

**VALIDATION OF THE PROJECT:
SUBA AND USAQUEN HYDROELECTRIC CDM UMBRELLA
PROJECT**

**EMPRESA DE ACUEDUCTO Y ALCANTARILLADO DE
BOGOTÁ E.S.P-EAAB.
(COLOMBIA)**

REPORT NO. CDMVAL-057-04

MAY, 2014

VALIDATION REPORT VVS



Date of first issue:	12/09/2013	Project No.:	
Audit team:	Francy Ramirez ICONTEC Lead Auditor Fernando Gomez ICONTEC Auditor/Technical Expert	Organizational unit:	Instituto Colombiano de Normas Técnicas y Certificación – ICONTEC Calle 53 No.58-33 Bogotá - Colombia
Version No.:	04	Last version date:	19/05/2014
Client:	Empresa de Acueducto y Alcantarillado de Bogotá E.S.P-EAAB.	Client ref.:	CDMVAL-057

Summary:

ICONTEC has performed the validation of the Suba and Usaquen hydroelectric CDM umbrella project in Colombia on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures and the subsequent decisions by the CDM Executive Board. This validation report summarizes the findings of the validation.

The proposed project activity under the validation process is based on methodology AMS-I.D: Grid connected renewable electricity generation, version 17.0. The project involves the installation of two small run-of-river hydroelectric plants (Suba and Usaquen), which take advantage of the water flow supply system of Bogotá. The project activity has a rated capacity of 4.85 MW (rated capacity of turbine-generator system, in accordance with Clean development mechanism project standard /UN2/ paragraph 82 (a)). The energy produced by this project activity will be delivered to the Colombian electrical grid.

The validation process consisted of the following three phases: i) a desk review of the project design documents, ii) follow up interviews with project stakeholders and iii) the resolution of outstanding issues and the issuance of the final validation report and opinion.

In summary, it is ICONTEC's opinion that the Suba and Usaquen hydroelectric CDM umbrella project, as described in the version 04.0 of the project design document, meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology AMS-I.D: Grid connected renewable electricity generation, version 17.0. Hence, ICONTEC requests the registration of the project as CDM project activity.

Report No:	CDMVAL-057-03	Subject Group:	1.2	Indexing terms:
Report title: Validation Of The Project: Suba And Usaquen Hydroelectric CDM Umbrella Project				Climate Change; Kyoto Protocol; Validation; Clean Development Mechanism

Work verified by	Jacobo Carrizales ICONTEC Technical reviewer Cristian Grisales ICONTEC Technical Expert reviewer	<input checked="" type="checkbox"/> No distribution without permission from the Client or responsible organizational unit <input type="checkbox"/> Limited distribution <input type="checkbox"/> Unrestricted distribution
Technical review date:	02/10/2013	
Number of pages:	76	

This report should not be read without reference to the annex A, Validation Protocol.

Abbreviations

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CERs	Certified emission reductions
CL	Clarification Request
CO ₂	Carbon Dioxide
CO ₂ e	Carbon dioxide equivalent
DNA	Designated National Authority
DOE	Designated Operational Entity
DR	Document Review
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
MoC	Modalities of Communication
MoV	Means of verification
MP	Monitoring Plan
PDD	Project Design Document
UNFCCC	United Nations Framework Convention for Climate Change
VVS	CDM Validation and Verification Standard
SIN	National Interconnected System (Sistema Interconectado Nacional)
UPME	Ministry of Mines and Energy - Energy planning Unit (Unidad de Planeación Minero Energética)
CREG	Regulatory entity of energy sector in Colombia (Comisión de Regulación de Energía y Gas)
EAAB	Water and Sewerage Company of Bogota (Empresa de Acueducto y Alcantarillado de Bogotá E.S.P)
CND	Colombian National Dispatch Centre (Centro Nacional de Despacho)
XM	“XM” (Experts Market) is a company of the ISA Group providing integral services. (www.xm.com.co).

NEON	It is an information service about the Colombian Wholesale Power Market that allows the market agents to obtain, in an interactive way, information of the operational process and the results of the liquidation of the transactions done in the Power Block Market.
MAVDT	Colombian Ministry of Environment, Housing and Territorial Development (Ministerio de Ambiente, Vivienda y Desarrollo Territorial)
CRA	Colombian Regulatory Commission of drinking water and basic sanitation (Comisión de Regulación de agua potable y saneamiento básico)
PPA	Power Purchase Agreement

Table of Contents

1.	INTRODUCTION.....	6
1.1.	OBJECTIVE.....	6
1.2.	SCOPE	6
1.3.	GHG PROJECT DESCRIPTION.....	6
2.	METHODOLOGY.....	8
2.1.	FOLLOW UP INTERVIEWS	9
2.2.	RESOLUTION OF CLARIFICATION AND CORRECTIVE ACTION REQUESTS	11
2.3.	INTERNAL QUALITY CONTROL.....	11
2.4.	VALIDATION TEAM	11
3.	VALIDATION FINDINGS	11
3.1.	OVERVIEW.....	11
3.2.	GENERAL REQUIREMENTS.....	12
3.2.1.	APPROVAL AND AUTHORIZATION	12
3.2.2.	MODALITIES OF COMMUNICATION	12
3.3.	PROJECT DESIGN	13
3.4.	BASELINE DETERMINATION	14
3.5.	ADDITIONALITY	16
3.5.1.	PRIOR CONSIDERATION OF THE CDM	16
3.5.2.	ADDITIONALITY ANALYSIS	17
3.6.	MONITORING PLAN	23
3.7.	CALCULATION OF GHG EMISSIONS	23
3.8.	ENVIRONMENTAL IMPACTS.....	24
3.9.	COMMENTS BY LOCAL STAKEHOLDERS	25
4.	GLOBAL STAKEHOLDERS CONSULTATION	25
5.	VALIDATION OPINION	25
6.	REFERENCES.....	27
7.	ANNEXES.....	30
	Annex A	31
	Validation Protocol	31
	Annex B	
	Letter of Approval (LoA)	62
	Annex C	
	Audit Team Experience and Knowledge	63

1. INTRODUCTION

Empresa de Acueducto y Alcantarillado de Bogotá E.S.P commissioned ICONTEC to perform the Validation of Suba and Usaquen hydroelectric CDM umbrella project (hereafter called “the project”).

This report summarizes the findings in the validation of the project, which was performed on the basis of UNFCCC criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

According to the documentation of the project activity, the project consists on the development of two new hydroelectric power plants, named: Suba and Usaquen; that takes advantage of the water flow supply system of Bogotá. The water flow will allow an rated capacity of 4.85 MW (rated capacity of turbine-generator system, in accordance with Clean development mechanism project standard /UN2/ paragraph 82 (a)), and an annual supply of electricity to the grid of 27,349 MWh. Electricity will be delivered to the Colombian SIN by the Morato substation (for Suba hydropower plant) and by Usaquen Substation (from Usaquen hydropower plant).

1.1. OBJECTIVE

The purpose of a validation is to secure the opinion of an independent third party in order to assess the project's design: the project's baseline, the monitoring plan, and the project's compliance with relevant UNFCCC.

Host Party's criteria are validated in order to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. Validation is a requirement for all CDM projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of certified emission reductions (CERs)

1.2. SCOPE

The validation scope involves an independent and objective review to determine that the project design meets the following criteria:

- UNFCCC criteria: The Kyoto Protocol Article 12 criteria, modalities and procedures for CDM (Marrakech Accords) and the relevant decisions by the CDM Executive Board, and
- Host Party criteria: National CDM requirements, including sustainable development priorities and potential specific requirements contained in, for example, the preliminary approval by the Designated National Authority or project agreements between involved parties.

ICONTEC carries out audits according to its ethics code and internal procedures for carrying out validation, verification and certification audits of CDM project activities, which, in turn, are based on the Validation and Verification Standard (VVS). Likewise, ICONTEC focuses on the identification of significant risks for CER generation, and verification of the mitigation during its audits.

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

1.3. GHG PROJECT DESCRIPTION

ICONTEC had the opportunity to verify the following description in the on-site visit to the project:

Project Parties:	Empresa de Acueducto y Alcantarillado de Bogotá (EAAB - ESP).
Title of project activity:	Suba and Usaquen hydroelectric CDM umbrella Project
Project Entity:	Empresa de Acueducto y Alcantarillado de Bogotá (EAAB - ESP). Av. Calle 24 N° 37 – 15. Bogota, Colombia.
Location of the project activity:	The project activity consists of two new hydropower plants (Suba and Usaquen), both located in Bogota City, Colombia at the following geographical coordinates:

Hydropower plant	Latitude	Longitude
Suba	4.7120	-74.0836
Usaquen	4.6920	-74.0381

Methodology:	AMS – I.D, Grid connected renewable electricity generation, Version 17.0.
--------------	---

This methodology is used in combination with the “Tool to calculate the emission factor for an electricity system” ver. 04.0.0

Project’s crediting period:	7 years renewable
Estimated amount of emission reductions over the chosen crediting period:	72,968 tonnes CO ₂ e

The Project consists of two new hydroelectric power plants, both of them take advantage of the water flow supply system of Bogotá, they are called Suba and Usaquen. The project is being implemented by Empresa de Acueducto y Alcantarillado de Bogotá E.S.P-EAAB.

In order to enhance the technical and geographical description of the project activity in the PDD, the audit team raised some findings (CL1, CL2 and CL 8) with the aim to attain consistency with UNFCCC’s requirements /UN2//UN3/, once the description of the project was improved in the PDD version 02.0 and following, these finding were closed.

The technology to develop this type of project consists of the installation of a hydraulic turbines in parallel of pressure reduce structures in the distribution system. In other words, the hydraulic turbines will do the same job of dissipation valves (dissipation valve = hydraulic turbine), however it is worth mentioning that the dissipation valve will be installed and it will remain in Stand By and it will enter in operation during outages (planned or not) of hydraulic turbines, hence there is no savings in the operation cost of the dissipation valves. This system is responsible for transporting the treated water from the treatment plants to its final users, nevertheless it is worth to mention that the design of these two hydropower plants ensure that the potable water supply service will always be a priority over the power generation. The design flow for Suba hydroelectric power plant is 5.64 m³/s and for Usaquen hydroelectric power plant is 2.85 m³/s.

In accordance with the provisions in the PS /UN2/ paragraphs 81 and 82, the maximum output of the project activity is given by *the installed/rated capacity as indicated by the manufacturer of the equipment or plant*, therefore for these renewable electricity generating units those involve turbine-

generator systems, the installed/rated capacity area based on the installed/rated capacity of the generators, hence for this umbrella project activity the rated capacity is 4.85 MW. However the emissions reduction calculations were made based on the effective power ratings which is the maximum output of the system turbine-generator-connection (the turbine capacity is smaller than the generator and transformer capacity), this value was calculated taking into account the installed/rated capacity of turbines, generator and transformers considering their efficiencies according to the manufacturer's specification. So, the total effective capacity is 3.77 MW. ICONTEC deemed this assumption conservative.

The project will deliver 27,349 MWh per year to the Colombian electrical grid. Thus, the project will increase the supply of electricity to the grid, offsetting thermal generation with a renewable source of energy, and consequently reducing greenhouse gases emissions. The project is expected to reduce 10,424 tCO₂e per year.

In the PDD version 1 published for global stakeholder consultation, it was included a third small hydroelectric Plan (Named Ventana), nevertheless the PP decided to take out this power plant and continue with the validation process with the remaining two (Suba and Usaquen) /34/, once the technical studies were done, the outcome of these studies was: that for the Ventana hydroelectric project characteristics, construction of the project Ventana would cost more than budgeted (an increase of approximately 184% over the initial capital expenditure), the Ventana hydroelectric project would be possible after execution of maintenance works of the potable water tunnels in 2018 (This justification is described and explained in Contract Amendment N°2 /34/ Pages 6 and 7).

The project activity considered can be classified as a CDM project in the sector 1, Energy industries (renewable/non-renewable sources), according to the List of Sectoral Scopes of UNFCCC.

The project starting date of the crediting period is expected on March 1st/2013, or the registration date whichever occurs later.

2. METHODOLOGY

The validation consists of the following three phases:

- i) A desk review of the project design documents
- ii) Follow up interviews with project stakeholders
- iii) Resolution of outstanding issues and the issuance of a final validation report and opinion.

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, in turn, are based on the validation and verification manual) focused on the identification of significant risks for CER generation and the verification of the contribution to climate change mitigation.

All documentation reviewed during the validation process has been including in chapter 6 - references.

The validation protocol resulting from the Validation of Suba and Usaquen hydroelectric CDM umbrella project is enclosed in Annex A of this report.

Findings established during the validation can be seen as:

- A non-fulfillment of validation 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 Clarifications Request (CL).

Corrective action requests (CAR) are issued where:

- The project participants have made mistakes which directly influence the ability of the project activity to achieve real, measurable and additional emission reductions;
- The CDM requirements have not been met; or
- There is a risk that emission reductions cannot be monitored or calculated

A Forward Action Request is made to highlight issues related to project implementation that will require review during the next verification of the project activity.

A Clarification Request is required when information is insufficient or not clear enough to establish whether a requirement has been met.

ICONTEC resolve or “close out” CARs and CLs only if the project participants modify the project design, rectify the PDD or provide additional explanations or evidence that satisfy the ICONTEC’s concerns.

This validation report explains the issues raised, the responses provided by the project participants, the means of validation of such responses and references to any resulting changes in the PDD or supporting annexes.

2.1. FOLLOW UP INTERVIEWS

ICONTEC performed interviews to project stakeholders in order to confirm the selected information and to resolve issues identified during the desk review. The main topics of the interview are summarized in Table 1 as follows.

Table 1: Follow up Interview

DATE	PLACE	INTERVIEW DELEGATE	ORGANIZATION	INTERVIEW TOPICS
02/05/2012 to 04/05/2012	EAAB's Offices and project site	Martha Patricia Cruz Specialized Professional	EAAB	Approval, Participation, Project Description, Baseline and monitoring methodology, Additionality, Monitoring Plan, Sustainable development, Local Stakeholder consultation, Environmental impacts
		Libia Cifuentes Professional		Sustainable development, Local Stakeholder consultation, Environmental impacts
		Lina Maria Ojeda Professional		
		Juan Carlos Sanchez Specialized Professional		Project Description, Baseline and monitoring methodology, Additionality,
02/05/2012 to	Project Site	Wilson Gonzalez		

03/05/2012		<p>Operating Technologist</p> <p>Ricardo Gamboa</p> <p>Head of Division Northern Suply System</p> <p>Karen Alarcon</p> <p>Work Supervisor</p> <p>Mariana Vergara</p> <p>Social Professional</p> <p>Sylvia Cuellar</p> <p>Seer</p> <p>Alfonso Cruz</p> <p>Seer</p> <p>Alejandro Mariño</p> <p>Work Supervisor</p>		Monitoring Plan,
04/05/2012	EAAB's Offices	<p>Katherine De Broc</p> <p>Electromechanical Services Professional</p> <p>Sergio Forero</p> <p>Professional</p> <p>Roosevelt Apache</p> <p>Electromechanical Services</p>		
02/05/2012	Project Site	<p>Weimar R. Romero</p> <p>Planning Secretariat</p> <p>Wilfrido Cotes</p> <p>Municipal Representative</p> <p>Elmer Cortes</p> <p>Environmental Engineer</p>	Guasca Municipality	Sustainable development, Local Stakeholder consultation, Environmental impacts
02/05/2012 to 04/05/2012	EAAB's Offices and project site	<p>Francisco Charry</p> <p>Consultant</p>	Deuman/IDB Consortium	Approval, Participation, Project Description, Baseline and monitoring methodology, Additionality, Monitoring Plan, Sustainable development, Local Stakeholder consultation, Environmental impacts
03/05/2012	Project Site	<p>Gloria Gantiva</p> <p>Specialized Professional</p>	Bogota Municipality	Sustainable development, Local Stakeholder consultation, Environmental impacts

2.2. RESOLUTION OF CLARIFICATION AND CORRECTIVE ACTION REQUESTS

Corrective action and clarification requests raised by ICONTEC were presented to the project participants and resolved through communication and meetings between EAAB and ICONTEC. To guarantee the transparency of the validation process, the concerns raised as well as responses provided by the project participants are documented in more detail in the validation protocol in Annex A.

Since modifications to the project design document were necessary to resolve the validation team concerns, the client decided to review the PDD and re-submit corrected versions of the PDD. After the period of public consultation (09/03/2012 to 07/04/2012) and after reviewing the last version of the PDD (version 04.0), ICONTEC issued this validation report and opinion.

2.3. INTERNAL QUALITY CONTROL

This report includes the validation findings that underwent a technical review before being submitted to the project participants.

The technical review and the quality control of the process was performed by an internal technical reviewer in accordance with ICONTEC internal procedures for carrying out validation, verification and certification audits of CDM project activities. The technical reviewers are qualified in accordance with ICONTEC professional qualification scheme for CDM validation and verification.

2.4. VALIDATION TEAM

The validation team consisted of the following personnel:

Table 2: Validation Team

ROLE/QUALIFICATION	LAST NAME	FIRST NAME	COUNTRY
Lead Auditor	Ramirez	Francy	Colombia
Sectoral Technical Expert	Gomez	Fernando	Colombia
Technical Expert (in training)	Nuñez	Paul	Colombia
Technical Reviewer	Carrizales	Juan Jacobo	Colombia
Technical Expert Reviewer	Grisales	Cristian	Colombia

The validation team is qualified in accordance with the ICONTEC qualification scheme for CDM validation and verification

3. VALIDATION FINDINGS

3.1. OVERVIEW

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

3.2. GENERAL REQUIREMENTS

3.2.1. APPROVAL AND AUTHORIZATION

The project participant of the project is: Empresa de Acueducto y Alcantarillado de Bogotá (EAAB-ESP)

The participation of Suba and Usaquen Hydroelectric CDM Umbrella Project has been approved by the DNA of Colombia by letter of approval dated on 23/11/2012. /3/

The host country ratified the Kyoto Protocol on November 30, 2001 and therefore meets requirements for participating in the CDM; the Designated National Authority of the host country has approved the project with the letter of approval described as follows:

Table 3: Approval Letter

Date of issue:	23/11/2012	
Description:	It provides confirmation that the project contributes to the country in the search of sustainable development	
Supporting documentation (if it is applicable)	Annex B	
Date of ICONTEC reception	23/04/2013	
Entity that sent the letter to ICONTEC	Project participants	Directly from the DNA
	X	
Means of validation employed to assess the authenticity	By means of phone call to Ms. Diana Rodriguez from the National Office for Clean Development of Colombian Ministry of Environment and Sustainable Development. 21/10/2013	
ICONTEC Conclusion	<p>All parties involved have approved the project activity. The letters is authentic and valid for the proposed CDM project activity under validation. It confirms and it is unconditional with respect to:</p> <p>(a) The Party is a Party to the Kyoto Protocol;</p> <p>(b) Participation is voluntary;</p> <p>(c) In the case of the host Party, the proposed CDM project activity contributes to the sustainable development of the country;</p> <p>(d) It refers to the precise proposed CDM project activity title in the PDD being submitted for registration.</p>	

3.2.2. MODALITIES OF COMMUNICATION

In order to validate the corporate identity of the project participants and focal point included in the Modalities of Communication (MoC) statement, ICONTEC reviewed the document and confirmed the corporate identity by applying paragraph 54 (a) of VVS /UN1/.

With the documental evidence provided by the PP /4/, ICONTEC verified Mr. German Galindo-Hernandez is the focal point for Suba and Usaquen hydroelectric CDM umbrella project as well as its legal representative and has a duly authorized to do so on behalf of Empresa de Acueducto y Alcantarillado de Bogotá E.S.P-EAAB.

ICONTEC confirmed that the form *Modalities of Communication Statement* (Version 02.1) was correctly used.

3.3. PROJECT DESIGN

The project activity has been developed using the methodology AMS-I.D, version 17.0, “Grid connected renewable electricity generation”. According to this methodology, the spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to. The audit team raised a finding (CAR 3) in order to ask to PP a proper description of the project activity boundary, this description was included in section B.3 of the PDD /1/ and the finding was close. Since the project is connected to the Colombian National Power Grid, all power plants connected physically to the electricity system are included in the project boundary. The project system boundaries were validated during the on-site visit according to the information provided by CND and UPME in its websites (<http://www.xm.com.co/Pages/DescripciondelSistemaElectricoColombiano.aspx> and <http://www1.upme.gov.co/index.php/servicios-de-informacion/noticias-del-sector/310.html> respectively).

A finding was raised by the audit team (CL 4) in order to have a precise description about the delivering point to Colombian Electrical Grid in accordance with the Colombian regulations and methodology requirements, in order to response this request, the PP enhanced the description regarding to the connection point to Colombian Electrical System in the updated version of the PDD in section A.4.3.

The project boundary was determined by means of: documental review of line diagrams which explain the connection of the project activity to Colombian SIN /5//6/. Consequently, ICONTEC is able to confirm that the identified boundary was correctly defined. ICONTEC also confirms the selected sources and gases are justified for the project activity in accordance with the project nature.

The project meets the requirements of Small-scale projects activities due to its installed capacity will remain under 15 MW every year under the crediting period as ICONTEC verified by means of the onsite visit /7/ and by means of documental review of feasibility studies for each of the hydroelectric power plants /8//9/. On the other hand, the audit team verified that EAAB has only one project activity registered as CDM project, Santa Ana Hydroelectric Plant (information available at <http://cdm.unfccc.int/Projects/DB/TUEV-SUED1140544492.1/view>), it was registered seven year ago (May 11th,2006). Hence the project activity is not a debundled component of a large-scale project activity, as it was checked during the on site visit by the validation team following the provisions stated in the Guidelines on assessment of de-bundling for SSC project activities /UN13/ paragraphs 1, 2 and 4,.

The project complies with the applicability criteria of the methodology as was verified by ICONTEC, as follows:

Table 4: Methodology Applicability Conditions Analysis

Applicability condition	Means of validation
This category comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass that supply electricity to a national or a regional grid or supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	The project activity comprises renewable energy generation units such as hydro and the project activity displaces electricity from the electricity system. This has been checked against Project activity's Technical description (Feasibility study report) /8//9/ and the documentation about hydroelectric power plants connection to SIN /5//6/.
This methodology is applicable to project activities that (a) install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) involve a capacity addition; (c) involve a	The project activity is a Greenfield hydroelectric power plant, as it was checked during the on site visit/7/.

retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s)	
Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: <ul style="list-style-type: none"> - The project activity is implemented in an existing reservoir with no change in the volume of reservoir; - The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m²; - The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m². 	As it was explained in section 1.3 of this report, The technology to develop this type of project consists of the installation of a hydraulic turbines instead of pressure reduce structures in the existing water distribution system. This information was assessed in accordance with the Feasibility study report /8//9/ and the on-site visit. Hence there is no change in the water that would have been used in the existing water supply system
If the new unit has both renewable and non-renewable components (e.g., a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel ⁵ , the capacity of the entire unit shall not exceed the limit of 15 MW.	This applicability condition of the project does not apply to this Project activity.
In the case of biomass power plants, no other biomass types than renewable biomass is to be used in the project plant.	This applicability condition of the project does not apply to this Project activity.
Combined heat and power (co-generation) systems are not eligible under this category.	This applicability condition of the project does not apply to this Project activity.
In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.	The Project activity does not involve the addition of a renewable energy generation unit, thus, this methodology condition does not apply.
In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.	This applicability condition of the project does not apply this Project activity.

In accordance with the project activity and selected methodology the emission sources are properly described in the PDD version 04.0, Section B.4. GHG occurring within the project boundary as a result of its implementation are all addressed by the applied methodology.

There are no GHG emissions within the project boundary caused by the implementation of the project activity which contribute to more than 1% of the expected annual emission reductions and which are not addressed in by the applied methodology. This was verified by ICONTEC by means of the onsite visit, observing the progress of the works and its nature.

ICONTEC concludes that the project description, as included in the PDD – version 04.0, is sufficiently complete and accurate as to meet CDM requirements. In addition, this PDD was completed using the last version of the PDD form and guidance appropriate to the type of project activity /UN4/, /UN5/.

3.4. BASELINE DETERMINATION

The baseline scenario is described as the electricity delivered by the project activity to the Colombian interconnected grid that would have otherwise been generated by the operation of the grid-connected power plants and by the addition of new generation sources.

As stated in the applied methodology AMS-I.D version 17.0, the baseline emissions are the product of the baseline emission factor times the electricity supplied by the project activity to the

grid. In the desk review and in the onsite visit, the audit team found some failures in the traceability of the information used to calculate the Colombian electrical grid emission factor, that is why CL 9 and CL11 were raised, hence the PP provided an updated Spreadsheet with the calculation of emission factor for Colombian SIN/2/ as well as an updated PDD. The baseline emission factor ($EF_{grid,CM,y}$) was calculated by the PP using the Tool to calculate the emission factor for an electricity system Version 04.0.0 as a combined margin (CM), consisting of the combination of the operating margin (OM) and the build margin (BM) factors, according to the following steps:

In step 1 it is necessary to identify the relevant electricity system. For the project activity case, the PP used the national transmission system (SIN) as the project electricity system. ICONTEC agrees with this approach since the project will be connected to this system /5//6/.

In the second step, PP decided not to include off-grid power plants, which is acceptable to the audit team.

In order to assess the reliability of the data used for the PP to calculate the Colombian electrical grid emission factor, ICONTEC reviewed the information available at XM and its Web platform NEON. XM is a non-governmental agency acting as the market administrator, being in charge of the registration of contracts, the settlement and billing of all the transactions that take place in this market. XM is also in charge of the National Dispatch Centre (CND).

In the step 3, simple adjusted OM was chosen by the PP to calculate the operating margin emission factor, using the ex-ante option, therefore, the operating margin emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. A 3-year generation-weighted average data vintage was used taking into account that in the Colombian electric system, the low-cost/must-run resources constitute more than 50% of total grid generation, hence the Simple OM method cannot be used as it was verified by ICONTEC by means of reviewing the generation average of the five most recent years (available at <http://eventos.xm.com.co/eventos/SitePages/generacion.aspx?q=historicos> and <https://sv01.xm.com.co/Parateclnt/Paginas/parametros.asp>) at the time of submission of the CDM-PDD to ICONTEC for validation.. ICONTEC validated this choice.

Calculations of OM emission factor (step 4) were made as described in the PDD/1/. All estimates of the baseline emissions can be replicated using the data and parameter values provided in the PDD and in the Emissions reduction file/2/. According to the tool specifications /UN6/. Plant emission factors $EF_{EL,m,y}$, were calculated under option A1 because the data on fuel consumption and energy generation are available at XM (<https://sv01.xm.com.co/Opesin/paginas/cargavariabel.aspx?Tit=GENERACI%D3N&Ind=generacion>). ICONTEC validated the values comparing the values presented for the PP in the Emissions reduction file/2/ ($EF_{EL,m,y/EL,k,y}$; $FC_{i,m,y}$; $NCV_{i,y}$; $EF_{CO2,i,y}$; $EG_{m,y/k,y}$), against the values downloaded from the XM website (ICONTEC made a random sampling of 4 plants in four different dates and hours). After the comparison, ICONTEC deemed reliable and appropriate the values used. The OM calculated was 0.55843 tCO₂e/MWh, hence ICONTEC deemed the obtained value as reliable and credible.

In order to calculate the BM emission factor (step 5) option 1 (ex-ante) for the first crediting period was adopted, the build margin emission factor is calculated based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation (March 2012). The PP took the information from the latest official XM statistics (available at <http://www.xm.com.co/Pages/Informes.aspx>).

ICONTEC agreed with the data collection used for the PP to calculate the BM, hence the BM is confirmed as reliable and credible. The BM calculated was 0.20387 tCO₂e/MWh, hence ICONTEC deemed the obtained value as reliable and credible

Finally, combined margin was correctly calculated by weighted average method, as it is explained below:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times W_{OM} + EF_{grid,BM,y} \times W_{BM}$$

Where:

$EF_{grid,OM,y}=0.55843$ tCO₂e/MWh

$EF_{grid,BM,y}=0.20387$ tCO₂e/MWh

$W_{OM}=0.5$

$W_{BM}=0.5$

Obtaining a result for the $EF_{grid,CM,y} = 0.38115$ tCO₂e/MWh

According to the previous description ICONTEC found that the project participant has correctly applied the selected methodology with respect to the Baseline determination. All estimates of the baseline emissions can be replicated using the data and parameter values provided in the latest version of the PDD.

ICONTEC verified the “Data and parameters that are available at validation”, presented in the latest of the PDD section B.6.2, by consulting directly the source of data.

To estimate the baseline emissions prior to validation the PP employed the grid emission factor just described (0.38115 tCO₂e/MWh), and the electrical energy baseline EG_{BL} validly estimated in 27,349 MWh/year, as presented in the project description. Thus, the estimated baseline emissions are 10,424 tCO₂e/ year.

According to this information the total emission in absence of the project is for the first 7-year crediting period 72,968 tonnes of CO₂e.

ICONTEC found that all information, assumptions and data used in the identification of the baseline scenario are relevant, justified appropriately, correctly quoted and interpreted, supported by evidence and can be deemed reasonable.

According to the previous description ICONTEC found that the project participant has correctly applied the selected methodology with respect to the Baseline identification. The scenario selected reasonably represents the anthropogenic emissions by sources of GHG's that would occur in the absence of the proposed CDM project activity. All estimates of the baseline emissions can be replicated using the data and parameter values provided in the PDD.

3.5. ADDITIONALITY

3.5.1. PRIOR CONSIDERATION OF THE CDM

The start date of the project activity was identified as 01/03/2010, as the signature of the work initiation act established in the contract No.1-01-26300-1063-2009 between the contractor Consorcio Generación Bogotá and EAAB/11/. The signature of this work initiation act implies contractual obligations for both parties since it means that the real action begun related with the expenditures execution for the construction of both hydroelectric power plants (Suna and

Usaquen). ICONTEC verified this documentation; therefore this start date of the project activity is in accordance with the Glossary of CDM terms /UN7/.

Since this start date is after 2 August 2008, and the PDD had not been published for global stakeholder consultation, ICONTEC confirmed by referring to the list of prior consideration notifications from the UNFCCC website that the PP had communicated to the secretariat/12/ and the Colombian DNA/13/ regarding the commencement of a new project activity, this event is dated on December 9th/2009.

ICONTEC verified in accordance with the VVS /UN1/ clauses 106 and 107 by means of desk review of the project documentation that the CDM benefits were considered in the decision for undertaking the project.

3.5.2. ADDITIONALITY ANALYSIS

The project's additionality was justified in accordance with the requirements derived from the applied approved CDM methodology/UN8/ and the applied methodological tools /UN9//UN10/.

a) Analysis of Alternatives

As a small scale project activity, this analysis is not mandatory.

b) Investment analysis

The PP has argued in the PDD version 04.0 that the project activity faces barriers to obtain financing for its implementation, in order to surpass this hurdle the PP has presented to ICONTEC a cash flow /14/ which pretends to demonstrate that the project activity is not the financially feasible without the revenue from the sale of certified emission reductions. That is why this barrier is assessed by means of the investment analysis stated in the Tool for the demonstration and assessment of additionality /UN9/ and the Guidelines on the assessment of investment analysis /UN10/.

In order to get an explanation about the analysis method chosen by the PP to undertake the financial analysis, the audit team raised CL 6, once the PP provided an explanation in section B.5 of PDD this finding was closed. For this project activity, benchmark analysis (Option III) was selected for the investment analysis. In accordance with the type of this project activity it is expected that incomes other than CDM inputs will be generated, regarding energy sales to the market. The DOE agrees that simple cost analysis is not suitable. Further, taking into account that the project activity cannot be implemented by other one but EAAB, since EAAB is the owner of the water supplying system in Bogotá, an investment comparison analysis is not appropriate. Therefore a benchmark analysis has been used to determine the profitability of the investment.

The benchmark was chosen in accordance with the Appendix in the Guidelines on the assessment of investment analysis /UN10/ which provides default values for the expected return on equity for different project activities, the relevant benchmark for energy projects in Colombia (Group 1 as given in the guidelines /UN10/) is 12%, It is worth to mention that the investment analysis was carried out by the PP in real terms.

Data and calculations of Project IRR, as well as sensitivity analysis, are set out in the spreadsheets "250414_Investment analyses EAAB projects V1 SUBA_Revision 6.xls; 250414_Investment analyses EAAB projects V1 USAQUEN_Revision 6.xls"/14/, ICONTEC has reviewed these files and confirmed that these include the relevant cost and revenues. The period of assessment is 22

years in accordance with statement in the Clause 3 of the Guideline and clarification /UN10/ (a maximum of 20 years) and the construction stage (almost 2 years → 22 years).

During the desk review and in the onsite visit, the audit team could not trace the sources for every input value used in the cashflow (CAR 4), in response the PP delivered the documental reference for all input parameters and assumptions used in the financial cash flow. The input values used in all investment analysis have been consistently applied at the time of the investment decision (July, 2010)/8//9/ and in all calculations. The depreciation has been added back to the net profits, and it was calculated in accordance with the Colombian accounting regulations /16/ and the fair value of the project activity assets was included at the end of the assessment period.(250414_Investment analyses EAAB projects V1 SUBA_Revision 6.xls; 250414_Investment analyses EAAB projects V1 USAQUEN_Revision 6.xls /14/ Sheet: PROJECTIONS without CERs, cell:Z34) and they are align with Guidelines on the assessment of investment analysis/UN10/.

The following tables show how ICONTEC assessed the main parameters used in the cash flow for each hydroelectric power plant:

Table 5a: Investment Barrier Analysis Parameters for Suba hydroelectric power plant.

Parameter	Value	Source	Validation Analysis
Energy generated	17,012 MWh/year	Feasibility studies reports /8//17/	<p>This data was taken from Feasibility study Reports issued by Consorcio Generacion Bogota (Consortium generation Bogota)/8//9/ , once the PP provided the plant load factors calculation to respond to CAR 5 raised by the audit team.</p> <p>ICONTEC verified that this value is consistently with the estimated power load factor reported on the Energy generated calculations /17/. In this document the plant load factors were determined as 87.09%. It is in accordance with the Guidelines for the reporting and validation of plant load factors /UN11/ paragraphs 3 (b) and 4, since it was determined by a third party contracted by the project participants. The power output estimated at high voltage side of the transformer is 1.5461 MW for Suba hydroelectric power plant, this values corresponds to the following calculations:</p> $\begin{aligned} \text{Energy Production (MWh/year)} &= \text{PlantLoadFactor}(\%) \times \text{HourperYear}(h) \\ &\times \text{PlantPowerCapacity}(MW) \\ \text{Energy Production}_{\text{Suba}} \text{ (MWh/year)} &= 0.8709 \times 8,760 \times 2.2299 \\ &= 17,012 \text{ MWh/year} \end{aligned}$ <p>Based on this crosscheck, ICONTEC confirms that the values used (file 250414_Investment analyses EAAB projects V1 SUBA_Revision 6.xls, sheet: ASSUMPTIONS SHEET cells C6, C7, C23 and C25)are credible and reliable</p>
Investment Costs	US\$ 6,796,948	Contract No.1-01-26300-1063-2009 /11/	<p>ICONTEC reviewed the Construction Contract signed between Consorcio Generación Bogotá and EAAB, /11/ in order to verify the investment costs reported in the cash flow file /14/.</p> <p>The price per kW installed is US\$3,048.09. This unit cost was cross checked by ICONTEC with the one reported in “Renewable Power Generation Costs in 2012, An Overview”/19/, issued by IRENA, page 44, figure 5.4, where is described that “The total installed costs for large-scale hydropower projects in Latin America typically range from a low of USD 1,000/kW to around USD 3,500/kW”, hence the Investment cost reported for this project activity is inside the recognized worldwide range of investment costs reported by IRENA, therefore ICONTEC deems that estimations of investment in the power electricity plant are suitable, reliable and conservative.</p>
Energy Tariff	US\$ 48.64 MWh	PPA signed	<p>Since at the moment of investment decision EAAB did not have any PPA for the project activity, the PP took other PPA signed for other hydroelectric</p>

		between EAAB and EMGESA /20/	<p>power plant with an installed capacity of 13.43 MW. This PPA was signed on September 2nd/2009, hence ICONTEC deemed this information available at the time of the investment decision as relevant and reliable.</p> <p>In order to validate the value used by the PP in the financial calculations (file 250414_Investment analyses EAAB projects V1 SUBA_Revision 6.xls, sheet: ASSUMPTIONS SHEET cell C24), ICONTEC review the report about prices and market transactions /35/ issued by XM (which is in charge of the Colombian National Interconnected System operation and the management of Colombian Energy Market) establishes that the average price for energy contracts (as is this project) is COP\$98.12/kWh</p> <p>In accordance with the Colombian Central Bank the average exchange rate (COP\$/US\$) from July 1st/2009 to June 30th/2010 (a year before of the time of investment) is US\$1= COP\$ 1,969.74 (http://www.banrep.gov.co/series-estadisticas/series-trm.htm), so the energy tariff for the ICONTEC's consultation is 49.81US\$/MWh. Based on this crosscheck, and in the fact that this price of US\$48.64/ MWh is based on a legal agreement ICONTEC confirms that the value used is credible and reliable.</p>
O&M Costs	US\$ 225,919	<p>These cost includes:</p> <ul style="list-style-type: none"> - Variable costs /8/ - Fixed costs/21/ - First Operational cost /11//22/ 	<p>ICONTEC reviewed the documental evidence /8//11//21//22/ in order to verify the investment costs reported in the cash flow file /14/</p> <p>In order to carry out the crosscheck, ICONTEC deems that as a common practice, O&M costs are usually given as a percentage of investment cost, so this ratio is:</p> $\frac{O\&M\ Costs}{Investments\ Costs} = \frac{US\$ 225,919}{US\$ 6,796,948} = 0.0332$ <p>ICONTEC could verify that the O&M costs reported by PP (3.32% of the Investments Costs) are lower than the ones reported in "Renewable Power Generation Costs in 2012, An Overview"/19/, issued by IRENA, page 46, section 5.3, where is described that "Annual O&M costs are often quoted as a percentage of the investment cost per kW per year. Typical values range from 1% to 4%". ICONTEC deems the value used as conservative, credible and reliable.</p>
Income tax	33% Tax exemption lifetime: 20 years	<p>Tax Law 1111/06 (Ley de Impuesto sobre la Renta). The applicable rate is 33% as per article 12 in the law</p>	<p>With the aim to assess the value described by the PP, ICONTEC verified the following link:</p> <p>http://www.secretariasenado.gov.co/senado/basedoc/ley/2006/ley_1111_2006.html, clause 383.</p> <p>The truthfulness of the information provided by the PP was checked.</p>
Depreciation	<p>For Civil Works: 20 years</p> <p>For electromechanical equipment: 10 years</p> <p>For Substation and Transmission Line</p>	<p>National regulations (Decree 3019 of 1989. Presidency of the Republic of Colombia).</p>	<p>These data is in accordance with the Decree 3019 of 1989 /16/. Article 2,</p> <p>ICONTEC deemed this parameter as a reliable</p>
Rescue Value	85%	Calculation made by the PP See: Sheet	<p>The fair value after 20 years was calculated as the assets' value at the end of the assessment period and it was included as a cash inflow in the final year (see Sheet DEPRECIATION, file 250414_Investment analyses EAAB projects V1 SUBA_Revision 6.xls.xls). Also, it was verified that this value</p>

		DEPRECIATION, file 261113 Investment analyses EAAB projects V1 SUBA-USAQUEN _Revision 5.xls	was calculated in accordance with the standard accounting regulations ICONTEC deemed this parameter as a reliable
Projected Months of Construction	48	Amendments of the contract No.1-01-26300-1063-2009.	In the page 1 of the Contract Amendment N°2 /34/, it is stated contract term is 48 months. According to that, ICONTEC deemed this parameter as a reliable
Inflation	3%	PP's estimations	The audit team reviewed the Colombian Central Bank's Website (http://www.banrep.gov.co/es/inflacion-basica) and did not find neither inflation forecast nor target inflation rate for the duration of the crediting period. The PP made an average of values from different sources: Colombian National Directorate of Planning (https://www.dnp.gov.co/EstudiosEconomicos/Indicadoresdecoyunturaecon%C3%B3mica/ICEmensualCUADROSYGR%C3%81FICOS.aspx), Bancolombia (http://investigaciones.bancolombia.com/InvEconomicas/home/homeinfo.aspx) and Helm Bank (https://www.grupohelm.com/actualidad-economica/proyecciones-macroeconomicas/). In order to validate the inflation rate used by the PP in its cash flow, the audit team reviewed the average forecasted inflation rate for the next five years published by the IMF (International Monetary Fund World Economic Outlook), available at: http://www.imf.org/external/pubs/ft/weo/2011/02/weodata/weorept.aspx?pr.x=83&pr.y=6&sy=2010&ey=2016&scsm=1&ssd=1&sort=country&ds=.&br=1&c=233&s=PCPIPCH&grp=0&a this average forecasted inflation is 2.928% (from 2012 to 2015, since the PP used the data available in the sources mentioned above in this framework of time). ICONTEC deemed the inflation rate used by the PP in the financial analysis as a reliable and appropriate.

Table 5b: Investment Barrier Analysis Parameters for Usaquen hydroelectric power plant

Parameter	Value	Source	Validation Analysis
Energy generated	10,337 MWh/year	Feasibility studies reports /9/ /18/	<p>This data was taken from Feasibility study Report issued by Consorcio Generacion Bogota (Consortium generation Bogota)/9/, once the PP provided the plant load factors calculation to respond to CAR 5 raised by the audit team.</p> <p>ICONTEC verified that this value is consistently with the estimated power load factor reported on the Energy generated calculations /18/. In this document the plant load factor was determined as 76.32% for Usaquen hydroelectric power plant. It is in accordance with the Guidelines for the reporting and validation of plant load factors /UN11/ paragraphs 3 (b) and 4, since it was determined by a third party contracted by the project participants. The power output estimated at high voltage side of the transformer is 1.5461 MW for Usaquen hydroelectric power plant, these values corresponds to the following calculations:</p> $\begin{aligned} \text{Energy Production (MWh/year)} &= \text{PlantLoadFactor}(\%) \times \text{HourperYear}(h) \\ &\times \text{PlantPowerCapacity}(MW) \\ \text{Energy Production}_{Usaquen} \text{ (MWh/year)} &= 0.7632 \times 8,760 \times 1.5461 \\ &= 10,337 \text{ MWh/year} \end{aligned}$

			Based on this crosscheck, ICONTEC confirms that the value used (file 250414_Investment analyses EAAB projects V1 USAQUEN_Revision 6.xls, sheet: ASSUMPTIONS SHEET cells C6, C7, C23 and C25)are credible and reliable
Investment Costs	US\$ 4,580,492	Contract No.1-01-26300-1063-2009 /11/	<p>ICONTEC reviewed the Construction Contract signed between Consorcio Generación Bogotá and EAAB, /11/ in order to verify the investment costs reported in the cash flow file /14/.</p> <p>The price per kW installed is US\$2,962.61. This unit cost was cross checked by ICONTEC with the one reported in “Renewable Power Generation Costs in 2012, An Overview”/19/, issued by IRENA, page 44, figure 5.4, where is described that “The total installed costs for large-scale hydropower projects in Latin America typically range from a low of USD 1,000/kW to around USD 3,500/kW”, hence the Investment cost reported for this project activity is inside the recognized worldwide range of investment costs reported by IRENA, therefore ICONTEC deems that estimations of investment in the power electricity plant are suitable, reliable and conservative.</p>
Energy Tariff	US\$ 48.64 MWh	PPA signed between EAAB and EMGESA /20/	<p>Since at the moment of investment decision EAAB did not have any PPA for the project activity, the PP took other PPA signed for other hydroelectric power plant with an installed capacity of 13.43 MW. This PPA was signed on September 2nd/2009, hence ICONTEC deemed this information available at the time of the investment decision as relevant and reliable.</p> <p>In order to validate the value used by the PP in the financial calculations (file 250414_Investment analyses EAAB projects V1 USAQUEN_Revision 6.xls, sheet: ASSUMPTIONS SHEET cells C24), ICONTEC review the report about prices and market transactions /35/ issued by XM (which is in charge of the Colombian National Interconnected System operation and the management of Colombian Energy Market) establishes that the average price for energy contracts (as is this project) is COP\$98.12/kWh</p> <p>In accordance with the Colombian Central Bank the average exchange rate (COP\$/US\$) from July 1st/2009 to June 30th/2010 (a year before of the time of investment) is US\$1= COP\$ 1,969.74 (http://www.banrep.gov.co/series-estadisticas/see_ts_trm.htm), so the energy tariff for the ICONTEC's consultation is 49.81US\$/MWh. Based on this crosscheck, and in the fact that this price of US\$48.64/ MWh is based on a legal agreement ICONTEC confirms that the value used is credible and reliable.</p>
O&M Costs	US\$ 211,387	<p>These cost includes:</p> <ul style="list-style-type: none"> - Variable costs /9/ - Fixed costs/21/ - First Operational cost /11//22/ 	<p>ICONTEC reviewed the documental evidence /9//11//21//22/ in order to verify the investment costs reported in the cash flow file /14/</p> <p>In order to carry out the crosscheck, ICONTEC deems that as a common practice, O&M costs are usually given as a percentage of investment cost, so this ratio is:</p> $\frac{O\&M\ Costs}{Investments\ Costs} = \frac{US\$ 211,387}{US\$ 4,580,492} = 0.04$ <p>ICONTEC could verify that the O&M costs reported by PP (4% of the Investments Costs) are lower than the ones reported in “Renewable Power Generation Costs in 2012, An Overview”/19/, issued by IRENA, page 46, section 5.3, where is described that “Annual O&M costs are often quoted as a percentage of the investment cost per kW per year. Typical values range from 1% to 4%”. ICONTEC deems the value used as credible and reliable.</p>
Income tax	<p>33%</p> <p>Tax exemption lifetime: 20 years</p>	<p>Tax Law 1111/06 (Ley de Impuesto sobre la Renta). The applicable rate is 33% as per article 12</p>	<p>With the aim to assess the value described by the PP, ICONTEC verified the following link:</p> <p>http://www.secretariassenado.gov.co/senado/basedoc/ley/2006/ley_1111_2_006.html, clause 383.</p> <p>The truthfulness of the information provided by the PP was checked.</p>

		in the law	
Depreciation	For Civil Works: 20 years For electromechanical equipment: 10 years For Substation and Transmission Line	National regulations (Decree 3019 of 1989. Presidency of the Republic of Colombia).	These data is in accordance with the Decree 3019 of 1989 /16/. Article 2, ICONTEC deemed this parameter as a reliable
Rescue Value	85%	Calculation made by the PP See: Sheet DEPRECIATION, file 261113 Investment analyses EAAB projects V1 SUBA-USAQUEN _Revision 5.xls	The fair value after 20 years was calculated as the assets' value at the end of the assessment period and it was included as a cash inflow in the final year (see Sheet DEPRECIATION, file 250414_Investment analyses EAAB projects V1 USAQUEN_Revision 6.xls). Also, it was verified that this value was calculated in accordance with the standard accounting regulations ICONTEC deemed this parameter as a reliable
Projected Months of Construction	48	Amendments of the contract No.1-01-26300-1063-2009.	In the page 1 of the Contract Amendment N°2 /34/, it is stated contract term is 48 months. According to that, ICONTEC deemed this parameter as a reliable

ICONTEC confirmed that the assumptions used are appropriate and the financial calculations made in the file "250414_Investment analyses EAAB projects V1 SUBA_Revision 6.xls; 250414_Investment analyses EAAB projects V1 USAQUEN_Revision 6.xls.xls" are correct. With discount rate of 12%, the financial analysis for this project activity states that the IRR of the project activity is 10.55% for Suba hydroelectric power plant and 8.6% Usaquen hydroelectric power plant.

The audit team raised a finding (CAR 6) since in the PDD version 01 there was no explanation regarding to sensitivity analysis, once the PP has included the Investment cost, energy tariff, the energy generation and the O&M costs as variables for this purpose, with a variation of $\pm 10\%$ (This range of variations seemed reasonable to the audit team in the Colombian and Project Context). The outcome of this sensitivity analysis is described in page 17 of PDD version 04.0, as well as in the spreadsheets "250414_Investment analyses EAAB projects V1 SUBA_Revision 6.xls; 250414_Investment analyses EAAB projects V1 USAQUEN_Revision 6.xls" (Sheet: SENSITIVITY ANALYSIS). As can be seen, in all scenarios the project IRR is less than discount rate.

<u>Variation of:</u>	<u>IRR without CDM Benefits for Suba Hydroelectric power plant</u>	<u>IRR without CDM Benefits for Usaquen Hydroelectric power plant</u>
TKC Contract		
+10% Variation	9.66%	7.87%

-10 Variation	11.49%	9.56%
Fixed Operations & Maintenance Costs		
+10 Variation	10.40%	8.45%
-10 Variation	10.70%	8.87%
Electricity Tariff (\$US/MWh)		
+10 Variation	11.71%	9.90%
-10 Variation	9.21%	7.36%
Electricity Generation (GWh Annually)		
+10 Variation	11.71%	9.90
-10 Variation	9.21%	7.36%

Therefore, in the view of ICONTEC, the sensitivity analysis demonstrates that the project is not financially attractive without the CDM incomes.

c) Common practice analysis

As a small scale project activity, this analysis is not mandatory.

d) Additionality conclusion

In conclusion, it was verified that the project is not the most likely baseline scenario. Hence, the emission reductions occurring from the project are deemed additional to those that would occur in the absence of the project activity.

3.6. MONITORING PLAN

ICONTEC has assessed the monitoring plan through the documental review. Compliance with the requirements of the applied monitoring methodology/UN8/ is fulfilled by the project activity.

The PDD version 04.0 specifies monitoring of the following parameter ex-post, in section B.7.1 and B.7.2 EG_{facility,y}: Net electricity generated and supplied to the grid by the project activity in the year y.

The audit team has verified all parameters in the monitoring plan against the requirements of the methodology; no relevant deviations have been found. The procedures established by EAAB (Section B.7 of PDD) have been reviewed by the audit team through document review of Colombian regulation (<http://www.creg.gov.co/cxc/secciones/documentos/leyes.htm>). This information, together with a physical inspection, allows the assessment team to confirm that the proposed monitoring plan is feasible, and within the project design and Colombian legislation.

The parameter EG_{facility,y} to be monitored was discussed with the PPs. In specific, these parameters include the location of meters, data management, and the quality assurance and quality control procedures to be implemented in the context of the project. ICONTEC found that the PP will be able to implement the monitoring plan and the achieved emission reductions can be reported ex-post and verified.

3.7. CALCULATION OF GHG EMISSIONS

In accordance with the methodology AMS-I.D version 17.0, emission reductions are to be calculated as:

$$ER_y = BE_y - PE_y - LE_y$$

Where:

ER_y = Emission reductions in year y (t CO₂e/yr)

BE_y = Baseline emissions in year y (t CO₂e/yr)

PE_y = Project emissions in year y (t CO₂e/yr)

LE_y = Leakage emissions in year y (t CO₂e/yr)

According to the applied methodology /UN8/, paragraph 22, the leakage is only considered when the energy generating equipment is transferred from another activity, this is not the case for this project activity, therefore no leakage emissions are considered ($LE_y = 0$ tCO₂e/yr).

Baseline emissions are to be calculated as validated by the DOE in the section 3.4 of this report.

Project emissions accounted by this activity project are to be calculated following the procedure described in the most recent version of ACM0002 /UN12/, as it was stated in the applied methodology /UN8/ paragraph 20:

$$PE_y = PE_{HP,y}$$

Where

$PE_{HP,y}$ = Project emissions from water reservoirs of hydro power plants in year y (tCO₂e/yr).

As demonstrated in the PDD, and validated by ICONTEC The technology to develop this type of project consists of the installation of a hydraulic turbines instead of pressure reduce structures in the existing water distribution system. This information was assessed in accordance with the Feasibility study report /8//9/ and the on-site visit. Hence there is no change in the water that would have been used in the existing water supply system,

$$PE_y = PE_{HP,y} = 0$$

So that,

$$ER_y = BE_y$$

The respective formulation as presented in the PDD is deemed appropriate by ICONTEC.

According to this, the total GHG emissions avoided by the activity project for the first 7-year crediting period is 72,968 tons of CO₂e, annual average.

ICONTEC verified by means of the review of the file "230413_EAAB emission reductions calculation V2_Revision 4.xls"/2/ that the project activity reduces emissions of 72,968tCO₂e over the crediting period (7 years). The values were confirmed by following assumptions that are considered appropriate and reproducing calculations.

3.8. ENVIRONMENTAL IMPACTS

ICONTEC confirmed this statement by means of reviewing the mentioned Decree (Article 8, clause 4 (a) and Article 9 Clause 3 (a)).

However it was necessary to develop an environmental management program /24/, which identifies the impacts related with the project activity and its mitigation. Some of the impacts identified were: noise, air pollution, waste water, solid waste, and ecological impact.

3.9. COMMENTS BY LOCAL STAKEHOLDERS

In order to engage stakeholders and to solicit their comments to the proposed project activity, EAAB carried out three consultation sessions with the aim to explain the development of the proposed project a clean development mechanism, the first one on July 19th, 2011, and the others on August 27th, 2011 (at 8:00 a.m for Suba hydroelectric project and at 2:00 p.m. for Usaquen hydroelectric project). These consultations included a session for questions or comments from local stakeholders. ICONTEC verified the execution of this meeting by the attendance listings and the meeting records/26//27//28//29/.

The audit team reviewed the invitation made to these three sessions, and confirmed that these invitations were made in a open and transparent manner /30//31//32/, likewise EAAB has taken due account of comments received and has described this process in the PDD Section E.2.

In general, ICONTEC determined that the community knows the project and agrees to perform it.

4. GLOBAL STAKEHOLDERS CONSULTATION

The PDD version 01 submitted by EAAB was made publicly available at UNFCCC website during a 30 days period from 09/03/2012 to 07/04/2012.

Parties, stakeholders and NGOs were invited to provide comments through the website. One comment was received during the public consultation submitted by Juan-Carlos Caycedo-Gonzales as follows: *“Colombia has stated that Dispatch Data Analysis (DDA) is the methodology to follow for calculating grid emissions factor. Why this PDD dismiss DDA methodology?”*

The audit team reviewed the latest Resolution issued by the Colombian Ministry of Energy and Mines regarding to the emission factor for energy generation projects connected to Colombian electrical grid /25/, this regulatory document used the Dispatch Data Analysis to calculate the emission factor for the Colombian electrical grid; but also this regulatory document stated the need to adopt (on a yearly basis) the emission factor for the Colombian electrical system (page 3 and Article 3), on the other hand, in the paragraph of the Article 1 states that PP can use other emission factor or other calculation method different from this Resolution /25/.

The Colombian Ministry has not issued and updated version of this Resolution /25/, therefore the audit team deemed that the method used by the PP to calculate the emission factor for Colombian electrical system is not in the opposite from the Colombian regulations and met the requirements and provision stated by the UNFCCC /UN6//UN8/.

5. VALIDATION OPINION

ICONTEC has performed a validation of the project Suba and Usaquen hydroelectric CDM umbrella project, in Colombia. ICONTEC also provided an update of the status of this validation activity on October 5th/2012, January 3rd/2013, April 10th/2013 and July 18th/2013. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host country criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The review of the Project Design Documentation and the subsequent follow up interviews has provided ICONTEC with sufficient evidence to determine the fulfilment of the stated criteria.

The project activity is being proposed as a unilateral project by Empresa de Acueducto y Alcantarillado de Bogotá E.S.P-EAAB, which has provided approval of voluntary participation and meets all requirements to participate in CDM. The Ministry of Environment and Sustainable

Development as Colombian DNA confirmed that the project helps in achieving sustainable development.

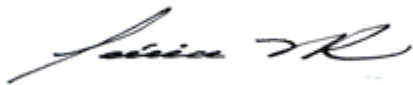
The project correctly applies the methodology: AMS-I.D.: Grid connected renewable electricity generation, version 17.0

The project consists of the development of a two new hydroelectric power plants, named: Suba and Usaquen; that takes advantage of the water flow supply system of Bogotá. The water flow will allow an installed capacity of 4.85 MW and an annual supply of electricity to the grid of 27,349 MWh. Electricity will be delivered to the Colombian SIN by the Morato substation (for Suba hydropower plant) and by Usaquen Substation (from Usaquen hydropower plant).. It is demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

The total emission reductions from the project are estimated to be on the average of 72,968 tCO₂e per year over the selected 7 years crediting period. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved because the underlying assumptions do not change.

In summary, it is ICONTEC's opinion that the project Suba and Usaquen hydroelectric CDM umbrella project in Colombia, as described in the PDD version 04.0, meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology : AMS-I.D.: Grid connected renewable electricity generation, version 17.0 . ICONTEC thus requests the registration of the project as a CDM project activity."

Bogotá D.C., May 19th, 2014



Monica Vivas
Director of conformity assessment
ICONTEC

6. REFERENCES

- /1/ CDM Project Design Document, including Baseline Methodology and the Monitoring Plan. PDD, version 01.0 (24/02/2012), version 02.0 (23/04/2013), version 03 (11/09/2013) and version 04.0 (25/04/2013)
- /2/ Baseline calculation data (file: "230413_EAAB emission reductions calculation V2_Revision 4.xls")
- /3/ Letter of Approval issued by the Colombian DNA (Ministry of Environment and Sustainable Development – Climate Change Division), dated on November 23th/2012.
- /4/ Resolution 0271 issued by EAAB, dated on April 27th/2012, which states the appointment of Germán Galindo as EAAB's General Manager
- /5/ Line diagram for Suba Hydroelectric Plant, which describes the connection to Colombian electrical grid and the electrical protections, this line diagram was issued by EAAB and dated on February 1st/2011
- /6/ Line diagram for Usaquen Hydroelectric Plant, which describes the connection to Colombian electrical grid and the electrical protections, this line diagram was issued by EAAB and dated on February 1st/2011
- /7/ Photographic record of electrical equipment installed in Suba and Usaquen hydroelectric power plants (these records were taken in the onsite visit (May 3rd/2012))
- /8/ Feasibility study – Technical report for Suba Hydroelectric Plant (Code PCH-SUB-GE-VAR-004), issued by Consorcio Generacion Bogota (Consortium generation Bogota) and dated on July 20th/2010
- /9/ Feasibility study – Technical report for Usaquen Hydroelectric Plant (Code PCH-USQ-GE-VAR-003), issued by Consorcio Generacion Bogota (Consortium generation Bogota) and dated on July 20th/2010
- /10/ Calculation for Colombian electrical grid emission factor (file: "060812_Emission Factor Calculation 2010 V3-Exante_Revision 1.xls")
- /11/ Contract No.1-01-26300-1063-2009 between the contractor Consorcio Generación Bogotá and EAAB, in order to construct three hydroelectric power plants in the EAAB system named Ventana, Suba and Usaquen. This contract was signed on December 24th/2009
- /12/ Prior consideration of the CDM form filled by EAAB for Ventana, Suba and Usaquen Hydroelectric CDM Bundled Project, this form is dated on November 27th/2009.
- /13/ Letter sent by Colombian Ministry of Environment, Housing and Territorial Development to EAAB, acknowledging the receipt of the Prior consideration of the CDM form /12/, dated on December 15th/2009.
- /14/ Spreadsheets with the financial analysis for the Suba and Usaquen hydroelectric CDM umbrella project (file: 230413 Investment analyses EAAB projects V1 SUBA-USAQUEN_Revision 4.xls; 261113 Investment analyses EAAB projects V1 SUBA-USAQUEN_Revision 5.xls; 050314_Investment analyses EAAB projects V1 SUBA_Revision 6.xls; 050314_Investment analyses EAAB projects V1 USAQUEN_Revision 6.xls; 250414_Investment analyses EAAB projects V1 SUBA_Revision 6.xls; 250414_Investment analyses EAAB projects V1 USAQUEN_Revision 6.xls)
- /15/ Resolution 312/2005 issued by the Colombian Regulatory Commission of drinking water and basic sanitation and dated on January 14th/2005. This regulatory document defines the discount rate applicable for works performed by the household utility companies of aqueduct and sewer
- /16/ Decree 3019 issued by the Colombian Ministry of Finance and Public Credit, dated on December 26th, 1989
- /17/ Energy generated calculation of Suba hydroelectric power plant made for the feasibility study report/8/ issued by Consorcio Generacion Bogota
- /18/ Energy generated calculation of Usaquen hydroelectric power plant made for the feasibility study report/9/ issued by Consorcio Generacion Bogota

- /19/ Renewable Power Generation Costs in 2012, An Overview, issued by IRENA , dated on 2013
- /20/ Contract N°1-99-26300-0530-2009 signed between EAAB and EMGESA S.A. ESP for Santa Ana hydroelectric power plan, dated on September 2nd/2009, with the purpose to purchase the energy generated by the mentioned power plant (PPA)
- /21/ Resolution 1310 issued by EAAB dated on December 26th/2008, which establishes the requirement, categories and tariffs for service provisions of personnel whom executes works for EAAB
- /22/ Amendment to Contract No.1-01-26300-1063-2009 (No.1-01-26300-1092-2009) signed on December 27th/2010
- /23/ Decree 1220/2005 issued by MAVDT which rules the environmental licenses, dated on April 21st/2005
- /24/ Environmental management program for Suba and Usaquen hydroelectric power plants, issued by J.E Jaimes Ingenieros S.A, dated on February 21st/2011.
- /25/ Resolution 18 0947 issued by the Colombian Ministry of mines and energy, which adopts the emission factor for energy generation projects connected to Colombian electrical grid, dated on June 4th/2010
- /26/ Attendance list for meetings performed by EAAB with the purpose to engage stakeholders and to solicit their comments regarding to the development of Suba and Usaquen Hydroelectric projects. These meetings were carried out on July 19th/2011 and August 27th/2011.
- /27/ Meeting minute held in the auditorium of the Chamber of Commerce of Bogota on July 19th, 2011 to carry out the local stakeholder consultation process for the project activity, (this minute includes local stakeholder comments)
- /28/ Meeting minute held in the auditorium of the community of Suba on August 27th, 2011 to carry out the local stakeholder consultation process for Suba Hydroelectric project, (this minute includes local stakeholder comments)
- /29/ Meeting minute held in the installations of EAAB in the neighbourhood of Santa Barbara, on August 27th, 2011 o carry out the local stakeholder consultation process for Usaquen Hydroelectric project, (this minute includes local stakeholder comments)
- /30/ Set of letters sent to different authorities from Bogota and Colombian with the aim to invite to the meetings to carry out the local stakeholder consultation process for the project activity. These letters were issued by EAAB
- /31/ Delivery certification of invitation to the meetings to carry out the local stakeholder consultation process for the project activity. These invitations were elaborated by EAAB.
- /32/ Press release published in a local newspaper (El Tiempo Zona) inviting to the local stakeholder consultation process for the project activity.
- /33/ Public tender IT-794-2009 published by EEAB with the purpose to construct three small hydroelectric plants in the Bogota's water supply system, dated on October 1st/2009
- /34/ Contract Amendment N°2 (Contract No.1-01-26300-1063-2009 /11/) signed on June 14 between the contractor Consorcio Generación Bogotá and EAAB, this document suppress all activities associated with the implementation and operation of the Ventana hydroelectric project.
- /35/ Report about prices and market transactions issued by XM on December 2010 (available at: http://www.xm.com.co/Informe%20Mensual%20Analisis%20del%20Mercado/03_Informe_Precios_y_Transacciones_TXR_12-2010.pdf)

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

/UN1/ Clean development mechanism validation & verification standard, version 05.0

- /UN2/ Clean development mechanism project standard, version 05.0
- /UN3/ General guidelines for SSC CDM methodologies, version 019.0
- /UN4/ Project Design Document form for Small-Scale CDM project activities, version 04.1
- /UN5/ Guidelines for completing the project design document form for small-scale CDM project activities, version 01.1
- /UN6/ Tool to calculate the emission factor for an electricity system, version 04.0.0
- /UN7/ Glossary of CDM terms, version 07.0
- /UN8/ SSC methodology AMS-I.D.: Grid connected renewable electricity generation, version 17.0
- /UN9/ Tool for the demonstration and assessment of additionality, version 07.0.0
- /UN10/ Guidelines on the assessment of investment analysis, version 05.0 and its clarification (version 01.0)
- /UN11/ Guidelines for the reporting and validation of plant load factors, version 01.0
- /UN12/ ACM0002, Consolidated baseline methodology for grid-connected electricity generation from renewable sources, version 14.0.0.
- /UN13/ Guidelines on assessment of de-bundling for SSC project activities, version 03.0

7. ANNEXES

Annex A

Validation 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 only the verification activities, undertaken after the publication of the monitoring report on the UNFCCC CDM website, were used as the basis for ICONTEC to conclude the verification and submission of 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 with VVS v 05.0§ 24-29.

TableA1: Validation Protocol

CHECKLIST QUESTION	REFERENCES	Final Conclusion
1. Global Stakeholder Consultation		
1.1 Has the validation team received and taken into account all comments on the PDD of the proposed project activity during the whole validation process? (not only during GSC) VVS (V 05.0) para34,35	4. Global Stakeholder consultation	Full
1.2 If comments indicate that the proposed project activity does not comply with the CDM requirements, did the validation team request further clarification from the entity providing the comment? VVS (V 05.0) para.34	N/A	Full
2. Approval		
2.1 Has the designated national authority (DNA) of each Party indicated (as being involved in the proposed CDM project activity in the PDD) provided a written letter of approval? VVS (V 05.0) para. 38	3.2 General Requirements 3.2.1 Approval and Authorization	Partial CAR 1 Solved

VALIDATION REPORT VVS
Annex A



CHECKLIST QUESTION	REFERENCES	Final Conclusion
		18/01/2013
<p>2.2 Is the letter(s) of approval issued by the respective Party's DNA the confirmation of:</p> <p>(a) The Party is a Party to the Kyoto Protocol;</p> <p>(b) Participation is voluntary;</p> <p>(c) In the case of the host Party, the proposed CDM project activity contributes to the sustainable development of the country;</p> <p>(d) It refers to the precise proposed CDM project activity title in the PDD being submitted for registration?</p> <p>VVS (V 05.0) para. 39 and 50</p>	<p>3.2 General Requirements</p> <p>3.2.1 Approval and Authorization</p>	Full
3. Authorization		
<p>3.1 All project participants have been listed in a consistent manner in the project documentation, and their participation in the project activity has been approved by a Party to the Kyoto Protocol.</p> <p>VVS (V 05.0) para. 46</p>	<p>3.2 General Requirements</p> <p>3.2.1 Approval and Authorization</p>	Full
<p>3.2 Are there entities other than those authorized as project participants included in these sections of the PDD?</p> <p>VVS (V 05.0) para. 47</p>	<p>3.2 General Requirements</p> <p>3.2.1 Approval and Authorization</p>	Full
<p>3.3 The approval of participation has been issued from the relevant DNA.</p> <p>VVS (V 05.0) para. 48</p>	<p>3.2 General Requirements</p> <p>3.2.1 Approval and Authorization</p>	Full
4. Modalities of communication		
<p>4.1 All focal points included in the MoC, as well as the personal identities, including specimen signatures and employment status, have been validated by corporative, personal identify and other relevant documentation like notarized documentation.</p> <p>VVS (V 05.0) para. 53</p>	<p>3.2 General Requirements</p> <p>3.2.2 Modalities of Communication</p>	Full
<p>4.2 Was the MoC correctly completed and duly authorized?</p> <ul style="list-style-type: none"> - The last version of the form F-CDM-MOC has been used? - The information required as per the F-CDM-MOC, including its annex 1, is correctly completed. -The authorized project participants signing the F-CDM-MOC correspond to the authorized project participants included in F-CDM-MOC, annex 1. <p>VVS (V 05.0) para. 59 - 60</p>	<p>3.2 General Requirements</p> <p>3.2.2 Modalities of Communication</p>	Full

VALIDATION REPORT VVS
Annex A



CHECKLIST QUESTION	REFERENCES	Final Conclusion
5. Project design document		
5.1. The PDD was completed using the last version of the PDD form and guidance appropriate to the type of project activity. VVS (V 05.0) para. 62	3.3 Project Design	Full
6. Description of the project activity		
6.1 The PDD is accurate, complete, and provides an understanding of the proposed CDM project activity (by reviewing available designs and feasibility studies and conducting comparison analysis with equivalent projects). VVS (V 05.0) para. 64	3.3 Project Design	Partial CAR 7, CL 1, CL 2, CL 4 Solved CL1, CL 4, CL 8 18/01/2013 CL 2 23/04/2013 CAR 7 18/01/2013
6.2 The project is correctly classified as large scale, non-bundled small-scale projects with emission reductions exceeding 15,000 tons per Year or bundled small-scale projects, each with emission reductions not exceeding 15,000 tonnes per year. VVS (V 05.0) para. 65		Full
6.3 For other individual proposed small-scale CDM project activities with emission reductions not exceeding 15,000 tonnes per year, the DOE should conduct a physical site visit as appropriate. If not, it shall be justified by the DOE. VVS (V 05.0) para. 66	N/A	N/A
6.4 If applicable, was the use of any sampling approach made according to the "Standard for sampling and surveys for CDM project activities and programme of activities"? VVS (V 05.0) para. 66	N/A	N/A
7. Application of the selected Baseline and monitoring methodology		
7.1 The baseline and monitoring methodologies selected by the project participants are the valid versions of those approved by the Board. The selected version is valid at the time of submission of the proposed project activity	3.4 Baseline Determination	Full

VALIDATION REPORT VVS
Annex A



CHECKLIST QUESTION	REFERENCES	Final Conclusion
for registration. VVS (V 05.0) para. 70 and 73		
7.2 The selected methodology applies to the project activity and was correctly applied with respect to: Project Boundary, baseline identification, algorithms and/ formulae used to determine emission reduction, additionality, monitoring methodology. VVS (V 05.0) para. 72 and 74		Full
7.3 Has each applicability condition listed in the approved methodology selected been confirmed? VVS (V 05.0) para. 77	3.4 Project Design Table 4: Methodology Applicability Conditions Analysis	Full
8. Deviation from an approved methodology		
8.1 Did the project request a deviation from an approved methodology before the publication of the PDD? VVS (V 05.0) para. 78	N/A	N/A
8.2 if there are any requests for deviation from an approved methodology, the applicability of the appendix 1 of Project standard must be applied. VVS (V 05.0) para. 79	N/A	N/A
9. Clarification on the applicability of an approved methodology		
9.1 In the cases where the DOE cannot make a determination regarding the applicability of the selected methodology to the proposed project activity, Was there requested any clarification on the applicability of the approved methodology? VVS (V 05.0) para. 81	N/A	N/A
10. Project boundary		
10.1 Are all main GHG emission sources, the physical delineation of the proposed project activity and other relevant project and baseline emission sources covered in the methodology, included within the project boundary for the purpose of calculating project and baseline emissions for the proposed project activity? VVS (V 05.0) para. 82	3.4 Baseline Determination 3.7 Calculation of GHG Emissions	Partial CAR 3 Solved 18/01/2013
10.2 Does the methodology allow project participants to choose whether a source or gas is to be included within the project boundary? -Has the project participant justified that choice?		Full

**VALIDATION REPORT VVS
Annex A**



CHECKLIST QUESTION	REFERENCES	Final Conclusion
<i>The DOE shall determine whether the justification provided is reasonable, based on an assessment of supporting documented evidence provided by the project participants and corroborated by observations if required.</i> VVS (V 05.0) para. 84		
<i>10.3 For the project activities that have both A/R and non-A/R components, please confirm that the emissions associated with the A/R activity will be accounted for and documented by the A/R project activity.</i> VVS (V 05.0) para. 85	N/A	Full
11. Baseline scenario identification and description		
<i>11.1 The Baseline identified for the proposed project activity is the scenario that reasonably represents the anthropogenic emissions by sources of GHGs that would occur in the absence of the proposed project activity.</i> VVS (V 05.0) para. 88		Full
<i>11.2 Please confirm that all tools required by the methodology have been used by the PP.</i> VVS (V 05.0) para. 89	3.4 Baseline Determination	Full
<i>11.3 Assess the baseline scenarios based on financial expertise and local and sectoral knowledge, crosscheck the information provided in the PDD with other verifiable and credible sources, such as local expert opinion, if available, relevant national and/or sectoral policies and circumstances, such as sectoral reform initiatives, local fuel availability, power sector expansion plans, and the economic situation in the project sector.</i> VVS (V 05.0) para. 90, 91, 92	3.7 Calculation of GHG Emissions	Full
12. Algorithms and/or formulae used to determine emission reductions		
<i>12.1 Do the steps taken and equations applied to calculate project emissions, baseline emissions, leakage and emission reductions comply with the requirements of the selected baseline and monitoring methodology?</i> VVS (V 05.0) para. 96	3.4 Baseline Determination	Partial CAR 5, CL 3 Solved 23/04/2013
<i>12.2 If the methodology allows for selection between various equations or parameters, the DOE shall determine whether adequate justification has been provided and if the justification provided is reasonable, based on an assessment of supporting documented evidence provided by the project participants and corroborated by observations if required.</i>	3.7 Calculation of GHG Emissions	Full

**VALIDATION REPORT VVS
Annex A**



CHECKLIST QUESTION	REFERENCES	Final Conclusion
VVS (V 05.0) para. 97		
12.3 Verify the justification given in the PDD for the choice of data and parameters used in the equations (appropriate, conservative and reasonable). Data sources must be provided for each parameter. VVS (V 05.0) para. 98		Partial CL 9, CL 10, CL 11 Solved 18/01/2013
13. Additionality of a project activity		
13.1 Assess and verify the reliability and credibility of all data and any assumptions, justifications and documentation provided by project participants to support the demonstration of additionality. Critically assess the evidence presented, using local knowledge and sectoral and financial expertise. VVS (V 05.0) para. 102	3.5 Additionality	Full
13.2 Please confirm that all tools required by the methodology have been used by the PP. VVS (V 05.0) para. 103		Full
13.3 For small scale project activities or micro scale project activities, the project participant used the applicable Guidelines, procedures and documents issued by the EB VVS (V 05.0) para. 158 - 160	N/A	N/A
14. Assessment of prior consideration of the clean development mechanism		
14.1 has the start date of the project activity been identified in accordance with the CDM glossary of terms? VVS (V 05.0) para. 106	3.5 Additionality 3.5.1 Prior consideration of the CDM	Partial CL 4 Solved 18/01/2013
14.2 Prior consideration assessment must be done according to the latest version of the "guidelines on the demonstration and assessment of prior consideration of the CDM." VVS (V 05.0) para. 106, 107, 108		Full
14.3 Depending of the gap between the evidence documented, does the PP justify the validation opinion of the CDM status? VVS (V 05.0) para. 110, 111		Full
15. Identification of alternatives (if apply)		

**VALIDATION REPORT VVS
Annex A**



CHECKLIST QUESTION	REFERENCES	Final Conclusion
15.1 Have the alternatives in accordance with the approved methodology and/or the tool of additionality been identified? VVS (V 05.0) para. 113	N.A	N.A
15.2 Does the DOE evaluate if the list of alternatives includes as one of the following options that the project activity is undertaken without being registered as a proposed project activity, contains all plausible alternatives of viable means of supplying the comparable outputs or that services are to be supplied by the proposed project activity and compliable with all applicable and enforced legislation? VVS (V 05.0) para. 114		N.A
16. Investment analysis (if applicable)		
16.1 Was it applied for the PP's the latest version of Guidelines on the assessment of investment analysis? VVS (V 05.0) para. 118	3.5 Additionality 3.5.2 Additionality Analysis b) Investment Analysis	Partial CL 15 Solved 23/04/2013
16.2 Does the DOE verify if the project activity is not the most economically or financially attractive alternative: <ul style="list-style-type: none"> Does not produce financial or economic benefits other than CDM-related income, Is less economically or financially attractive than at least one other credible and realistic alternative: The financial returns of the proposed project activity would be insufficient to justify the required investment? VVS (V 05.0) para. 119		Partial CL 6 Solved 18/01/2013
16.3 Was verified: <ul style="list-style-type: none"> suitability of the financial indicator selected, assessment of all parameters and assumptions used in calculating such financial indicators, as well as a determination of accuracy and suitability cross-check the parameters against a third-party, review, as appropriate, feasibility reports, public announcements, annual financial reports sensitivity analysis All computations, the accuracy of implementation and documentation by PP's VVS (V 05.0) para. 120		Partial CAR 4, CAR 6 Solved 23/04/2013

VALIDATION REPORT VVS
Annex A



CHECKLIST QUESTION	REFERENCES	Final Conclusion
<p>16.4 Was verified:</p> <ul style="list-style-type: none"> Determine whether the type of benchmark applied is suitable for the type of financial indicator presented Ensure that any risk premiums applied in determining the benchmark reflect the risks associated with the project type or activity Determine whether it is reasonable to assume that no investment would be made at a rate of return lower than the benchmark. <p>VVS (V 05.0) para. 121</p>		<p>Partial CL 7</p> <p>Solved 23/04/2013</p>
<p>16.5 Was verified (if apply):</p> <ul style="list-style-type: none"> The FSR is the basis for the decision to proceed with the investment in the project, i.e. that the period of time between the finalization of the FSR and the investment decision is sufficiently short that it is unlikely in the context of the underlying project activity that the input values would have materially change The values used in the PDD and associated annexes are fully consistent with the FSR, and where inconsistencies occur the DOE shall assess the appropriateness of the values The input values from the FSR are valid and applicable at the time of investment decision. The DOE shall confirm this on the basis of its specific local and sectoral expertise and by cross-checking or other appropriate means. <p>VVS (V 05.0) para. 122</p>	<p>3.5 Additionality 3.5.2 Additionality Analysis b) Investment Analysis</p>	<p>Full</p>
17. Barrier Analysis (if applicable)		
<p>17.1 Does the DOE determine whether the proposed project activity faces barriers that:</p> <p>(a) Prevent the implementation of this type of proposed project activity (See the latest "Guidelines for objective demonstration and assessment of barriers")</p> <p>(b) Do not prevent the implementation of at least one of the alternatives.</p> <p>VVS (V 05.0) para. 124</p>	N/A	N/A
<p>17.2 Did the DOE determine if the issues that have a direct impact on the financial returns of the project activity are not considered barriers and shall be assessed by investment analysis? This does not refer to either:</p> <p>(a) Risk related barriers, for example risk of technical failure, that could have negative effects on financial performance; or</p> <p>(b) Barriers related to the unavailability of sources of finance for the project activity.</p> <p>VVS (V 05.0) para. 125</p>	N/A	N/A

VALIDATION REPORT VVS
Annex A



CHECKLIST QUESTION	REFERENCES	Final Conclusion
17.3 Did the DOE apply the two step process to evaluate the barrier analysis performed and determine if the barriers are real and if so prevent the implementation of the project activity but not the implementation of at least one of the possible alternatives? VVS (V 05.0) para. 126	N/A	N/A
18. Common Practice Analysis(if applicable)		
18.1 For proposed large-scale project activities, unless the proposed project type is first-of-its-kind as determined in accordance with the relevant guidelines, the DOE has assessed whether the project participants have conducted a common practice analysis. VVS (V 05.0) para. 128		N/A
18.2 Did the DOE use official sources and its local and sectoral expertise to: (a) assess whether the geographical scope (e.g. the defined region) of the common practice analysis is appropriate for the assessment of common practice related to the project activity, (b) Determine to what extent similar and operational projects (e.g. using similar technology or practice), other than project activities, have been undertaken in the defined region; (c) Assess, if similar and operational projects, other than project activities, are already “widely observed and commonly carried out” in the defined region, and whether there are essential distinctions between the proposed project activity and the other similar activities. (See the Tool for assessing the additionality and/or the latest version of the Guidelines for assessing the common practice) VVS (V 05.0) para. 129	N/A	N/A
19. Monitoring Plan		
19.1 The Audit team identified the list of parameters required by the selected approved methodology including applicable tool(s), and confirmed that it includes the data management and quality assurance and quality control procedures to ensure that the proposed project activity can be reported ex post and verified. To assess the implementation of the plan the DOE shall, by means of review of the documented procedures, conduct interviews with relevant personnel, project plans and any physical inspections of the proposed project activity site. VVS (V 05.0) para. 132	3.6 Monitoring Plan	Partial CL 12, CL 13, CL 14 Solved 13/01/2013

VALIDATION REPORT VVS
Annex A



CHECKLIST QUESTION	REFERENCES	Final Conclusion
20. Environmental Impacts		
20.1 Did the project participants develop an environmental impact analysis including trans boundary impacts? VVS (V 05.0) para. 134	3.8 Environmental Impacts	Full
20.2 Did the project participant conduct an environmental impact assessment, if required to do so by the host Party, in accordance with the host Party's procedures?	3.8 Environmental Impacts	Full
21. Local stakeholder consultation		
21.1. Have the project participants completed a local stakeholder consultation process and were due steps were taken to engage stakeholders and solicit comments for the proposed project activity? VVS (V 05.0) para. 138	3.9 Local stakeholder consultation	Full
21.2 Did the DOE determine whether: (a) Comments have been invited from local stakeholders that are relevant for the proposed project activity; (b) The summary of the comments received as provided in the PDD is complete; (c) The project participants have taken due account of all comments received and have described this process in the PDD. VVS (V 05.0) para. 139	3.9 Local stakeholder consultation	Full
22. Specific validation requirements		
23.1. For certain specific validation activities such as SSC, A/R, and PoA, the DOE shall comply with the general validation requirements described in the sections above as well as those that follow, including the simplified modalities and procedures for small-scale project activities, the modalities and procedures for afforestation and reforestation project activities, and Standards for PoA. VVS (V 05.0) para. 149	N/A	N/A
23. Small-scale project activities (if applicable)		
1. Project activity eligibility	3.3 Project Design/A	Partial CAR 2

VALIDATION REPORT VVS
Annex A



CHECKLIST QUESTION	REFERENCES	Final Conclusion
<ul style="list-style-type: none"> - The project activities fall within the threshold of the three possible types of small project activities. - The DOE verified that the small-scale methodologies were applied in conjunction with the general guidance to the methodologies. - The DOE verified that the project activity is not a debundled component of a large-scale project, in accordance with the rules defined in the appendix C of the simplified modalities for small-scale CDM project activities <p>VVS (V 05.0) para.. 150-153</p>		Solved 18/01/2013N/A
<p>2. Debundling</p> <ul style="list-style-type: none"> - The DOE shall verify that the proposed small-scale project activity is a debundled component of a large-scale project activity if there is a registered small-scale project activity or an application to register another small-scale project activity. - The DOE, where appropriate, has taken into account specific debundling requirements for Type I project activities and small-scale transport project activities. <p>VVS (V 05.0) para. 154-157</p>		Full
<p><i>The proposed small-scale project activity is not a debundled component of a large-scale project activity in accordance with the Guidelines on assessment of debundling for SSC project activities</i></p> <p>VVS (V 05.0) para. 154</p>		Full
<p><i>The proposed small-scale project activity is a debundled component of a large-scale project activity if there is a registered small-scale project activity or an application to register another small-scale project activity.</i></p> <p>VVS (V 05.0) para. 155</p>		Full
<p><i>The Project participant takes into account specific debundling requirements for Type I project activities and small-scale transport project activities.</i></p> <p>VVS (V 05.0) para. 156</p>		Full
<p>3. Additionality</p> <ul style="list-style-type: none"> - The DOE verified that the proposed SSC project activity is additional in accordance with CDM requirements applicable for small-scale project activities. - For the activities type I, II and III, the DOE assessed the fulfillment of the relevant criteria to establish the automatic additionality for these projects - The DOE detailed all the steps taken to make the cross-check of the information contained in the PDD <p>VVS (V 05.0) para. 158-161</p>	<p>3.5 Additionality 3.5.2 Additionality Analysis b) Investment Analysis</p>	Full

CHECKLIST QUESTION	REFERENCES	Final Conclusion
24. Afforestation or reforestation project activities		
<p>In addition to the requirements listed above, the DOE verified the specific requirements for A/R CDM project activities, which include:</p> <ul style="list-style-type: none"> - Project boundary for A/R CDM; - Selection of carbon pool; - Eligibility of land; - Approach proposed to address non permanence; - Timing of management activities, including harvesting cycles and verifications; - Socioeconomic environmental impacts, including impacts on biodiversity and natural ecosystems. <p>VVS (V 05.0) para. 162</p>	N/A	N/A
<p>1. Project boundary</p> <p>The DOE described the documentation assessed and oral statements delivered by persons interviewed and approved their acceptability under the legal system of the host country.</p> <p>In case the DOE has applied a sampling approach; the validation report shall describe how many sites have been assessed and how these were selected.</p> <p>VVS (V 05.0) para. 163-166</p>	N/A	N/A
<p>2. Selection of carbon pool</p> <p>The DOE verified whether the selection of the carbon pool complied with the applied approved methodology or whether the exclusion of a certain pool is allowed for the methodology and is correctly justified.</p> <p>VVS (V 05.0) para. 167-169</p>	N/A	N/A
<p>3. Eligibility of land</p> <p>DOE verified the reliable discrimination between forest and non-forest land according to the particular threshold adopted by the host country.</p> <p>VVS (V 05.0) para. 170-172</p>	N/A	N/A
<p>4. Addressing non permanence</p> <p>DOE verified the specification of the proposed approach to address nonperformance in accordance with paragraph 38 of the modalities and procedures for A/R CDM projects activities.</p>	N/A	N/A

**VALIDATION REPORT VVS
Annex A**



CHECKLIST QUESTION	REFERENCES	Final Conclusion
VVS (V 05.0) para. 173-175		
5. Timing of management activities <i>The DOE verified how the project participants would ensure that a systematic coincidence of verification and peaks in carbon stocks would be avoided.</i> VVS (V 05.0) para. 176-178	N/A	N/A
6. Socioeconomic and environmental impacts <i>The DOE verified using local official sources whether the project participants have undertaken an analysis of socio-economic and environmental impacts, including impacts on biodiversity and natural ecosystems, as well as impacts outside the project boundary.</i> VVS (V 05.0) para. 179-183	N/A	N/A
25. Small-scale A/R project activities		
<i>The DOE determined whether:</i> <i>The project activities qualify as a proposed small-scale A/R CDM project activity and comply with the threshold for the proposed small-scale A/R projects in accordance with the decision 5/CMP.1, annex paragraph 1(i).</i> <i>The project activity complies with one of the types of small-scale A/R project activities defined in appendix B of the annex to decision 6/CMP.1.</i> <i>The base line, monitoring methodology and the methodology is applied correctly.</i> <i>The proposed CDM project activity is not part of a debundled large-scale A/R project activity, in accordance with the rules defined in appendix C of the annex to decision 6/CMP.1.</i> <i>The proposed CDM project activity has been developed or implemented by low-income communities and individuals as confirmed by the host Party in accordance with the decision 5/CMP.1, annex paragraph 1(i).</i> VVS (V 05.0) para. 184.	N/A	N/A
26. Programme of activities / Component project activities		
1. Coordinating/managing entity and participants in a PoA <i>The DOE assessed the management system described in the PoA design document (CDM PoA-DD) in accordance with the Standard for demonstration of additionality, development of eligibility criteria and application of multiple</i>	N/A	N/A

VALIDATION REPORT VVS
Annex A



CHECKLIST QUESTION	REFERENCES	Final Conclusion
methodologies for the programme of activities VVS (V 05.0) para. 186		
2. CPA design document <i>The DOE assessed the proposed CPA that a coordinating/managing entity wished to include in the PoA.</i> VVS (V 05.0) para. 187-188	N/A	N/A
3. Description of a PoA/CPAs <i>The DOE assessed the CDM-PoA-DD and the PoA-specific CDM-CPA-DD that was submitted by the coordinating/managing entity and confirmed the framework developed for the implementation of the PoA, and defined a CPA under the PoA.</i> VVS (V 05.0) para. 189	N/A	N/A
4. Application of multiple methodologies <i>The DOE assessed the application of multiple methodologies in accordance with the Standard for demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programme of activities</i> VVS (V 05.0) para. 190	N/A	N/A
5. Boundary for the PoA in terms of geographical area <i>The DOE verified the boundary of the PoA within which all CPAs included in the PoA will be implemented and if the project participant has taken into account all the applicable national and/or sectoral policies and regulations.</i> VVS (V 05.0) para. 191-192	N/A	N/A
6. Start date of CPA <i>The DOE verified that the start date of the CPA is on or after the start date of the PoA.</i> VVS (V 05.0) para.193	N/A	N/A
7. Prior consideration of the CDM <i>The DOE shall assess prior consideration of the CDM for the PoA applying the provisions of paragraph 107 above mutatis mutandis.</i>	N/A	N/A

**VALIDATION REPORT VVS
Annex A**



CHECKLIST QUESTION	REFERENCES	Final Conclusion
VVS (V 05.0) para. 194		
8. Demonstration of additionality of the PoA as a whole <i>The DOE verified the additionality of a PoA in accordance with the .Standard for demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programme of activities.</i> VVS (V 05.0) para. 195	N/A	N/A
9. Eligibility criteria for inclusion of a CPA in the PoA <i>The DOE assessed the eligibility criteria for inclusion of a CPA in the PoA in accordance with the .Standard for demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programme of activities.</i> VVS (V 05.0) para. 196	N/A	N/A
10. Crediting period of a PoA/CPA <i>The DOE determined that the length of a PoA does not exceed 28 years (60 years for A/R).</i> VVS (V 05.0) para. 197	N/A	N/A
11. Monitoring plan for a PoA/CPA <i>The DOE verified that the monitoring plan for a CPA is in accordance with the approved monitoring methodology, including applicable tool(s).</i> VVS (V 05.0) para. 198	N/A	N/A
12. Environmental Analysis of a PoA <i>The DOE determined that an analysis of the environmental impacts of the PoA in accordance with CDM-PoA-DD and the CDM-CPA-DD was undertaken.</i> VVS (V 05.0) para. 199-200	N/A	N/A
13. Local stakeholder consultation <i>The DOE verified that the local stakeholder consultation process was carried out for the whole PoA or at the CPA level?</i> <i>If comments by local stakeholders were invited with regard to the whole PoA, the DOE shall determine how these comments were invited; whether the</i>	N/A	N/A

VALIDATION REPORT VVS
Annex A



CHECKLIST QUESTION	REFERENCES	Final Conclusion
summary of the comments received is complete and how due account was taken of all comments received. VVS (V 05.0) para. 201-		
If the local stakeholder consultation is conducted at the CPA level, the DOE shall determine whether it is in accordance with the level of consultation specified by the coordinating/managing entity and whether the local stakeholder comments were taken into account and described in the CDM-PoA-DD and the CDM-CPA-DD VVS (V 05.0) para. 202	N/A	N/A
14. Determination of occurrences of debundling under a PoA The DOE verified that the proposed small-scale CPA of a PoA is not a debundled component of a large-scale project activity in accordance with the Guidelines on assessment of debundling for SSC project activities. VVS (V 05.0) para. 203	N/A	N/A
15. Inclusion or renewal of a crediting period of a CPA under a registered PoA The DOE verified that the specific CDM-CPA-DD is in accordance with the latest version of the PoA and determined that the CPA meets the requirements of the PoA. VVS (V 05.0) para. 204	N/A	N/A
27. Validation status and outcomes, opinion, and report		
1. Validation status and outcomes The DOE provided an update of the status of its validation activity, unless the project activity has been submitted for registration 180 days subsequent to the end of the period for the submission of public comments. The updated status presented for the DOE, must contain one of the following	5. Validation opinion	Full

VALIDATION REPORT VVS
Annex A



CHECKLIST QUESTION	REFERENCES	Final Conclusion
<p>conditions:</p> <p>Finalization of the validation contract</p> <p>A negative validation opinion</p> <p>Summary of the issues raised with updates or reconfirmations of the validation status at three month intervals</p> <p>Which party/parties are involved in the absence of sending of a valid letter of approval</p> <p>Explanations about the length of the validation activity and the update of the validation status if the validation activities are ongoing and the CAR or CL have not yet been sent to the project participant.</p> <p>VVS (V 05.0) para. 141-142</p>		
<p>2. Validation opinion</p> <p>It was emitted an opinion of the likelihood of the project activity achieving the anticipated emission reductions stated in the PDD, where the PP has been informed of the validation outcome, whether it is a positive or negative opinion.</p> <p>The DOE's opinion must include:</p> <ul style="list-style-type: none"> - A summary of the validation methodology and process used and the validation criteria applied - A description of project components or issues not covered by the validation process - A summary of the validation conclusions - A statement on the validation of the expected emission reductions - A statement as to whether the proposed project activity meets the stated criteria. - The validation opinion confirms whether the project meets the stated criteria and that the methods presented in the project design documentation are acceptable and have been correctly applied. <p>VVS (V 05.0) para. 143-146</p>	<p>5. Validation opinion</p>	<p>Full</p>
<p>3. Validation Report</p> <p>Is The validation report in line with IN-P-CC-01?</p> <p>The DOE included in the validation report a validation opinion that integrated:</p>	<p>5. Validation opinion Page 23 Table A2 Findings</p> <p>4. Global stakeholder consultation</p> <p>2.1 Follow up Interviews</p>	<p>Full</p>

VALIDATION REPORT VVS
Annex A



CHECKLIST QUESTION	REFERENCES	Final Conclusion
<ul style="list-style-type: none"> - <i>Conclusions regarding the proposed project activity's conformity with applicable</i> - <i>CDM requirements</i> - <i>Overview of the validation activities</i> - <i>Findings and conclusions</i> - <i>Information on the global stakeholder consultation process carried out.</i> - <i>A list of interviewees and documents reviewed</i> - <i>Details of the validation team</i> - <i>Information on quality control within the team and in the validation process</i> - <i>Appointment certificates or curricula vitae of the DOE's validation team members, technical experts and internal technical reviewers for the project activity.</i> <p>VVS (V 05.0) para. 147-148</p>	<p><i>Table 1: Follow up Interview</i></p> <p><i>2.3 Internal quality control</i></p> <p><i>2.4 Validation team</i></p> <p><i>Table 2: Validation Team</i></p> <p><i>Annex C, Audit Team Experience and Knowledge</i></p>	

TableA2: Resolution of Corrective Action, Forward Action and Clarification Request

The following table explains how ICONTEC resolve or “close out” CARs and CLs describing how the project participants modify the project design, rectify the PDD or provide additional explanations or evidence that satisfy the ICONTEC’s concerns. VVS (V 04.0) paragraph 28.

This table explains the issues raised, the responses provided by the project participants, the means of validation of such responses and references to any resulting changes in the PDD or supporting annexes. VVS (V 05.0) para. 29

Report clarifications and corrective action requests	Ref. to checklist question in table 2	Summary of project owner response	Validation conclusion
<p>CAR 1</p> <p>The letter of approval has not been issued yet by the Colombian DNA</p>	<p>VVS version 05.0 Paragraph 38</p>	<p>The letter of approval (LoA) has been issued on December 03, 2012 by the local DNA (Ministry of Environment and Sustainable Development). In addition the Modalities of Communication has been signed by the Project Participant on January 02, 2013. The LoA and MoC are attached to this document and included into the dropbox as a share files.</p> <p><u>Project owner response for further DOE’s request:</u></p> <p>The complete MoC form signed has been attached to this document in order to provide an unaltered format. The complete MoC is included into the dropbox as a share file.</p> <p><u>Project owner response for further DOE’s request 2:</u></p> <p>Documents regarding personal details and employment status of the MoC signatories are attached to this document in order to provide the</p>	<p>Validation Team Response:</p> <p>The audit team has reviewed the LoA, and it confirmed that LoA has been issued from the Colombian DNA.</p> <p>However when the audit team reviewed the MoC, this was filled in a modified format</p> <p>After sent the updated MoC, a documental evidence to support the corporate and personal details, employment status and specimen signatures included in the MoC statement are valid and accurate is missing</p> <p>The audit team reviewed the LoA and MoC, these documents and its support are in compliance with the VVS requirements</p> <p>Validation Team Conclusion:</p>

**VALIDATION REPORT VVS
Annex A**



		<i>required evidence. Copy of personal id and employment status certification of MoC signatories are included into the dropbox as a share file.</i>	Closed
CAR 2 <i>The provisions of General Guidelines to SSC CDM methodologies was not considered in the PDD</i>	VVS version 05.0 paragraph 150	<i>On section B.2 of PDD the justification of the choice of the project category has been enhance to take into account the provisions of General Guidelines to SSC CDM methodologies, regarding the scale of the project (considering the sum of the size of each component of the project activity). In addition other sections of the PDD have been improved in order to provide more clarity regarding the capacity of the project (each power plant included). The PDD updated is attached to this document.</i>	<p>Validation Team Response:</p> <p><i>In the section B.2 of the PDD version 02.0 (and further versions), the PP has included the provision of the General Guidelines to SSC CDM methodologies</i></p> <p>Validation Team Conclusion: Closed</p>
CAR 3 <i>The description of project activity boundary provided in Clause B.3 of the PDD version 01.0 should be accordance with the methodology AMS-I.D version 17, Clause 10</i>	VVS version 05.0 paragraph 82	<i>On section B.3 of PDD the project boundary has been adjusted in order to be consistent with the description provided in clause 9 of methodology AMS-I.D version 17 (with the inclusion of the National Interconnected System into the project boundary). The PDD updated is attached to this document.</i>	<p>Validation Team Response:</p> <p><i>The updated description of the project boundary described in section B.3 of the PDD version 02.0 (and further versions), has included the Colombian electrical grid in accordance with the methodology AMS-I.D</i></p> <p>Validation Team Conclusion: Closed</p>
CAR 4 <i>The evidence for all parameters and assumptions used in financial assessment should be provided</i>	VVS version 05.0 paragraph 120	<p><i>On section B.5 of PDD has been referred the documental evidence for all parameters and assumptions used in the investment analysis (a list of the main parameters has been included). The documental evidence and the PDD updated are attached to this document and included into the dropbox as a share files.</i></p> <p><u>Project owner response for further</u></p>	<p>Validation Team Response:</p> <p><i>The documental reference for the parameters and assumptions used in the financial analysis are described in the sheet ASSUMPTIONS SHEET of the file 230413 Investment analyses EAAB projects V1 SUBA-USAQUEN_Revision 4.xls.</i></p>

		<p><u>DOE's request:</u></p> <p>On section B.5 of PDD, Table: Timeline for the project activity has been indicated which activity corresponds to the project investment decision time. In addition, in the footnote 21) has been included the date for project investment decision (date for the contract No.1-01-26300-1063-2009 signature). The documental evidence (contract No.1-01-26300-1063-2009) and the PDD updated are attached to this document and included into the dropbox as a share files.</p> <p><u>Project owner response for further DOE's request 2:</u></p> <p>To be consistent with project milestones, the activity which corresponds to the project investment decision has been updated on section B.5 of PDD, Table: Timeline for the project activity. In addition, in the footnote 21) has been corrected the date for project investment decision (date for the public tender IT-794-2009 which corresponds to the process to hire a technical company to develop the project). The documental evidence (public tender IT-794-2009) and the PDD updated are attached to this document and included into the dropbox as a share files.</p>	<p>However in the PDD version 02.0 was not provided the investment time decision in order to assess (by the DOE), the consistency and appropriateness of the input values with this timing.</p> <p>The investment decision dates was provided by the PP (and its documental support) to the audit team</p> <p>Validation Team Conclusion: Closed</p>
<p>CAR 5</p> <p>The plant load factor and its calculations rationale (water resource availability) should be demonstrated</p>	<p>VVS version 05.0 paragraph 96</p>	<p>On section A.4.2 of PDD has been included an explanation for the plant load factor estimation and the power plants capacity determination. In addition have been included two footnotes indicating the origin of these parameters and their calculations rationale (refer the hydraulic studies explained in the</p>	<p>Validation Team Response:</p> <p>The PP provided the feasibility studies and its annexes related with energy assessment for each power plant, the documental reference provided meet the requirements stated</p>

**VALIDATION REPORT VVS
Annex A**



		<p>feasibility reports "PCH-USQ-GE-VAR-003 V0.2 feasibility" and "PCH-SUB-GE-VAR-004 v0.0 feasibility", Chapter 6, 2010, Consorcio Generación Bogotá; and the capacity studies explained in the Chapter 9, 2010, of the same documents. The calculation rationale is compiled in the spreadsheets "310812 Evaluación energética PCH Usaquen-Anexo 9.2 factibilidad" and "310812 Evaluación energética PCH Suba - Anexo 9.2 factibilidad". The parameters have been ratified by the technical supervisors on letter dated on December 06, 2010. The feasibility reports, the spreadsheets, the technical supervisor's letter and the PDD updated are attached to this document and included into the dropbox as a share files.</p>	<p>in Guidelines for the reporting and validation of plant load factors version 01.0</p> <p>Validation Team Conclusion: Closed</p>
<p>CAR 6 The sensitivity analysis should be provided in the PDD in accordance with Clause 20 of the Guidelines on the assessment of investment analysis</p>	<p>VVS version 05.0 paragraph 120</p>	<p>On section B.5 of PDD a sensitivity analysis has been included according to the provisions of the Guidelines on the assessment of investment analysis (in particular clauses 20 and 21 regarding the parameters to be varied). The PDD updated is attached to this document.</p>	<p>Validation Team Response:</p> <p>In section B.5 of the PDD version 02.0 (and further versions) the sensitivity analysis was included</p> <p>Validation Team Conclusion: Closed</p>
<p>CAR 7 One component of the bundled project is missing in the version 02.0 of the PDD (Ventana)</p>	<p>General principles for bundling, version 02.0 paragraphs 8 and 9 VVS version 05.0 paragraph 64</p>	<p>Initially, the project provided by EAAB considered the development of 3 small hydroelectric power plants called Suba, Usaquen and Ventana. After several technical evaluations it was established that the PCH Ventana could not be developed with the other two projects, since a previous work in the tunnels driving the potable water was needed, in order to guarantee the availability of water to generate power. Likewise, additional costs were not budgeted, reason for why on May 30, 2001, by</p>	<p>Validation Team Response:</p> <p>In section B.5 of the PDD version 02.0 (and further versions) the sensitivity analysis was included</p> <p>Validation Team Conclusion: Closed</p>

**VALIDATION REPORT VVS
Annex A**



		<p>communication 26350-2011-257, it was required the modification of the contract 1-01-26300-1063-2009 in order to suppressing all activities associated with the implementation and operation of the PCH Ventana and to reduce contract value at US\$7,275,275. This change was effectively on June 14, 2011, with the signing of the Contract Amendment No.2. On section B.5 of PDD, Table: Timeline for the project activity has been modified in order to reflect the withdrawal of the PCH Ventana project. The documental evidence (communication 26350-2011-257, Contract Amendment No.2) and the PDD updated are attached to this document and included into the dropbox as a share files.</p>	
<p>CAR 8 The CDM small-scale project activities bundling form is missing</p>	<p>General principles for bundling version 02.0 paragraph 11</p>	<p>The document titled "301013 EAAB hydroelectric projects CDM BUNDLING FORM V1_Revisión 1" has been prepared to meet the requirements of General principles for bundling version 02.0 (paragraph 11). The CDM small-scale project activities bundling form is attached to this document and included into the dropbox as a share file.</p>	<p>Validation Team Response:</p> <p>The audit team reviewed the document provided by the PP, and it is in accordance with the latest version of the CDM small-scale project activities bundling form</p> <p>Validation Team Conclusion: Closed</p>
<p>CL 1 The PP should provide the geographical location by means of decimal coordinates</p>	<p>VVS version 05.0 paragraph 64</p>	<p>On section A.4.1.4 of PDD, the coordinates for the project location have been updated as per UNFCCC format (Cartesian coordinate system with +/- sign, and a precision of 4 decimals). These coordinates have been confirmed by the Direction of Technical and Geographical Information of Empresa de Acueducto y Alcantarillado de Bogotá S.A. (project participant). The project location map and the PDD updated are</p>	<p>Validation Team Response:</p> <p>The geographical location for each hydro power plant was provided in the PDD 02.0 (and further versions)</p> <p>Validation Team Conclusion: Closed</p>

**VALIDATION REPORT VVS
Annex A**



		attached to this document (These documents have been included into the dropbox as a share files).	
<p>CL 2 The total installed capacity of the bundled project described in Clause A.2 and Clause A.4.2 of PDD version 01.0 should be in accordance with individual installed capacity</p>	VVS version 05.0 paragraph 64	<p>On sections A.2 and A.4.2 of PDD, the technical specifications of the major equipment have been enhanced according to the provisions of the "General guidelines to SSC CDM methodologies". The description of the total installed capacity has been improved in order to provide more clarity regarding the individual capacity and the effective capacity of each power plant. In addition, the emissions reduction calculation has been adjusted according to each effective power rating. The PDD updated is attached to this document.</p> <p><u>Project owner response for further DOE's request:</u></p> <p>On section A.3 of PDD description of the effective power capacity (rated power turbine value in the figure: Technical specifications for major equipment - Usaquen power plant) has been corrected in order to be consistent with the values used for the investment analysis, the emission reductions calculation and information contained in other sections of the PDD. The difference in the value was a misprint. The PDD updated is attached to this document and included into the dropbox as a share file.</p>	<p>Validation Team Response:</p> <p>In sections A.1 and A.3 of the PDD 02.0 the description of the total installed capacity was included, as well as the effective power capacity. However the information provided about the effective power capacity is not coherent between page 1 and the tables on pages 7, 8 and 28 of the PDD, on the other hand this effective power capacity is not coherent between PDD and file 230413 Investment analyses EAAB projects V1 SUBA-USAQUEN_Revision 4.xls</p> <p>Once the PP delivered an updated version of the PDD, the audit team reviewed the proper consistency inside the PDD and between the PDD and the spreadsheet used for additionality assessment and emissions reductions calculation</p> <p>Validation Team Conclusion: Closed</p>
<p>CL 3 The average emission reduction per year and the total emission reduction during the first crediting period described in Clause A.2 of PDD version 01.0 should be coherent and consistent with the</p>	VVS version 05.0 paragraph 96	<p>On sections A.2, B.4.3, B.6.3 and B.6.4 of PDD the emissions reduction per year and the total emissions reduction during the first crediting period have been adjusted in order to be consistent with the new version of the emissions</p>	<p>Validation Team Response:</p> <p>The emission reduction calculations were made with the power effective rating values; these are conservative</p>

**VALIDATION REPORT VVS
Annex A**



spreadsheet 20120208_EAAB emission reductions calculation_V1.xls		reduction calculation spreadsheet (230413_EAAB emission reductions calculation V2_Revision 4.xls). The calculation has been adjusted considering the new national emission factor calculation (spreadsheet 060812_Emission Factor Calculation 2010 V3-Exante_Revision 1.xls) and each effective installed capacity. The spreadsheets and the PDD updated are attached to this document and included into the dropbox as a share files.	since the installed capacity values are higher. The coherence and consistency between the PDD version 02.0 (and further versions) and the spreadsheets 230413_EAAB emission reductions calculation V2_Revision 4. Xls and 060812_Emission Factor Calculation 2010 V3-Exante_Revision 1.xls is right Validation Team Conclusion: Closed
CL 4 Information about grid connection for every hydroelectric plant should be included in PDD. Please provide one-line diagram for each plant with the connection to Colombian grid	VVS version 05.0 paragraph 64	On section A.4.2 of PDD, the technology/measure of the project has been enhanced to include a full description of the grid connection for each power plant (according to the last version of the one-line diagram for each project). The one-line diagrams and the PDD updated are attached to this document and included into the dropbox as a share files.	Validation Team Response: The connection to the Colombian electrical grid was included in section A.3 of the PDD version 02.0 (and further versions) Validation Team Conclusion: Closed
CL 5 The documental evidence to support the actions taken to secure CDM status of the project activity should be provided to ICONTEC	VVS version 05.0 paragraph 106	As a documental evidence to support the actions taken to secure CDM status of the project activity, the following documents are attached: <ul style="list-style-type: none"> - Project Idea Note (form used to support the No Objection Letter request). - No Objection Letter request dated 13/07/2009. - Communication 24100-2010-3247 requesting cooperation from the Interamerican Development Bank (to assess the CDM feasibility to develop the project). - Communication 24100-2011-1114 requesting cooperation from the 	Validation Team Response: The documental evidence to support support the actions taken to secure CDM status of the project activity was provided Validation Team Conclusion: Closed

VALIDATION REPORT VVS
Annex A



		<p><i>Interamerican Development Bank (to develop the Project Design Document).</i></p> <ul style="list-style-type: none"> - <i>Communication 24100-2010-2530 confirming the acceptance of the cooperation from the Interamerican Development Bank and definition of the main activities to be developed.</i> - <i>Document with the indication to access the history of the contract IT-794-2009.</i> - <i>First national Approval letter request dated 16/04/2012.</i> <p><i>These documents have been included into the dropbox as a share files.</i></p>	
<p>CL 6 <i>An explanation about the selection criteria for the appropriate investment analysis method should be provided in the PDD</i></p>	<p><i>VVS version 05.0 paragraph 119</i></p>	<p><i>On section B.5 of PDD, the investment analysis has been enhanced in order to provide more clarity regarding the selection criteria for the analysis method used. This adjustment has been developed according to the provisions of the Guidelines on the assessment of investment analysis. The PDD updated is attached to this document.</i></p>	<p><i>Validation Team Response:</i></p> <p><i>In section B.5 of the PDD version 02.0 (and further versions) it was explained the benchmark analysis as the option used for the PP to demonstrate the project's additionality</i></p> <p><i>Validation Team Conclusion:</i> <i>Closed</i></p>
<p>CL 7 <i>An explanation about why and how the discount rate of 13.4% (about water infrastructure inversions) can be applied when energy inversions (turbines, generators, etc). are concerned, should be provided in the PDD</i></p>	<p><i>VVS version 05.0 paragraph 121</i></p>	<p><i>On section B.5 of PDD has been included an explanation for the use of the appropriate discount rate and how this is pertinent according to the nature of the project. The selection criteria and the support evidence have been included considering the provisions of the Guidelines on the assessment of investment analysis. The PDD updated is attached to this document.</i></p>	<p><i>Validation Team Response:</i></p> <p><i>The explanation about the use of 13,4% as a discount rate (benchmark applied) for investment applied was provided in the PDD version 02.0 (and further versions) and it is suitable for this type of project.</i></p> <p><i>Validation Team Conclusion:</i> <i>Closed</i></p>

**VALIDATION REPORT VVS
Annex A**



<p>CL 8 The technical description for the three hydroelectric projects should be enhanced in order to reflect the technical characteristics found in the onsite visit.</p>	<p>VVS version 05.0 paragraph 64</p>	<p>On section A.4.2 of PDD, the technical description of the project has been enhanced in order to include a full description of each power plant and to be consistent with the description of the one-line diagrams. The PDD updated is attached to this document.</p>	<p>Validation Team Response:</p> <p>In section A.3 of the PDD version 02.0 (and further versions), the technical description provided by the PP is in accordance with the technical characteristics found by the audit team in the onsite visit</p> <p>Validation Team Conclusion: Closed</p>
<p>CL 9 The data source used for emission factor calculation for the Colombian grid should be mentioned in the PDD with the complete electronic Web path.</p>	<p>VVS version 05.0 paragraph 98</p>	<p>On section B.6.2 of PDD, the data source used for the national emission factor calculation have been enhanced to provide a complete source reference. In addition the complete electronic web path has been included for each data source (where is available). The PDD updated is attached to this document.</p>	<p>Validation Team Response:</p> <p>The entire section B.6 of the PDD version 02.0 (and further versions) was modified in order to provide clarity about the step followed and the sources used by the PP to calculate the Colombian grid emission factor</p> <p>Validation Team Conclusion: Closed</p>
<p>CL 10 The installed capacity for each hydroelectric project should be described in section B.6.2 of PDD</p>	<p>VVS version 05.0 paragraph 64</p>	<p>On section B.6.2 of PDD the table "installed capacity" has been deleted in order to provide more clarity in the PDD reading. The installed capacity of the project (including the capacity of each power plant) has been included on sections A.2, A.4.2 and B.6.3 of PDD. The PDD updated is attached to this document.</p>	<p>Validation Team Response:</p> <p>The technical characteristics was included in section A.3 of the PDD version 02.0 (and further versions), on the other hand, the entire section B.6 of the PDD version 02.0 (and further versions) was modified in order to provide clarity about the step followed and the sources used by the PP to calculate the Colombian grid emission factor and the emission reductions</p>

**VALIDATION REPORT VVS
Annex A**



			Validation Team Conclusion: Closed
<p>CL 11</p> <p>According to the calculations reviewed in the onsite visit for the emission factor for Colombian grid, the Justification of the choice of data or description of measurement methods and procedures actually applied for the following parameters should be clarified:</p> <ul style="list-style-type: none"> • $EF_{EL,m,y}$ • $EF_{EL,k,y}$ • $EF_{grid,OMadj,y}$ • $EF_{grid,BM,y}$ 	VVS version 05.0 paragraph 64	<p>On sections B.6.1, B.6.2 and B.6.3 of PDD the justification of the choice of data, description of measurement methods, the data sources and procedures to calculate the parameters $EF_{EL,m,y}$, $EF_{EL,k,y}$, $EF_{grid,OMadj,y}$, $EF_{grid,BM,y}$ have been enhanced in order to be more precise and transparent. In addition the national emission factor calculation (spreadsheet 060812_Emission Factor Calculation 2010 V3-Exante_Revision 1.xls) has been adjusted in order to be consistent with the new provisions on the PDD. The spreadsheet and the PDD updated are attached to this document and included into the dropbox as a share files.</p>	<p>Validation Team Response:</p> <p>In the PDD version 02.0 (and further versions) the justification of the choice of data, description of measurement methods, the data sources and procedures to calculate the parameters $EF_{EL,m,y}$, $EF_{EL,k,y}$, $EF_{grid,OMadj,y}$, $EF_{grid,BM,y}$ are in accordance with provisions of the updated PDD form and the spreadsheet used to calculate the Colombian grid emission factor (060812_Emission Factor Calculation 2010 V3-Exante_Revision 1.xls)</p> <p>Validation Team Conclusion: Closed</p>
<p>CL 12</p> <p>The parameter $EG_{BL,y}$ should be described for each hydroelectric project in Clause B.7.1 of PDD</p>	VVS version 05.0 paragraph 132	<p>On section B.7.1 of PDD the description of the parameter $EG_{BL,y}$ has been enhanced in order to provide specific information for the measurement of the net electricity generated and supplied to the grid by each power plant considering the provisions of the AMS.I-D version 17 (this in line with each project monitoring scheme). On section A.4.2 of PDD the connection scheme of each project has been included in order to provide more clarity regarding the measurement of the net electricity generated. The PDD updated is attached to this document.</p>	<p>Validation Team Response:</p> <p>The description of the parameter $EG_{BL,y}$ for each hydroelectric project included in this bundled project was included in section B.7.1 of the Pdd version 02.0 (and further versions)</p> <p>Validation Team Conclusion: Closed</p>

**VALIDATION REPORT VVS
Annex A**



<p>CL 13 The description of measurements methods and procedure to be applied for parameter $EG_{BL,y}$ is not in accordance with the real project scheme</p>	<p>VVS version 05.0 paragraph 132</p>	<p>On section B.7.1 of PDD the description of measurement methods and procedures to be applied (including QA/QC aspects) for the parameter $EG_{BL,y}$ has been enhanced in order to provide specific information for the measurement of the net electricity generated and supplied to the grid by each power plant considering the provisions of the AMS.I-D version 17 (this in line with each project monitoring scheme). On section A.4.2 of PDD the connection scheme of each project has been included in order to provide more clarity regarding the measurement of the net electricity generated. The PDD updated is attached to this document.</p>	<p>Validation Team Response:</p> <p>The description of measurements methods and procedure to be applied for parameter $EG_{BL,y}$ is in accordance with the real project scheme (see: section B.7.1 of the PDD version 02.0 (and further versions))</p> <p>Validation Team Conclusion: Closed</p>
<p>CL 14 The auxiliary consumptions have not been taken into account in the electricity net generation for each plant</p>	<p>VVS version 05.0 paragraph 132</p>	<p>On sections B.6.1 and B.7.1 of PDD the following text (according to the AMS.I-D version 17) has been included "The net electricity export/supplied to a grid is the difference between the measured quantities of the grid electricity export and the import and is determined as the measured quantities of the grid electricity delivered to the grid minus the auxiliary electricity consumption, technical losses and electricity imports from the grid to each project power plant" to clarify the net electricity determination and how are taken into account the auxiliary consumptions and electricity imports. The PDD updated is attached to this document.</p>	<p>Validation Team Response:</p> <p>In section B.6 and B7 of the PDD version 02.0 (and further versions) the auxiliary consumptions have been taken into account in accordance with the provision of the applied methodology.</p> <p>Validation Team Conclusion: Closed</p>
<p>CL 15 The spreadsheet with financial calculations for investment analysis should be provided in English language</p>	<p>VVS version 05.0 paragraph 118</p>	<p>The spreadsheet "220413 Investment analyses EAAB projects V1 SUBA-USAQUEN_Revision 5" has been updated in order to be consistent with the CDM language requirements and the information provided on the PDD. The spreadsheet and the PDD updated are</p>	<p>Validation Team Response:</p> <p>The spreadsheet with financial calculations for investment analysis (file: 230413 Investment analyses EAAB projects V1 SUBA-</p>

VALIDATION REPORT VVS
Annex A



attached to this document.

*USAQUEN_Revision 5.xls)
was provided in English
language*

*Validation Team Conclusion:
Closed*

Annex B

Letter of Approval (LoA)

Annex C

Audit Team Experience and Knowledge

FRANCY MILENA RAMÍREZ TORRES
CDM Lead Auditor

Electrical Engineer. Universidad Los Andes, 2001

Postgrade: Assessment of Social Projects. Universidad Los Andes, 2005

University of Oxford. Course: Applying Knowledge Management, Principle and Practices (December 1 de 2009).

University of Oxford. Course: Successful Change Management for Engineers, Scientists and Staff in Hi-tech Companies (Diciembre 2 de 2009).

University of Oxford. Course: Essentials of Project Management for Engineers, Scientists and Staff in Hi-tech Companies (December 3 de 2009).

University of Oxford. Course: Advanced Project Management for Engineers, Scientists and Staff in Hi-tech Companies (December 4 de 2009).

Climate Change, Trade and Standardization - in a development perspective". Estocolmo, Suecia (23 y 25 de Noviembre de 2009)

ISO global workshop on Greenhouse Gas Schemes Addressing Climate Change – How ISO Standards Help, Estocolmo, Suecia. (20 y 21 de Noviembre de 2009)

Conference on Climate Change – Deforestation and Standardization. Bali, Indonesia (31 de mayo y 1 de junio de 2010)

PROFESSIONAL EXPERIENCE

- ICONTEC. (2005 – Actually)

Professional of Standardization

Planning, coordinate, implement and ensure compliance with the program of national standardization in technical committees among which are electrical installations, electrical power quality, electrical transformers, substations and equipment for medium and high voltage, lighting, appliances and electrical accessories, protection against lightning strikes and electrical equipment. Develop technical standards. Develop and manage special projects assigned. Participate in programs of regional and international standardization.

- CODENSA (2002 – 2005)

Inspections and electrical works coordinator

Supervise field work and download the results in the central information system, evaluate the inspections performed, reconciled with contractors, addressing the results of inspections to different areas of the company, charging inspections and electrical work to clients of the firm, coordination and support group field sales engineers, technical training for technical staff, administrative support to department business processes and lost control, maintenance of the database for internal management inspections. Project Leader for the Optimization of Technical Processes and Regional Trade in Cundinamarca.

EXPERIENCE IN CDM ACTIVITIES:

Lead Auditor

- Validation of Guanaquitas 9.74 MW hydroelectric project, Colombia
- Validation of Fuel Switching through change of furnaces at Imusa S.A., Colombia
- Validation of Installation of a high-pressure/high-efficiency bagasse boiler to cogenerate heat and power, Argentina
- Validation of Cueva Maria Hydroelectric Expansion Project, Guatemala
- Validation of Paysandú Clean Energy, Uruguay
- Validation of La Vegona Hydroelectric project, Honduras
- Validation of Chamelecón 280 Hydroelectric project, Honduras
- Validation of Pardos SHPs and LOGICarbon CDM Project, Brazil
- Validation of Pequi and Sucupira SHPs and LOGICarbon CDM Project, Brazil
- Validation of Cambará and Embaúba SHPs and LOGICarbon CDM Project, Brazil
- Validation of Bonyic hydroelectric project, Panamá
- Validation of METALDOM Fossil fuel switch from reheat furnace, República Dominicana
- Validation of Toachi – Pilaton Hydroelectric Project, Ecuador
- Validation of EMGEA Small Hydropower (SHP) Run-of-the-River CDM Project Bundle, Colombia
- Validation of Energy efficiency at Malvinas Gas Plant, Perú
- Validation of Marañon Hydroelectric Project, Perú
- Validation of Santa Rita Hydroelectric Plant, Guatemala
- Validation of Ventana, Suba and Usaquen Hydroelectric CDM Bundled, Colombia
- Verification of Los Algarrobos hydroelectric project, Panamá
- Verification of Bio energy in General Deheza –Electric power generation from peanut hull and sunflower husk-, Argentina
- Validation of Taurichuco Hydropower Project, Perú
- Validation of Aguafresca Multipurpose and Environmental Service Project, Colombia
- Verification of Agua Fresca Multipurpose and Environmental Service Project, Colombia
- Verification of La Joya Hidroelectric project, Costa Rica
- Verification of Amaime Minor Hydroelectric Power Plant, Colombia

Specialist

- Validation of Rio Bonito and Baitaca SHPs and LOGICarbon CDM Project, Brazil
- Validation VCS of Pequi and Sucupira SHPs and LOGICarbon CDM Project, Brazil
- Verification of three crediting periods of La Vuelta and la Herradura hydroelectric project, Colombia

CDM Technical Reviewer

- Validation of Improving energy efficiency in a new Gas Plant in Gibraltar - Colombia
- Validation of Tres Valles Cogeneration Project, Honduras
- Validation of Tunjita Diversion Hydroelectric Project, Colombia
- Validation of Ferreira Gomes Hydro Power Plant CDM Project, Brazil
- Verification of two crediting periods of La Venta II, México
- Verification of two crediting periods of La Joya Hidroelectric Project, Costa Rica
- Verification of Bio energy in General Deheza –Electric power generation from peanut hull and sunflower husk-, Argentina
- Verification of Tres Valles Cogeneration Project, Honduras
- Verification of Agua Fresca Multipurpose and Environmental Services, Colombia
- Verification of La Venta II, México
- Verification of two crediting periods of Fertinal Nitrous Oxide Abatement Project, México
- Verification of Co-composting of EFB and POME project, Guatemala
- Verification of Biogas Project, Olmeca III, Tecun Uman, Guatemala
- Verification of Jepirachi Wind Power Project, Colombia
- Verification of Biogas energy plant from palm oil mill effluent, Guatemala
- Verification of Santa Ana Hydroelectric Project, Colombia
- Validation of SHP Morro Azul CDM Project (JUN1164), Colombia
- Verification of Biogas Project, Olmeca III, Tecun Uman, Guatemala

Specialist Technical Reviewer

- Validation of Biogas project, Olmeca I, Santa Rosa, Guatemala
- Validation of CGR Catanduva Landfill Gas Project, Brazil
- Validation of Macaubas Landfill Gas Project, Brazil

FERNANDO GÓMEZ GÓMEZ **Technical Expert**

Electrical Engineer. Universidad Nacional (1967)
Master of Power Systems - Instituto Tecnológico de Monterrey (1970)
EAFIT Financial Specialist (1984)

PROFESSIONAL EXPERIENCE

- ECONOMETRÍA S.S. - Technical Advisory (October 2002 - March 2003)

Technical Advisory to Unidad de Planeación Minero Energética to incorporate international electrical interconnections into the Colombian electrical planning carried by UPME, (including use of SUPEROLADE, MPODE, NEPLAN and REAL models).

- ECOENERGIA S.S. ESP - Founding Member and Manager

Management of private projects of generation, distribution and commercialization of power.

- UNIDAD DE PLANEACIÓN MINERO ENERGÉTICA – UPME (October 1996 - October 1997)

Elaboration of Catalog of Generation Projects for National Energy Plan,

- AUDITORES ENERGÉTICOS - AENE LTDA (October 1994 - March 1995)

Advisory to the company in the application of the new regulatory scheme of Colombian electrical sector to private and public entrepreneurial management through the following studies:

- CORELCA: Determination of marginal costs and development of innovative rate structures for power generation companies and big industrial customers, October 1994 - March 1995.
- CORELCA: Development and application of rate models to prepare proposal on power sale in the wholesale market, July 1995 - September 1995.
- Empresa de energía de Cundinamarca - EEC: Advisory in convoking and long-term power contracting, July 1995 - September 1995.
- Instituto Nacional de Ciencias Nucleares y Energías Alternativas - INEA: Development of tutorial model for financial assessment of energy projects in the industry, April 1995 - September 1995.
- Consorcio Nacional de Energía CNE : Consortium Management. Elaboration of studies on power commercialization in Colombia and competitive strategies. Interpretation and application of the Code of Commerce, Code of Networks and other power regulatory standards - commercial activity in Colombia, October 1995 - March 1996.
- EMPRESA DE ENERGIA DE BOGOTÁ – EEB (1978 – 1994)

Positions:

- Chief of the Department of generation planning, interconnection and sub-transmission, 1978 - 1979.
- Chief of Electric Planning Division, 1979 - 1986.
- Assistant for Technical Sub-management, 1986 - 1987
- Chief of Special Projects Division, 1987
- Chief of expansion and Development Division, 1987 - 1994
- Management Advisor, 1994
- INTERCONEXIÓN ELÉCTRICA S.A - ISA (1976 – 1978)

Engineer Specialist in electric planning Research and development of models for planning and operation of electric systems.

National Coordinator of Colombian electric system planning in the project “Study of Electric Power Sector (Estudio del Sector de Energía Eléctrica), ESEE” winner of the National Award of Engineering.

EXPERIENCE IN CDM ACTIVITIES

Participation as an Energy expert in:

- Validation of El Bote Small Hydroelectric Plant project
- Validation of Caruquia 9.76 MW hydroelectric project
- Validation of Guanaquitas 9.74 MW hydroelectric project
- Validation of Hydroelectric Project of the Amoya River
- Validation of Fuel Switching through change of furnaces at Imusa S.A.
- Validation of Cervecería Hondureña Methane Capture Project
- Validation of Installation of a high-pressure/high-efficiency bagasse boiler to cogenerate heat and power
- Validation of Macano Small Hydro Power Plant
- Validation of Cueva Maria Hydroelectric Expansion Project
- Validation of La Vegona Hydroelectric project
- Validation of Chamelecón 280 Hydroelectric project
- Validation of Pardos SHPs and LOGICarbon CDM Project
- Validation of Pequi and Sucupira SHPs and LOGICarbon CDM Project
- Validation of Cambará and Embaúba SHPs and LOGICarbon CDM Project
- Validation of Bonyic hydroelectric project
- Validation of Tres Valles Cogeneration Project
- Validation of Tunjita Diversion Hydroelectric Project
- Validation of METALDOM Fossil fuel switch from reheat furnace.
- Validation of Toachi – Pilaton Hydroelectric Project
- Validation of El Toqui wind power project
- Validation of EMGEA Small Hydropower (SHP) Run-of-the-River CDM Project Bundle
- Validation of Ferreira Gomes Hydro Power Plant CDM Project
- Validation of Providencia I: 1.8MW Small Hydro Power Generation Plant
- Validation of Providencia III: 9.11MW Small Hydro Power Generation Plant
- Validation of Marañón Hydroelectric Project
- Validation of Santa Rita Hydroelectric Plant
- Renewal of Aguafresca Multipurpose and Environmental Service Project
- Verification of four crediting periods of Agua Fresca Multipurpose and Environmental Services
- Verification of La Cascada 2.3 MW Hydroelectric Project
- Verification of three crediting periods of La Venta II
- Verification of RIMA Fuel Switch in Bocaiúva
- Verification of Biogas Project, Olmeca III, Tecun Uman
- Verification of Jepirachi Wind Power Project
- Verification of A joint venture project of cogeneration of electricity and hot water using natural gas and biogas produced from on-site wastewater biodigesters
- Verification of Santa Ana Hydroelectric Project
- Verification of Los Algarrobos hydroelectric project
- Verification of two crediting periods of La Joya Hidroelectric project
- Verification of Bio energy in General Deheza –Electric power generation from peanut hull and sunflower husk-
- Verification of Thuan Nhien Phong Wind Farm
- Verification of Phuong Mai 3 Wind Power Project
- Verification of CTR Rosario Landfill Gas Project
- Verification of SHP Itaguacu CDM Project (JUN 1146), Brazil
- Verification of Palmaceite Wastewater Treatment and Biogas Utilization Project

- Verification of Feira de Santana Landfill Gas Project
- Verification of SHP Morro Azul CDM Project (JUN1164)

Technical Reviewer

- Validation of Energy efficiency at Malvinas Gas Plant
- Verification of Bio energy in General Deheza –Electric power generation from peanut hull and sunflower husk-
- Verification of Teresina Landfill Gas Project
- Verification of Maceio Landfill Gas Project

PAUL FERNANDO NUÑEZ GALVEZ
Technical Expert in Training

Colegio Comfandi El Prado, Bachiller Técnico Industrial. Cali, 1993

Universidad del Valle, Civil Engineer. Cali, 2001

Escuela Colombiana de Ingeniería, Design Specialist, Construction and Conservation Roads. Bogota DC. 2003

Diploma in Traffic Engineering, 150 hours Completed. Universidad del Valle. Cali, May 2000

PROFESIONAL EXPERIENCE

Grupo Vial S.A.S. Projects Engineer, Since December 2000 until now. Review, setting and programming of the planning of traffic road signed with traffic sign lights of Santiago de Cali. Traffic analysis, calculating TPD, Forecast Future Traffic, Signalling Design Final, Design for the traffic light Tender for the Construction of Road Corridors Pretroncales the Integrated Mass Transport Passenger Cali. Design of Traffic Management Plan for the Construction of the Terminal Header and Section Sameco Trunk Road of the Integrated Mass Transport Passenger Cali. Design of Traffic Management Plan for the Construction of Patio and Workshop Valle del Lili and Aguablanca the Integrated Mass Transport Passenger Cali. Follow the Traffic Management Plan, Signage and detours for the Construction, Maintenance and Transfer Infrastructure Works, Public Space and Retrieval Arterial Road and Local Mesh Mobility Group 1 and Group 2 Mega Works of Santiago de Cali.

James Cárdenas Grisales. Engineer Specialist. Preparation of the "Traffic Study and traffic lights Patio and Workshop Aguablanca called the Integrated Mass Transport Passenger of Santiago de Cali " from May to July 2011. Consulting Services in the field of Civil Engineering to perform the "Development of Supply and Demand Study of Parking del Barrio Granada and its area of influence in the municipality of Santiago de Cali, as part of comprehensive urban mobility plan - PIMU "January-March 2011. Participate in the development of the project "Gauging external cord vehicular main access roads to the city, scanning, processing, analysis and evaluation of the data and methodology used for the characterization of traffic at the entrances and exits of Santiago de Cali, with particular emphasis on freight transportation, as part of the study of transport demand Santiago de Cali ", from March to August 2010.

Empresa de Transporte Masivo ETM S.A. Operations Coordinator, from May 2007 until April and 2010. In the preoperational stage, participation in tasks related to the process of reducing supply, making the system bus fleet, patio and workshop assignment to the dealer operation, linking bus operators, implementation and operation start . In Stage Operational Functions of programming and control, supervision and support in the performance of bus operators MIO system and follow-up scorecards levels of service by the dealership operation.

Cadavid Arquitectos. Traffic Engineer Contractor, September-November 2007. Prepare the traffic study, geometric design and signage of the project: Rehabilitation of Public Space Roosevelt Avenue between Calle 34 and Carrera 5 and the Carreras 34 and 36 between Calles 6 and 9 of Santiago de Cali.

Empresa de Buses Blanco y Negro S.A. Transportation Coordinator, from February 2004 to April 2007. Regulatory review and statistical trends of indices and variables related operational public transport. Design review and allocation plan bearing the same available to the fleet. Study routes. Management personnel (drivers and monitors operational control).

EXPERIENCE IN CDM ACTIVITIES

- Validation of Suba and Usaquén Hydroelectric CDM Bundled
- Validation of Project LRT system in tunis
- Validation of EKO Electric Vehicles, India
- Validation of Electrotherm Electric Vehicles, India
- Validation of Hero Electric Vehicles
- Validation of Lohia Auto Industries Electric Vehicles, India
- Verification of Santa Ana Hydroelectric Project
- Verification of BRT Lines 1-5 EDOMEX, Mexico
- Verification of Metro Delhi, India
- Verification of BRT Zhengzhou, China

JACOBO CARRIZALES

CDM Lead Technical Reviewer

Bilingual Zootechnician (animal husbandry) and Environmental Management and Sustainable Development magister

PROFESSIONAL EXPERIENCE

- ICONTEC - 6th of December 2011 - Present

Position: Audit and Technical expert

Specialized technical services for CDM projects (Clean Development Mechanism) as well as auditing services for CDM Validation and Verification.

- Estudios Técnicos Diana Rauchwergwer - 20th to 24th of December 2011 and y 2nd to 10th of January 2012. Paz de Rio –Boyacá-

Position: Field Assistant

Soil associated wildlife recognition as part of environmental impact studies

- Corporación Colombia Internacional -CCI- 15th to 30th of November 2011. Bogotá

Position: Loan Reviewer

Credit requests documentation inspection

- Secretaría Distrital de Ambiente - 7th of March to 9th of June 2011. Bogotá

Position: Public server. Professional responsible of wildlife traffic prevention

Lectures on sensitizing about wildlife traffic on district public schools. Bogotá, teacher at the course “Good environmental practices in Animal Commercialization”. Escuela de Altos estudios -OPEL- (Secretaria Distrital de Ambiente).

- Secretaria Distrital de Ambiente - 8th of September 2010 to 7th of January 2011. Bogotá

Position: Public server. Professional responsible of wildlife traffic prevention

Wildlife legal use monitoring, lectures on sensitizing about wildlife traffic on district public schools

- O. G. Entertainment - 27th of April to 5th of September 2010. Bogotá

Position: English Educational advisor

Responsible of English teaching following a pre-established methodology

- Hacienda Agrominera Zelandia S.A. – Ricardo Arenas - 20th of May to 7^h of May 2007. Susa – Cundinamarca

Position: Professional advisor in systematization and productive records updating

Productive records updating from 2000 to 2007 period, about 400 dairy cattle animals along the period

- Universidad Nacional de Colombia - Facultad de Ciencias, Departamento de Geociencias. Grupo: Centro De Estudios Historia Natural De Colombia. Profesora Cristina Garzón - 5th of February to 15th of May 2007. Bogotá, Villa de Leyva -Boyacá-

Position: Lecturer. Professional supporting the Project “Contributions to the natural history of Fauna and Flora of Villa de Leyva (Boyacá, Colombia)”

Lectures to public school students from Antonio Nariño school at Villa de Leyva. The main subject was traditional productive techniques and rustic poultry races

- Finca Sevilla – Raul Behar - August to December 2006. La Calera, Vereda el Volcán – Cundinamarca

Position: Professional in charge of protection and conservation of forest areas

Silvopastoral productive system design and reforestation

- Hacienda Tres Esquinas – Gloria de Luque - December 2005 to March 2006.
La Calera Vereda Jerusalén – Cundinamarca

Position: Professional in charge of protection and conservation of forest areas

Silvopastoral productive system design, wetlands protection and reforestation

- Hacienda Juncas S.A. – Philip George - February to December 2004.
Simijaca – Cundinamarca-

Position: Professional Practice

Productive duties and stock control. Productive, sanitary and reproductive records updating. Advisory in animal nutrition and management

ACADEMIC BACKGROUND

- Environmental Management and Sustainable Development Magister - 2010 to 2012 – 14th of December 2012-

Main Professional Skills

Masters focused on research, self-deepening on economic valuation of natural resources and environmental economy

Institution

Universidad Distrital Francisco José de Caldas

Dissertation Title

Potential use and management valuation of game wildlife associated to beef cattle productive areas in Orinoquia Region. Case of study: Venado Cola Blanca (*Odocoileus virginianus* Zimmermann, 1780) y Chiguiro (*Hydrochoerus hydrochaeris* Linnaeus, 1766) harvesting in “Pénjamo” farm of Hato Corozal county (Casanare)

Zootechnician (animal husbandry specialist) - 1999 a 2005 – 27th of October 2005

Main Professional Skills

Domestic animal productive methods, wildlife breeding, quality process analysis and agricultural business administration

Institution

Universidad De La Salle

Dissertation Title

Relationship between age, weight and reproductive efficiency in competition Brahman females

ADDITIONAL STUDIES

Market Research - August to October 2009

Institution

City University of London

Advanced Marketing - February to April 2009

Institution

City University of London

General English - June to December 2007

Institution

Avalon School of English. London

Emprendimiento y Empresarismo - February 2006

Institution

SENA. Bogotá

Artificial Insemination - June 2000

Institution

Asociación Club Bovino Lasallista. Universidad De La Salle. Bogotá

EXPERIENCE IN CDM ACTIVITIES

Lead Auditor

- Verification of Monomeros nitrous oxide abatement project, Colombia
- Validation of Thuan Nhen Phong Wind Farm, Viet Nam
- Validation of Phuong Mai 3 Wind Power Project, Viet Nam

Specialist

- Validation of CGR Catanduva Landfill Gas Project, Brazil
- Verification of Macaubas Landfill Gas Project, Brazil
- Verification of Ciudad Juarez Landfill Gas to Energy Project, México

Technical Reviewer

- Verification of BRASCARBON Methane Recovery Project BCA-BRA-02, Brazil
- Verification of BRASCARBON Methane Recovery Project BCA-BRA-03, Brazil
- 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
- Verification of Biogas energy plant from palm oil mill effluent, Guatemala
- Verification of Co-composting of EFB and POME project, Guatemala
- Validation VCS of BRASCARBON Methane Recovery Project BCA-BRA-02, Brazil
- Validation VCS of BRASCARBON Methane Recovery Project BCA-BRA-03, Brazil
- Validation VCS of BRASCARBON Methane Recovery Project BCA-BRA-05, Brazil
- Validation VCS of BRASCARBON Methane Recovery Project BCA-BRA-07, Brazil
- Validation VCS of BRASCARBON Methane Recovery Project BCA-BRA-08, Brazil
- Verification VCS of BRASCARBON Methane Recovery Project BCA-BRA-02, Brazil
- Verification VCS of BRASCARBON Methane Recovery Project BCA-BRA-03, Brazil
- Verification VCS of BRASCARBON Methane Recovery Project BCA-BRA-05, Brazil

- Verification VCS of BRASCARBON Methane Recovery Project BCA-BRA-07, Brazil
- Verification VCS of BRASCARBON Methane Recovery Project BCA-BRA-08, Brazil

CRISTIAN DARIO GRISALES BERNAL
Specialist Tech Reviewer

ISO 14001 Lead Auditor
 ICONTEC
 February - May 2013

ISO 9001 Lead Auditor
 ICONTEC
 August - October 2012

Electrical Engineer
 National University of Colombia
 Bogotá - Colombia
 July 2009

PROFESSIONAL BACKGROUND

CDM Professional
 ICONTEC
 May 2012 – Today

Electrical Maintenance Engineer
 Hydroelectric Power Plants
 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.

Phone (57-1) 6274738 Ext 101, Mobil (57) 3182611285
 November 3, 2009 - April 30, 2012

EXPERIENCE IN CDM ACTIVITIES:

Specialist

- Validation of Biogas Project, Olmeca I, Santa Rosa, Guatemala
- Validation of CGR Catanduva Landfill Gas Project, Brazil
- Validation of Macaubas Landfill Gas Project, Brazil
- Validation of Taurichuco Hydropower Project, Perú
- Validation of Teresina Landfill Gas Project, Brazil

- Validation of Maceio Landfill Gas Project, Brazil
- Verification of Amaime Minor Hydroelectric Power Plant, Colombia
- Validation of Doña Teresa Small Hydro Power Plant, Colombia
- Verification of the Ciudad Juarez Landfill Gas Project, Mexico
- Verification and Renewal of the Crediting Period of LaGeo Geothermal Project, Salvador
- Verification of Santa Ana Hydro Power Project, Colombia

Technical Reviewer

- Validation of Thuan Nhlen Phong Wind Farm, Viet Nam
- Validation of Phuong Mai 3 Wind Power Project, Viet Nam
- Validation of Chamelecón 280 Hydroelectric project, Honduras
- Validation of Providencia I: 1.8MW Small Hydro Power Generation Plant, Colombia
- Validation of Providencia III: 9.11MW Small Hydro Power Generation Plant, Colombia
- Validation of SHP Itaguacu CDM Project (JUN 1146), Brazil, Brazil
- Renewal of Aguafresca Multipurpose and Environmental Service Project, Colombia
- Validation of Feira de Santana Landfill Gas Project, Brazil
- Validation of SHP Morro Azul CDM Project (JUN1164), Colombia
- Verification of Santa Ana Hydroelectric Plant, Colombia
- Verification of Methane recovery and effective use of power generation project Norte III-B Landfill, Argentina
-