SANTA ANA HYDROELECTRIC PLANT
(UNFCCC REGISTRATION REF. NO. 0275)

EMPRESA DE ACUEDUCTO Y ALCANTARILLADO DE BOGOTÁ - EAAB
(COLOMBIA)

EDF TRADING LIMITED
(UNITED KINGDOM OF GREAT BRITAIN)

MGM CARBON PORTFOLIO, S.A.R.L.
(NORTHERN IRELAND)

VERIFICATION PERIOD
01/08/2010 – 31/07/2011

REPORT NO. CDMVER-12-013-01

NOVEMBER, 2012

Date of first issue:	*02/10/2012*	*Project No.:*	*UNFCCC REGISTRATION REF. No. 0275*
Audit team:	*Erika Urrego* *ICONTEC Lead Auditor* *Ana Isabel Aubad* *ICONTEC Auditor/Technical Expert*	*Organizational unit:*	*Instituto Colombiano de Normas Técnicas y Certificación – ICONTEC* *Calle 53 No.58-33* *Bogotá - Colombia*
Project title:	*Santa Ana Hydroelectric Plant*	*Report No:*	*CDMVER-12-013-01*
Version No.:	*01*	*Last version date:*	*November 2012*
Sectoral scope:	*1.2*	*Monitoring period number/Duration:*	*6* *01/08/2010 to 31/07/2011*
Client:	*Empresa de Acueducto y Alcantarillado de Bogotá (EAAB).* *Address:* *Av. Calle 24 No. 37 - 15* *Bogotá – Colombia* *Phone: + 57-1 – 3447058*	*Client ref.:*	*CDMVER-12-013*

Summary:

ICONTEC performed the sixth periodic verification of the registered CDM project: Santa Ana Hydroelectric Plant in Colombia (Registration Number: N°0275; Registration Date: 11th of May 2006) on the basis of UNFCCC criteria referred to Article 12 of the Kyoto Protocol and CDM modalities and procedures according to the Marrakech Agreement, the criteria of the CDM Executive Board and the Host country, as well as the operational and technical monitoring criteria specific to this type of project. The applied methodology is AMS I.D, version 7 “Renewable Electricity Generation for a Grid”.

The project activity under this verification process is a small run-of-river type hydroelectric plant with an installed capacity of 13.43 MW, introduced into the municipal potable water supply system of Bogotá – Colombia, located on the outskirts of the city. It was scheduled to begin operations in the second semester of 2005. In this framework, the management of Empresa de Acueducto y Alcantarillado de Bogotá (EAAB) in Colombia, is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project Monitoring and Verification Plan indicated in the final PDD version 2.

A step by step description of dates in which the activities related to the project will be carried out, as:

02/05/2012	The monitoring report was publicly available in the UNFCCC web page
10-11/05/2012	Desk review and investigation of secondary sources of information
17-18/05/2012	On-site visit and interview with stakeholders
21/05/2012	ICONTEC sent findings
19/07//2012/	The owner of the project answers the findings and sends the new version of the monitoring report
18/10/2012	Draft verification report was sent to the owner of the project and technical review
19/10/2012	The verification report was sent to technical review
03/11/2012	The owner of the project sent comments to the verification report and final version of MR.

26/11/2012	Final report was updated with the project participant's comments and technical review.
30/11/2012	The project documentation was uploaded into the UNFCCC web page to request for Issuance

Documentation review, interview and on-site visit allowed ICONTEC to collect enough evidence to completely assess the verification criteria and determinate that the project is implemented as planned and as described in the validated and registered PDD Version 02. Emission reductions were correctly calculated based on the PDD and the monitoring equipment that has an impact on the claimed emissions reductions runs reliably. The monitoring system is in place and is calibrated appropriately. ICONTEC confirmed that the GHG emission reductions are calculated without material misstatements.

Based on the information that we saw and evaluated we confirm the following statement:

Reporting period: From 01/08/2010 to 31/07/2011
Verified emission reductions: 15,604 tCO_2 equivalents

Work verified by	*Eng. Diana Santos* *CDM Auditor* *Eng. Cristian Grisales* *Sectoral 1.2 Expert*	☒ *No distribution without permission from the Client or responsible organizational unit* ☐ *Limited distribution* ☐ *Unrestricted distribution*
Technical review date:	*31/10/2012*	
Number of pages:	*53*	

This report should not be read without reference to the annexed Verification Protocol.

Abbreviations

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CERs	Certified Emission Reductions
CL	Clarification Request
CO_2	Carbon Dioxide
CO_2 eq	Carbon Dioxide Equivalent
DNA	Designated National Authority
DOE	Designated Operational Entity
DR	Document Review
FAR	Forward Action Request
GHG	Greenhouse Gases
I	Interview
ICONTEC	Colombian institute of technical standards and certification (Instituto Colombiano de Normas Técnicas y Certificación)
IPCC	Intergovernmental Panel on Climate Change
MoV	Means of verification
MP	Monitoring Plan
MR	Monitoring Report
PDD	Project Design Document
PP	Project Participant
UNFCCC	United Nations Framework Convention on Climate Change
VVS	Validation and Verification Standard
EAAB – E.S.P	Empresa de Acueducto y Alcantarillado de Bogotá (water and sewage company of Bogotá)
EMGESA	Empresa Generadora de Energía Eléctrica S.A. (Electricity Market Agent)
XM	Abbreviation for “Market Experts”. XM is a company of the ISA, Group providing integral services. (www.xm.com.co).
CAM	Multiservice American Company (Compañía Americana de Multiservicios), is a company that provides services to EMGESA for interrogation and recording commercial frontier power meters. Additionally CAM has accredited laboratory in Colombia for the revision of power meters.
ASIC	Administrador del sistema de intercambio comercial (System Manager Exchange Commercial)
CND	Centro Nacional de Despacho (National Dispatch Center)
UPME	Unidad de planeación minero energética (Colombia) (Mining and Energy Planning Unit)
CREG	Comisión de Regulacion de Energía y Gas (Regulatory commission of energy and gas)

Table of Contents

LIST OF TABLES

1. INTRODUCTION

Empresa de Acueducto y Alcantarillado de Bogotá (EAAB – ESP), has commissioned ICONTEC to perform the 6th verification of emission reductions of its registered CDM project: Santa Ana Hydroelectric Plant (hereafter called "the project").

ICONTEC reviewed the GHG data collected for the period from 01/08/2010 to 31/07/2011. This report contains the findings of the project as well as the verification and certification statements for the certified emission reductions.

The verification was performed on the basis of UNFCCC criteria referred in Article 12 of the Kyoto Protocol and CDM modalities and procedures according to the Marrakech Agreement, the criteria of the CDM Executive Board and the host country, as well as criteria given for consistent project operations, monitoring and reporting.
JJH
The project activity under verification process consists of energy generation by the Santa Ana Hydroelectric Plant. The energy is sent into the national interconnected grid in accordance to power market regulations, environmental and operational authorizations. A key objective of the project is to reduce greenhouse gas emissions from the national interconnected system of Colombia.

1.1 OBJECTIVE

According to CDM Modalities and Procedures (Decision 17/CP7 and paragraph 62), the purpose of this verification process is the periodical independent review and ex-post determination of the monitored reductions which have occurred as a result of the registered CDM project activity during the verification period.

Based on the applicable requirements of paragraph 62 of the CDM modalities and procedures, this assessment shall:

a. Ensure that the project activity has been implemented and operated as per the registered PDD and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place:
b. Ensure that the monitoring report (MR) and other supporting documents provided are complete and in accordance with the latest applicable version of the completeness checklist for requests of issuance of CERs and verifiable and in accordance with applicable CDM requirements;
c. Ensure that the actual monitoring system and procedures comply with the monitoring system and procedures described in the monitoring plan and the approved methodology;
d. Evaluate the data recorded and stored as per the monitoring methodology.

As a result of this process, a written certification of the emission reduction achieved and verified is prepared by the DOE for the specified time period.

1.2 SCOPE

The scope of verification is that the project activity was implemented and operated as per the PDD version 2, registered on May 11th, 2006 and that all physical features of the project are in place, ensuring that actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan and the approved methodology and that the data reported are complete and transparent. The verification scope is defined as an independent and objective review of the PDD, the projects monitoring plan and other relevant documents. The information in these documents is reviewed against Kyoto Protocol requirements, UNFCCC rules and associated interpretations.

ICONTEC based on its ethics code and internal procedures for carrying out validation, verification and certification audits of CDM project activities (the internal procedures are based on the Validation and Verification Standard version 2.0 (VVS - EB 65 Annex 4 of UNFCCC) focused on the identification of significant risks for CER's generation, and verification of the mitigation.

Verification does not mean to provide any consulting for the project participants. However, stated requests for clarifications and/or corrective, forward actions may have provided input for improvement of the project design.

1.3 DESCRIPTION OF THE PROJECT ACTIVITY

Project Participants:	Empresa de Acueducto y Alcantarillado de Bogotá (EAAB – ESP), Colombia EDF Trading Limited, United Kingdom MGM Carbon Portfolio, S.a.r.l., Northern Ireland
Project title:	Santa Ana Hydroelectric Plant
Registration Date:	11 May 2006
UNFCCC registration No:	0275
Project Owner:	Empresa de Acueducto y Alcantarillado de Bogotá (EAAB – ESP)

Location of the project activity: Northern Bogotá city, Colombia

Geo coordinates:	110324.65 North and 105849.56 East
Crediting period:	01 Aug 2005 - 31 Jul 2015 (Fixed)
Verification period:	01-08-2010 to 31-07-2011
Project starting date:	01/08/2005

Santa Ana Hydroelectric Plant is a small run-of-river type hydroelectric plant, with an installed capacity of 13.43 MW, introduced into the municipal potable water supply system of Bogotá – Colombia, located on the outskirts of the city. The project began operations in the second semester of 2005.

Santa Ana Hydroelectric Plant project has installed at the base of the Usaquén Alternate tunnel, a power house with hydroelectric power conversion equipment, that turbines the water passing from the Wiesner water treatment plant into the distribution storage system of the city, producing clean electricity to be placed into the Colombian National Interconnected Grid, following local existing electricity market regulations and required environmental and operational permits.

A key objective of the project is to reduce Greenhouse Gas Emissions that would have otherwise been generated by the National Interconnected System of Colombia.

The power capacity is 13.43 MW and the energy generation of Santa Ana Hydroelectric Plant is transmitted to the national grid through a short 34.5 kV line connecting the power plant with the Usaquén Electrical Substation, which could generate until 90 GWh/year, owned by the local operator CODENSA. Just before this point (Usaquen Electrical Substation), in the same location, there is a step down transformer 34.5/11.4 kV, owned by EAAB, where the power is adjusted to the voltage level required for connection to Usaquén Electrical Substation of CODENSA. Besides that, in Usaquén EAAB installations there are two meters (main and back up) used for EAAB to verify and validate measurements of Santa Ana Hydroelectric Plant input registered by the meters of commercial frontier in Usaquén Electrical Substation of CODENSA.

In order to establish the correspondence between the power registered at Usaquen Electrical Substation of CODENSA and the power generated by Santa Ana Hydroelectric Plant, the connection between them was physically verified by ICONTEC according to the single line diagram PCH45_09A1UnifilarModel/8/. ICONTEC confirmed that the line maintenance is the responsibility of the company CODENSA.

The verification team checked during onsite assessment that there were no other electrical connections, different from the main connection, through which could be energy feedback counted from other systems. This verification was based on a review of electrical connections inside the power plant room control and finding out that meters are bidirectional.

The GHG emission relevant to the project activity is CO_2 displaced for generate energy with water and not fossil fuels.

The project activity is based on the methodology AMS I.D. Version 7: Renewable electric power generation for a grid /12/.

The impact in global warming generated for the sixth monitoring period of the accreditation period of the plant was a generated and delivered energy of 35.5 GWh/year to the national interconnected grid of Colombia, reducing of this way the emission of 15,604 tCO_2e at the atmosphere.

2. METHODOLOGY

The verification consists of the following four phases:

1. Desk review and investigation on secondary sources of information,
2. On-site assessment
3. Reporting of findings
4. Issuance of the final verification report with the conclusion on the emission reductions achievements

As mentioned in clause 1.2 of this report, ICONTEC based on its ethics code and internal procedures, carries out validation, verification and certification audits of CDM project activities (which are based on the validation and verification standard) focused on the identification of significant risks for CER generation, and verification of the mitigation.

Findings established during the verification can be seen as:

A non-fulfillment of verification protocol criteria, or an identified risk to the fulfillment of the project objectives.

The findings could take the form of a Corrective Action Request (CAR), Forward action Request (FAR) or a Clarification Request (CLA).

The verification protocol resulting from the verification of Santa Ana Hydroelectric Plant is enclosed in Annex A of this report.

2.1 VERIFICATION TEAM

The verification team consists of the personnel described in table 1:

Table 1: Verification Team

Role/Qualification	Last Name	First Name	Country	Type of involvement			
				Desk review	Site Visit/ Interviews	Reporting	Technical Review
Lead Auditor	Urrego	Erika	Colombia	X	X	X	
Auditor/Technical Expert	Aubad	Ana	Colombia	X	X	X	
CDM technical reviewer	Santos	Diana	Colombia				X
Technical reviewer	Grisales	Cristian	Colombia				X

The verification team is qualified in accordance with ICONTEC qualification scheme for CDM validation and verification. (See in the Annex B the CVs).

2.2 DESK REVIEW AND INVESTIGATION OF SECONDARY SOURCES OF INFORMATION

In order to carry out the desk review, the following documents were requested to the project participants:

- *Last version of PDD Version 02 dated 10/01/2006 and monitoring plan /1/.*
- *File: "CO2e Emissions Reductions Santa Ana Hydroelectric Plant (01-08-2010 to 31-07-2011)"/2/*
- *Monitoring report (6th Monitoring Period) /3/*
- *Reports and records of daily, monthly and annual monitoring data on the items defined in the monitoring plan and the Monitoring Report for the crediting period under verification (01/08/2010 to 31/07/2011). /4/, /5/ and/ 6/.*
- *Previous verification report CDMVER -043-02 (from 01/08/2009 – 31/07/2010), version 02 December 2011 /7/.*

The whole documentation was reviewed and a verification audit plan was completely carried out during the verification activities.

During the desk review it was confirmed that the Monitoring Report fulfills with F-CDM-MR, version 02.0, Form Monitoring Report of UNFCCC.

The monitoring report version 02 /3/ of the sixth crediting period was made publicly available at UNFCCC web site on May 02, 2012.

2.3 ON-SITE VISIT

Between 17 May 2012 and 18 May 2012, the project was visited at the following facilities:

- Santa Ana Hydroelectric Plant (Calle 119 No. 0-10 Este, Bogotá)
- Control Center (Av. Calle 22 No 80 A 81, Bogotá)
- EAAB Headquarter Office (Av. Calle 24 No. 37 – 15, Bogotá)
- Usaquén Electrical Substation of CODENSA (Calle 110 No. 9-80, Bogotá)
- Usaquén Electrical Substation of EAAB (Calle 110 No. 9-80, Bogotá)

Interviews were conducted to Santa Ana Hydroelectric Plant directors and operative personnel, as well as to support personnel (see list below). Other project stakeholders were also interviewed.

During the on-site visit, the following people were interviewed:

Table 2: Interview list

Entity	Name	Position
EAAB	Martha Patricia Cruz	Specialized Professional Environmental Management
EAAB	Juan Carlos Sanchez	Specialized Professional Electromechanical Services Direction
EAAB	Lina Maria Ojeda	Professional Environmental Management
EAAB	José Gilberto. Lopéz	Specialized Professional Network Matrix Aqueduct Direction
EAAB	Alfonso Cubillos.	Specialized Professional Electromechanical Services Direction
EAAB	Mauricio Velástegui	Control Center Division Chief Network Matrix Aqueduct Direction
EAAB	Ricardo Gamboa	Technician Network Matrix Aqueduct Direction
EAAB	Magda Castaño	Specialized Professional Technology Management
EAAB	Jose Javier Jimenez	Specialized Professional Quality and Process Direction
EAAB	Bertha Sofia Ortiz	Director Quality and Process Direction
CAM - EMGESA	Javier Fandiño	Operative Coordinator

Entity	Name	Position
CAM - EMGESA	Mauricio Bermudez	Maintenance Engineer

ICONTEC performed the verification by means of:

- Interviews with relevant personnel of operation activities and stakeholders
- Reviewing project documentation
- On-site inspections, including review of plant installations, performance records, and interviews with project participants
- Collecting measurements, observing established practices and verifying the accuracy and liability of monitoring equipment
- Cross-checking measurements of generated electricity, emission factor and reduction emissions
- Reviewing monitoring results and checking the correct application of monitoring methodologies, and quality control of the data collection and its report; and
- Setting of the GHG emissions reductions.

The verification assessment included the following aspects:

a) Implementation of the monitoring plan and follow up, including verification of:

   - All data on project emissions reduction and follow up of indicators of sustainable development
   - Responsibilities and related authorities
   - Monitoring frequency
   - Accuracy and liability of the equipment used for monitoring, control and calibration
   - Consistency of results, their approval and revision
   - Controls to prevent, detect, and correct any errors or omissions during the monitoring.

b) Verification of consistency of data resulting from the project operation regarding the baseline.
c) Analysis of potential risks to the project
d) Quality assurance and management system

The verification process was carried out using the verification protocol included in Annex A, with the use of this checklist ensures a complete verification process and allows to obtain the information needed to develop this report, demonstrates how emission reductions were verified and how the verification findings were reached.

2.4 REPORTING OF FINDINGS

Findings established during the verification can be seen as:

- A non-fulfillment of verification protocol criteria, or
- An identified risk to the fulfillment of the project objectives

The findings could take the form of a Corrective Action Request (CAR), Forward action Request (FAR) or a Clarification Request (CL).

A Corrective Action Request (CAR) shall be raised if one of the following situations occurs: (VVS v 2.0 paragraphs 219-224)

a) Non-compliance with the monitoring plan or methodology are found in monitoring and reporting and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient;

b) Modifications to the implementation, operation and monitoring of the registered project activity has not been sufficiently documented by the project participants;

c) Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impact the quantity of emission reductions;

d) Issues identified in a FAR during validation to be verified during verification have not been resolved by the project participants.

A Clarification Request (CL) shall be raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

A Forward Action Request (FAR) is issued for actions if the monitoring and reporting require attention and/or adjustment for the next verification period.

Clarification requests raised by ICONTEC, presented to the project participants were resolved through communication and meetings between Santa Ana Hydroelectric Plant and ICONTEC. To guarantee the confidence and transparency of the verification process, the concerns raised and the response provided by the project participants are documented in more detail in the verification protocol. (See Annex A, Table A4 Findings).

For this verification period ICONTEC declared 4 Clarifications and none CAR or FAR.

3. VERIFICATION OF COMPLIANCE

The findings of the verification are stated in the following sections. The verification criteria (requirements), the means of verification and the results from verifying the identified criteria are documented in more detail in the verification protocol in Annex A.

As a result of this assessment there were found 4 Clarifications, which are described in section 3.1 to 3.6 and Table A2.

3.1 REMAINING ISSUES, CARS, FARS FROM PREVIOUS VALIDATION/ VERIFICATION

There are not CAR´s or FAR´s from previous verification.

3.2 COMPLIANCE OF THE PROJECT IMPLEMENTATION WITH THE REGISTERED PROJECT DESIGN DOCUMENT

The status of implementation, progress and starting date of operation for each phase is shown on the next table:

Table 3: Implementation Status

Phase/Site	***Status of implementation***	***Progress***	***Operation***	***Comments***
Operation hydroelectric plant	*Completed*	*100%*	*Begin operations in the second semester of 2005.*	*No comments*
Delivery of energy to the grid	*Completed*	*100%*	*August 1th, 2005.*	*No comments*

There are not pending activities for implementation. The activity project is operating normally.

During the onsite visit, ICONTEC confirmed the events that affected the project operation during the 6th monitoring period and that were registered by PP inside the monitoring report (Section B). ICONTEC cross checked the information through the CER´s Spreadsheet /2/, the operating logbook /5/ and the information registered on the SAP system, in order to confirmed the periods where no generation was produced.

The starting date of the Crediting Period is the August 1th, 2005 (00:00:00, Colombian time, GMT -5). The project was registered May 11, 2006. This information can be verified at the following web page: http://cdm.unfccc.int/Projects/DB/TUEV-SUED1140544492.1/view

The information (data and variables) provided in the monitoring report is not different from what is stated in the registered PDD version 2 and has not caused an increasing in emission reductions estimates, for the current monitoring period.

The project activity has not suffered any notification or request of approval of changes from the one described in the registered CDM-PDD.

The crediting period corresponding to this monitoring period: 01/08/2010 to 31/07/2011.

The information (data and variables) provided in the monitoring report is not different from that stated in the registered PDD version 2.

ICONTEC confirmed that:

- The implementation of the Project is consistent with the information provided in the registered PDD version 2.
- The project is operated as per the registered PDD version 2 by the PP.
- Information provided in the MR is in accordance with that stated in the registered PDD version 2.

3.3 COMPLIANCE OF THE MONITORING PLAN WITH THE MONITORING METHODOLOGY INCLUDING APPLICABLE TOOL(S)

According to the PDD version 2, the CDM Project Activity was monitored following the methodology AMS I.D. version 7 Renewable electricity generation for a grid.

According to the specification given in this methodology, the monitoring shall consist of metering the electricity generated by the renewable technology.

The monitoring plan is in accordance with the approved methodology applied by the proposed CDM project activity.

ICONTEC verified that the monitoring plan, including the data and parameters to be monitored, measurement procedures, monitoring frequency and QA/QC procedures as described in the registered PDD version 2, and is able to confirm that the monitoring plan is in accordance with the approved methodology applied by the project.

3.4 COMPLIANCE OF MONITORING ACTIVITIES WITH THE REGISTERED MONITORING PLAN

The monitoring parameters related to the GHG emissions reduction in the project activity has been implemented in accordance with the monitoring plan contained in the registered PDD (or any accepted revised monitoring plan) (VVS v 2.0 art 235)

In the monitoring report, Section D.1 Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors, like the emission factor of the national interconnected grid of Colombia, is presented as 0.4392 kg CO_2e per KWh.

ICONTEC verified that, in fact, this is the validated grid emission factor to be applied along the fixed crediting period of 10 years.

In the monitoring report, Section D.2 Data and parameters monitored, monitoring of the parameter net electricity supplied to the national grid is presented.

The verification of this parameter is provided as follows:

Table 4 describes the parameters that were determined ex-ante and not monitored.

The values of these parameters were determined in the registered PDD version 2 (Section E.1.2.4).

Table 4: Parameters Determined Ex-Ante in the Registered PDD

Parameter	*Description*	*Value*	*Source*
EF_{Grid}	*Colombian official emissions factor*	*0.4392 kg CO_2e/kWh*	Resolution 181421 of 2005 of Ministry of Mines and Energy – UPME, Colombia

The following table includes all parameters monitored and describes how ICONTEC verified the fulfillment of each parameter including the information flow and the values as reported in the MR.

Table 5: Parameters Verification

Baseline Parameters	***Description***	***Means of verification***
ID. 1: EG_h	*Net electricity supplied to the grid by the project activity (kWh)*	**Source of data and frequency:** Records of commercial frontier meters, located in the Usaquén electrical substation, owned by CODENSA, which is the local electricity distributor. ICONTEC verified that, according to the procedures established in the regulatory framework (CREG Resolution 006 of 2003), the measurements of meters installed in the commercial frontier are reported to the CND and to the administrator of the commercial transactions in the national market (ASIC – Administrador del Sistema de Intercambios Comerciales), agency tied to the CND. The electricity generation is hourly measured and read remotely every 24 hours using tele-measurement technology to be sent to the National Dispatch Centre (CND). The electric power generation data are registered and available for consultation (with password) on the website of XM. **Used equipments**: The meters used for recording and cross checking the net electricity delivered to the grid by Santa Ana power plant are related in the Table 6 “Equipment” presented below,, where information about “Calibration records” and “Internal procedures” are also showed. **Data cross checking:**

		During the verification, the following data cross checking was carried out: The recording daily generation data on the website of XM (www.xm.com.co) /11/ for the monitoring period was cross checked by ICONTEC through the registered generation data from the meter located in the Usaquen electrical substation owned by EAAB, by the software JEAMREAD. After obtaining this information, it was confirmed that the official record of electric generation for the CER´s calculation comes always from the CODENSA´s meters. Acueducto2.xls:excel spreadsheet /4/ with macros developed by the company in order to record data from each meter, from CODENSA (Siemens) and from EAAB-ESP (Ametek), and calculate the difference in the measurement to inquiry the meters. Report of monthly liquidation during the monitoring period /"EMGG_Reporte_Santa Ana_month. xls"/,/10/ elaborated by EMGESA (the Power Generation Company that represents Santa Ana as agent in the wholesale market in Colombia) for EAAB, where are reviewed the generation calculations; the report is accepted and the monthly generation invoice is generated. The information was confirmed by ICONTEC with the CER´s Spreadsheet /2/. With the files above mentioned, ICONTEC confirmed the data on power generation reported for each month during the verification period. **Consistency with the QA/QC defined in the methodologies**: All variables used by the owner project to calculate baseline emissions are directly measured or are publicly available from official sources. The information was also cross checked with XM, the official agency in charge of ASIC and CND, which is the information basis to administer the transactions in the wholesale market in Colombia; and the amount of energy Santa Ana delivers to the national grid through the page http://sv04.xm.com.co/neonweb/SeleNeon.asp) was confirmed, which can be consulted only with the user password. **Consistency between the QA/QC established by the project participants in the PDD:** The control established for the meters by the project owner is supported by Resolution 025 of 1995 by CREG. This resolution specifies the technical characteristics of measurement, telecommunications and back-up equipment to meet installation, testing, certification, operation and maintenance procedures. During the visit and the interviews with the personnel responsible for data management, ICONTEC confirmed the application of the requirements set by the project participant in the PDD. **Verify application of default values: (If applicable)** It is not applicable. **Findings:**

		There were no findings about this parameter. **Conclusions:** During the verification, ICONTEC confirmed that the parameter is properly applied according to the monitoring plan and the registered PDD, and that the information is consistent with the secondary information sources used to verify the information.

3.5 COMPLIANCE WITH THE CALIBRATION FREQUENCY REQUIREMENTS FOR MEASURING INSTRUMENTS

During the verification process, ICONTEC confirmed that all meters had metrological assurance by mean of the calibration realized by CAM during the verified crediting period.

CL2 was raised by ICONTEC, about an inconsistency in the serial number of the 30029 meter, which was properly corrected by the PP inside the MR Version 3.

The parameter evaluated for calibration is:

- EG

Table 6 includes this parameter, and the information about the meter's numbers, original calibration records and internal procedures to metrological assurance. The DOE verified that the dates of certificate calibrations covered the entire 6th monitoring period from 01/08/2010 to 31/07/2011.

The meters calibrations were performed by CAM, which is the accredited laboratory (by Superintendence of Industry and Commerce) in Colombia for the revision of power meters.

ICONTEC raised CL4 in order to ask PP for some clarifications related to the electricity meters (see Annex, table A.2). The finding was appropriately closed.

Table 6: Equipment

Parameter	*Equipment*	*Calibration records*	*Internal procedure*
EG	***Main Meter (Located in the Project Boundary)*** *Meter serial number: 30031 (Replaced)* *Accuracy: 0.2 IEC*	*The SIEMENS meter 30031 was retired on 10/03/2010 and it was not immediately replaced, given that the measure was taken from the 30029 meter (supporting meter).* According to calibration certificate CAM-IMNC1003-0003307 issued on 15/03/2010 the meter 30031 did not meet the tests of	*Electric power meters of commercial frontier.* *Biannual calibration is performed on site by an external laboratory.*

		accuracy. *On 3/11/2010 the meter 102013561 was installed, as a replacement of the meter 30031.*	
	Supporting Meter (Located in the Project Boundary) *Meter serial number: 30029* *(Replaced)* *Accuracy: 0.2 IEC*	*The meter 30029 was replacing the meter 30031.* *The calibration certificate CAM-IM0807-003322 issued on 27/06/2008 of the meter 30029 was valid from 27/06/2008 until 26/06/2010.* *Because the meter 30029 was working until 30/11/2010, it was removed and sent to the calibration laboratory. The calibration entity CAM, issued a calibration certicate CAM-IM1103-011911 dated 14/03/2011 and a certification of conformity between these two certificates according to CAM's statement dated 28/04/2011.* *CAM is a laboratory accredited by the Superintendence of Industry and Commerce. It accreditation is sheltered by the resolution 5899 since 09/03/2006 and IEC 17025.* *On 30/11/2012 was installed the meter 102013562 as a replacement of the meter 30029.*	*Electric power meters of commercial frontier.* *The meter 30029 registered official measurements used for ER calculations until 30/11/2012, date from which start the official interrogation of meter 102013561.* *The replacement of meter 30029 was not because it had calibration problems, but it was due to a homologation of the EAAB meters with the network operator meters.*
	Main meter (Located in the Project Boundary *Meter serial 102013561* *(New)* *Accuracy: 0.2 IEC*	*Calibration certificate CAM-IM1010-020007 was issued 27/10/2010 by the calibration laboratory of CAM. The equipment is conforming.* *It was the meter that replaced the 30031 meter.*	*It was confirmed the date of installation with the act CAM N° AT 07771 and AT 07772 since 03/11/2010. CAM was the company who made the installation of the meters. EMG ANS 01006194 seal was placed.* *Conformity certificate for the meter 102013561 since 05/10/2010 from Ametek.*
	Supporting Meter (Located in the Project Boundary	*Calibration certificate CAM-IM1010-020003 was issued on 26/10/2010 by the calibration laboratory of CAM. The equipment is conforming.*	*It was confirmed the date of installation with the act CAM N° AT 08025 and AT 08027 since 30/11/2010. CAM was*

	Meter serial 102013562 *(New)* *Accuracy: 0.2 IEC*	*It meter was the meter that replaced the 30029 meter.*	*the company who made the installation of the meters. EMG ANS 6574 seal was placed.* *Conformity certificate for the meter 102013562 since 05/10/2010 from Ametek.*
	Main Meter *Meter serial number: 14600821* *Accuracy: 0.2 IEC*	*Calibration certificate CAM-IM1003-001400 was issued on 16/03/2010 by the calibration laboratory of CAM. The equipment is conforming.*	*Direct measurement of EAAB. for comparison and verification of official measurements Located in the project boundary.*
	Supporting Meter *Meter serial number: 14600822* *Accuracy: 0.2 IEC*	*Calibration certificate CAM-IN1004-002887 was issued on 15/04/2010 by the calibration laboratory of CAM. The equipment is conforming.*	*Direct measurement of EAAB for comparison and verification of official measurements. Located in the project boundary.*

ICONTEC concluded that the calibration is conducted at the frequency as specified by the methodology, monitoring plan of the registered PDD version 2 or the approved revised monitoring plan.

3.5.1 MANAGEMENT SYSTEM AND QUALITY ASSURANCE

ICONTEC verified that the company is implementing the quality management system under the NTC-ISO 9001:2008.

Through Management Agreements, the persons responsible for uploading the information are defined; the information is then validated by the directors of the Electromechanical Services and Network Matrix Aqueduct areas.

In conclusion the process of data management, transfer, storage and reporting was carried out in compliance with the monitoring plan, the PDD version 2 and the methodology AMS I.D, version 7.

ICONTEC concluded that:

- The monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD.
- All parameters stated in the monitoring plan of the registered PDD have been correctly and sufficiently monitored and listed. The monitored data for required parameters have been verified by ICONTEC and have been found complete, reliable and consistent by checking the whole procedure for data aggregation /6/.

3.6 ASSESSMENT OF DATA AND CALCULATION OF EMISSIONS REDUCTIONS

ICONTEC reviewed the spreadsheet: "CO2e Emissions Reductions Santa Ana Hydroelectric Plant (01/08/2010 to 31/07/2011).xls" /2/ and verified that the baseline emissions were correctly and accurately calculated by the PP, using the grid emission factor and the project generation, as related in the Section 3.3 of this report, with the next results.

A complete set of data for the specified monitoring period is available. As the registered PDD version 2 and the methodology AMS I-D version 7 indicate, Emission reductions are baseline minus project minus leakage emissions.

BASELINE EMISSIONS:

Table 6: Baseline Parameters Not Monitored

Parameter	Description	Value
EF_G	Emission coefficient calculated in a transparent and conservative manner as the average of the "approximate operating margin" and the "build margin", according to the Resolution 181421 of 2005 of Ministry of Mines and Energy – UPME, Colombia.	0.4392 kg CO_2e/KWh

Table 7: Baseline Parameters Monitored

Parameter	Description	Value
EG_Y	Amount of electricity generated and delivered to the interconnected national grid of Colombia.	Measured See CER Spreadsheet /2/

PROJECT EMISSIONS:

ICONTEC verified that in accordance to the approved baseline methodology used in this CDM project activity, emissions by sources of GHG due to the project activity are considered to be zero.

Since Project emissions and leakage are zero, Emission reductions are equal to Baseline emissions.

EMISSIONS REDUCTION:

ICONTEC verified that the emissions reduction achieved during the 6th monitoring period are *lower* than the ex-ante value of emissions reduction in the registered PDD, version 2.

ICONTEC reviewed the information that supports the determination or operation of all parameters, procedures and equipment used to monitor the emission reductions.

Among many others, the following information has been used by the audit team during the verification process:

- On-site review and printouts of the main equipments.

- Internal procedures for calibration of equipment.
- Office workbooks.
- Instructions for data measurement and analysis, MA0407I02-01 /6/, state the measurements and activities that must be carried out to verify the energy generation and calculate emission reductions
- Instructions for energy generation – Reconciliation of results MA0407I04-01 /6/ state the criteria to be followed each time inconsistencies occur in the measurements issued by the EAAB and the data published in the XM web page (www.xm.com.co)
- MA0407F04-01 Data comparison /6/
- XM (Neon) file /11/
- Acueducto2.xls /4/
- Generation report of EMGESA. File: EMGG_ reporte-SANTA ANA-month.xls /10/

The audit team verified the consistency of data resulting from project operation related to the baseline and potential inconsistencies in the use of formulas on spreadsheets and their connections, according with V/V Standard (v 02.0) art.244.

The data were cross-checked and recalculated by ICONTEC in order to establish the accuracy and reliability of the data and calculation of the emission reductions.

ICONTEC verified that the file: “CO2e Emissions Reductions Santa Ana Hydroelectric Plant (01-08-2010 to 31-07-2011).xls” /2/, contains all information on the calculation of EG in compliance with the AMS I-D, version 7 and the monitoring plan registered in the PDD version 2. On the table follow was indicated the emissions reduced for this period.

YEAR	MONTH	ELECTRIC POWER (MWh)	EMISSIONS REDUCED (Ton CO_{2e})
2010	AGO	1,910	839
	SEP	0	0
	OCT	360	158
	NOV	3,963	1,740
	DEC	3,863	1,697
2011	JAN	3,385	1,487
	FEB	3,727	1,637
	MAR	2,930	1,287
	APR	2,453	1,077
	MAY	4,567	2,006
	JUN	4,497	1,975
	JUL	3,874	1,701
	TOTAL	35,528	15,604

All aspects related to direct and indirect emissions, including project emission parameters, baseline emission parameters, leakage, assumptions, appropriate emission factor, and also the reductions/removals claimed were covered during the verification.

ICONTEC verified the correctly application of the formulae according with the methodology and tools, and the data sources for each parameter and the application of default values.

ICONTEC confirmed that:

a) The data used for determination of the emission reductions are available and monitored in accordance with the registered monitoring plan and the methodology AMS I-D, version 7.
b) The data used in anthropogenic emission reductions' calculation of this monitoring period have been verified and found consistent with those in the registered PDD, version 2.
c) The appropriate methods and formulae for calculating baseline emissions, project emissions and leakages have been followed in accordance with the registered PDD version 2 and the methodology.
d) The assumptions, emission factors and default values applied in the MR and the calculations are justified.

4. POST REGISTRATION CHANGES

4.1 TEMPORARY DEVIATIONS FROM THE REGISTERED MONITORING PLAN AND /OR MONITORING METHODOLOGY

There are not deviations from the registered monitoring plan and/or methodology.

4.2 CORRECTIONS

There are no corrections to project information or parameters fixed at validation, as described in the registered PDD version 2, made by the project participants

4.3 CHANGES TO THE START DATE OF THE CREDITING PERIOD

The project participant has not changed the start date of the crediting period.

4.4 PERMANENT CHANGES FROM THE REGISTERED MONITORING PLAN OR MONITORING METHODOLOGY

There are no permanent changes from the registered monitoring plan and/or methodology.

4.5 CHANGES TO THE PROJECT DESIGN OF A REGISTERED PROJECT ACTIVITY

There are no proposed or actual changes to the project design of the registered CDM project activity

5. VERIFICATION STATEMENT

ICONTEC has been engaged by Empresa de Acueducto y Alcantarillado de Bogotá (EAAB – ESP) to verify the greenhouse gas (GHG) emission reductions reported by the CDM project Santa Ana Hydroelectric Plant, project registration number 0275, owned by PP for the period 01/08/2010 to 31/07/2011, equating to 15,604 tons of CO2 equivalent.

The verification was performed based on the requirements set by the CDM and relevant guidance provided by CMP and the CDM Executive Board. ICONTEC considers that the project's GHG emissions and resulting GHG emissions reductions reported in the Monitoring Report Version 3 dated 11/07/2012, are fairly stated. ICONTEC confirms that the project is implemented as described in the validated and registered PDD. Installed equipment essential for generating emission reductions are run reliably and calibrated appropriately. The monitoring system is in place and the project is generating GHG emission reductions as a CDM project.

Santa Ana Hydroelectric Plant is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project's Monitoring and Verification Plan. Santa Ana Hydroelectric Plant is responsible for developing and keeping records and reporting procedures in accordance with the Monitoring plan.

ICONTEC got the information and asked for explanations we deemed necessary to provide enough evidence that the amount of GHG emission and the calculation of the GHG emission reductions, based on the Monitoring Report, are fairly stated for the reporting period. The verification consisted of the three following phases: i) desk review of the PDD, the MR and the monitoring plan ii) follow-up interviews with project stakeholders; iii) resolution of outstanding issues and the issuance of the final verification report and opinion.

It is ICONTEC´s responsibility to set an independent GHG verification opinion on the GHG emissions from the project and approved baseline for the monitoring period.

ICONTEC approach is risk-based, drawing on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate them. ICONTEC's examination includes assessment, on a test basis, of evidence relevant to the amounts and disclosures in relation to the project GHG emission and the calculations of GHG emission reductions for this reporting period.

ICONTEC confirmed that the GHG emission reductions are calculated without material misstatements with a reasonable level of assurance. Our opinion relates to the projects GHG emissions and resulting GHG emission reductions reported and related to the validated and registered baseline, monitoring plan and its associated documents. ICONTEC confirms the following statement:

CDM project:	Santa Ana Hydroelectric Plant, reg. number 0275
Reporting period:	01/08/2010 to 31/07/2011
Emission Reductions:	15,604 tCO_2 equivalents

Bogotá D.C., November, 2012

Diego Caballero
Director of Conformity Assessment Services
ICONTEC

6. REFERENCES

Documents provided by the project proponent that relate directly to the project:

/1/ CDM Project Design Document, including Baseline Methodology and the Monitoring Plan. Registered PDD Version 2 dated 10/01/2006.

/2/ CER's file, "CO2e Emissions Reductions Santa Ana Hydroelectric Plant (01-08-2010 to 31-07-2011).xls"

/3/ Monitoring Report (6th Monitoring Period) version 2, 16/04/2012
Monitoring Report (6th Monitoring Period) version 3, 11/07/2012

/4/ "Acueducto2.xls" file. Information on maintenance and calibration of equipment related with the emission reduction

/5/ Maintenance records of the equipment of the project activity. Technical report Santa Ana August 2010 to July 2011 (Informe técnico Santa Ana 2010-2011.pdf).
Preventive maintenance No.991
Inspection Plan No. 211.
Work order 4000155249 by corrective and inspection activities.

/6/ Quality Management documents and internal procedures:
Procedure: MA0407P-01 "Electric power generation"
Instructive: MA0407I01-01 "Start-up and operation of small hydroelectric plant".
Instructive: MA0407I02-01 "Measurement and data analyses".
Instructive: MA0407I03-01 "Load rejection".
Instructive: MA0407I04-01 "Reconciliation of results".
Instructive: MA0417P-01 "Control of electric power generation measurement equipments".
Instructive: MA0401I02-01 "Routine Santa Ana station".
Format MA0407F04-01 Data comparison

/7/ Verification Report Santa Ana Hydroelectric Plant, N° CDMVER-043-02, from 01/08/2009 – 31/07/2010

/8/ PCH45_09A1UnifilarModel. Made by Ingetec.

/9/ Monitoring Report version 2, from 01/08/2010 to 31/07/2011 (6th Monitoring Period) Dated: 16/04/2012

/10/ Monitoring Report version 3, from 01/08/2010 to 31/07/2011 (6th Monitoring Period) Dated: 11/07/2012

/11/ EMGESA Report, "EMGG_ reporte-SANTA ANA-Month-10.xls"
EMGESA Report, "EMGG_ reporte-SANTA ANA-Month-11.xls"
Anexo 1: XM (Neon) file (Hourly dispacht data)

/12/ Background documents related to the design and/or methodologies employed in the design or other reference document:

- Methodology AMS I-D, Version 7.
- Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion, version 02

- Tool to calculate the emission factor for an electricity system, version 02.2.1
- CDM Validation and Verification Standard, version 02.0.

7. ANNEXES

Annex A

Verification Protocol

The audit team conducts a thorough, independent assessment of the registered project activities.

The next table contains questions that the audit team shall follow in order to determine whether the project activity complies with the requirements of paragraph 62 of the CDM modalities and procedures. The audit team ensures that the only verification activities undertaken after the publication of the monitoring report on the UNFCCC CDM website shall be use as a basis for the DOE to conclude their verification and submit a request for issuance of CERs to the board.

Questions were answered on the right column using the following scores:

- Full: When the audit team had full access to the required information, the information is complete and satisfactory
- Partial: When the audit team did not have access to the information, or the information is incomplete, or not satisfactory. In this case, indicate finding type and number.
- Resolved: When a partial score is assigned, indicate the date when the finding was closed
- N/A: Shall be used when the question does not apply.

When raising a clarification request, corrective action request and forward action, it is in accordance to VVS v 2.0 art 219-224.

Table A 1: VERIFICATION PROTOCOL

A. Completeness of information and quality of evidence	***REFERENCES***	**Score**
A.1. In desk review *Verify completeness of information, both quantitative and qualitative, in accordance to VVS Art 209-216, 217(a),218* *In addition to monitoring documentation, did the auditor review the following:* *a) The registered PDD and the monitoring plan, including any approved revised monitoring plan and/or changes from the registered PDD, and the corresponding validation opinion* *b) The validation report* *c) Previous verification reports, if any* *d) The applied monitoring methodology* *e) The monitoring report to verify that it is as per the standardized format (EB 54, annex 34)* *f) Any other information and references relevant to the project activity's emissions reductions (e.g. IPCC reports, data on electricity generation in the national grid or laboratory analysis and*	See section 2.2	Partial See CL 1 Resolved 02/10/2012

national regulations).		
In addition to reviewing the monitoring documentation, the DOE shall determine whether the project participants have addressed the FARs identified during the validation or previous verification(s). VVS v 2.0 art 213.	See section 2.4	Full
Determine whether the project status is specified in the monitoring report, otherwise, It may be confirmed through an e-mail to the project participant.	See section 3.2	Full
A.2. Quality of evidence *When assessing the audit trail, did the auditor:* *a) Address whether there is sufficient evidence available, both in terms of frequency (time period between evidence) and coverage (in covering the full monitoring the full monitoring period).* *b) Address the source and nature of the evidence (external or internal, oral or documented).* *c) Cross-check the monitoring report against other sources such as comparable information, where available, from sources other than those used in the monitoring report to determine whether the stated figures are correct.*	See section 3.4	Full

A.3. On site visit *The on site visit assessment shall involve all means of verification specified on VVS V 2.0 Art 217 b If an on-site visit is not conducted, the DOE shall justify the rationale of the decision.* *i. An assessment of the implementation and operation of the registered project activity as per the registered PDD or any approved revised PDD;* *ii. A review of information flows for generating, aggregating and reporting the monitoring parameters;* *iii. Interviews with relevant personnel to determine whether the operational and data collection procedures are implemented in accordance with the monitoring plan in the PDD;* *iv. A cross check between information provided in the monitoring report and data from other sources such as plant logbooks, inventories, purchase records or similar data sources;* *v. A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the PDD and the selected methodology and corresponding tool(s), where applicable;* *vi. A review of calculations and assumptions made in determining the GHG data and emission reductions;* *vii. An identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.* *viii. Confirm project status during the visit*	See section 2.3	Full
B. Verification of compliance *in accordance to VVS v 2.0 art 225*		
Determine whether the monitoring report and other supporting documents provided are complete in accordance with the latest applicable version of the completeness checklist for request for issuance of CERs, verifiable , and in accordance with applicable CDM requirement.	See section 2.2.	Full
B.1. Compliance of the project implementation with the registered project design document *VVS v 2.0 art 226-228*		
Was it identified any concerns related to the conformity of the actual project activity and its operation with the registered project design document?		

a) *Has the implementation and operation of the project activity been conducted in accordance with the description contained in the registered PDD* b) *Did any deviation or the proposed o actual changes in the implementation or operation project activity comply with the requirements of the Project Standard?*	See section 3.2.	Full
B.2. Compliance of the monitoring plan with the monitoring methodology including applicable tool(s) *VVS v 2.0 art 229-232*		
Determine whether the monitoring plan of the project activity is in accordance with the applied methodology including applicable tool(s) *Is the project implementation in accordance with the provisions of the registered PDD and/or an approved revised PDD?*	See section 3.3.	Full
For monitoring aspects that are not specified in the methodology, particularly in the case of small-scale methodologies (e.g. additional monitoring parameters, monitoring frequency and calibration frequency), the DOE should bring to the attention of the Board issues which may enhance the level of the accuracy and completeness of the monitoring plan, See VVS v 2.0 art 231.	See section 3.3	Full
B.3. Compliance of the monitoring activities with the registered monitoring plan *VVS v 2.0 art 233-236*		
a) *Has the monitoring plan been properly implemented and followed by the project participants*	See section 3.2	Full
b) *Have all parameters stated in the monitoring plan and relevant Board decisions been monitored and updated as applicable, including:* *i. Project emissions parameters* *ii. Baseline emissions parameters* *iii. Leakage parameters* *iv. Management and operational system: the responsibilities and authorities for monitoring and reporting are in accordance with the responsibilities and authorities in the monitoring plan,*	See table 5: Parameters Verification	Full

c) *Was the equipment used for monitoring controlled and calibrated in accordance with the monitoring plan, the applied methodology, the Board guidance, local/national standards, or as per manufacture´s specification?*	See Table 6: Equipments.	Partial See CL 2 Resolved 02/10/2012
d) *Were the monitoring results consistently recorded as per approved frequency?*	See section 3.5	Full
e) *Have quality assurance and quality control procedures been applied in accordance with the monitoring plan or the revised monitoring plan?*	See Section 3.5.1	Full
B.4. Compliance of the calibration frequency requirements for measuring instruments *VVS v 2.0 art 237-243*		
Was the calibration of measuring equipments, that have an impact on the claimed emissions reductions, conducted by the project participants at a frequency specified in the applied monitoring methodology and/or monitoring plan? a) *Were the calibrations results available, complete and its originals shown? If not see 239 and 240* b) *Were the calibrations of measuring equipments conducted at the time of verification at a frequency specified in the applied monitoring methodology and/or monitoring plan? If not see 240 and 241*	See table 6: equipments	Partial See CL 2 Resolved 02/10/2012
B.5. Assessment of data and calculation of emission reductions *VVS v 2.0 art 244-246*		
The DOE shall determine whether: a) *A complete set of data for the specified monitoring period is available. If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, the DOE shall either raise a CAR for the project participants to comply with the requirements of appendix 1 of the Project standard or submit a request for deviation prior to submitting the request for issuance, if appropriate;*	*See section 3.6*	Partial See CL 3 Resolved 02/10/2012

b) *Information provided in the monitoring report has been cross-checked with other sources such as plant logbooks, inventories, purchase records, laboratory analysis;* c) *Calculations of baseline emissions, and project activity emissions and leakage, as appropriate, have been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology document;* d) *Any assumptions used in emission calculations have been justified;* e) *Appropriate emission factors, IPCC default values and other reference values have been correctly applied.*		
C. Post registration changes		
General VVS v 2.0 art 247-250		
When the project participant have request post-registration changes, Have the changes required prior approval by the board in accordance with appendix 1 of Project Standard?	N/A	
Has post-registration changes submission complied with the procedures for post-registration changes and the Project cycle procedure?	N/A	
C.1. Temporary deviation from the registered monitoring plan and/or monitoring methodology VVS v 2.0 251-256		
Has the DOE identified that the project participants have deviated from the registered monitoring plan and/or methodology? VVS v 2.0 art 252	N/A	
C.2. Corrections *VVS v 2.0 art 257-259*		
If the DOE identifies that the project participants have made corrections to project information or parameters determined at validation, the DOE shall determine whether: *a) The corrected information is an accurate reflection of actual project information; and/or* *b) The corrected parameters are in accordance with the applied*	N/A	

methodology and/or selected monitoring plan.		
C.3. Changes to the start date of the crediting period *VVS v 2.0 art 260-261*		
If the project participants wish to change the start date of the crediting period in accordance with section H of the Project standard: *a) Has the proposed changes resulted in a less conservative baseline?* *b) Have the requirements in the Project standard been met?*	N/A	
C.4. Permanent changes from the registered monitoring plan or monitoring methodology *VVS v 2.0 art 262-268*		
The DOE shall determine whether the changes to the monitoring plan contained in the registered PDD proposed by the project participants are in compliance with the applied methodology and do not reduce the level of accuracy of the monitoring compared with the requirements contained in the registered monitoring plan (art 263)	N/A	
In cases where the proposed changes refer to a later version of the applied methodology in the registered PDD, Have the methodology version and tools changes in the registered PDD impacted the conservativeness of the monitoring and verification process, including the related emission reduction calculations? (art 264)	N/A	
The DOE shall identify whether the project participants are unable to implement the monitoring plan contained in the registered PDD and it will not be possible to monitor the registered CDM project activity in accordance with a monitoring plan (art 265)	N/A	
The DOE shall determine whether the permanent changes are likely to lead to a reduction in the accuracy of the calculation of emission reductions (art 266)	N/A	
C.5. Changes to the project design of a registered project activity *VVS v 2.0 art 269-282*		

If the DOE identifies that the project design in the implementation or operation of the project activity does not conform with the description contained in the registered PDD or the relevant provisions of appendix 1 of the Project standard, the DOE shall request guidance from the Board concerning the acceptability of the proposed or actual changes in accordance with the section on post registration changes in the Project cycle procedure. (art 270)	N/A	
In case of actual changes, the DOE shall, by means of an on-site visit and review of the submitted revised PDD by the project participants, which describes the nature and extent of the actual changes, determine whether this description accurately reflects the implementation, operation and monitoring of the modified project activity. (art 271)	N/A	
The DOE shall conduct an on-site inspection to assess the impacts of the actual changes on the compliance of the monitoring plan, the applied monitoring methodology and tools and/or the level of accuracy of the monitoring activity. (art 272)	N/A	
The DOE shall, by means of reviewing the revised PDD against applicable additionality and methodological requirements, determine whether the proposed or actual changes would adversely affect the conclusions of the validation report of the registered PDD with regard to: (art 273) *a) Additionality of the project activity;* *b) Scale of the project activity;* *c) Applicability and application of approved baseline methodology under which the project activity has been registered; or* *d) The compliance of the monitoring plan with the applied monitoring methodology.*	N/A	
If the proposed or actual changes affect the additionality of the project	N/A	

activity then the DOE shall confirm that: (art 274) *a) In the case of investment analysis, project participants have only modified the key parameters in the original spreadsheet calculations affected by the proposed or actual changes to the project activity;* *b) In the case where only barriers have been claimed to demonstrate additionality, project participants have demonstrated that the barriers are still valid under the new circumstances.*		
In cases where the proposed or actual changes impact the implementation of the project activity and where the original methodology would no longer be applicable, and where the project participant applies a later version of the methodology or another methodology that is applicable to the project activity, the DOE shall confirm that the applied methodology and tools do not impact the conservativeness of the monitoring and verification process and the related emission reduction calculations. (art 275)	N/A	
The DOE shall assess whether the revised PDD complies with the applied monitoring methodology and tools or any later version of the methodology or the requirements of another methodology that is applicable to the project activity. (art 276)	N/A	
D. Specific verification requirements *VVS v 2.0 art 288-296*		
D.1. Afforestation or reforestation project activities		
At the first verification, the DOE, in accordance with paragraph 34(d) of the CDM modalities an procedures of afforestation and reforestation project activities shall confirm those areas of land for which the control over A/R project activity has been established by the project participant since validation. (art 288)	N/A	
As part of the fist verification report, the DOE shall confirm that the boundary of the A/R project activity geographically delineates exclusively the afforestation or reforestation project activity under the control of the project participants. (art 289)	N/A	

D.2. Programme of activities		
If, subsequent to the registration of the programme of activities (PoA), a new coordinating/managing entity is added then the DOE that is undertaking the next inclusion of a CPA shall submit: (art 290) *a) New letter(s) of authorization from each respective host Party stating the change in the coordinating/managing entity;* *b) A confirmation from the new coordinating/managing entity that the PoA will be developed and implemented with the same set framework as originally described in the CDM-PoA-DD; and* *c) A validation opinion regarding the compliance of the new coordinating/managing entity.*	N/A	
D.2.1. Post-registration change to boundary of programme of activities		
The DOE shall determine whether the boundary of the PoA is amended post-registration to expand the geographic coverage or to include an additional host Party provided: (art 291) *a) The existing registered PoA design document (CDM-PoA-DD) is revised to reflect the changes, in particular the eligibility criteria for inclusion of CPAs;* *b) The baseline established in the CDM-PoA-DD is applicable to the extended PoA boundary; and* *c) The DNA of the new host Party issues a letter of approval for the PoA and a letter of authorization for the coordinating/managing entity where the amended PoA boundary includes additional host Parties.*	N/A	
D.2.2. Request for issuance of certified emission reduction for PoA		

A DOE that has not performed validation/inclusion/renewal of crediting period activities for the PoA shall: (art 292) *d) Identify those CPAs that it shall consider for verification in accordance with the method/procedure to be used for verification of the amount of reductions of anthropogenic emissions by sources or removals by sinks of greenhouse gases achieved by CPAs under the PoA and determined in the CDM-PoA-DD;* *e) Take into account the possible existence of different versions of the PoA and the need to account for this in its sampling approach, to ensure that a statistically sound sample of CPAs from each version of the PoA are being verified;* *f) Make all monitoring reports received from the coordinating/managing entity immediately publicly available in accordance with the Project cycle procedure;* *g) Systematically verify and certify the correct implementation and operation of the record-keeping system.*	N/A	
The DOE conducting the verification shall include in its verification report a description of how it applied the methods/procedures for the purpose of verification stipulated in the registered CDM-PoA-DD. The DOE shall include in its verification report a description/justification of the site visits undertaken. (art 293)	N/A	
A DOE shall request issuance of CERs for a PoA in accordance with the Project cycle procedure. The request shall relate to all CPAs included in the PoA during the specified monitoring period. The monitoring periods shall be consecutive. A request for issuance shall relate to the certified emission reductions verified as per the above. (art 294)	N/A	
A DOE shall not request issuance of CERs for a PoA within 90 days of the previous request for issuance. (art 295)	N/A	
D.2.3. Review of erroneous inclusion of a CPA		

The DOE shall confirm that a CPA that has been excluded shall not be re-included again in that or any other PoA, or qualify as a project activity. (art 295)	N/A	

Table A 2: FINDINGS

Report clarifications and corrective action requests	*Reference*	*Summary of project owner response*	*Validation conclusion*
CL 1 The completion date of the monitoring report is not consistent with the date of issue of monitoring report, neither with the date of the verification period.	MONITORING REPORT FORM (F-CDM-MR) Version 02.0	- The completion date of the MR was corrected. See Monitoring Report Version 3, page 1. - The data of the footer # 19 of the MR was corrected. See Monitoring Report Version 3, page 11. - The start date of the data of the contract No. No. 1-99-26300-0530-2009 is 01/09/2009. This date was clarified in the footer # 26. See Monitoring Report Version 3, page 12. - In the footer # 31 is included that the communication No. 3014-11-009431-3 is the approval of the meter change. See Monitoring Report Version 3, page 13. - The edition mistakes were corrected.	Verification Team Response: 02/10/2012 - The completion date of the monitoring report was corrected in accordance with the date of issue of the monitoring report. - The data of the footer was updated in the version 3 of the MR (footer # 19 and 20) - The start date was updated in the version 3 of MR (footer 26). - It was clarified the date of the meter in the footer # 31 of the MR, Version 3. Verification Team Conclusion: Closed

Report clarifications and corrective action requests	*Reference*	*Summary of project owner response*	*Validation conclusion*
CL 2 There is an inconsistency with the meter serial number 30029, with calibration certificate CAM-IM0807-003322, issued on 27/06/2008 reported in Monitoring report 5 v.3 and the calibration certificates No. CAM-IM0806-003322 del 27/06/2008, reported in the Monitoring report 6 v2.	MONITORING REPORT B.1. Description of implemented registered project activity	The calibration certificate of is CAM CAM-IM0807-003322, issued on 27/06/2008. The transcription mistake was corrected in the MR. See Monitoring Report Version 3, page 21.	Verification Team Response: 02/10/2012 The inconsistency was corrected in the MR, version 3. Verification Team Conclusion: Closed.
CL 3 There is an inconsistence between the generation information reported on the ER Spreadsheet (data: 15/08/2010) and the information registered on the MR (Pag 10, Section B.1). Explain the event happened the 12/08/2010, according with the spreadsheet CO2e Emissions reductions Santa Ana Hydroelectric Plant (01/08/2010 to 31/07/2011).xls.	MONITORING REPORT Section B.1	- During the second Chingaza tunnels maintenance, done between 10/08/2010 and 18-10-2010, was necessary to suspend the generation in Santa Ana Hydroelectric Plant from 15/08/2010 (suspension starting from 09:00 am) until 20/10/2010, due to operating conditions of water system. On15/08/2012 the plant generated from 00:00 am until 09:00 am. See Monitoring Report Version 3, page 10. - During the second Chingaza tunnels maintenance, the Wiesner plant operated with pumping San Rafael reservoir. On 11/08/2010 the pumping was suspended and Santa	Verification Team Response: 02/10/2012 The project participant explained appropriately the events happened during this monitoring period. Verification Team Conclusion: Closed.

Report clarifications and corrective action requests	*Reference*	*Summary of project owner response*	*Validation conclusion*
		Ana Hydroelectric Plant stopped operating from 16:00 pm. On 12/08/2010 is attempted to restart the operation but Pratt valve did not open and the plant did not operate. Corrective maintenance was performed by Electromechanical Services Direction and the plant operated from 13/08/2012 at 11:00 am until 15/08/2010 at 09:00 am. (See Annex 1). See Monitoring Report Version 3, page 10.	
CL 4 Clarify in the text of MR the dates of the removal of the meters 30029 and 30031 and the installation dates of meters Jemstar No. 102013561 and 102013562 and their locations.	MONITORING REPORT	The meter No. 30031 was removed on 10/03/2010. The meter No. 30029 was removed on 30/11/2010. The meter No. 102013561 was installed on 03/11/2010. It is the main meter from 30/11/2010. The meter No. 102013562 was installed on 30/11/2010. The meters are located in Usaquén electrical substation, owned by CODENSA. See Monitoring Report Version 3, pages 21 and 22.	Verification Team Response: 02/10/2012 All the removals or installation dates of the meters have been updated in the MR version 3. Verification Team Conclusion: Closed.

Table A 3: FARs FROM PREVIOUS VALIDATION OR VERIFICATION PERIOD

FAR ID	Forward action request	Response by Project Participants	DOE's assessment of response by Project Participants	ICONTEC RESPONSE
FAR 1	N/A			Verification Team Response: Verification Team Conclusion:

Annex B

Team audit experience and knowledge

Eng. Erika Lucia Urrego Ortiz
Lead Auditor

Currently a student at the Magister in quality and integral management, 2012

Specialist in Environmental Management Systems. Universidad Externado de Colombia. Bogotá D.C. September 2002

Zootechnician, Universidad Agraria De Colombia, Bogotá D.C. August 1997.

Environmental management system under ISO 14001 Diploma, ICONTEC, Bogotá D.C. 2002.

Food Harmlessness Management System under ISO 22000 standard Course, ICONTEC, Bogotá D.C. March, 2003

Quality Management Systems under ISO 9001:2000 standard Course, ICONTEC, May 2007.

Updating on CDM Course, Ministry of Environment, Housing and Territorial Development, Bogotá D.C 2006

OHSAS 18001 Diploma, ICONTEC, Bogotá D.C. July 2005.

WORK EXPERIENCE

2006 – Actual ICONTEC
To prepare and perform the certification services assigned as per her Career Plan qualification, according to the procedures. To provide guidance to the certification costumers about the technical aspects of the assigned services provision. To participate in changing or designing Certification services, by changing or creating the respective procedures.

2003 – 2006
ASOCIACION COLOMBIANA DE PORCICULTORES-FNP

To coordinate the activities to be performed by the Environmental Window Program in the various country areas. To allocate and execute resources engaged under the Cleaner Production agreements signed by pork producers with several environmental authorities. To

lead the CDM project, focused on reducing methane (CH4) emissions issued by animal waste.

To be aware of the Ecuadorian and Chilean methodologies already approved by the CDM Executive Board for Hog Breeding Sector to elaborate a proposal for the hog breeding sector together with the Ministry of Environment, Housing and Territorial Development in order to join farms to CDM projects.

2001 – 2002
FICHTNER GmbH & Co. KG

To prepare, design and apply surveys focused on the identification of power consumption in the sector of slaughter, processed meat and food concentrate for animals.

1998 – 2001
Regional Environmental Authority (CAR Sumapaz)

To support the environmental management units on technical concepts of processes, permissions, sanctions, control, monitoring and assessment in the proper and timely management of the Sumapaz area's natural resources.

Experience in CDM activities:

- Validation of Biogas and energy efficiency measures at La Calera, Peru
- Validation of project ECC methane capture and combustion from AWMS at dairy farms in Mexico I.
- Validation of project Macano Small Hydro Power Plant.
- Validation of Energy Efficiency at Ladrillera Alcarraza
- Validation of the Project Montenegro Landfill Gas Recovery and Flaring.
- Validation of the Project Montería Landfill Gas Recovery and Flaring.
- Validation of the Project Pirgua Landfill Gas Recovery and Flaring
- Verification of three periods for Doña Juana Landfill Gas to Energy Project
- Validation of Bonyic hydroelectric project
- Validation of Chamelecón 280 Hydroelectric project
- Validation of La Vegona Hydroelectric project
- Validation of Tunjita Diversion Hydroelectric Project
- Verification of Tres Valles Cogeneration Project
- Verification of Landfill Gas to Energy Facility at the Nejapa Landfill Site, El Salvador
- Verification of La Venta II
- Verification of three periods for Santa Ana Hydroelectric plant project
- Verification of Jepirachi Wind Power Project
- Verification of Biogas energy plant from palm oil mill effluent
- Validation of Los Angeles Landfill Gas Flaring Project
- Verification of Fuel-Switching Project from Fossil Fuels to Biomass in La Providencia, Arcor
- Validation of Ferreira Gomes Hydro Power Plant CDM Project
- Validation of Estancia NINA Afforestation Project

- Validation of BRASILM 1 - Avoidance of Methane Emissions through Composting of Manure Waste
- Verification of BRASCARBON Methane Recovery Project BCA-BRA-01, Brazil.
- Verification of BRASCARBON Methane Recovery Project BCA-BRA-02, Brazil
- Verification of BRASCARBON Methane Recovery Project BCA-BRA-03, Brazil.

Lead auditor in voluntary schemes

- Validation and verification VCS of BRASCARBON Methane Recovery Project BCA-BRA-01, Brazil.
- Validation and verification VCS of BRASCARBON Methane Recovery Project BCA-BRA-02, Brazil
- Validation and verification VCS of BRASCARBON Methane Recovery Project BCA-BRA-03, Brazil.

Eng. Ana Isabel Aubad
Auditor/Technical expert

International Master (MSc.) "Material and Energy Flow Management". Universidad Trier, Germany. Area of study in depth: "Use of solid waste for energy generation". Master's thesis with the biogas company Kompogas. 2005

"ISO 14000 and ISO 9000 Quality Auditor". Universidad de Antioquia in association with Bureau Veritas, Medellin, Colombia. 1999

"Environmental Engineer". Escuela de Ingeniería de Antioquia, Envigado, Colombia. 1998

Internship - November 2009: company specialized in design, construction and operation of biogas plants: Chfour Biogas Inc. Ontario, Canada.

Internship- September 2008: company specialized in design, construction and operation of biogas plants: Agraferm Ag-Luxemburgo.

Internship- April-May 2007: companies specialized in design, construction and operation of biogas plants (Agraferm, Biogasnord, Ökobit). Germany.

Practical training – November 2004: "Local Administration of the Environment, Agenda 21 and sustainable development (2 phase)". Life Academy, San José, Costa Rica.

Practical training – April-May 2002: "Local Administration of the Environment, Agenda 21 and sustainable development (1 phase)". Life Academy, Karstad, Sweden.

Internship – July- August 1999: "Practical training on Environmental Management Systems and Cleaner Production". Federal Swiss Institute for Research and Materials Testing (EMPA). St. Gallen, Switzerland.

PROFESSIONAL EXPERIENCE

- Environmental engineer and project management company G.P.R. S.A., Chile. (2006 – 2011). Project Manager (main subjects: energy, biogas and waste management projects).

- ICONTEC S.A. (2006–Today). External professional ISO 9001/14001/Chilean Technical Standards/Education/ Climate Change (CDM, voluntary programs, carbon foodprint).

- Deuman S.A., Chile. (2007). Team work engineering for development and implementation of CDM – Kyoto Protocol projects.

- ISAGEN S.A. E.S.P, Colombia (2000 – 2006). Analysts of the national energy company.

- Fulda-Südwest". Öko Institut (German Ecology Institute), Darmstadt-Germany. (July to September 2004). Co-realization of the feasibility study for the construction of an energy plant from the biomass potential of the region of Fulda.

- MVR Müllverwertung Rugenberger Damm GmbH & Co. KG, Hamburg-Germany. (December 2003 to February 2004). Environmental engineering (professional internship), waste incineration with co-generation plant.

- National Center of Cleaner Production and Environmental Technologies (Centro Nacional de Producción Más Limpia y Tecnologías Ambientales - CNPMLTA), Medellín-Colombia. (1999 – 2000).

- ISAGEN S.A. E.S.P, Colombia. (1997 – 1998). Professional practice, work team member responsible for designing the EMS based on ISO 14001.

EXPERIENCE IN CDM ACTIVITIES (Main references)

Technical Reviewer:

- Verification of three periods for "Agua Fresca Multipurpose and Environmental Services Project"
- Validation of "Fuel Switching through change of furnaces at Imusa S.A."
- Validation of "Pirgua Landfill Gas Recovery and Flaring"
- Validation of "Installation of a high-pressure/high-efficiency bagasse boiler to cogenerate heat and power"
- Validation of "Methane Gas Capture and Fuel Switching at Compañía Argentina de Levaduras S.A.I.C. Plant Project"
- Validation of "Cueva Maria Hydroelectric Expansion Project"
- Validation of "Montenegro Landfill Gas Recovery and Flaring"
- Validation of "La Vegona Hydroelectric project"
- Validation of "Chamalecón 280 Hydroelectric project"
- Validation of "Metaldom Fossil fuel switch from reheat furnace"
- Verification of "Doña Juana Landfill gas-to-energy project"
- Verification of "La Vuelta and la Herradura hydroelectric project"
- Verification of "Landfill Gas to Energy Facility at the Nejapa Landfill Site, El Salvador"
- Verification of "Co-composting of EFB and POME project"
- Verification "Biogas Project, Olmeca III, Tecun Uman"
- Verification of "Los Algarrobos hydroelectric project"
- Verification La Venta II Project
- Verification Toachi – Pilaton Hydroelectric Project
- Verification VCS Scheme: Fuel-Switching Project from Fossil Fuels to Biomass in La Providencia, Arcor

Specialist (onsite visit):

- Verification of two periods “Biogas energy plant from palm oil mill effluent”
- Validation of “Los Angeles Landfill Gas Flaring Project”
- Verification of “Doña Juana Landfill gas-to-energy project”
- Verification of “Landfill Gas to Energy Facility at the Nejapa Landfill Site, El Salvador”
- Verification of “La Joya hydroelectric project”
- Verification of “Hydroelectric Santa Ana”
- Verification Biogas Project, Olmeca III,Tecún Uman

Lead Auditor:

- Verification of “BRASCARBON Methane Recovery Project BCA-BRA-05, Brazil”
- Verification of “BRASCARBON Methane Recovery Project BCA-BRA-07, Brazil”
- Verification of “BRASCARBON Methane Recovery Project BCA-BRA-08, Brazil”
- Validation of Biogas Project, Olmeca I, Santa Rosa
- Verification of Co-composting of EFB and POME project
- Verification Doña Juana landfill gas-to-energy project
- Validation CTR Rosario Landfill Gas Project
- Validation CTR Feira de Santana Landfill Gas Project

Lead auditor in voluntary schemes:

- Validation and verification of VCS “BRASCARBON Methane Recovery Project BCA-BRA-05, Brazil”
- Validation and verification of VCS “BRASCARBON Methane Recovery Project BCA-BRA-07, Brazil”
- Validation and verification of VCS “BRASCARBON Methane Recovery Project BCA-BRA-08, Brazil”

Team Technical review experience

DIANA CAROLINA SANTOS

CDM Technical Reviewer

Industrial Engineer, Los Andes University, Bogotá, Colombia 2002
Post degree on Clean Production, Los Andes University, Bogotá, Colombia 2003
Master on International cooperation for development, Pavia University. Italy – San Buenaventura University, Cartagena, Colombia 2007
Specialization on Climate Change and Kyoto Protocol OEA 2011-ILC, Latin American Institute of Sciences, Perú, 2011
Quality Management Systems Diploma, ISO 9000, 9001, 9004 y 14001
Lead Auditor Sello Ambiental Colombiano, Sostenibilidad Turística, Auditor ISO 14001

RELEVANTS

Calculating the Carbon Footprint. ISO Comite 207, SC 07. ISO. Oslo, Noruega Junio 2011
Roundtable on Verification of Afforestation / Reforestation (A/R) CDM Projects. Carbon Finance Unit - The World Bank, UNFCCC. Paris Francia. May 2011
Regional work shop ISO / BAS life cycle analysis e ISO 14040 y 14064 Nov 2010
Latin American and Caribbean Carbon Forum - BID2010 UNEP RISO CENTRE, Santo Domingo – Republica Dominicana Oct 2010

CARBON MARKETS AND CLIMATE FINANCE CONFERENCE Green Power Academy and Action for Sustainable, Ciudad de México, México. Sept 2010
Sustainable development indicators World Bank, CEPAL – United Nations, Los Andes University, Bogotá, Colombia Jul 2007

RELEVANT WORK EXPERIENCE

2008 –Actual ICONTEC: Climate Change Professional:
CDM Management system support, Development of new services and innovate the current ones in order to meet the Climate Change market needs, control Support of Climate Change Product and Services.

2007 ECLAC –Economic Commission for Latin America and the Caribbean– Unit Nations Organization – UNO:
Formulation and management Support of the projects, participate on the link enforcement with the UNICEF initiative of public investment for children; support on the management of the project Efectos y Costos de la Desnutrición Infantil en Colombia, currently in process, made in association with the Programa Mundial de Alimentos PMA, lead by CEPAL; y also support other projects for sustainable Development and environment.

2004-2005 ODES. Organización para el Desempeño Empresarial Sostenible:
Professional on the development and implementation of PGIRS (Integrated Solid Waste Management) with the Tolima government and the Environmental authority.

Experience in CDM activities:

- Validation of El Toqui wind power project
- Validation of Estancia NINA Afforestation project
- Validation of San Nicolas CDM Reforestation Project

CRISTIAN DARIO GRISALES BERNAL

CDM Technical Reviewer

Electrical Engineer
National University Of Colombia
Bogotá – Colombia
July 2003 - July 2009

Intensive English
National University Of Colombia
January 2007 - May 2009

RETIE Update
CIDET
Bogotá - Colombia September 11, 2008

PROFESSIONAL BACKGROUND

- ICONTEC S.A. (2012–Today). Internal Climate Change professional. Climate Change Technical Expert Sectora Scope 1 – Technical Area 1.2 (CDM, voluntary programs, carbon foodprint).

- Electrical Maintenance Engineer
  Hydroelectric Power Plants Guaca, Tinta, Junca
  Bogotá River Hydroelectric Plants
  EMGESA S.A ESP. Colombia
  Preventive, predictive and corrective maintenance of the generating units, auxiliary services, power transformers and electrical substation, developed of the investment projects interventory in accordance with annual operating budget, implementation of maintenance plans from systems analysis as RCM decision sheets, monthly service availability in the plant, and availability of full-time in failure attention, electrical testing of generators, transformers, motors and substation equipment.
  November 3, 2009 - April 30, 2012

- Auxiliary Engineer
  GPI LTDA
  Verification of reported assets by the network operators to the CREG. Inspection of electrical networks (length, kind of conductor, type of support, geographic location and equipment) reported by the EEC and CODENSA to the Energy Regulatory Commission CREG
  January 2009 - February 2009

- Engineering Intern
  SPECIALIZED ENGINEERING S.A.
  Quote visits to different industries, sales, design and assembly of shielding systems, grounding grids, power quality studies, calculation of electrical installations, inspections from RETIE point of view, diagnostic grounding systems, implementation, supervision and maintenance of the designs, marketing SSD's.
  Phone (57-1): 7030032, Mobil (57) 3158322342
  5 May, 2008- 30 October 2008

EXPERIENCE IN CDM ACTIVITIES

- Validation of Energy Efficiency at Ladrillera Alcarraza
- Validation of CGR Catanduva Landfill Gas Project
- Validation of Macaubas Landfill Gas Project
- Validation of Maceio Landfill Gas Project
- Validation of Teresina Landfill Gas Project
- Validation of Biogas project, Olmeca I, Santa Rosa
- Validation of Tauricucho Hydropower Project
- Verification of Amaime Hydropower Project
- Technical review of Agua Fresca Multipurpose and Environmental Service Project
- Technical review of Feira de Santana Landfill Gas Project
- Technical review of SHP Itaguacu CDM Project (JUN 1146), Brazil
- Technical review of Thuan Nhien PhongWind Farm
- Technical review of Phuong Mai 3 Wind Power Project

- Technical review of Morro Azul Hydropower Plant