) version 9, dated 03/10/2013 - /A 4/.</p> <p>* CDM Validation and Verification Standard for project activities (VVS), version</p>
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	02.0, dated 29/11/2018; CDM Project Cycle Procedure (PCP) for project activities, version 02.0, dated 29/11/2018; CDM Project Standard for project activities (PS), version 02.0, dated 29/11/2018 - /A 5/. During the site visit it was confirmed that there are 15 installed wind generators (1.3 MW each), confirmed to be Nordex model N60/1300. Thus, the total installed capacity remains equal to 19.5 MW, as stated in the registered PDD.
Findings	No findings have been identified / raised.
Conclusion	The project is implemented and operated as per registered project design document.

E.4. Post-registration changes

E.4.1. Temporary deviations from the registered monitoring plan, applied methodologies or applied standardized baselines

No temporary deviations from the registered monitoring plan or temporary deviations from applied methodology or standardized baselines have been submitted to the UNFCCC prior to the current monitoring period.

E.4.2. Corrections

During the verification of the current monitoring plan no need for corrections have been identified.

E.4.3. Change to the start date of the crediting period of the project activity

No change to the start date of the crediting period.

E.4.4. Inclusion of a monitoring plan

No inclusion of a monitoring plan.

E.4.5. Permanent changes from registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines or other applied standards or tools

No permanent changes or deviations.

E.4.6. Changes to the project design

There were no changes to the project design.

E.4.7. Changes specific to afforestation and reforestation project activities

N/A.

E.5. Compliance of the registered monitoring plan with the methodology including applicable tools and standardized baselines

Means of verification	The registered monitoring plan (PDD) /A 4/ of the Project has been assessed against the monitoring methodology ACM0002 version 12.1.0 /A 6/ and applicable Tools /A 7/.
Findings	No findings have been identified / raised.
Conclusion	The project is in line with the monitoring methodology and applicable Tools.

E.6. Compliance of monitoring activities with the registered monitoring plan

E.6.1. Data and parameters fixed ex ante or at renewal of crediting period

Means of verification	<p>The combined margin emission factor of the grid ($EF_{grid,CM,2007-2009} = EF_{grid,CM} = 0.4441 \text{ tCO}_2/\text{MWh}$) was determined at registration (PDD section B.6) /A 4/, mentioned at MR section D.1 /A 1/ and is fixed during the whole crediting period. The spreadsheet for the calculation of the combined margin emission factor of the grid /A 4/ was reviewed and calculations considered accurate.</p> <p>Other parameters mentioned at MR /A 1/, in accordance to registered PDD /A 4/, are:</p> <ul style="list-style-type: none"> * $EG_{m,y}$ and $EG_{k,y}$; * $EF_{CO_2,i,y}$, $EF_{EL,m,i,y}$, and $EF_{EL,k,i,y}$ Diesel Oil = 72,600 tCO₂/GJ Residual Fuel Oil = 75,500 tCO₂/GJ Natural Gas = 54,300 tCO₂/GJ Subbituminous Coal = 92,800 tCO₂/GJ Other Bituminous Coal = 89,500 tCO₂/GJ * $\eta_{m,y}$ and $\eta_{k,y}$ * $EF_{grid,OM,y}$ 0.4853 tCO₂/MWh * $EF_{grid,BM,y}$ 0.3206 tCO₂/MWh
Findings	No findings have been identified / raised.
Conclusion	LRQA confirms that the data and parameters fixed ex-ante have been correctly listed. The parameters fixed ex-ante have been verified by checking the information flow and in compliance with the monitoring plan of the registered PDD /A 4/.

E.6.2. Data and parameters monitored

Means of verification	<p>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.</p> <p>The Monitored Data ($EG_{PJ,y}$) is included in the Monitoring Report /A 1/ as per the Monitoring Plan. The data is continuously measured, as required by the Monitoring Plan (see the MR section D.2 /A 1/, data and parameters monitored).</p> <p>All data has been generated with the frequency required by the MP /A 4/ (continuous measurement), as verified through the direct observation of data from the SCADA and from interviews with the plant operator/s.</p> <p>All meters were calibrated by the EPM Calibration Laboratory ("Laboratorio de Calibración de Equipos de Medida de Energía y Gas"), accredited by ONAC: Resolution # 3225, dated 28/01/2011 /A 13/.</p> <p>Below meters (pictures /A 10/) verified during site visit:</p> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p>Metering Point # 1 at Jepirachi site: Transformer Jepirachi (used for ER calculations – Commercial frontier)</p> <p>Serial number: PT-0809A455-01 (main)</p> <p><u>Operating period:</u> 01/01/2013 to 31/12/2017</p> <p><u>Manufacturer:</u> Schneider Electric – Power Management / <u>Model:</u> ION8600</p> <p><u>Accuracy class:</u> 0.2</p> <p>Serial number: PS-0511A080-01 (backup)</p> <p><u>Operating period:</u> 01/01/2013 to 31/12/2017</p> <p><u>Manufacturer:</u> Schneider Electric – Power Management / <u>Model:</u> ION8300</p> <p><u>Accuracy class:</u> 0.2</p> </div> <div style="border: 1px solid black; padding: 5px;"> <p>Metering Point # 2 at Jepirachi site: Puerto Bolivar (Used for cross checking)</p> <p>Serial number: PS-0511A082-01 (main)</p> <p><u>Operating period:</u> 01/01/2013 to 31/12/2017</p> <p><u>Manufacturer:</u> Schneider Electric – Power Management / <u>Model:</u> ION8300</p> </div>
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Accuracy class: 0.2

Serial number: PS-0511A083-01 (backup) - cross checking

Operating period: 01/01/2013 to 31/12/2017

Manufacturer: Schneider Electric – Power Management / Model: ION8300

Accuracy class: 0.2

Metering Point # 3 at Jepirachi site: Cuestecitas (Used for cross checking)

Serial number: PS-0511A084-01 (main)

Operating period: 01/01/2013 to 31/12/2017

Manufacturer: Schneider Electric – Power Management / Model: ION8300

Accuracy class: 0.2

Serial number: PS-0511A085-01 (backup) - cross checking

Operating period: 01/01/2013 to 31/12/2017

Manufacturer: Schneider Electric – Power Management / Model: ION8300

Accuracy class: 0.2

The emergency procedures applicable to the monitoring system and verified during the site visit are listed below.

ITEM	Action	Executed
1	Daily check-Team Link Jepirachi 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. <i>This situation has NOT occurred at the wind farm during its operation.</i>	Failure
5	There is a measurement code ("password") 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

Moreover, ION series 8000 meters data can be downloaded via an optical probe (Abacus A6Z) to a computer.

Small power generators (*less than 20 MW, as per Colombian regulations*) have preferential access to the market, and are always dispatched. Thus, small generators and low cost, such as Jepirachi's wind power plant, are always dispatching first.

All QA/QC activities were checked during desk review and the site visit. The documentation (a. to g., below) was reviewed and it was confirmed that QA/QC procedures have being consistently applied:

a. documented instructions, management manual;

	b. documentation; c. data archiving; d. monitoring report; e. cross-checking; f. energy balance analysis (as relevant); g. internal audits / verification and management review.
	No findings have been identified / raised.
Conclusion	The monitoring has been implemented in accordance with the monitoring plan contained in the registered PDD /A 4/. The monitoring and reporting procedures have been implemented accordingly.

E.6.3. Implementation of sampling plan

Means of verification	N/A
Findings	N/A
Conclusion	N/A

E.7. Compliance with the calibration frequency requirements for measuring instruments

Means of verification	<p>Particular attention was paid to the frequency of measurements, the quality of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the PDD /A 4/, applied methodology /A 6/, applicable tool(s) /A 7/ and the quality assurance / control procedures.</p> <p>ION Technical Note, dated 31/08/2005 /A 12/, states that ION Digital Meters do not require calibration, only verification of their accuracy. Although ION meters do not require calibration, only verification of their accuracy, the meters are calibrated every two years depending on the registration of tendencies variations (error, standard variation), affected by to the working conditions (PDD /A 4/).</p> <p>Calibration-accuracy verification is carried out according to EPM internal procedure "Instructive to perform on-site electricity meter proofs with a pattern metering device" (DIS-EM-LE-IN-009-01), based on the Colombian technical norm NTC-ISO-IEC 17025 and NTC 4856.</p> <p>For details related to meters frequency of calibration, certificates /A 3/, calibration dates, etc., please refer to Appendix 5.</p>
Findings	CAR 4: Latest calibrations were carried out on 12/2017 but previous calibrations were carried out on 03/2015 (PDD /A 4/ states calibration every two years), thus a delay of ~10 months was noticed and delayed calibration procedure was not applied according to VVS /A 5/ paragraph 366.
Conclusion	All discount periods (03 to 12/2017) and equivalent errors (0.2%) are now correctly applied at revised ER spreadsheet (ER Calculation_2nd MR_Jepirachi_110119). This CAR is closed.

E.8. Assessment of data and calculation of emission reductions or net removals

E.8.1. Calculation of baseline GHG emissions or baseline net GHG removals by sinks

Means of verification	<p>It has been checked whether the applied formulae and methods for calculating baseline emissions are in accordance with the monitoring plan, the approved methodology and applicable Tool(s). Raw data ER calculation summary spreadsheet /A 2/, was reviewed, calculations (transparency, parameters consistency, correctness, completeness) checked and raw data for years 2013, 2014, 2015, 2016 and 2017 are included in the spreadsheet.</p> <p>The equation applied for the determination of baseline GHG emissions is consistent with the registered / revised PDD and methodology:</p> $BE_y = EG_{PJ,y} * EF_{grid, CM, y}$ <p>Where,</p> <ul style="list-style-type: none"> • 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
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	<p>(MWh/yr);</p> <ul style="list-style-type: none">• $EF_{grid,CM,y}$: 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” /A 7/, (tCO₂e/MWh). <p>CO₂ emission factor of the national connected grid ($EF_{grid,CM,y}$) was 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 factor ($EF_{grid,BM,y}$), as follows:</p> <p>$EF_{grid,CM,y} : WOM * EF_{grid,OM,y} + WBM * EF_{grid,BM,y}$ ($w_{OM} = 0.75$ and $w_{BM} = 0.25$)</p> <p>The combined margin emission factor of the grid ($EF_{grid,CM,2007-2009} = EF_{grid,CM} = 0.4441$ tCO₂/MWh) was determined at registration (PDD section B.6) /A 4/, mentioned at MR section D.1 /A 1/ and is fixed during the whole crediting period. Baseline emissions calculated during this monitoring period: 111,077 tCO₂e. As per PDD version 09, annual electricity generation in 2009 was 57,709 MWh, therefore estimated electricity generation for this monitoring period was considered as 288,545,00 MWh (57,709 * 5).</p> <table><tr><th>EG_y (MWh) - PDD</th><th>EG_y (MWh) - MR</th><th>EG_y (MWh) - XM</th><th>Ex-ante estimated emission reductions for this monitoring period</th><th></th></tr><tr><td>288,545.0</td><td>250,191.2</td><td>250,191.2</td><td>128,155 tCO₂e</td><td>TOTAL</td></tr></table>	EG _y (MWh) - PDD	EG _y (MWh) - MR	EG _y (MWh) - XM	Ex-ante estimated emission reductions for this monitoring period		288,545.0	250,191.2	250,191.2	128,155 tCO ₂ e	TOTAL
EG _y (MWh) - PDD	EG _y (MWh) - MR	EG _y (MWh) - XM	Ex-ante estimated emission reductions for this monitoring period								
288,545.0	250,191.2	250,191.2	128,155 tCO ₂ e	TOTAL							
Findings	No findings have been identified / raised.										
Conclusion	Calculation of the baseline emissions was found to be fully compliant with the monitoring plan, the approved methodology and applicable Tool(s). No errors, miscalculations, omissions, misstatements or incomplete information has been identified.										

E.8.2. Calculation of project GHG emissions or actual net anthropogenic GHG removals by sinks

Means of verification	The verification team has checked whether calculations (transparency, parameters consistency, correctness, completeness) of baseline GHG emissions, project GHG emissions and leakage GHG emissions have been carried out in accordance with the formulae and methods described in the registered monitoring plan/PDD /A 4/.
Findings	No findings have been identified / raised.
Conclusion	According to the applied methodology ACM0002 /A 6/, the project emissions are considered to be zero.

E.8.3. Calculation of leakage GHG emissions

Means of verification	The verification team has checked whether calculations (transparency, parameters consistency, correctness, completeness) of baseline GHG emissions, project GHG emissions and leakage GHG emissions (MR /A 1/, ER spreadsheet /b/) have been carried out in accordance with the formulae and methods described in the registered monitoring plan.
Findings	No findings have been identified / raised.
Conclusion	According to the applied methodology ACM0002 /A 6/, leakage emissions are considered to be zero.

E.8.4. Summary calculation of GHG emission reductions or net anthropogenic GHG removals by sinks

Means of verification	It has been checked whether the applied formulae and methods for calculating project GHG emissions are in accordance with the monitoring plan, the approved methodology and applicable Tool(s). Raw data ER calculation summary spreadsheet /A 2/, was reviewed, calculations (transparency, parameters consistency, correctness, completeness) checked and raw data for years 2013, 2014, 2015, 2016 and 2017 are included in the spreadsheet. Electricity generation is measured hourly (aggregated every 15 minutes) by EPM using digital bidirectional electricity meters. This information is backed up by the
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CDM VERIFICATION

	<p>Informatics Unit of EPM through the Large Energy Consumers ('Grandes Clientes de Energía') database on a daily basis through the SQL Server. The data is read remotely every 24 hours using tele-measurement technology and sent to the National Dispatch Center.</p> <p>Measuring and reporting frequency are in line with the MP /A 1/ and the Monitoring Methodology /A 6/.</p> <p>No emission calculations assumptions were used.</p> <p>The amount of net electricity generation supplied to the grid in this 2nd monitoring period (01/01/2013 to 31/12/2017) of the second crediting period, as per MR version 2, was equal to 250,191.2 MWh ($EG_{PJ,y}$). For comparison purposes, the total generation for years 2013 to 2017 (January 1st to December 31st) was verified in the XM database (/A 9/) and was confirmed as: 250,191.2 MWh (Average=50,038.0 MWh). 2017 generation (3,071.4 MWh) was far below average (50,038.0 MWh), mainly due to operation downtimes (stolen cables) and also due to the return of an ancient community (the third in the region), which resulted in discussions between communities which have led to continuing operations shutdowns. Currently (2018), the wind power plant operates normally, continuously.</p> <table><tr><th>EG_y (MWh) - PDD</th><th>EG_y (MWh) - MR</th><th>EG_y (MWh) - XM</th><th>Annual estimate of emission reductions</th><th></th></tr><tr><td>288,545.0</td><td>250,191.2</td><td>250,191.2</td><td>128,155 tCO₂e</td><td>TOTAL</td></tr></table> <p>As per above table, the cross check between MR /A 1/ and ER calculation summary spreadsheet /A 2/ and XM raw data and monthly/yearly generation data /A 9/, confirmed the consistency and accuracy of all figures. Moreover, checking Bitacora records (binnacle records) and its monthly/yearly generation totals, it was found that total generation measured at Jepirachi site was equal to 254,666.4 MWh, which means around 1.76% reduction comparing with total (Real, delivered to the grid) generation confirmed at XM site (250,191.2 MWh).</p>	EG _y (MWh) - PDD	EG _y (MWh) - MR	EG _y (MWh) - XM	Annual estimate of emission reductions		288,545.0	250,191.2	250,191.2	128,155 tCO ₂ e	TOTAL
EG _y (MWh) - PDD	EG _y (MWh) - MR	EG _y (MWh) - XM	Annual estimate of emission reductions								
288,545.0	250,191.2	250,191.2	128,155 tCO ₂ e	TOTAL							
Findings	<p>CAR-4: Latest calibrations were carried out on 12/2017 but previous calibrations were carried out on 03/2015 (PDD /A 4/ states calibration every two years), thus a delay of ~10 months was noticed and delayed calibration procedure was not applied according to VVS /A 5/ paragraph 366.</p>										
Conclusion	<p>All discount periods (03 to 12/2017) and equivalent errors (0.2%) are now correctly applied at revised ER spreadsheet (ER Calculation_2nd MR_Jepirachi_110119). This CAR is closed.</p>										

E.8.5. Comparison of actual GHG emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Means of verification	As per PDD version 09, annual estimated emission reductions for this monitoring period was equal to 128,155 tCO2e (25,631 tCO2e x 5).		
	GHG emission reductions for this monitoring period	Ex-ante estimated emission reductions for this monitoring period	
	111,077 tCO2e	128,155 tCO2e	TOTAL
	It was verified that current emissions reductions (for this monitoring period) are lower (~13.3%) than estimated emission reductions.		
Findings	No findings have been identified / raised.		
Conclusion	<p>The ex-ante estimated value was found to be higher than the ex-post determined value.</p> <p>Current emissions reductions were found to be lower than the ex-post determined value mainly due to operation downtimes (stolen cables) and also due to the return of an ancient community (the third in the region), which resulted in discussions between communities which have led to continuing operations shutdowns.</p> <p>Nevertheless, it is worth mentioning, the verification team noticed that emissions reductions were higher than estimated for years 2014 and 2015 but, as already explained in section E.8.4, all data (generation raw data and yearly total generation) was verified in the XM database (/A 9/) and confirmed.</p>		

E.8.6. Remarks on difference from estimated value in registered PDD

Means of verification	The emission reductions (for this monitoring period) are lower than the estimates in the revised PDD /A 4/, and deemed negligible.																																																																																										
Findings	No findings have been identified / raised.																																																																																										
Conclusion	<p>The ex-ante estimated emission reductions value for this monitoring period was found to be higher than the ex-post determined value.</p> <p>Current emissions reductions (for this monitoring period) were found to be lower than the ex-post determined value mainly (year 2017) due to operation downtimes (stolen cables) and also due to the return of an ancient community (the third in the region), which resulted in discussions between communities which have led to continuing operations shutdowns.</p> <p>Nevertheless, it is worth mentioning, the verification team noticed that emissions reductions were higher than estimated (25,631 tCO2) for years 2014 (31,184 tCO2) and 2015 (30,361 tCO2) but, as already explained in section E.8.4, all data (generation raw data and yearly total generation) was comprehensively verified in the <u>XM database</u> (/A 9/) and confirmed.</p> <p>Main reason for that was higher wind speeds (2014 and 2015) and availability (2014), as can be seen in the table below (Availability, Wind speed and Load Factor = yearly averages), which, logically, implied in increased power generation, thus higher emission reductions. Nordex N60/1300 Wind turbines (and others) are designed in a way that, when the wind direction changes the nacelle is yawed actively. Moreover, the wind power increases with the cube of the wind speed, thus the differences in the Load Factor.</p> <table><tr><th>YEAR</th><th>Egy (MW)</th><th>Availability (%)</th><th>Wind Speed (m/s)</th><th>Load Factor (%)</th></tr><tr><td>2,013</td><td>57,625</td><td>80.14%</td><td>8.38</td><td>33.7%</td></tr><tr><td>2,014</td><td>70,230</td><td>88.05%</td><td>9.04</td><td>41.1%</td></tr><tr><td>2,015</td><td>68,377</td><td>80.38%</td><td>9.49</td><td>40.0%</td></tr><tr><td>2,016</td><td>50,887</td><td>81.36%</td><td>8.18</td><td>29.8%</td></tr><tr><td>2,017</td><td>3,071</td><td>15.15%</td><td>7.92</td><td>1.8%</td></tr></table> <p>Finally, from Nordex N60/1300 technical paper (A 15) ,table below, one can see that “optimal performance” for this equipment is around 8 and 9 m/s wind speed.</p> <table><tr><th>Wind Speed (m/s)</th><th>Power (kW)</th><th>Load Factor</th></tr><tr><td>6</td><td>131</td><td>35.0%</td></tr><tr><td>7</td><td>241</td><td>40.4%</td></tr><tr><td>8</td><td>376</td><td>42.4%</td></tr><tr><td>9</td><td>536</td><td>42.4%</td></tr><tr><td>10</td><td>704</td><td>40.6%</td></tr></table> <p>Furthermore, a research was carried out to check other wind projects Load Factors, as can be seen in the table below, which confirmed huge variations in wind projects load factors (LF).</p> <table><tr><th>UN #</th><th>PROJECT</th><th colspan="2">MONIT. PERIOD</th><th>LF</th><th>COUNTRY</th></tr><tr><td>6143</td><td>EOLO WIND POWER PROJECT</td><td>01/01/2014</td><td>31/12/2015</td><td>59.3%</td><td>Nicaragua</td></tr><tr><td>6652</td><td>Orosi Wind Power Project</td><td>07/09/2015</td><td>31/12/2016</td><td>54.3%</td><td>Costa Rica</td></tr><tr><td>2315</td><td>Amayo 40 MW Wind Power Project - Nicaragua</td><td>01/07/2015</td><td>11/04/2016</td><td>49.7%</td><td>Lithuania</td></tr><tr><td>2315</td><td>Amayo 40 MW Wind Power Project - Nicaragua</td><td>01/04/2012</td><td>30/04/2013</td><td>44.8%</td><td>Nicaragua</td></tr><tr><td>4147</td><td>Guanacaste Wind Farm</td><td>01/01/2013</td><td>31/12/2013</td><td>44.7%</td><td>Costa Rica</td></tr><tr><td>6143</td><td>EOLO WIND POWER PROJECT</td><td>01/01/2013</td><td>31/12/2013</td><td>42.1%</td><td>Mexico</td></tr></table>	YEAR	Egy (MW)	Availability (%)	Wind Speed (m/s)	Load Factor (%)	2,013	57,625	80.14%	8.38	33.7%	2,014	70,230	88.05%	9.04	41.1%	2,015	68,377	80.38%	9.49	40.0%	2,016	50,887	81.36%	8.18	29.8%	2,017	3,071	15.15%	7.92	1.8%	Wind Speed (m/s)	Power (kW)	Load Factor	6	131	35.0%	7	241	40.4%	8	376	42.4%	9	536	42.4%	10	704	40.6%	UN #	PROJECT	MONIT. PERIOD		LF	COUNTRY	6143	EOLO WIND POWER PROJECT	01/01/2014	31/12/2015	59.3%	Nicaragua	6652	Orosi Wind Power Project	07/09/2015	31/12/2016	54.3%	Costa Rica	2315	Amayo 40 MW Wind Power Project - Nicaragua	01/07/2015	11/04/2016	49.7%	Lithuania	2315	Amayo 40 MW Wind Power Project - Nicaragua	01/04/2012	30/04/2013	44.8%	Nicaragua	4147	Guanacaste Wind Farm	01/01/2013	31/12/2013	44.7%	Costa Rica	6143	EOLO WIND POWER PROJECT	01/01/2013	31/12/2013	42.1%	Mexico
YEAR	Egy (MW)	Availability (%)	Wind Speed (m/s)	Load Factor (%)																																																																																							
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6	131	35.0%																																																																																									
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UN #	PROJECT	MONIT. PERIOD		LF	COUNTRY																																																																																						
6143	EOLO WIND POWER PROJECT	01/01/2014	31/12/2015	59.3%	Nicaragua																																																																																						
6652	Orosi Wind Power Project	07/09/2015	31/12/2016	54.3%	Costa Rica																																																																																						
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6143	EOLO WIND POWER PROJECT	01/01/2013	31/12/2013	42.1%	Mexico																																																																																						

	5676	Oaxaca III Wind Energy Project	01/02/2014	31/08/2017	39.6%	Honduras
	5584	Cerro de Hula Wind Project	01/01/2014	31/12/2015	37.7%	Nicaragua
	2315	Amayo 40 MW Wind Power Project - Nicaragua	12/04/2016	30/06/2017	36.3%	Costa Rica
	LT200 0019	"Liepynes wind power park joint implementation project	01/01/2011	31/12/2011	34.6%	Nicaragua
	0683	Osório Wind Power Plant Project	01/01/2008	31/12/2008	32.8%	Brasil
	6275	Los Santos Wind Power	01/05/2016	30/06/2018	32.5%	Costa Rica
	0194	JEPIRACHI WIND POWER PROJECT	01/01/2013	31/12/2017	29.3%	Colombia
	0824	Tejona Wind Power	01/01/2003	31/12/2007	28.8%	Costa Rica
	0194	JEPIRACHI WIND POWER PROJECT	01/01/2009	30/01/2011	28.2%	Colombia
	0194	JEPIRACHI WIND POWER PROJECT	31/01/2011	31/12/2012	28.1%	Colombia
	0486	Horizonte Wind Power Generation	25/04/2009	31/01/2011	21.5%	Brazil
	1958	Canela Wind Farm Project	03/04/2009	31/12/2011	18.0%	Chile

E.8.7. Actual GHG emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Means of verification	The verification team has determined the CERs achieved during first crediting period (31/01/2004 to 30/01/2011) = 112,601 tCO ₂ e and for the 1 ST monitoring period (31/01/2011 to 31/12/2012) of the second crediting period (31/01/2011 to 30/01/2018) = 40,916 tCO ₂ e. Baseline emissions calculated for this 2 ND monitoring period (01/01/2013 to 31/12/2017) of second crediting period = 111,077 tCO ₂ e.
Findings	No findings have been identified / raised.
Conclusion	No GHG emission reductions (0 tCO ₂ e) before 01/01/2013 were achieved during this 2 nd monitoring period (starting on 01/01/2013). CERs achieved during first crediting period = 112,601 tCO ₂ e and for the second crediting period, up to 31/12/2017 = 151,993 tCO ₂ e (40,916 tCO ₂ e + 111,077 tCO ₂ e).

E.9. Assessment of reported sustainable development co-benefits

Means of verification	Environmental and social indicators (Power Operations Department support) are mentioned (MR) and related monitoring evidences /A 11/ were provided. The Monitoring Follow-up Plan (EIA) involves physical-biotic and social aspects to protect natural resources and to promote a sustainable development (special programs as impact of birds with wind mills or electrics wire conductions, survival of cactus experimental plantation and reestablishment of vegetation, landscape perception, noise impact, job creation), also tracking the effectiveness of the compensatory measures (houses, desalinization plant-visited and found fully operational). for compliance purposes, sustainability and acceptance by the community. The Environmental Management Plan involves the identification and assessment of impacts and the environmental criteria including, among others, actions of prevention, mitigation, compensation, correction and control of impacts. No issues were identified during the site visit in relation to local stakeholders, claims, complaints, etc. According to the PP, as declared during the site visit, no complaint has been received from the local stakeholders. As per CORPOGUAJIRA letter dated 09/12/2002, Reference Appendix A /A 14/, Jepirachi Wind Power Project does not need an Environmental License and, according to CORPOGUAJIRA Environmental Evaluation, meets all environmental sustainability criteria and is in accordance with all environmental requirements. Furthermore, Empresas Publicas de Medellín (EPM) has the "CORPOGUAJIRA"
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	Forestry usage, dumping of waste water and solid waste management Permits, Resolution # 03499 /A 14/.
Findings	No findings have been identified / raised.
Conclusion	Sustainable development co-benefits are identified, monitored and followed-up.

E.10. Global stakeholder consultation

Means of verification	N/A
Findings	N/A
Conclusion	N/A

SECTION F. Internal quality control

The technical review by a qualified person independent from the verification team, and a review by an authorised decision maker are conducted before the submission of the verification report to the PP and before requesting the issuance of the verified ERs.

SECTION G. Verification opinion

LRQA has undertaken the second periodic verification of the second crediting period for the project activity “Jepirachi Wind Power Project”, covering the monitoring period from 01/01/2013 to 31/12/2017 based on the requirements of CDM as set out in Article 12 of the Kyoto Protocol, the CDM M&P, the present Appendix C, subsequent decisions made by the COP/MOP and CDM-EB, and the other rules applicable to the project activity including the host country’s legislation and its specific requirements for sustainable development.

Through the verification process, the verification team identified 1 CAR. The PP has taken actions to address the CAR and submitted to LRQA the revised monitoring report Version 2 dated 11/01/2019 and the other supporting evidences. CAR 1 has been appropriately closed before the issuance of the verification report.

The verification team is of the opinion that the project activity, “Jepirachi Wind Power Project” has been implemented and operated in accordance with the registered revised PDD version 9, dated 03/10/2013, the monitoring plan with validated revision complies with the approved monitoring methodology, the monitoring of parameters complies with the monitoring plan of the registered PDD and the monitored data and calculation of ERs are assessed and confirmed as correct. Therefore LRQA hereby certifies, and requests the issuance of, the reported ERs of “Jepirachi Wind Power Project” during the monitoring period from 01/01/2013 to 31/12/2017 amounting to 111,077 tCO₂e to the CDM Executive Board.

Decision Maker

Ketan S. Deshmukh
CDM Quality Manager
03 May 2019

SECTION H. Certification statement

LRQA has undertaken the second periodic verification of the second crediting period for the project activity “Jepirachi Wind Power Project”, covering the monitoring period from 01/01/2013 to 31/12/2017 based on the requirements of CDM as set out in Article 12 of the Kyoto Protocol, the CDM M&P, the present Appendix C, subsequent decisions made by the COP/MOP and CDM-EB, and the other rules applicable to the project activity including the host country’s legislation and its specific requirements for sustainable development.

Based on the verification, LRQA hereby certifies, and requests the CDM Executive Board to issue 111,077 tCO₂e for the project activity “Jepirachi Wind Power Project” for the stated monitoring period.

Decision MakerA handwritten signature in black ink, appearing to read 'K S Deshmukh', written over a horizontal line.

Ketan S. Deshmukh
CDM Quality Manager
03 May 2019

Appendix 1. Abbreviations

Abbreviations	Full texts
ASIC	Administradora del sistema de intercambios comerciales (<i>Administrator of Commercial Trade System</i>)
CAR	Corrective action request
CDM	Clean Development Mechanism
CDM-EB	Executive Board of Clean Development Mechanism
CDM M&P	Modalities and procedures for a clean development mechanism
CER	Certified Emission Reduction
CL	Clarification
CND	Centro Nacional de Despacho (<i>National Dispatch Center</i>)
COP/MOP	Conference of the Parties serving as meeting of the Parties to the Kyoto Protocol
CREG	Comisión de Regulación de Energía y Gas (<i>Regulatory Commission of Energy and Gas</i>)
EIA	Estudio de Impacto Ambiental (<i>Environmental Impact Study</i>)
EPM	Empresas Públicas de Medellín (<i>Medellín Public Enterprises</i>)
ERs	Emission reductions
FAR	Forward action request
GHG	Greenhouse gas
IPCC	Intergovernmental panel on climate change
KP	Kyoto Protocol of the United Nations Framework Convention on Climate Change
LR	Lloyd's Register
LRQA	Lloyd's Register Quality Assurance Limited
ONAC	Organismo Nacional de Acreditación de Colombia (<i>National Accreditation Organization in Colombia</i>)
PDD	Project design document
PP	Project participant
tCO ₂ e	Tonne of carbon dioxide equivalent
UNFCCC	United Nations Framework Convention on Climate Change
XM	Operador del Sistema Interconectado Nacional (SIN) y administrador del Mercado de Energía Mayorista de Colombia (MEM) (<i>SIN operator and administrator of the MEM - Colombian Wholesaler Energy Market</i>)

Appendix 2. Competence of team members and technical reviewers

Verification of Jepirachi Wind Power Project

We hereby certify that the following personnel have engaged in the verification process that has fully satisfied the competence requirements of the verification of the CDM project activity.

Name of Person	Assigned Roles
Vicente San Valero	Team Leader, Sector expert
Ketan S Deshmukh	Technical Reviewer, Sector Expert
Ketan S Deshmukh	Decision Maker

Signed by

Decision Maker



Ketan S. Deshmukh
CDM Quality Manager
03 May 2019

Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
A 1	International Bank for Reconstruction and Development (IBRD) as Trustee of the Prototype Carbon Fund (PCF)	* Monitoring Report version 1, dated 07/11/2018 – published on 09/11/2018. * Monitoring Report version 2, dated 11/01/2019.	--	PP
A 2	International Bank for Reconstruction and Development (IBRD) as Trustee of the Prototype Carbon Fund (PCF)	* Raw data ER calculation summary spread sheet, dated 19/10/2018 (file: “ <i>ER Calculation_2nd MR_Jepirachi_191018.xlsx</i> ” – based in daily/hourly generation data) * Raw data ER calculation summary spread sheet, dated 13/12/2018 (file: “ <i>ER Calculation_2nd MR_Jepirachi_131218.xlsx</i> ” – based in daily/hourly generation data) * Raw data ER calculation summary spread sheet, dated 11/01/2019 (file: “ <i>ER Calculation_2nd MR_Jepirachi_110119.xlsx</i> ” – based in daily/hourly generation data)	--	PP
A 3	EPM Lab	CALIBRATION CERTIFICATES: ‘CALIB Certificates 2013-14-15-17.zip’. Please refer to Appendix 5.	--	PP
A 4	International Bank for Reconstruction and Development (IBRD) as Trustee of the Prototype Carbon Fund (PCF): Jepirachi Wind Power Project	* Project Design Document (CDM-PDD) version 9, dated 03/10/2013 (renewal date: 18/07/2011). * Emission Factor (2007-2008-2009) calculation spreadsheet (“ <i>Combined_OM_BM_EF_Lambda_method_Feb_24_2011.xls</i> ”) – combined emission factor validated at crediting period renewal = $EF_{grid,CM} = 0.4441 \text{ tCO}_2/\text{MWh}$).	https://cdm.unfccc.int/Projects/projsearch.html https://cdm.unfccc.int/Projects/DB/SGS-UKL1135244574.04/CP/4V693H8SKDG7Y14A9EJE46NYEXSQWH/history	Others
A 5	CDM Executive Board	* CDM Validation and Verification Standard for project activities (VVS), version 02.0, dated 29/11/2018. * CDM Project Cycle Procedure (PCP) for project activities, version 02.0, dated 29/11/2018. * CDM Project Standard for project activities (PS), version 02.0, dated 29/11/2018.	https://cdm.unfccc.int/Reference/index.html	Others
A 6	CDM Executive Board	ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” version 12.1.0, dated 26/11/2010.	https://cdm.unfccc.int/Reference/index.html	Others
A 7	CDM Executive Board	CDM Executive Board: “Tool to calculate the emission factor of an electricity system”, version 2, dated 16/10/2009.	https://cdm.unfccc.int/Reference/index.html	Others
A 8	LRQA	Validation Opinion for Post	https://cdm.unfccc.int	Others

CDM-VCR-FORM

		Registration Changes, Version 02 dated 13/11/2013.	/filestorage/Z/S/P/ZS PCHUY7JTENK9LD 5F3MR10VBQGO8 W/CDM_Post_Regis tration_changes_rep ort_Jepirachi_CD_fo r_DMR_Ver_2.1.pdf ?t=d3R8cGlvMHJifD CBuADcQCePToc6 AgQVkyt	
A 9	EPM / XM	<p>* Bitacora records (binnacle records): “<i>Bitacora/MM/YYYY.xls</i>” files – contains hourly/daily generation data and presents monthly generation totals, with all events/problems registered (hours) in order to calculate Jepirachi’s power plant daily/monthly availability.</p> <p>* Wind yearly averages: Spreadsheet “<i>Datos viento 2013 2014 2015 2016 2017.xlsx</i>”.</p> <p>* Generación Real 2013, 2014, 2015, 2016, 2017 EPM.XLS. * XM Generacion_(kWh)_2013, 2014, 2015.xlsx / XM Generacion_(kWh)_2016SEM1, SEM2.xlsx / XM Generacion_(kWh)_2017SEM1, SEM2.xlsx.</p>	<p>EPM Records</p> <p>EPM Records</p> <p>XM http://informacioninteligente10.xm.com.co/oferta/Paginas/HistoricoOferta.aspx?RootFolder=%2Foferta%2FHistorico%20Oferta%2FGeneraci%C3%B3n&FolderCTID=0x01200075F2CCF9F779EE4B93D2D54764CDB78A&View={9F21C71E-AD8F-4E3F-B2EA-0B38F49A9BA8}</p>	Others
A 10	LRQA	<p>Meters pictures (show serial number and meters specifications as, for instance, Class 0.2) taken at site: * Jepirachi Meters.zip; * Cuestecitas SUB Station meters.zip.</p>	--	Others
A 11	EPM	<p>*EPM_Jepirachi_EIA_Corpoguajira_2002_Cap_6_PMA.PDF - ENVIRONMENTAL MANAGEMENT PLAN. *EPM_Jepirachi_EIA_Corpoguajira_2002_Cap_7_Plan_Monitoreo.pdf - MONITORING AND FOLLOW-UP PLAN.</p>	--	Others
A 12	Power Measurement	* ION Technical Note dated 31/08/2005 – states that ION Digital Meters do not require calibration, only verification of their accuracy.	--	Others
A 13	ONAC	* ONAC: Resolution # 3225, dated 28/01/2011 – (Re) Accreditation/Certification of EPM Calibration Laboratory (“ <i>Laboratorio de Calibración de Equipos de Medida de Energía y Gas</i> ”).	--	Others

A 14	CORPOGUAJIRA	<p>* Corporación Autónoma Regional de La Guajira, "CORPOGUAJIRA" (La Guajira Environmental Authority): Letter dated 09/12/2002, stating that Jepirachi Wind Power Project does not need an Environmental License and, according to CORPOGUAJIRA Environmental Evaluation, meets all environmental sustainability criteria and is in accordance with all environmental requirements.</p> <p>* "CORPOGUAJIRA" Forestry usage, dumping of waste water and solid waste management Permits, Resolution # 03499, dated 26/12/2002.</p>	http://www.corpoguajira.gov.co	Others
A 15	NORDEX	* Nordex N60/1300 KV Technical paper - "Nordex_N60_EN.pdf".	--	Others

Appendix 4. Clarification requests, corrective action requests and forward action requests

Table 1. Remaining FAR from validation and/or previous verifications

There were no FAR(s) from validation and/or previous verifications.

Table 2. CL from this verification

CL ID	xx	Section no.		Date: DD/MM/YYYY
Description of CL				
xx				
Project participant response				Date: DD/MM/YYYY
xx				
Documentation provided by project participant				
DOE assessment				Date: DD/MM/YYYY
xx				

Table 3. CAR from this verification

CAR ID	CAR 4	Section no.	E.7, E.8.2	Date: 17/12/2018
Description of CAR				
Latest calibrations were carried out on 12/2017 but previous calibrations were carried out on 03/2015 (PDD /A 4/ states calibration every two years), thus a delay of ~10 months was noticed and delayed calibration procedure was not applied according to VVS /A 5/ paragraph 366.				
Project participant response				Date: 11/01/2019
The calculation of GHG emission reductions was corrected in Section E.1, taking into account that the electricity meters calibration should have been made latest on March 2017. The following aspects were taken into account for the penalized energy generation: • Net generation (MWh) was penalized for all days of the following months: March, April, May, June, July, August, September, October, November and December 2017. • Net generation (MWh) was not penalized for January and February 2017. The GHG emission reduction was corrected in the other sections on MR that mention this aspect. The calculation of GHG emission reductions was also corrected in the spreadsheet.				
Documentation provided by project participant				
* 2nd_Monitoring Report_Jepirachi_v2_190111_track Changes; * 2nd_Monitoring Report_Jepirachi_v2_190111 (clean); * ER Calculation_2nd MR_Jepirachi_110119.				
DOE assessment				Date: 27/01/2019
All discount periods (03 to 12/2017) and equivalent errors (0.2%) are now correctly applied at revised ER spreadsheet (ER Calculation_2nd MR_Jepirachi_110119). This CAR is closed.				

Table 4. FAR from this verification

FAR ID	xx	Section No.		Date: DD/MM/YYYY
Description of FAR				
xx				
Project participant response				Date: DD/MM/YYYY
xx				
Documentation provided by project participant				
xx				
DOE assessment				Date: DD/MM/YYYY

Appendix 5. Calibration data

- * **Metering Point # 1** at Jepirachi site: Transformers Jepirachi (used for ER calculations – measurements at the commercial frontier = 115 kV / 0.7 km transmission line that connects the wind park with the National Interconnected System - SIN).
- * **Metering Point # 2** at Jepirachi site: Puerto Bolivar (used for balance cross-check).
- * **Metering Point # 3** at Jepirachi site: Cuestecitas (used for balance cross-check).

Model	Serial	Main / Backup	Certificates Numbers	Dated	Calibrated on	Source	Measurement Point
ION 8300	PS-0511A084-01	Main	20666046-4-1, 2, 3, 4	14/02/2018	21/12/2017	EPM Lab	Cuestecitas
ION 8300	PS-0511A085-01	Backup	20666046-5-1, 2, 3, 4	14/02/2018	20/12/2017	EPM Lab	Cuestecitas
ION 8600	PT-0809A455-01	Main	20666046-6-1, 2, 3, 4	14/02/2018	20/12/2017	EPM Lab	Trafo Jepirachi
ION 8300	PS-0511A080-01	Backup	20666046-1-1, 2, 3, 4	14/02/2018	19/12/2017	EPM Lab	Trafo Jepirachi
ION 8300	PS-0511A082-01	Main	20666046-2-1, 2, 3, 4	14/02/2018	19/12/2017	EPM Lab	Puerto Bolivar
ION 8300	PS-0511A083-01	Backup	20666046-3-1, 2, 3, 4	14/02/2018	19/12/2017	EPM Lab	Puerto Bolivar
ION 8300	PS-0511A084-01	Main	50664	02/03/2015	02/03/2015	EPM Lab	Cuestecitas
ION 8300	PS-0511A085-01	Backup	50664	02/03/2015	02/03/2015	EPM Lab	Cuestecitas
ION 8600	PT-0809A455-01	Main	50664	02/03/2015	02/03/2015	EPM Lab	Trafo Jepirachi
ION 8600	PS-0511A080-01	Backup	50664	02/03/2015	02/03/2015	EPM Lab	Trafo Jepirachi
ION 8300	PS-0511A082-01	Main	50664	02/03/2015	02/03/2015	EPM Lab	Puerto Bolivar
ION 8300	PS-0511A083-01	Backup	50664	02/03/2015	02/03/2015	EPM Lab	Puerto Bolivar
ION 8300	PS-0511A084-01	Main	50633	25/02/2014	25/02/2014	EPM Lab	Cuestecitas
ION 8300	PS-0511A085-01	Backup	50633	25/02/2014	25/02/2014	EPM Lab	Cuestecitas
ION 8600	PT-0809A455-01	Main	50633	25/02/2014	25/02/2014	EPM Lab	Trafo Jepirachi
ION 8600	PS-0511A080-01	Backup	50633	25/02/2014	25/02/2014	EPM Lab	Trafo Jepirachi
ION 8300	PS-0511A082-01	Main	50633	25/02/2014	25/02/2014	EPM Lab	Puerto Bolivar
ION 8300	PS-0511A083-01	Backup	50633	25/02/2014	25/02/2014	EPM Lab	Puerto Bolivar
ION 8300	PS-0511A084-01	Main	50608	01/04/2013	01/04/2013	EPM Lab	Cuestecitas
ION 8300	PS-0511A085-01	Backup	50608	01/04/2013	01/04/2013	EPM Lab	Cuestecitas
ION 8600	PT-0809A455-01	Main	50608	01/04/2013	01/04/2013	EPM Lab	Trafo Jepirachi
ION 8300	PS-0511A080-01	Backup	50608	01/04/2013	01/04/2013	EPM Lab	Trafo Jepirachi
ION 8300	PS-0511A082-01	Main	50608	01/04/2013	01/04/2013	EPM Lab	Puerto Bolivar
ION 8300	PS-0511A083-01	Backup	50608	01/04/2013	01/04/2013	EPM Lab	Puerto Bolivar
ION 8300	PS-0511A084-01	Main	50584	09/07/2012	12/06/2012	EPM Lab	Cuestecitas
ION 8300	PS-0511A085-01	Main	50584	09/07/2012	12/06/2012	EPM Lab	Cuestecitas
ION 8600	PT-0809A455-01	Main	17606001-1-1	12/03/2013	24/01/2012	EPM Lab	Trafo Jepirachi
ION 8300	PS-0511A080-01	Backup	50584	09/07/2012	12/06/2012	EPM Lab	Trafo Jepirachi
ION 8300	PS-0511A082-01	Main	50584	09/07/2012	12/06/2012	EPM Lab	Puerto Bolivar
ION 8300	PS-0511A083-01	Backup	17617789-1-1	15/02/2013	24/01/2012	EPM Lab	Puerto Bolivar
ION 8600	PT-0809A455-01	Main	17606001	20/01/2012	20/01/2012	EPM Lab	Trafo Jepirachi
ION 8300	PS-0511A081-01	Backup	50505	26/01/2011	26/01/2011	EPM Lab	Trafo Jepirachi

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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
02.1	11 January 2018	Editorial revision to correct the numbering of appendices in the instructions.
02.0	31 October 2017	Revision to align with the requirements of the “CDM validation and verification standard for project activities” (version 01.0).
01.0	23 March 2015	Initial publication.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: project activities, verifying and certifying		