

**CDM VALIDATION REPORT****GAS NATURAL SDG S.A.****VALIDATION OF THE PROJECT ACTIVITY:****BAJO TULUÁ MINOR HYDROELECTRIC  
POWER PLANT****REFERENCE NUMBER: 2008/0989/CDM/07****REPORT NUMBER: 01**

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**VALIDATION REPORT**

<b>Date of first issue:</b> 2009-07-24	<b>Reference No:</b> 2008/0989/CDM/07
<b>Client:</b> GAS NATURAL SDG, S.A	
<b>Summary:</b> <p>The Spanish Association for Standardization and certification (AENOR) has carried out the validation of the "Bajo Tuluá Minor Hydroelectric Power Plant" located in the Municipalities of Buga, Tuluá and San Pedro, in the department of the Cauca Valley, Colombia, on the basis of UNFCCC criteria for the CDM, as well as relevant decisions of the EB.</p> <p>The objectives of the validation are to confirm that the project follows the above criteria and the approved methodology and that the PDD presented by Empresa de Energía del Pacífico (EPSA) and Gas Natural SDG, S.A. will lead to a realistic determination of the emissions reductions of the project activity. The scope of the validation covers the additionality assessment (investment and barrier analysis), the environmental impact study and the stakeholder consultation. In addition it covers the baseline methodology, the calculation of the emission factor (ex-post) and the monitoring methodology to quantify the emissions reductions during the operational life of the project.</p> <p>The validation carried out by AENOR, involved a desk study of the PDD, associated documentation and the approved methodology. The next step was the visit of the validation team to Cali, in the department of Cauca Valley, and EPSA head office in Cali, Republic of Colombia, where not only key personnel involved in the project, but also Representatives of the Community of Tuluá, Buga y San Pedro were interviewed. The validation team interviewed in a previous visit the headquarters of XM (Electric Market Operator) in Medellín. In this validation visit was not necessary to interview them again, since the necessary data are available on their web site. Conformance with legal and environmental regulations was also confirmed in the Environment Competent Authority, Corporación Autónoma Regional del Valle del Cauca (CVC) head office in Cali. A visit to the relevant organizations was carried out in Colombia, but a visit to the site of the project activity could not be developed because the power plant is located in an isolated rural area and it is vulnerable to guerrilla attacks.</p> <p>Clarifications and corrective actions on a number of issues were requested by AENOR according to desk review and on-site visit conclusions; these were amended satisfactorily by EPSA and resulted in the last version of the original PDD (version 03.-5). In the opinion of AENOR the project meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria, therefore the project shall be recommended for registration.</p>	

<b>Report No.:</b> 2008/0989/CDM/07		
<b>Report title:</b> VALIDATION REPORT <b><i>BAJO TULUÁ MINOR HYDROELECTRIC PROJECT</i></b>		
<b>Members of the validation team:</b> Elena Llorente Pérez Mercedes García Madero Marcelino Pellitero Martinez Luis Robles (Technical reviewer)		
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**Indexing terms**

Hydroelectric plant, CO<sub>2</sub>, climate change, CDM project, Colombia national grid, GHG emissions

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## VALIDATION REPORT

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### Abbreviations

ACM0002	Approved consolidated baseline and monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources
BM	Build Margin
CAR	Corrective Action Requested
CL	Clarification
CCGT	Combined Cycle Gas turbine
CDM	Clean Development Mechanism
CER	Certified Emission Reductions
DECISION 3/CMP.1	Modalities and Procedures for a Clean Development Mechanism as Defined in Article 12 of the Kyoto Protocol
DNA	Designated National Authority
EB	Executive Board of the CDM of the Kyoto Protocol
EIA	Environmental Impact Assessment
GHG	Greenhouse Gasses
GWhB <sub>eB</sub>	Electrical Giga Watt hour
GWhB <sub>tB</sub>	Thermal Giga Watt hour
IPCC	Intergovernmental Panel on Climate Change
MP	Monitoring Plan
MWh	Mega Watt hour
OM	Operating Margin
PDD	Project Design Document
CVC	Regional Corporation of Cauca Valley
tC	Carbon tonnes
tCOB <sub>2B</sub>	Carbon dioxide equivalent tonnes
TJ	Tera Joules
Tool	Tool for the calculation of the emission factor of the electricity system
Additionality tool	Tool for the demonstration and assessment of the additionality
UNFCCC	United Nations Framework Convention on Climate Change
VVM	Validation and Verification Manual
XM	Company of Market Experts

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VALIDATION REPORT

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## 1 INTRODUCTION

This validation concerns a project implemented by Gas natural SDG, S.A, in Colombia to reduce emissions of CO<sub>2</sub> by generating renewable energy coming from hydraulic resources. The objectives of the validation exercise are to confirm that the project meets the necessary CDM criteria, that the project follows the approved consolidated methodology, ACM0002 (Version 10), and that the proposals presented by Gas natural SDG, S.A in the PDD will lead to a realistic determination of the emissions reductions.

The scope of the validation covers the additionality assessment (investment and barrier analysis), the environmental impact study and the stakeholder consultation. In addition it covers the baseline methodology, the calculation of the emission factor and the monitoring methodology to quantify the emissions reductions during the operational life of the project.

The project implies the installation of 20 MW hydroelectric power plant in the Municipalities of Tuluá, Buga and San Pedro, department of Cauca Valley, in the Republic of Colombia. This plant will generate electric energy that would otherwise continue to be generated with fossil fuels power plants.

### **Validation team:**

Elena Llorente Pérez	AENOR	CDM Chief Validator
Mercedes García Madero	AENOR	CDM Validator and Technical Expert
Marcelino Pellitero	AENOR	CDM Validator
Luis Robles Olmos	AENOR	Technical Expert Reviewer

**Elena Llorente Pérez- Chief validator** (Environmental Sciences Decree and Quality Management Master) is qualified as CDM Chief Validator and Verifier at the Climate Change Unit of AENOR. She has 3 years of quality and environmental consultancy experience before working at AENOR. She is working as a member of the audit team for four years. She has participated in several projects located mainly in South, Central America and Africa.

**Mercedes García Madero- Validator and Technical Expert** (Biology Degree) is qualified as Chief CDM Validator and Chief Verifier in the Climate Change Unit of AENOR. She has 5 years experience in Environmental consultancy, developing Project Design Documents of different projects. Since she has been working in AENOR, she has participated in CDM Validation and Verification processes in several countries in America and Africa as well as methodologies assessment.

**Marcelino Pellitero Martinez- Validator**, (MSc in Economics and Diploma in Operations, Logistics and Transportation) is one of the financial experts of AENOR for the Climate Change Unit. In addition, he has ten years work experience in economic and financial analysis of environmental projects, he has been member of the Economic Analysis Group of the Spanish Ministry of Environment and he is co-author of several national and international articles and books.

**Luis Robles Olmos- Technical Reviewer Expert**, (Agronomic Engineer) is the Manager of the Climate Change Unit, qualified as chief validator and chief verifier. During his 15 years of experience in environmental and quality management sector, has developed plenty climate change activities, especially in CDM sector. Currently, he is developing validation and verification activities of the Climate Change Unit, and technical revisions as well.

## 1.1 Objective

Gas natural SDG, S.A has commissioned AENOR to validate “**Bajo Tuluá Minor Hydroelectric Power Plant**”. The purpose of a validation is to have an independent third party assessment of the project design. In particular, the project's baseline, the monitoring plan (MP), and the project's compliance with relevant UNFCCC and host country criteria are validated in order to confirm that the project design as documented is sound and reasonable and meets the stated requirements and identified criteria.

Validation is a requirement for all CDM projects and it is considered as necessary to provide assurance of the quality of the project and its intended generation of certified emission reductions (CERs).

UNFCCC criteria refer to the Kyoto Protocol criteria and the CDM rules and modalities as agreed in the Bonn Agreement and the Marrakech Accords.

## 1.2 Scope

The scope of the validation is to assess all aspects of GHG reduction involved in the project, including the project design, the baseline, the determination of the emission factor of the grid and the procedures proposed for monitoring the emissions reductions in the future.

The following documents were reviewed as part of the scope of the activity:

- PDD, including baseline study and monitoring plan.
- Approved Methodology: ACM0002 (Version 07 and 10).
- Decision 3/CMP.1 and relevant decisions and guidelines from the EB.
- Validation and Verification Manual. Version 01.2.
- Associated documentation (environmental requirements, investment analysis, etc.)

The validation scope is defined as an independent and objective review of the project design document, the project's baseline study and monitoring plan and other relevant documents. The information in these documents is reviewed against Kyoto Protocol requirements, UNFCCC rules and associated interpretations. AENOR, based on the Instruction for validation, verification and certification of CDM project activities (IE-DTC-039.), and the Validation and Verification Manual, has used a risk-based approach in the validation, focusing on the identification of significant risks for project implementation and the generation of CERs.

The validation is not meant to provide any consultancy services to the Client. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the PDD.

## 1.3 GHG Project Description

**Title of the project activity:** “Bajo Tuluá Minor Hydroelectric Project”

**Project participants:**

Empresa de Energía del pacífico, EPSA S.A. E.S.P.

Gas Natural SDG, S.A

**Host Party:** Colombia.

The purpose of this project is to build a Hydroelectric Power Plant, with a total installed capacity of 20 MW, with the aim of making use of the capacity of the Tuluá River. The ultimate objective of the project is not only to build a power plant to cover the expected increase in demand for electricity, but to contribute to the improvement in the efficiency of the electricity system in general; increasing the electricity service in the department of the Cauca Valley, while contributing to the sustainable development of the region with the reduction of CO<sub>2</sub> emissions.

The power plant will be of the run-of-river type with the purpose of minimizing environmental impact. The Project will not only displace fossil fuel-based generation with a clean energy source; but it will also increase local employment, and brings new investment to the region.

The minor Hydroelectric Power Plant of Bajo Tuluá will provide a response to the following objectives set forth:

- To cater for the electricity generation and supply requirements of the Cauca Valley with an environmentally sustainable method.
- Contribute towards the sustainable development priorities of the Department of the Cauca Valley with the corresponding environmental and economic benefits for the country in general and for the project area in particular.
- Stimulate the transfer of clean technologies from the most developed countries, while attracting investment flows to Colombia, thus encouraging the sustainable development of the country.
- Reduce the level of global greenhouse gas emissions from the national Colombian electricity system, thus mitigating the medium and long-term effects of the global climate change.

The Bajo Tuluá minor hydroelectric Project will have an installed capacity of 20 MW with two Francis turbines, as it was crosschecked against the Environmental License (0100 No.0730-0606 and clarification 0100 No.0720-144). It is expected to generate 117.4 GWh per year in accordance with the technical characteristics of the turbines.

AENOR considers that the guidelines for the completion of the PDD in their most recent version have been followed. Relevant information was provided by the participants in the applicable PDD sections.

## 2 METHODOLOGY

The validation of the project started in August 2008 and concluded in February 2010. The validation was performed in the manner of an audit, where a desk review of the PDD version 03.1 was first undertaken against the approved methodology and CDM and other relevant criteria. The desk review was followed by a site visit to EPSA, CVC, and key stakeholders in Colombia.

In order to ensure transparency, a validation protocol was customized for the project, according to Instruction IE-DCT-039. The protocol shows, in a transparent manner, criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organizes, provides details and clarifies the requirements a CDM project is expected to meet.
- It ensures a transparent validation process where the validator will document how a particular requirement has been validated and the result of the validation.

The validation protocol consists of three tables. The different columns in these tables are described in Figure 1. The completed validation protocol is enclosed in Appendix A to this report.

Validation Protocol Table 1: Mandatory Requirements			
Requirement	Reference	Conclusion	Cross reference
The requirements the project must meet.	Gives reference to the legislation or agreement where the requirement is found.	This is either acceptable based on evidence provided ( <b>OK</b> ), or a <b>Corrective Action Request (CAR)</b> of risk or non-compliance with stated requirements. The corrective action requests are numbered and presented to the client in the Validation report.	Used to refer to the relevant checklist questions in Table 2 to show how the specific requirement is validated. This is to ensure a transparent Validation process.

Validation Protocol Table 2: Requirement checklist				
Checklist Question	Reference	Means of verification (MoV)	Comment	Draft and/or Final Conclusion
The various requirements in Table 1 are linked to checklist questions the project should meet. The checklist is organized in seven different sections. Each section is then further sub-divided. The lowest level constitutes a checklist question.	Gives reference to documents where the answer to the checklist question or item is found.	Explains how conformance with the checklist question is investigated. Examples of means of verification are document review (DR) or interview (I). N/A means not applicable.	The section is used to elaborate and discuss the checklist question and/or the conformance to the question. It is further used to explain the conclusions reached.	This is either acceptable based on evidence provided ( <b>OK</b> ), or a <b>Corrective Action Request (CAR)</b> due to non-compliance with the checklist question (See below). <b>Clarification</b> is used when the validation team has identified a need for further clarification.

Table 2.1 has been included in order to summarize the new requirements of the Validation and Verification Manual (version 01.2).

Validation Protocol Table 3: Resolution of Corrective Action and Clarification Requests			
Draft report clarifications and corrective action requests	Ref. to checklist question in table 2	Summary of project owner response	Validation conclusion
If the conclusions from the draft Validation are either a Corrective Action Request or a Clarification Request, these should be listed in this section.	Reference to the checklist question number in Table 2 where the Corrective Action Request or Clarification Request is explained.	The responses given by the Client or other project participants during the communications with the validation team should be summarized in this section.	This section should summarize the validation team's responses and final conclusions. The conclusions should also be included in Table 2, under "Final Conclusion".

**Figure 1 Validation protocol tables**



## 2.1 Review of Documents

The Project Design Document submitted by EPSA was reviewed against the approved methodology and against CDM and other relevant criteria. Additional background documents related to the project design and baseline were also made available before and during the on-site visit in Colombia. These documents were also reviewed.

To address the corrective actions and clarification requests that arose from the desk review and on-site visit, EPSA and Gas natural SDG, S.A revised several times the project design document and developed a final version (version 03.5) submitted to the audit team on 25 February 2011

The final validation findings are presented in this report related to the project as described in the final PDD

The reviewed documents used during all the validation process are detailed in the Chapter 6 of this report.

## 2.2 Follow-up Interviews

AENOR conducted interviews with project developers in Colombia to confirm selected information and to resolve issues identified in the document review.

On 27-30<sup>th</sup> October 2008, representatives of EPSA, and main stakeholders were interviewed: the Mayor of Buga, Tuluá and San Pedro and the representatives of the Environmental Authority also were interviewed in Cali.

The main topics of the interviews are summarized in Table 1.

**Table 1 Interview topics**

Interviewed organization Person/Position	Interview topics
<b>GAS NATURAL SDG, S.A</b> Madrid, Spain. <ul style="list-style-type: none"> <li>- Ángel Lagares. Environment Director.</li> <li>- Amado Gil. Carbon Management.</li> <li>- Tomás Pedraza. Investment Development.</li> <li>- German Medina. Investment Development.</li> </ul>	<ul style="list-style-type: none"> <li>✓ Project design.</li> <li>✓ Additionality assessment (investment and barrier analysis).</li> <li>✓ Baseline determination: OM &amp; BM (power plants, electricity production, start of operation, fuels, efficiencies, most recent data...).</li> <li>✓ EIA approval and related conditions.</li> <li>✓ Monitoring of environmental impacts.</li> </ul>
<b>SOCOIN</b> <ul style="list-style-type: none"> <li>- Antonio Sanz. Energy Efficiency Department.</li> <li>- Estrella Ruiz. Energy Efficiency Department.</li> </ul>	

Interviewed organization Person/Position	Interview topics
<b>EPSA ESP – Cali, Colombia.</b> <ul style="list-style-type: none"> <li>- Pablo Rondeño. Bajo Tuluá Project Manager.</li> <li>- Liliana Vidal. Responsible for Social labours.</li> <li>- Albeiro Arias. Manager of wholesale market.</li> <li>- Carlos Quiceno. Environmental Responsable.</li> </ul>	<ul style="list-style-type: none"> <li>✓ Construction and O&amp;M of the Bajo Tuluá Hydroelectric Plant.</li> <li>✓ Social performances.</li> </ul>
<b>SAN PEDRO – Colombia</b> Werney Ladino Bedoya: Major of San Pedro municipality. <b>BUGA- Colombia</b> Freddy Hernando Libreros Henao: Major of Buga municipality. <b>TULUÁ- Colombia</b> Rafael Eduardo Palau : Major of Tuluá municipality.	<ul style="list-style-type: none"> <li>✓ Opinion about the project.</li> <li>✓ Knowledge of the environmental impacts.</li> <li>✓ Benefits for the community.</li> <li>✓ Land owners current socioeconomic situation.</li> <li>✓ Consultation with municipality's authorities, land owners and other stakeholders.</li> </ul>
<b>CVC – Cali, Colombia</b> <ul style="list-style-type: none"> <li>- Alberto Valcarcel. Territorial Director</li> <li>- Pablo Emilio Flores. Biodiversity</li> <li>- Rocio Cheverre. Geologist.</li> <li>- Alberto Riascos. Water resources Expert.</li> </ul>	<ul style="list-style-type: none"> <li>✓ EIA approval and related conditions.</li> <li>✓ Monitoring of environmental impacts.</li> </ul>
<b>DNA-Bogotá, Colombia.</b> <ul style="list-style-type: none"> <li>- Sandra Garavito Rojas. Assessor of DNA Climate Change Group.</li> </ul>	<ul style="list-style-type: none"> <li>✓ Project's sustainable development contribution.</li> <li>✓ Consultation with municipality's authorities, land owners and other stakeholders.</li> <li>✓ DNA's opinion.</li> </ul>

A visit to the relevant organizations was carried out in Colombia, but a visit to the site of the project activity could not be developed because the power plant is located in an isolated rural area and it is vulnerable to guerrilla attacks.

## 2.3 Resolution of Clarification and Corrective Action Requests

The objective of this validation phase was to resolve the requests for corrective actions and clarifications and any other outstanding issues that needed to be clarified for AENOR's positive conclusion on the project design. The corrective action requests (CARs) and clarification requests (CLs) raised by AENOR were resolved during communications with project participants. To guarantee the transparency of the validation process, the concerns raised and responses given are summarized in chapter 3 below and documented in more detail in the validation protocol in Appendix A.

Since modifications to the Project design were necessary to resolve AENOR's concerns, the Client decided to revise several times the documentation and finally resubmitted the project design documentation Version 03.5 in October 2010.

The final PDD dated February 25th, 2011 following the Request for Review received on February 9th, 2011 serves as the basis for the final assessment presented; paragraphs and sections which have been revised/added with reference to the issues raised in the context of the Request for Review are further identified in detail in track changes version of the document. Changes are not considered to be significant with respect to the qualification of the project as a CDM project based on the two main objectives of the CDM. These are an achievement of reduction of anthropogenic GHG emissions and to contribute to a sustainable development.

### 3 VALIDATION FINDINGS

The main findings of the validation are stated in the following sections. The validation findings for each validation subject are presented as follows:

- 1) The findings from the desk review of the original project design documents and the findings from interviews during the on-site visit are summarized. A more detailed record of these findings can be found in the Validation Protocol in Appendix A.
- 2) Where AENOR had identified issues that needed clarification or that represented a risk to the fulfillment of the project objectives, a Clarification or Corrective Action Request, respectively, have been issued. The Clarification and Corrective Action Requests are stated, where applicable, in the following sections and are further documented in the Validation Protocol in Appendix A. During the validation process, seven Clarifications and eight Corrective Actions were requested.
- 3) Where Clarification or Corrective Action Requests have been issued, the exchanges between project participants and AENOR to resolve these Clarification or Corrective Action Requests are summarized.
- 4) The conclusions for validation subject are presented.

The final validation findings are related to the project design as documented and described in the revised and resubmitted project design documentation.

#### 3.1 Participation Requirements

The project participants for Bajo Tuluá project activity are EPSA S.A. E.S.P from the Host country, Colombia and Gas Natural SDG from Spain.

Empresa de Energía del Pacífico (EPSA) S.A. E.S.P. from the Host Party Colombia meets all relevant participation requirements following detailed:

- Colombia has confirmed that is a party of the Kyoto Protocol (2001, 30<sup>th</sup> November)
- Colombia has confirmed its voluntary participation and the contribution of the project to the sustainable development through the National Approval of the project (dated on 15<sup>th</sup> July 2009). The authenticity of the Letter of Approval was checked through interviews with the people in charge of the approval.

As stated above, the Annex I party is Gas Natural SDG, S.A, Spain.

In the first PDD, which was submitted for Global stakeholder consultation, one project participant was Union Fenosa S.A. This project participant has changed since Gas natural SDG, S.A. has absorbed the company Union Fenosa, S.A. on 04<sup>th</sup> September 2009. This situation has been stated in the last PDD, version 03.4 [5](#). It is the same company, so the approval letter from Colombia has been

considered correct. The validation team has validated this status against the certification of merger from Barcelona Official Register. This document is attached in the request for registration of Bajo Tuluá.

The Annex I Party meets also all relevant participation requirements below detailed:

- Spain has confirmed that is a Party of the Kyoto Protocol (2002, 31<sup>st</sup> May).
- Spain has confirmed its voluntary participation to the project through the Letter of Approval. The Letter of Approval of Spain was obtained on 09<sup>th</sup> October of 2009 and it is in accordance with the requirements established in the Validation and Verification Manual of the UNFCCC.

EPSA has made basic electricity training for the local communities, as it was confirmed through the official notification of these training courses evaluated by the validation team. These courses are part of the social labors that EPSA has been making in the Bajo Tuluá area.

It complies with the framework of the energy sector policies of Colombia in aspects related to renewable energy electricity generation and technological innovation.

The contribution of the project to the sustainable development of Colombia was confirmed by the DNA of the Host Country.

The validation did not reveal any information that indicates that the project can be seen as a diversion of ODA funding towards Colombia.

The LoA does not refer to a specific version of the PDD or validation report. The corresponding references included to LoA, PDD and validation report are consistent.

AENOR therefore considers that the requirements of VVM (paragraph 45-48) have been met.

## 3.2 Project Design

The PDD of *Bajo Tuluá minor Hydroelectric Project Activity* has been prepared in accordance with latest template (version 03) and guidance from the CDM Executive Board.

The "*Bajo Tuluá minor Hydroelectric Project Activity*" comprises a run-of-river hydroelectric power plant located in the Tuluá River. The hydroelectric power station will have a power house with two Francis type turbines of an installed capacity of 20 MW. The generation of the renewable electricity partly displaces electricity generation based on fossil fuels supplied to the national interconnection grid of Colombia.

The project design engineering reflects good practice. As the plants will supply generated electricity to the grid, the project is eligible as Renewable Energy Projects / Renewable electricity generation for a grid.

The main technical characteristics are detailed below:

- Type of regulation: Run-of-river.
- Capacity of each distribution point: 12 m<sup>3</sup>/s.
- Turbine design flow: 6 m<sup>3</sup>/s.
- Elevation of the distribution point: 1,474.7 meters above sea level.
- Length of the conduction tunnel: 5,657 m.
- Final diameter of the tunnel: 3.00 m.
- Maximum gross drop: 225 m.
- Installed capacity: 20 MW.
- Number and type of turbines. 2, Francis.

As it is established in the PDD, the project's contribution to sustainable development is not only related to electric generation from renewable resources and the subsequent reduction of pollutant emissions, but also to the social benefits that will introduce in the area. The power plant will be located in an area with a low standard of living and it contributes to regional development, consolidating the local and regional administrations in institutional terms. As it was checked during the *on site* interviews, its operation will provide direct financing to the municipalities that are directly affected, which will allow them to assume the development of their own projects, thus contributing directly to the improvement in the standard of living of the communities affected.

The project Design has been checked mainly against the Environmental License by the validation team, because according to local regulation, the license is a unique document, and it shall include the technical approved description of the project.

All the characteristics included in the PDD were checked during the on site visit and against the maps and the documentation submitted by EPSA. The validation team requested to modify some of them because the project participant asked for a clarification of the project activity to the Competent Authority not included in the first version of the PDD. As result of the CAR 4 (detailed in the Validation Protocol) regarding these technical characteristics, all of these changes in the design of the project were included in the new version of the PDD. (Version 03.4 5)

The last version of the PDD (version 03.4 5) finally details the design of the project in precise manner, in accordance with the accuracy and completeness principles required for the CDM process.

In conclusion, AENOR confirms that the project description, as included in the PDD, is sufficiently accurate and complete in order to comply with the requirements of the CDM.

### **3.2.1 Starting date of the Project Activity and CDM prior consideration**

The starting date of Bajo Tuluá project activity is 15th January 2009 which is the earliest date at which either the implementation or construction or real action of a project activity begins. The starting date of the Project activity stated in the first version of the PDD was not in accordance with the Glossary of Terms, so Clarification 13 was requested in order to justify this date. In the last version of the PDD, it is stated as the date of the purchase of the equipment, on 15th January 2009

The validation team has deemed as appropriate the date November 2007 as the date of final investment decision and 15<sup>th</sup> January 2009 as the starting date of Bajo Tuluá project activity. The starting date of the project activity is, according to the current version of the CDM Glossary, the earliest date at which either the implementation or construction or real action of the project activity begins. This starting date corresponds to the purchase contract of Bajo Tuluá equipment EP-CO003-2009, which was provided to the validation team.

Prior consideration of the CDM was validated according to the "Guidance on the demonstration and assessment of prior consideration of the CDM"; since the project starting date is after 02 August 2008 and, the PDD has been submitted for global stakeholder consultation on 2<sup>nd</sup> August 2008, i.e., before the project starting date, the PP does not need to inform to the Host Party DNA and UNFCCC thus project activity complies with the requirements.

A renewable crediting period of 21 years was selected. On 29th November 2011 is expected to start the power plant operation. This date was checked against the chronogram included in the technical Report of the power plant.

Accordingly, the PP has provided to AENOR the timeline of the project activity and the evidences to support it. The main milestones of the project are shown below

Date	Milestones	Evidence provided
September 2005	Early consideration of implementing the project as a CDM project	No Objection Letter by Colombian DNA
May 2007	First Local Stakeholders Consultation Meeting	Minutes of the stakeholder s meeting
November 2007	Union Fenosa/EPSA Strategic Plan (BIGGER) (Investment decision date)	BIGGER approval
April 2008	Environmental Impact Assessment (EIA)	EIA report
June 2008	Agreement with CDM consultant	Contract with SOCOIN
June 2008	Agreement with DOE	Contract with AENOR
July 2008	PDD submitted to DOE for Validation	Email sent by PP to AENOR
August 2008	PDD published for GSC	UNFCCC webpage
January 2009	Starting Date of project activity	Purchase contract of Bajo Tuluá equipment
February 2009	Beginning of civil works	Chronogram

As it is demonstrated in the table above, the development of the Project activity Bajo Tuluá Minor Hydroelectric Power Plant, continued with real actions even when a fusion process between some companies involved in the project activity was been carried out. The fusion process of Gas Natural and Union Fenosa/EPSA, started during the first trimester of 2008 and it was completed in September 2009.

All evidence provided to the validation team are credible and reliable, hence in the opinion of the AENOR validation team the project activity was seriously considered in the decision to implement the project activity

### 3.3 Baseline methodology

The PDD, version 03. [5/43](#), describes the baseline methodology, which is in conformance with the approved baseline methodology ACM0002 (Version 10) for grid-connected electricity generation from renewable sources. The key conclusions about the correct application are summarized below.

The PDD, version 03.1 [/1](#), submitted to AENOR for public comments applied the version 07 of the methodology. This version expired on August 2009, so the project participant had to update the PDD using Version 10.

The methodology is applicable because is the installation of a run-of-river reservoir hydro power plant and the power density of the power plant is greater than 4 W/m<sup>2</sup>. It has been checked against the Technical Study of the power plant.

Bajo Tuluá hydropower plant, complying with Colombia's 110/2006 Law, will supply electricity to Colombia's national grid. The system boundaries are the Colombia national grid as there are no energy transmission constraints. This requirement is in accordance with the applicability condition of the methodology *the geographic and system boundaries for the relevant electricity grid can be clearly identified and*

information on the characteristics of the grid is available. The source of data of the grid is XM *Compañía de Expertos en Mercados S.A. The official Electric Market of Colombia*.

The baseline emission factor (EFy) included in the final PDD, version 03.45, has been determined with the ex post option according to the three steps stated in ACM0002 (Version 10). The Operational Margin (OM) and the Build Margin (BM) have been calculated and combined to obtain the Baseline Emission factor.

The method selected to calculate the operating margin emission factor was the Simple Adjusted OM, called "option B" of the *"Tool to calculate the emission factor of an electricity system"*, version 2. The Simple Adjusted OM provides a formula of the sources for calculating the emission factor taking into account the hourly generation system and the % provided by the low-cost/must-run plants. This method can be applicable to electrical systems, where % of the mean generation during a period of five years for low-cost/must-run plants exceeds the 50% value, as is the case of the Colombian System. This issue was confirmed with NEON data (software application owned by the electric market operator of Colombia).

The plants registered as CDM project activities were taken into account for the calculation of the operating margin emission factor, as established by the Tool for calculation the emission factor. The procedure followed for the calculation of the operating margin was correctly described in the PDD and the Annex 3 and assessed by the validation team against the methodology and the tool. The chosen option was *ex-post* approach for the operating margin emission factor, so, it will be calculated once a year.

For the purpose of determining the Build Margin (BM) Emission Factor the set of plants used for the calculation of the build margin factor was the plants that have been built recently and generate 20% of the system's energy during 2007. CDM project activities are not included according to the methodology. "Option 2" was chosen in the build margin emission factor as the method selected. Therefore, it shall be updated annually with an ex-post approach.

The values of all plants in operation have been provided by the Associated Services Management, XM *Compañía de Expertos en Mercados S.A. E.S.P* and it was checked by the audit team against the XM web site, NEON.

Official data related to the most recent additions to the electricity generation system of Colombia and their net power generations were requested by AENOR to XM *Compañía de Expertos en Mercados S.A.* AENOR was registered in the software application NEON, in the web page XM (<http://sv04.xm.com.co/neonweb/>) in order to download all the official data. The NEON application is property of XM.

The origin of data regarding the history of the power plants (XM mail sent by the consultancy) was requested by the audit team and it was also checked.

The formulae included in the spreadsheets were checked and they were in accordance with the methodology, using the same values and variables.

Following sources of data were taken into account:

- "Emission factors for fuels Colombians" of UPME, FECOC and the Colombian Academy of Sciences. <http://www.upme.gov.co/sima/index.aspx>
- "Plan de expansión de referencia generación transmisión 2008 – 2022". UPME.
- 2006 IPCC Guidelines for National Greenhouse Gas Inventories Vol 2 Chapter 1. Table 1.2 Pag 1.18.

### 3.4 Additionality

The additionality of the Bajo Tuluá Minor Hydroelectric Power Plant activity as required by ACM0002 (version 10), is demonstrated by applying the *"Tool for the demonstration and assessment of additionality"* version 05.2.

During the validation activities, the origin of all the input values and the improvement of the financial analysis as required in the Guidance for the Investment Analysis were requested (CAR 12). As a result of this CAR, an Annex document was developed by the Project Participant in order to clarify in detail the additionality assessment. However, during the completeness check of the project, the CDM team requested the confidential PDD appendices, so CAR 16 was raised. As a result of this CAR, the PPs decided to make publicly available the financial parameters under their control (those related to BajoTuluá) in the final PDD version, and to discard the investment comparison analysis against the fuel-fired power plant in order to avoid any type of legal penalties with the technology provider because of the financial data used in that analysis was strictly confidential.

Finally, all issues requested to the PP have been resolved in opinion of the validation team since the new criteria and assumptions considered fulfill with the methodology and tool of additionality. Therefore CAR 12 and CAR 16 have been solved.

*Step 1: Identification of alternatives to the project activity consistent with current laws and regulations:*

As part of the first step of the additionality tool, in the first version of the PDD four alternative scenarios were identified. These were:

- Alternative 1: Continuation of the current trend to add capacity to the system (baseline scenario).
- Alternative 2: Execution of the project without its registration as CDM.
- Alternative 3: Construct a 350 MW coal-fired power plant in order to supply this electricity to the Interconnected System.
- Alternative 4: Construct a 25 MW fuel-fired power plant in order to supply this electricity to the Interconnected System.

AENOR was able to verify that Alternative 3 (350 MW coal-fired power plant) was not a realistic and credible alternative to the Project (20 MW of installed power). As a result of the CAR raised, this issue was solved and Alternative 3 was discarded so in the PDD latest version, the alternatives presented in the Step 1 are the following:

- Alternative 1: Continuation of the current trend to add capacity to the system (baseline scenario).
- Alternative 2: Execution of the project without its registration as CDM.
- Alternative 3: Construct a 25 MW fuel-fired power plant in order to supply this electricity to the Interconnected System.

These three alternatives are realistic and credible and comply with the regulation in place. Hence, the requirements of step one of the additionality tool were fulfilled successfully.

Alternatives and Baseline Scenario were checked against the Reference Expansion Plan of the Colombian Mining Energy Planning Unit (UPME). References are included in the PDD.

*Step 2. Investment analysis:*

Concerning the step 2, the PP has finally chosen the investment analysis. As the project activity generates financial and economic benefits other than CDM related income through the sales of electricity and the proposed baseline scenario does not involve an investment, project participants



have used an IRR benchmark analysis (Sub-step 2b – Option III) in order to demonstrate the additionality of the Project activity.

It has been demonstrated that the project IRR without any CDM revenues is estimated to be 11.67%. The Project IRR is lower than the benchmark IRR of 12.59% adopted by the Project participant. As per the “Tool for the demonstration and assessment of additionality” (version 05.2) a relevant benchmark for a project IRR can be derived from Government bond rates, increased by a suitable risk premium to reflect the private investment or project type.

In line with this, the benchmark has been derived from the Government treasury bonds raised by risk premium. The Colombian Sovereign Bond rate of 10.05% raised by the risk premium of 2.54% has been considered for the arriving at the benchmark of 12.59%. The references have been verified and crosschecked by AENOR and are found to be a conservative assumption in the CDM/additionality context hence accepted by the audit team (risk premium is significantly lower than the 4 % assigned by the Organization for Economic Co-operation and Development (OECD) to Colombia in year 2007). The IRR improves to 13.34% on considering CDM revenues.

The validation team verified that taxes and depreciation used in the investment analysis comply with the Colombian legal requirements i.e. 33% value of the corporate tax and depreciation method applied.

Following Annex 58 of EB51 “Guidelines on the Assessment of Investment Analysis”, it has been validated that the project IRR calculation reflects the expected operation of the underlying project activity (a technical lifetime of 50 years) and that the capital cost of the assets and their depreciation as an expense to the project were not treated both to constitute a double counting of this cost and that the cost of financing expenditures (i.e. loan repayments and interest) was not included in the calculation of project IRR.

In the same way, it has been validated that the project IRR calculation are not limited to the proposed crediting period and as that the fair value of the project activity assets at the end of the assessment period is zero in accordance with local accounting regulations.

November 2007 has been considered as the date of final investment decision, as Bajo Tuluá Minor Hydroelectric Power Plant was included by the Board in “Union Fenosa/Epsa Strategic Plan” (Plan BIGGER).

AENOR has verified and confirmed that the values used in the financial analysis are consistent with the value of the source and although, due to the acquisition negotiation between Union Fenosa and Gas Natural which supposed a delay in the implementation of the strategic plan (BIGGER), the period of time between the investment decision and the starting date of the project activity (14 months), it has been checked in the context of the project activity that the input values used in the investment analysis were conservative related to the existing values at the starting date of the Project (15/01/2009) and thus accepted by the validation team of AENOR. References are included in the PDD and IRR calculation spreadsheet.

The financial worksheets have been evidenced and verified to be correct. The assumptions used, the base documents and the financial calculations have also been verified.

In addition, during the assessment of this project, the reasonableness of the parameters used in the project IRR calculation were analyzed by comparison with similar projects (according to Resolution 086 of 1996 which categorizes capacities under 20 MW as minor scale, see common practice analysis below) signed as CDM project in the same area and public available data, as follows:

## **Total Investment**

The investment cost has been quoted by EPSA internal document named “Concepto Técnico Y Presupuestal Pequeña Central Hidroeléctrica Bajo Tulua. Fase Prefactibilidad” (“Technical and

financial basis for Tulua small hydropower plant, prefeasibility phase" (November 2007) which provided a quotation of 112,227 million COP (US\$ 53,442,376), corresponding to equipment, machinery, grid connection, substation, development and civil works for the project. The document "Technical and financial basis for Tulua small hydropower plant, prefeasibility phase" constitutes the basis for the Board decision of including the Project activity in the Union Fenosa/EPSA Strategic Plan (BIGGER) (November 2007). The unitary prices stated in the mentioned document were provided by the external engineering company, INGETEC SA.

AENOR checked the credibility and plausibility of the input data by comparing the applied values with the average costs provided by several sources, inter alia, the report named "Development Plan for Non-Conventional Sources of Energy in Colombia of the Mining Energy Planning Unit (UPME)" dated in 2010, the World Energy Outlook 2008 of the International Energy Agency (IEA), and with similar projects proposed as CDM project in the same area (see table 1 below); Ministerio de Minas y Energía (Energy and Mines Ministry). The parameters have been cross-checked against third-party and publicly available sources.

Table -: Comparison of investment costs per kW among minor hydropower projects in Colombia

Project	Capacity (MW)	Total investment US\$ 1,000	Investment per KW US\$	Source
Project 3347 : Caruquia 9.76 MW Hydroelectric project	9.7	21,500	2,216	UNFCCC
Project 1411 : La Cascada 2.3 MW Hydroelectric Project	2.3	3,179	1,445	UNFCCC
Patico	14.5	22,500	1,552	UPME
Prado	50	52,500	1,050	UPME
Barroso	19.9	40,000	2,010	Energy and Mines Ministry
<b>Bajo Tulua Minor Hydroelectric Power Plant</b>	<b>20.0</b>	<b>53,442</b>	<b>2,672</b>	EPSA "Technical and financial basis for Tulua small hydropower plant, prefeasibility phase"

According to UPME, the capital cost of minor hydro projects is site specific and can range from 1,400 US\$/KW to 2,200 US\$/KW being the most likely 1,800 US\$/KW.

The investment cost of Bajo Tulua (2,672 US\$/KW) was found to be higher than the values provided by UPME and other sources and also higher than the 2,216 US\$/KW of Caruquia, but lower than the average of 2,900 US\$/KW provided by the International Energy Agency.

However, Bajo Tulua Minor Hydroelectric Power Plant project differentiates from other conventional minor hydropower projects since it includes a tunnel over 5,650 meters long, 16 km of electrical distribution line and complementary civil works e.g. adaptation of landfills, construction of two bridges and rehabilitation of current routes.

According to the initial budget, the cost associated to the tunnel, bridges, and transmission line represents 28% of the total Investment. If we consider a hypothetical and conservative estimation of the specific costs of the project, for example 20% (instead of 28%) the unitary cost of the project

would be around the 2,100 US\$/KW, in line with projects like Barroso or Caruquias. Therefore, AENOR deemed the investment cost of the project activity as reasonable and appropriate.

In addition, PP has provided the up-to-date summary of costs of the project which shows current costs are being higher than those budgeted at the time of investment decision, among other reasons due to geological difficulties in the tunnel construction, not considered in the initial budget. According to the current valuation the cost of the project will rise to COP 120,632,000, in the most optimistic scenario, or to COP 123,948,000 for the worst scenario.

This situation confirms that the financial analysis done by the PP at the time of investment decision can be considered as conservative in the CDM/additionality context.

## O&M costs

The annual O&M costs have been crosschecked with data from the Development Plan for Non-Conventional Sources of Energy in Colombia of the Mining Energy Planning Unit (UPME), International Energy Agency and the World Bank (Technical and Economic Assessment of Off-grid, Mini-grid and Grid Electrification Technologies 2007) and with similar projects proposed as CDM project in the same area (see table 4 below).

Table 4: Comparison of O&M costs per KWh among CDM minor hydropower projects in Colombia

Project	Capacity (MW)	Annual Generation (MWh)	Annual O&M Costs (US\$)	US\$/KWh
Project 3347 : Caruquia 9.76 MW Hydroelectric project	9.70	59,800	510,552	0.01
<b>Bajo Tulua Minor Hydroelectric Power Plant</b>	<b>20.00</b>	<b>117,400</b>	<b>981,236</b>	<b>0.01</b>

Source: <http://cdm.unfccc.int/Projects/registered.html> and Project Proponent

The applied average annual O&M costs of 0.01 US\$/KWh, were found to be in line with similar projects signed as CDM project in the same area and also in line with the average of 0.01 US\$/KWh provided by the World Bank and UPME, hence the value has been deemed appropriate and therefore accepted by the validation team of AENOR.

In the same way O&M costs of 49.06 US\$/KW-installed were found to be lower than the average of 64 US\$/KW-installed provided by the International Energy Agency, hence O&M costs can be considered as conservative in the CDM/additionality context. Nevertheless, AENOR has validated that with a zero O&M costs, the benchmark is not crossed by the project activity.

Based on previous information, AENOR validation team considered that the Annual O & M cost used in the PDD was reasonable, valid and applicable at the time of the investment decision.

## Annual Power Generation

The hydro power plant capacity factor of 67.01% was found to be slightly higher than the average of 66.39% from the registered minor hydropower plants in the same area, hence conservative in the CDM/additionality context and therefore accepted by AENOR's validation team.

Table -: Comparison of the annual running hours among minor hydropower projects in Colombia

Project	Capacity (MW)	Annual operation hours	Load Factor (%)	Annual output MWh
Project 122 : Agua Fresca Multipurpose and environmental services project	7.49	8,451	96.48%	63,300
Project 275 : Santa Ana Hydroelectric Plant	13.43	3,500	39.95%	47,000
Project 1411 : La Cascada 2.3 MW Hydroelectric Project	2.30	6,239	71.22%	14,350
Project 2600: Amaime Minor Hydroelectric Power Plant	19.00	4,722	53.91%	85,000
Project 3347 : Caruquia 9.76 MW Hydroelectric project	9.70	6,165	70.38%	59,800
<b>Bajo Tulua Minor Hydroelectric Power Plant</b>	<b>20.00</b>	<b>5,870</b>	<b>67.01%</b>	<b>117,400</b>

Source: <http://cdm.unfccc.int/Projects/registered.html> and Project Proponent

Furthermore, electricity generation was determined by an independent third party, SOCOIN, an international energy consultancy which specialises in sustainable energy technologies, including hydropower projects. Therefore, according to the "Guidelines for the reporting and validation of plant load factors" and due to above mentioned cross-checking, AENOR Validation Team considered that the annual grid-connected electricity generation is reasonable and appropriate.

## Power tariff

The electricity tariff of 121.3 COP/KWh (53.20 US\$ /MWh) is an estimation of EPSA based on the historic prices of energy transactions available from official sources. The AENOR validation team consulted the statistic of spot prices in the bulk market in Colombia through the data bases of the SIEL (Sistema de Información Eléctrico Colombiano – Colombian Electric Information System), managed by the Mining and Energy Planning Unit of the Ministry of Energy (UPME), Republic of Colombia and the company XM (electricity market operator). AENOR validation team was able to check that the price used was 44% higher than year 2007 average market price of 83.8 COP/KWh and 37% higher than the 2008 average of 88.5 COP/KWh. For subsequent years a scenario of CPI escalation has been used based on the forecasts by Bancolombia. The validation team of AENOR deems that the approach used by the PP in estimating the energy prices is adequate and the values used are correct and appropriate. Thus the tariff used is conservative in the CDM/additionality context and therefore accepted by the AENOR validation team.

AENOR validation team also examined the PDDs of small hydropower projects in Colombia and found the tariff used in the investment analysis of the final PDD to be the highest within the range of the tariffs for the existing small hydropower CDM projects (see table 1).

Table. Comparison of tariffs among CDM minor Hydropower Projects in Colombia.

Project	Capacity (MW)	Tariff US\$ /MWh	Indexed
Project 1411 : La Cascada 2.3 MW Hydroelectric Project	2.30	49.35	Yes
Project 3347 : Caruquia 9.76 MW Hydroelectric project	9.76	48.55	No
<b>Bajo Tuluá Minor Hydroelectric Power Plant</b>	<b>20.00</b>	<b>53.20</b>	<b>Yes</b>

Source: <http://cdm.unfccc.int/Projects/registered.html> and Project Proponent

In summary, the tariff used for IRR calculation was valid and applicable at the time of the investment decision and the concerns expressed by CDM-EB in paragraph 48 of EB49 report have been addressed, and the electricity tariff is confirmed through cross-checking the above mentioned evidences.

AENOR has verified and confirmed that the values used in the financial analysis are consistent with the value of the source and this information was available at the date of the final investment decision (November 2007) and was thus likely to be considered in the decision. References are included in the PDD.

#### Step 2d: *Sensitivity analysis:*

A sensitivity analysis has been carried out for variations in the range of +/- 20% for the parameters of CERs price, power generation, total investment costs, O&M costs, O&M costs+regulatory costs and regulatory costs because of these variables constitute more than 20% of either total project costs or total project revenues.

The sensitivity analysis shows that without the income from CERs sales the project activity IRR crosses the benchmark when the electricity output/electricity tariff and total investment vary by +10% and -10% respectively, but AENOR has validated that these three scenarios are unlikely to occur due to the following facts:

- The annual electricity output is determined by a third party, SOCOIN, an engineering firm specialised in the energy sector, based on series hydrology data for 23 years at Tuluá river. The study also shows that the probability of exceeding in a 10% the estimated electricity generation during the first five years of commercial operation is less than 1%. The evidences and results of this study have been reviewed by the validation team coupled with the fact that the capacity factor of Bajo Tuluá was found to be higher than the average, which demonstrate that it is unlikely that the electricity output can increase by 10% to make the project IRR cross the benchmark.
- The electricity tariff. was an estimation of EPSA based on the historic prices. As told before, the chosen tariff was cross-checked by AENOR, resulting to be 44% and 37% higher than year 2007 and 2008 average market price respectively. In addition, the tariff is indexed to CPI during the assessment period and most of the scenarios outlined by the UPME in the Expansion Plan Generation-Transmission 2008-2022, unless specific values (spikes of a month or two on a horizon of 24 years) never exceed the price indicated for Bajo Tuluá. The evidences have been reviewed by the validation team and demonstrate that it is unlikely that the chosen electricity tariff could increase by 10% to make the project IRR crossing the benchmark.
- For the hydroelectric Project plant, the cost of the turbine purchase, engineering construction and related accessories constitute the main costs. Prices including those for the main

equipments and raw materials have been increasing in recent years<sup>1</sup>. In addition, the PP has provided evidence of higher investment costs than those estimated at the time of investment decision by the International Energy Agency. Therefore, it is unlikely that the total investment will decrease by 10%, such that the project IRR crosses the benchmark.

In addition, AENOR has validated that higher variations for the remainder parameters, that would make the project IRR reach the benchmark, are not likely to occur: due to the following facts:

- 126% decrease in the total O&M costs. It means that even without O&M costs the project IRR does not reach the benchmark.
- 186% decrease in the total Regulatory costs. It means that even without Regulatory costs the project IRR does not reach the benchmark.

AENOR reviewed and confirmed all related documents. The assessments show clearly that investment is unlikely to be 10% lower, and that tariff or generation are unlikely to be 10% higher while the required O&M costs and Regulatory costs variation scenarios are unreal.

In summary, it is AENOR's opinion that the additionality of the project is sufficiently demonstrated based on the investment analysis and thus it is sufficiently demonstrated that the project is not a likely baseline scenario and those emission reductions are therefore additional.

### Step 3: *Barrier analysis*

Based on the Request for Review the project participants have removed from final PDD all the barriers but the Sector Barriers.

AENOR confirms that this reflects §115 of VVM version 01.2 and the Guidelines for the objective demonstration and assessment of barriers (Version 01) given that the surveillance and insurance costs associated with the vulnerability of the project due to guerrilla attacks (social and institutional barriers) have an impact which was already included in the context of investment analysis, and due to lack of clear and strong evidences to further support the political and investment barriers and the common practice barriers.

AENOR validation team confirms that this decision does not undermine the additionality of the proposed project based on the assessment done in the context of Investment Analysis, nevertheless the additionality of the project is strengthened through an analysis of the sector barriers:

While the alternative "continuation of current activities" does not face any barriers, the construction of new minor run-of-river hydroelectric power plants faces sector barriers. AENOR assessment of the presented barrier is as follows:

*(b) Sector barriers: The project faces sector barriers associated with the dependency on hydrologic conditions and its classification as "minor scale" within the Colombian electricity sector.*

AENOR has verified that this fact prevent the project activity from being eligible to receive a reliability payment. The reliability payment scheme allows the generation companies to benefit from a stable compensation in the long-term, and therefore provides signals and incentives for investments in conventional plants i.e. large hydro and thermal power plants.

The validation team has verified and confirmed that the values used in the sector barriers assessment are consistent with the value of the source and confirms that CDM revenues, that

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<sup>1</sup>The National Administrative Department of Statistics -DANE-  
[http://www.dane.gov.co/daneweb\\_V09/en/index.php?option=com\\_content&view=article&id=54&Itemid=76](http://www.dane.gov.co/daneweb_V09/en/index.php?option=com_content&view=article&id=54&Itemid=76)

represent the 15.6% of the expected annual income, will alleviate the barrier in an objective way, in line with EB50, Annex 13, para. 5

The barrier analysis demonstrates that the most plausible scenario is the continuation of current practice (addition of capacity to the system by means of conventional hydroelectric power plants and thermal power plants).

#### Step 4 - Common practice analysis

Colombian electricity market is dominated by thermal power plants (33% of total installed power capacity and 17% of total electricity generation) and hydroelectric power plants (67% of total power capacity and 78% of total electricity generation) according to year 2007 data.

In addition, during year 2007, activities similar to the project i.e. minor run of river hydro plants comprised 4.41% of total power capacity and 5.16% of the electricity generation.

The installed capacity trends for Colombia and the analysis of similar options to the project activity were presented and discussed in the PDD and references and sources are provided.

Analyzing the "Reference expansion plan generation and transmission, 2008-2022" (UPME), it was verified that there was a predominance of thermal and hydroelectric capacity (99.1% or 12,374.16 MW) if compared with new projected minor hydro power plants with similar capacities (10-20 MW) to the project activity (0.40% or 49.5 MW).

The PDD states that until 2003 there were only few run of river plants with capacities between 10-20 MW. These plants are the following:

Denomination	Capacity	Construction year	Owner
Insula	19 MW	1951	CHEC
Palmas San Gil	15 MW	1954	ESSA
El Limonar	18 MW	1957	ENERSIS
La Tinta	19.4 MW	1967	ENERSIS
Charquito	19.4 MW	1972	ENERSIS
Ayura	18 MW	1983	EPM
Niquia	19 MW	1993	EPM
Río Frío II	10 MW	1996	CETSA
Tequendama	19.4 MW	1998	EMGESA

In addition, the similarity of projects is judged by three aspects, namely, similar scale, similar regulatory framework and similar construction year. The standards of scale and regulatory framework are derived from "Resolution 086 of 1996", where capacity under 20 MW is classified as minor scale and where it is established that power plants under 10 MW are excluded from the central dispatching and therefore excluded for the wholesale electricity market (WEM). AENOR has checked this standard with satisfactory result and confirmed that it could be used to recognize similarity.

The similar construction year is years after 1994. Year 1994 is deemed as a milestone of Colombia electricity system. AENOR has checked the evidential materials such as (Law 142 on public services and Law 143 on electricity which were the basis of the Colombian electric power sector reform.

According to above requirements, only Tequendama and Río Frío II meet all the criteria of similarity. However, there are some important differences among Tequendama, Río Frío II and the proposed project activity. In the case of Río Frío II, the plant, unlike Bajo Tuluá, has opted for not participating in the WEM, hence the plant is not included in the central dispatching. This option, according to

"Resolution 086 of 1996" allows power plants with capacities between 10-20 MW to sell the energy to any customer (distribution licensee, direct costumer or generators) by means of direct contracts avoiding its exposure to market risks (electricity price and generation demand uncertainties) and in addition, the plant doesn't have to participate in the AGC system (automatic generation control), avoiding the stop/start costs established by the regulation and therefore helping to alleviate the existing investment barriers. Regarding Tequendama, the plant belongs to EMGESA whereof main shareholder is the District of Bogotá (51.51%). Being a state-owned plant is an advantage when dealing with the project risks and financial constraints existing in the Colombian hydropower sector.

In addition, since 2004 only 4 minor run of river hydro plants have been built in Colombia with capacities between 10-20 MW and all of them have been registered as CDM project activities.

UNFCC Ref	Project Title	Capacity (MW)	Registration Date
2600	Amalme Minor Hydroelectric Power Plant	18	29 Oct 09
0735	La Vuelta Hydroelectric Project	12	15 Jan 07
0735	La Herradura Hydroelectric Project	20	15 Jan 07
0275	Santa Ana Hydroelectric Plant	13.43	11 May 06

**Source:** UNFCCC

Bajo Tuluá Project capacity represents by itself, accordingly to the "Reference expansion plan generation and transmission, 2008-2022" (UPME), 23% of the overall minor hydro capacity planned for the whole country during 2008-2022 period (88.66 MW) and 40% if only projects with similar capacities are taken into account.

Although hydro energy dominates the Colombian market, it can be stated, accordingly to above data, that minor run-of-river hydro generation is not yet a business as usual scenario in Colombia and projects between 10-20 MW are not common practice, especially without CDM support.

To conclude, AENOR can state that, according to all the documents reviewed, the project is not a common activity in Colombia and the emission reductions are additional.

### 3.5 Monitoring Plan

As stated above, the project uses the approved "Consolidated methodology for grid-connected electricity generation from renewable sources", ACM0002 (Version 10).

As stated in the methodology ACM0002/Version 10 and in the PDD, the main monitoring parameters are the following:

1. **Net Electricity (KWh) generated by the project's activity:** This data shall be measured with two calibrated meters in accordance with the standards of XM as the audit team checked during the *on site* interview. The electricity generated by the project activity used in the emission reduction calculation, should be measured by EPSA each hour through the commercial frontier located at the sub-station of Tuluá. The data obtained will be recorded once a month on a spreadsheet. On the other hand, in order to contrast them, the data will also be provided by the NEON application, which will be downloaded annually and recorded on a different spreadsheet. EPSA will validate this official generation data against the data provided by their meters and it will be crosschecked with the monthly invoices. During the on site visit the validation team checked that the internal procedure of Bajo Tuluá has been developed in accordance with the national requirement of the electricity sector of Colombia.
2. Data required re-calculating the **operating margin emission factor** and the **build margin emission factor**. These data will be obtained through the NEON web site (using a password) and incorporated them in a spreadsheet. These data are described as following:



2.1. *Annual electricity generated (kWh) by each plant* of the National Interconnected System of Colombia: registered in the NEON Software Application as "Real Generation/agents". This system will be accessed once a year to download data, which will be stored in an electronic spreadsheet.

2.2. *Electricity hourly generated by the National Interconnected System of Colombia*: Data obtained from the Software Application NEON as the total addition of the "Real Generation/System".

2.3. *Plants (and its generation) considered for the calculation of the Operating Margin Factor*. This parameter is used to detect the new plants that have been dispatched during the year.

2.4. *Plants (and its generation) considered for the calculation of the Build Margin Emission Factor*. The NEON software application incorporates the new plants in operations during a year.

2.5. *Net calorific value (energy content) of fossil fuel type i in year y* obtained through following data:

- *Heat Rate (MBTU/MWh)*. This piece of data is provided directly by the Colombian electricity authorities in different formats. During the validation works, this data was facilitated by the Colombian authorities and documented evidence was sent to the validation team.

- *Average net energy conversion efficiency of power unit m in year y ( $\eta_{m,y}$ )* obtained directly from NEON system.

2.6. *Emission factor of each plant (KgCO<sub>2</sub>/KWh)*. It will be calculated once a year in accordance with the type and characteristics of the fuel used to obtain energy, from IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories the Colombian Heat Rates.

The following environmental and social indicators were considered in the PDD:

**1. Social and environmental investments.** Depending on the commitments acquired with the community. This information will be counted once a year.

**2. Investment related to obtaining CERs.** During the validation visit was assessed this commitment of the promoter. If CERs are obtained a part of the profits of its sale shall be invested in the community in accordance with the Environmental License.

**3. Ecologic river flow:** The description of the monitoring of this parameter was also described in the Monitoring Plan in the PDD. This parameter was checked during the visit with the local authority responsible of the Environmental License (CVC) and it was established in accordance with the local guidelines. On the other hand, Bajo Tuluá Hydroelectric Plant has to submit periodically, Environmental Reports to CVC in order to check the monitoring of the environmental impacts. So, during the operational life of the project, the environmental indicators will be monitored.

Several CARs and CLs were requested in order to improve the design of the Monitoring Plan (variables units, the audit of the data, training procedures, calibration and documentation control procedures, etc). The detail of these modifications is included in the Validation Protocol. The revised Monitoring Plan was then established in accordance with the guidelines stated in the methodology ACM0002 and the relevant Tool. The Bajo Tuluá hydroelectric plant shall deliver its energy through the substation of Tuluá. This shall be the commercial frontier with the national grid. The department of energy control of EPSA will be in charge of the supervision of the measurement of the equipment. This department has plenty of experience in the maintenance of electric meters as it was demonstrated during the on site visit to the EPSA head quarters. This process is in accordance with the "Procedure for the commercial measurement of the frontier point" prepared by EPSA.

For the general operation of the monitoring parameters they will be integrated in the Quality System of Bajo Tuluá (ISO 9000 certificate assessed by the validation team), with an audit by a third party. Following procedures have been developed in order to facilitate the implementation of the Monitoring Plan:

- Procedure PR.GRH.07.002 "Procedure for the Develop of Competencies". The different responsibilities regarding the calculation and monitoring of the emission reductions are included in this procedure.
- Procedure PR.PRO.03.001 "Procedure for Control of the production equipment". It includes the calibration and verification (internal or external) of the meters. In accordance with the validation team request (CL 5), the procedure was referred in Section B.7.1 of the PDD in order to demonstrate the future control of the measurement equipment. The internal calibration is made by the EPSA calibration laboratory. The accreditation of this entity (Resolution 3972, 21<sup>st</sup> February 2003) was sent to the validation team in order to check the validity of the Calibration Certificates of the meters.
- Procedure PR.PRO.01.005 "Coordination between the CSM operation and the power plants". It includes the control of the documentation regarding to the electricity generation.

The monitoring Plan provides the relevant data necessary for determinate the baseline emissions determination in accordance with the methodology. So, according with ACM0002 (Version 10) requirements, the MP provides information about frequency and responsibility for controlling and reporting during the crediting period.

### 3.6 Calculation of GHG Emissions

The methodology for calculating emission reductions is transparently documented and it complies with existing good practice. Following detailed is the calculation of the emissions reduction stated in last version of the PDD:

The validation of the emission reductions calculation was carried out in the following way:

#### **PDD Version.4 5 – 25th February 2011**

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On 04<sup>th</sup> August, the version 07 of the consolidated Methodology ACM0002 expired. The new version of the Methodology has to be applied but did not affect the emission reduction calculation.

According to the methodology ACM0002 (version 10) and "*Tool to calculate the emission factor for an electricity system*" (hereinafter Tool), the Operational Margin (OM) and the Build Margin (BM) have been calculated and combined again in order to obtain the Baseline Emission factor.

Project participant has used the **Simple Adjusted method** for the calculation of the Operational Margin Emission Factor according to the methodology<sup>2</sup> and the Tool.

As it is below detailed, the source of the data is NEON. EPSA uses in this case two files including different spreadsheets designed to automate the process for the calculation of the emission factor.

The description of the validation activities of each spreadsheet is following detailed:

The first file, named "**Operating margin**" includes four spreadsheets:

- ***FE power station***: includes the list of the power installations of the national electricity system. The spreadsheet also incorporates the heat rate, the fuel, and the emission factor according to

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<sup>2</sup> The version 010 of the consolidated methodology ACM0002 (and respective Tool for the calculation of the emission factor of the electricity system) permits to choose between the four options to calculate the operating margin emission factor depending on the particular conditions.

the Chapter 2 of the 2006 IPCC Guidelines of all the installations included in the electricity Colombian system. The efficiency of the installations is also detailed in the spreadsheet. The source of data has been checked by the validation team.

- **Hourly generation:** This spreadsheet includes the real hourly generation of the national system (KWh), information generated by Neon between 01/01/2007 and 31/12/2007. The validation team has assessed all the data of 2007 and all of them were the same as the NEON information.
- **Lambda:** the lambda calculation has been developed according to the Tool. The sort of the load data from the highest to the lowest MW level is included in the column D. The load curve in descendent order has been plotted in the same spreadsheet and using the total generation of the low cost – must run power plants (calculated in other spreadsheet) the X, Y and Lambda have been correctly identified and calculated.
- **MO 2007:** Includes the generation (KWh) of all the agents of the Colombian national system and the emission factors of each agent in the system.

The second file (**Build Margin**) includes the two following spreadsheets:

- **History:** the installations of the national electricity system were included in the spreadsheet, detailing their type of generation (Thermal, cogeneration, hydro), and the opening and closing date, if it is applicable. The source of data was the communications between the consultancy firm and XM, market operator, because these data were not available in the web page.
- **Calculation EFBM:** This spreadsheet includes the same information as the last spreadsheet about the installations, incorporating the capacity and the energy generation during 2007. Using the emission factor of each power plant (described in spreadsheet named “FUEL”) the emissions of each power plant have been calculated. The choice of the power power plants of the build margin is made according to the tool as the set of power capacity additions that comprises 20% of the system and have been built most recently.
- **Fuel:** the spreadsheet includes the same information as the spreadsheet named “FE power station” of the operating margin calculation file: heat rate, emission factor and fuel of each plant of the electricity national Colombian system. All of the data were crosschecked to the first file and they were in accordance.
- **Station power data:** this spreadsheet also includes the same information as the spreadsheet named MO 2007 of the operating margin calculation file. The 20% of the total national generation is calculated in conformance to the Tool.
- **Summary EF BM:** includes a summary of the installations in order to analyze the last installations built during 2007. This data was crosschecked with the NEON information.
- **FE:** The last spreadsheet of this file includes the last calculation: the baseline combined emission factor.

The emission baseline factors, calculated in accordance with the ex-post approach are following detailed:

<b>EF<sub>BM</sub> =</b>	<b>0.237</b>	tCO <sub>2</sub> /MWh
<b>EF<sub>OM</sub> =</b>	<b>0.469</b>	tCO <sub>2</sub> /MWh
<b>EF<sub>y</sub> =</b>	<b>0.353</b>	tCO <sub>2</sub> /MWh

The average annual emission reductions to be achieved by the project are **41,430** tCO<sub>2</sub>/year.

As stated in Section 3.2, in order to validate the data and results included in the PDD, information regarding to the electrical system of Colombia was checked by AENOR through the download of data by NEON software application. Calculations have been reproduced by the validation team and the same results have been obtained, achieving the transparency, accuracy and consistency principles required for the CDM projects.

In regard to item 86 of VVM, AENOR confirms that:

1. All the assumptions and data used by the project participants are listed in the PDD, including their references and sources.
2. All documentation used is relevant for establishing the baseline scenario and correctly quoted and interpreted in the PDD.
3. Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence, and can be deemed reasonable.
4. Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD.
5. The approved baseline methodology has been correctly applied to identify the most reasonable baseline scenario, and the identified baseline scenario reasonably represents what would occur in the absence of the proposed CDM project activity.

### 3.7 Environmental Impacts

According to Colombian law (Decree 12/20 of 2005), proposals for electricity generation with water sources must undertake an environmental impact study and submit it to the corresponding Authority. The law stipulates that plants with a nominal installed capacity between 10 and 100 MW (as Bajo Tuluá hydroelectric project) has to communicate with the Autonomous Corporation, "*Corporación Regional del Valle del Cauca*".

The environmental authorization for Bajo Tuluá Hydroelectric Project was granted by CVC on November 14<sup>th</sup>, 2008 (Resolution No. 0100 No.0730-0606), and is granted upon compliance with 21 terms and 12 conditions (under the 5th term). Both documents were crosschecked by the validation team during a meeting with the "*Corporación Regional del Valle del Cauca*" personnel in Cali, during the on site visit.

The 5<sup>th</sup> condition establishes as a clause the development and submission of an Environment Management Plan specifically, 17 environmental handling and 8 follow up and monitoring files. CL 2 arose regarding the inclusion of environment indicators of this Management Plan in the Monitoring Plan of the PDD, and it was correctly addressed (See Validation Protocol, CL 2).

The PDD is in line with the EIA approval. These requirements are described in the PDD (section D.2.) and they were checked by the audit team during the on site visit and the interview with the CVC, with the people in charge of the Environment Licenses of the Cauca Valley.

EPSA will give the 25% of the CERs incomes to the communities involved in the Tuluá River Basin. It was also checked against the Environment License, the CVC personnel and the Colombian DNA.

We conclude that the PPs followed the requirements of the host country in regards to environmental impacts.

### 3.8 Comments by Local Stakeholders

According to the Environment Law (Decree 12/20 2005), in order to guarantee the right to social participation and allow the involvement of the general public in the evaluation of the Project, CVC made the Bajo Tuluá project activity EIA available for public scrutiny in the newspaper, and in posters. No negative feedback was received, only one remark in order to get all the information of the project.

During the on-site visit to the project location in October 2008, some issues were verified:

- 18 Meetings were carried out to socialize the project activity.

- Local communities have been consulted and have demonstrated their support for the development of the Bajo Tuluá Hydroelectric Project by signing the corresponding minutes of the meetings. A sample of the minutes of the signed meetings was reviewed.
- EPSA has designated a local person in charge of providing information and receiving local complaints.

The mayors of Tuluá, Buga and San Pedro, where the project will be implemented, were interviewed during the on-site visit to Tuluá, Buga and San Pedro Municipality on October 28<sup>th</sup>, 2008. They confirmed their support to the project and his knowledge about its benefits and environmental impacts. Landowners have participated in the development by leasing their lands to the project developer. The opinion and comments of the interview are summarized below:

- The overall opinion on the project was very positive.
- The project can be an example of agree between the council and the private companies in the region because they need public services.
- They fear the environment damages, but EPSA has created Vigilance Committees with members of the communities in order to guarantee the fulfillment of the Handling Plan.
- The project will benefit the local communities because EPSA have offered employment at the construction site and the services associated.
- The project activity Bajo Tuluá will respect the priority in the use of water; the human consumption will be the main priority.
- The project activity will also provide support to restoration, conservation and protection programs of the territorial flora.
- Training activities in the tourism sector have been included in the budget.
- The promoter will give priority for local workers during the development, construction and operation of the project.

It is important to highlight that EPSA make different kinds of voluntary donation, apart from the mandatory:

- Voluntary investment plan: EPSA will give an amount of money to electrification, infrastructure projects in education and environmental projects.
- CDM Benefits (voluntary): additionally, EPSA will donate to the affected communities a 25% of the revenue obtained from the sale of the Certificate Emission Reductions (CERs).

Finally, EPSA submitted to the validation team a Certificate of no presence of native people in the Tuluá river basin, signed on 09<sup>th</sup> of May of 2008, by the "*Ministerio del Interior y Justicia*" in accordance with the Law 21 of 1991.

AENOR determines that the local stakeholders comments have been invited, a summary of the comments received and the project participants have taken due account of the comments received.

AENOR states that the local stakeholder consultation is adequate and accurate.

## 4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

According to Decision 3/CMP.1, the validator shall make publicly available the PDD and receive, within 30 days, comments on the validation requirements from parties, stakeholders and UNFCCC accredited NGOs and make them publicly available.

AENOR published the first PDD, version 3.1, on CDM website (<http://unfccc.cdm.int>) on 2<sup>nd</sup> of August of 2008 and invited comments by Parties, stakeholders and non-governmental organizations. No comments were received during this period.

Besides, AENOR published PDD, version 3.3, on CDM website (<http://unfccc.cdm.int/>) on 25<sup>th</sup> of July of 2009 and invited comments by Parties, stakeholders and non-governmental organizations. No comments were received during this period.

## 5 VALIDATION OPINION

AENOR has performed a validation of the **“Bajo Tuluá minor Hydroelectric Project”** in Colombia. The validation was performed on the basis of UNFCCC criteria 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, the on-site visit and the subsequent follow-up interviews have provided AENOR with sufficient evidence to determine the fulfillment of stated criteria. In our opinion, the project meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria.

Hence, AENOR will recommend the project for registration by the CDM Executive Board.

The calculation of the project emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of 290,010 tCO<sub>2</sub>e are most likely to be achieved within the 1st crediting period

On the other hand, AENOR have received the Letter of Approval from the Colombian DNA and the Letter of Approval of Spain.

By displacing fossil fuel-based electricity with electricity generated from a renewable source, the project results in reductions of CO<sub>2</sub> emissions that are real, measurable and give long-term benefits to the mitigation of climate change. An analysis of the investment, other barriers and common practice in Colombia demonstrates that the proposed project activity 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. Given that the project will be implemented as designed, the project is likely to achieve the estimated amount of emission reductions.

The validation is based on the information made available to us and the engagement conditions detailed in this report.

2011-02-28



Jose Luis Tejera Oliver

Authorized Person

2011-02-28



Elena Llorente Pérez

Chief validation





## 6 REFERENCES

**Category 1 documents:** Documents provided by the project proponents that relate directly to the GHG components of the project. These have been used as direct sources of evidence for the determination conclusions.

**Category 2 documents:** Background documents related to the design and/or methodologies employed in the design or other reference documents. Where applicable, Category 2 documents have been used to check project assumptions and confirm the validity of information given in the category 1 documents.

Category	Ref	Document Name	Date	Author/Competent Authority
1	1	PDD Bajo Tuluá minor hydroelectric project activity Version Version 3.1	2008-07-21	GAS NATURAL S.D.G, S.A
1	2	PDD Bajo Tuluá minor hydroelectric project Version 03.2/version 03.3	2008-03-11 2009-07-22	GAS NATURAL S.D.G, S.A
1	3	PDD Bajo Tuluá minor hydroelectric project Version 03.4	2010-10-05	GAS NATURAL S.D.G, S.A
2	4	ACM0002 (Version 7) – Consolidated methodology for grid-connected electricity generation from renewable sources	2006-05-19	CDM - EXECUTIVE BOARD
2	5	ACM0002 (Version 10) – Consolidated methodology for grid-connected electricity generation from renewable sources	2008-05-28	CDM - EXECUTIVE BOARD
2	6	Tool to calculate the emission factor for an electricity system - Version 01.1	2008-07-29	CDM - EXECUTIVE BOARD
2	7	Tool to calculate the emission factor for an electricity system - Version 02.	2009-10-16	CDM - EXECUTIVE BOARD
2	8	Tool for the demonstration and assessment of Additionality – Version 05.2	2008-08-26	CDM - EXECUTIVE BOARD
2	9	2006 IPCC Guidelines for National Greenhouse Gas Inventories	2006	PANEL INTERGUBERNAMENTAL PARA EL CAMBIO CLIMÁTICO
1	10	Host Country Letter of Approval	2009-07-15	MINISTERIO DE AMBIENTE, VIVIENDA Y DESARROLLO TERRITORIAL (Colombian DNA)
1	11	Environmental License 0100 No.0730-0606.	2008-11-14	CORPORACIÓN AUTÓNOMA REGIONAL DEL VALLE DEL CAUCA (Environment Competent Authority)
1	12	Methodology for the energy production calculation	01-09-2009	SOCOIN (consultant company)
1	13	Environmental Management Plan	2008	EMPRESA DE ENERGÍA DEL PACIFICO, EPSA S.A. E.S.P.
1	14	No presence of native communities Certificate	2008-01-23	MINISTERIO DEL INTERIOR Y DE JUSTICIA
1	15	Hydroelectric Power plant map PL-TUL-EIA	2008-11-14	EMPRESA DE ENERGÍA DEL PACIFICO, EPSA S.A. E.S.P

Category	Ref	Document Name	Date	Author/Competent Authority
1	16	Contract for the purchase of the Bajo Tuluá equipment EP-CO 003-2009	2009-01-15	EMPRESA DE ENERGÍA DEL PACIFICO, EPSA S.A. E.S.P.
1	17	Technical report Bajo Tuluá	2008-11-14	EMPRESA DE ENERGÍA DEL PACIFICO, EPSA S.A. E.S.P.
1	18	Sworn statement of the accomplishment of the national regulation	2008-04-07	EMPRESA DE ENERGÍA DEL PACIFICO, EPSA S.A. E.S.P.
1	19	ISO 9001 Certificate (Icontec)	2006-01-20	EMPRESA DE ENERGÍA DEL PACIFICO, EPSA S.A. E.S.P.
1	20	Procedure PR.GRH.07.002 "Procedure for the Develop of Competencies".	2008-03-27	EMPRESA DE ENERGÍA DEL PACIFICO, EPSA S.A. E.S.P.
1	21	Procedure PR.PRO.03.001 "Procedure for Control of the production equipment"	2008-06-04	EMPRESA DE ENERGÍA DEL PACIFICO, EPSA S.A. E.S.P.
1	22	Accreditation of EPSA as Calibration Laboratory No.3972	2003-02-21	MINISTERIO DE DESARROLLO ECONÓMICO SUPERINTENDENCIA INDUSTRIA Y COMERCIO
1	23	Proof of payment for the renewal of the Accreditation of the Calibration Laboratory	2008-01-14	EMPRESA DE ENERGÍA DEL PACIFICO, EPSA S.A. E.S.P./SUPERINTENDENCIA INDUSTRIA Y COMERCIO
1	24	Procedure PR.PRO.01.005 "Coordination between the CSM operation and the power plants".	2008-07-04	EMPRESA DE ENERGÍA DEL PACIFICO, EPSA S.A. E.S.P.
1	25	Procedure for the commercial measurement of the frontier point	2008-05-14	EMPRESA DE ENERGÍA DEL PACIFICO, EPSA S.A
1	26	Requirements for the local contracts – FR.GRH.012.02	2008-04-04	EMPRESA DE ENERGÍA DEL PACIFICO, EPSA S.A
1	27	Chronogram of Bajo Tuluá Hydroelectric Project	2008-10-23	EMPRESA DE ENERGÍA DEL PACIFICO, EPSA S.A
1	28	CONPES 3242	2003-08-25	MINISTERIO DE AMBIENTE Y VIVIENDA
1	29	Minutes of the public meetings with the communities	2007-08-08	EMPRESA DE ENERGÍA DEL PACIFICO, EPSA S.A
1	30	Official meeting notification	2007-06-26	CORPORACIÓN AUTÓNOMA REGIONAL DEL VALLE DEL CAUCA (Environment Competent Authority)
1	31	Energy production qualified curve: Bajo Tuluá	2008	SOCOIN (consultant company)
2	32	Reference expansion plan generation and transmission, 2008-2022" (Plan de Expansión de Referencia Generación Transmisión 2008-2022)	2008	MINISTERIO DE MINAS Y ENERGÍA. UNIDAD DE PLANEACIÓN MINERO ENERGÉTICA
2	33	World Energy Outlook 2008	2008	INTERNATIONAL ENERGY AGENCY
2	34	Country Default Spreads and Risk Premiums	2008	ASWATH DAMODARAN. STERN SCHOOL OF BUSINESS
2	35	Technical and Economic Assessment of Off-grid, Mini-grid and Grid Electrification Technologies 2007	2007	WORLD BANK
2	36	Historical Country Risk Classification	2008	ORGANIZATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (OECD)
2	37	Departmental Integral Plan (Plan Integral Unico Departamental)	2007	OFICINA GESTIÓN DE PAZ Y CONVIVENCIA DEPARTAMENTAL GOBERNACIÓN DEL VALLE DEL CAUCA

Category	Ref	Document Name	Date	Author/Competent Authority
2	38	General Financial Parameters (Parámetros financieros generales)	2007	BANCOLOMBIA
2	39	Report of Operation and Administration System Market 2007,	2008	XM (Colombian Electricity Market Operator)
2	40	CDM Validation Protocol Report Number 02	22-07-2009	AENOR
2	41	Certification of merger of Gas Natural and Union Fenosa S.A.	4 <sup>th</sup> September 2009	GAS NATURAL SDG, S.A.
2	42	Methodology for the production of electricity	2008	SOCOIN
1	43	PDD Bajo Tuluá minor hydroelectric project Version 03.5	2011-02-25	GAS NATURAL S.D.G, S.A
2	44	Guidance on the demonstration and assessment of prior consideration of the CDM version 3	September 2009	CDM - Executive Board
2	45	Glossary of the CDM terms version 5		CDM - Executive Board
1	46	No objection Letter	September 2005	MINISTERIO DE AMBIENTE, VIVIENDA Y DESARROLLO TERRITORIAL (Colombian DNA)
1	47	Union Fenosa Strategic Plan Approval (investment decision date)	November 2007	GAS NATURAL SDG, S.A.
1	48	Gas Natural SDG, S.A. acquisition of Union Fenosa S.A.	September 2009	GAS NATURAL SDG, S.A.
2	49	Law N° 1111 (Tax law)	2006-12-27	DIAN (COLOMBIAN TAX AND CUSTOMS AUTHORITY)
2	50	Decree 3019 (Depreciation periods)	1989-12-26	MINISTERIO DE HACIENDA Y CRÉDITO PÚBLICO
2	51	Guidelines on the assessment of investment analysis v3.1	2010-01-15	CDM - EXECUTIVE BOARD
2	52	Resolution 086 (scale classification for hydropower plants)	1996	COMISIÓN DE REGULACIÓN DE ENERGÍA Y GAS (CREG)
1	53	Investment costs quotation	November 2007	"CONCEPTO TÉCNICO Y PRESUPUESTAL PEQUEÑA CENTRAL HIDROELÉCTRICA BAJO TULUA. FASE PREFACTIBILIDAD" ("Technical and financial basis for Tuluá small hydropower plant, prefeasibility phase")
2	54	Development plan for Non-Conventional Sources of Energy in Colombia	2010	MINISTERIO DE MINAS Y ENERGÍA. UNIDAD DE PLANEACIÓN MINERO ENERGÉTICA
2	55	Project 3347 : Caruquia 9.76 MW Hydroelectric Project		CDM - EXECUTIVE BOARD
2	56	Project 0122 : Agua Fresca Multipurpose and environmental services project		CDM - EXECUTIVE BOARD
2	57	Project 0275 : Santa Ana Hydroelectric Plant		CDM - EXECUTIVE BOARD
2	58	Project 1411 : La Cascada 2.3 MW Hydroelectric Project		CDM - EXECUTIVE BOARD
2	59	Project 2600. Amaime Minor Hydroelectric Power Plant		CDM - EXECUTIVE BOARD
2	60	Guidelines for the reporting and validation of plant load factors v.1.	July 2009	CDM - EXECUTIVE BOARD
2	61	Electricity prices	Various years	SIEL (COLOMBIAN ELECTRIC INFORMATION SYSTEM)
2	62	Price Indexes in Colombia	Various years	NATIONAL ADMINISTRATIVE DEPARTMENT OF STATISTICS (DANE)

Category	Ref	Document Name	Date	Author/Competent Authority
1	63	Updated investment budget	2010	EMPRESA DE ENERGÍA DEL PACIFICO, EPSA S.A
1	64	Summary of work progress	2011	EMPRESA DE ENERGÍA DEL PACIFICO, EPSA S.A
2	65	Guidelines for objective demonstration and assessment of barriers-version 01	2009-10-16	CDM - EXECUTIVE BOARD
2	66	Resolution 071 of 2006: Firm Energy for the Reliability Charge	2006	COMISIÓN DE REGULACIÓN DE ENERGÍA Y GAS (CREG)
2	67	Reliability Payment Auction Result	2008	SUPERINTENDENCIA DE SERVICIOS PÚBLICOS

## CDM VALIDATION PROTOCOL

### UNIÓN FENOSA GENERACIÓN S.A

### VALIDATION OF THE PROJECT ACTIVITY:

### BAJO TULUÁ MINOR HYDROELECTRIC POWER PLANT

**REFERENCE NUMBER: 2008/0989/CDM/07**

**REPORT NUMBER: 03**

Validation Type
Validation of a project activity
Validation team: Elena Llorente Pérez Mercedes García Madero Marcelino Pellitero Martinez Luis Robles (Technical reviewer)

Address: C/ Génova, 6 28004 Madrid Tlf: +34 91 4326004	Date: 2010-11-15
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**Table 1 Mandatory Requirements for Clean Development Mechanism (CDM) Project Activities**

REQUIREMENT	REFERENCE	CONCLUSION	Cross Reference / Comment
1. The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3	Kyoto Protocol Art.12.2	YES	Table 2, Section B.12.1
2. The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof	Kyoto Protocol Art. 12.2, Marrakesh Accords, CDM Modalities §40a	YES	Table 2, Section A.3
3. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC	Kyoto Protocol Art.12.2.	YES	Table 2, Section B.12.1
4. The project shall have the written approval of voluntary participation from the designated national authorities of each party involved	Kyoto Protocol Art. 12.5a, Marrakesh Accords, CDM Modalities §40a	<b>CAR-1</b> <b>CAR-2</b>	<del>The approval letter of the Colombian Designated National Authority has to be obtained.</del> <del>The approval letter of the Spain Designated National Authority has to be obtained.</del> (For resolution: See table 3, version 02)
5. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change	Kyoto Protocol Art. 12.5b	YES	Table 2, Section B
6. Reduction in GHG emissions shall be additional to any that would occur in absence of the project activity, i.e. a CDM project activity is	Kyoto Protocol Art. 12.5c,	YES	Table 2, Section B.2

REQUIREMENT	REFERENCE	CONCLUSION	Cross Reference / Comment
additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity	Marrakesh Accords, CDM Modalities §43		
<b>7.</b> Potential public funding for the project from Parties in Annex I shall not be a diversion of official development assistance	Marrakech Accords	N/A	There is not foreseen to receive or seek any public funding from any Annex I Party and AENOR has not come across any indication about ODA during the validation process.
<b>8.</b> Parties participating in the CDM shall designate a national authority for the CDM	Marrakech Accords, CDM Modalities §29	YES	Government of Colombia has designated " <i>Ministerio de Ambiente, Vivienda y Desarrollo Territorial</i> " to act as DNA.  The Government of Spain has designated " <i>Oficina Española de Cambio Climático, Ministerio de Medio Ambiente y Medio Rural y Marino</i> " to act as a DNA.
<b>9.</b> The host country shall be a Party to the Kyoto Protocol	Marrakech Accords, CDM Modalities §30	YES	Date of ratification: 30/11/01 Source: UNFCCC
<b>10.</b> Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received	Marrakech Accords, CDM Modalities §37b	YES	Table 2, Section E
<b>11.</b> Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted,	Marrakech Accords, CDM	YES	Table 2, Section D

REQUIREMENT	REFERENCE	CONCLUSION	Cross Reference / Comment
and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	Modalities §37c		
<b>12.</b> Baseline and monitoring methodology shall be previously approved by the CDM Methodology Panel	Marrakech Accords, CDM Modalities §37e	YES	Table 2, Section B.1.1 and B.3.1
<b>13.</b> Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP	Marrakech Accords, CDM Modalities §37f	YES	Table 2, Section B
<b>14.</b> Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available	Marrakech Accords, CDM Modalities, §40	YES	The project design document has been made publicly available on 2008-08-01 on UNFCCC web site.
<b>15.</b> A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances	Marrakech Accords, CDM Modalities, §45c,d	YES	Table 2, Section B.2
<b>16.</b> The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure	Marrakech Accords, CDM Modalities, §47	YES	Table 2, Section B.2
<b>17.</b> The project design document shall be in conformance with the UNFCCC CDM-PDD format	Marrakech Accords, CDM Modalities, Appendix B, EB Decisions	<b>CAR 3</b>	The format of the PDD used (Version 03.1) is not in accordance with the last format published in the UNFCCC web page.  Furthermore, some tables are not in accordance to the



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REQUIREMENT	REFERENCE	CONCLUSION	Cross Reference / Comment
			Guidelines for completing the project design document (CDM-PDD) and the proposed new baseline and monitoring methodologies (CDM-NM) – Version 7.

**Table 2 Requirements Checklist**

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
<b>A. General Description of Project Activity</b> <i>The project design is assessed.</i>					
<b>A.1. Project Boundaries</b> <i>Project Boundaries are the limits and borders defining the GHG emission reduction project.</i>					
A.1.1. Are the project's spatial (geographical) boundaries clearly defined?		DR	<p>The Bajo Tuluá minor hydroelectric Project is located in the middle section of the river's basin, between points 1,472 and 1,250 meters above sea level, in the department of the Cauca Valley, in the Municipalities of Tuluá, Buga and San Pedro.</p> <p>As stated in the PDD, the water intake point is located on the right margin on the district of Jicaramata (borough of Monteloro, municipality of Tuluá). The engine house is located in the height 1,474.7, approximately 700 meters downstream of the reavine of the Gaitana.</p> <p>The coordinates of the project are:  Latitude: 3.925272°  Longitude: -76.087950°</p> <p>The location was checked against the EIA, the maps coded PL-TUL-EIA-A-001 and PL-TUL-EIA-A-002, and the interview to the majors of the Municipalities located in the area during the on site visit (Buga, Tuluá and San Pedro). The validation team will not be able to get to the site project because it is a high vulnerable area of the guerrilla attacks.</p> <p>Some differences between the technical description of PDD and the EIA have been detected.</p>	<b>CAR-4</b> <b>CAR-5</b>	OK

\* MoV = Means of Verification, DR= Document Review, I= Interview

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			<p><del>CAR 4</del> — The differences detected between the technical description of PDD and the EIA have to be solved.</p> <p><del>CAR 5</del> — The Environmental License has to be provided. (For resolution: See table 3, version 02)</p>		
A.1.2. Are the project's system (components and facilities used to mitigate GHGs) boundaries clearly defined?		DR	<p>Yes. The delimitation system for this project is determined by National Interconnected System of Colombia and all the plants connected physically to this electricity system. It is in accordance with the definition of electricity system included in the "Tool to calculate the emission factor for an electricity system".</p> <p>As it is referred in the PDD, Section B.3, the hydroelectric power plant does not have a reservoir so no project emissions have been considered.</p> <p>Following the guidelines established by the ACM0002, the baseline only consider the CO<sub>2</sub> emissions from the fossil fuel consuming plants that are shifted by Bajo Tuluá minor hydroelectric project activity.</p> <p>Regarding the facilities of the project, the PDD describes the following stages:</p> <ul style="list-style-type: none"> <li>• water collection</li> <li>• pressure conduction tunnel</li> <li>• engine house</li> <li>• electrical distribution line and,</li> <li>• Complementary civil works like to access path, adaptation of landfills, and bridge over the Tuluá River.</li> </ul> <p>These units are clearly defined, but they have to be in accordance with the Environmental License.</p> <p>See A.1.2 CAR 5</p> <p>Some differences have been detected between the Environmental License application and the description</p>	<p><b>CAR-4</b></p> <p><b>CAR-5</b></p>	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
			included in the PDD. These discrepancies shall be solved. See A.1.1 CAR 4.		
<b>A.2. Technology to be employed</b> <i>Validation of project technology focuses on the project engineering, choice of technology and competence maintenance needs. The validator should ensure that environmentally safe and sound technology and know-how is used.</i>					
A.2.1. Does the project design engineering reflect current good practices?		DR	<p>The project design engineering reflects current good practices. The emission reductions result due to the displacement of the grid based power.</p> <p>As it is established in the Section A.2 of the PDD, the hydroelectric project consists in two Francis Turbines with a capacity of 19.84 MW.</p> <p>The power plant obtains water at 1,472 meters above sea level (225 m) with a mean flow of 12.5 m<sup>3</sup>/s. The length of the power tunnel (m) will be 5,839 m.</p> <p>The technology use to optimize the electricity production is as follow:</p> <ul style="list-style-type: none"> <li>- The engine house consists of two generators with Francis turbines with an expected efficiency at 100% opening of 93%, and a design power per unit of 9,920 kW.</li> <li>- Electronic control devices for regulation and supervision;</li> </ul> <p>Grid connection:</p> <ul style="list-style-type: none"> <li>- The electrical distribution line between the engine house and the sub-station of Bajo Tuluá has a Nominal voltage of 34.5 KV.</li> </ul> <p>Bajo Tuluá has an Environmental Impact Assessment, but the Environmental License has not been yet obtained. This issue was checked during the interview</p>	<b>CAR-4</b> <b>CAR-5</b>	OK

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			to the CVC ( <i>Corporación Regional del Valle del Cauca</i> ).  The conformance with the environmental regulation was also assessed during the CVC visit.  See A.1.1, A.1.2 <b>CAR 4 and CAR 5.</b>		
A.2.2. Does the project use state of the art technology or would the technology result in a significantly better performance than any commonly used technologies in the host country?		DR	Yes. The project uses the state of the art technology to generate electricity from the capacity of the Tuluá River.  The power plant is a run of river with two Francis turbines with a design power of 9,920 kW.	OK	OK
A.2.3. Is the project technology likely to be substituted by other or more efficient technologies within the project period?		DR I	The project technology will not be likely substituted by other technology.  The Environmental Impact Assessment seems to be approved for the installed capacity of 19.91 MW of the Minor Hydroelectric power plant Bajo Tuluá. A re-powering should be possible, but since the legislation in Colombia for electric power distinct the capacity of the plants to operate in the market, a re-powering of the plant is not expected during the renewable crediting period.  <del>CAR 5 – The Environmental License has to be provided.</del> (For resolution: See table 3, version 02)	<b>CAR 5</b>	OK
A.2.4. Does the project require extensive initial training and maintenance efforts in order to work as presumed during the project period?		DR I	The project requires initial training and maintenance efforts for the hydro power plant for the local people that will be involved in the process.  During the on site visit to the CVC offices and the interview with the majors of the Municipalities of Buga, Tuluá and San Pedro, the EPSA intention to contract local people during the construction and the operating stage was assessed. No contract has been signed with local people.  <b>FAR 1 - Documented evidence regarding the local</b>	<b>FAR 1</b>	<b>FAR 1</b>

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			people training, and the contract of the people of the communities should be verified during the initial verification.		
A.2.5. Does the project make provisions for meeting training and maintenance needs?		DR I	See A.2.4	<b>FAR 1</b>	FAR 1
<b>A.3. Contribution to Sustainable Development</b> <i>The project's contribution to sustainable development is assessed.</i>					
A.3.1. Is the project in line with relevant legislation and plans in the host country?		DR I	<p>Conformance with relevant legislation has been audited during the on-site visit. The project developer has not yet obtained the Environmental license, so the rest of the permits are neither obtained.</p> <p><b>FAR 2 - Authorizations obtained by EPSA (project participant) should be revised during the initial verification:</b></p> <ul style="list-style-type: none"> <li>- <b>Generation Permit</b></li> <li>- <b>Operation Permit</b></li> </ul> <p>The absence of indigenous populations in the influence area has been certificate by the Internal and Justice Ministry in accordance to Law 99 of 1993. The certificate has been provided to the validation team.</p>	<b>FAR 2</b>	FAR 2
A.3.2. Is the project in line with host-country specific CDM requirements?		DR I	<p>Letter of Approval by the DNA of Colombia has to be obtained.</p> <p>The approval letter of the Colombia's DNA shall state clearly that the project is in line with sustainable development policies of Colombia.</p> <p>Letter of Approval by the DNA of Spain has to be obtained as well, according to the applicable Spanish legislation RD 1031/2007, 20 July.</p> <p><del><b>CAR 6 - According to the national procedure, a No Objection Letter from the Colombia DNA has to be</b></del></p>	<b>CAR-1</b> <b>CAR-2</b> <b>CAR-6</b>	OK

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			<del>also obtained. It shall be submitted to the validation team.</del> (For resolution: See table 3, version 02)		
A.3.3. Is the project in line with sustainable development policies of the host country?		DR	See section A.3.2.	<b>CAR-1</b> <b>CAR-2</b> <b>CAR-6</b>	OK
A.3.4. Will the project create other environmental or social benefits than GHG emission reductions?		DR I	<p>The view of project participant on the contribution of the project activity towards sustainable development is transparently described in section A.2 of the PDD. As it is established, the project of the minor hydroelectric power plant of Bajo Tuluá contributes to the fulfilment of the following national sustainable development priorities:</p> <ul style="list-style-type: none"> <li>• Reduction in the atmospheric contamination (NOX, SOX, COVs and suspended particles) and contamination of water.</li> <li>• Reduction in the consumption of fossil fuels.</li> <li>• Increase in the use of renewable energy sources</li> </ul> <p>During the on-site visit, the Major of the Municipalities involved will be interviewed in order to confirm the social and economic benefits the project will bring (local employment, additional incomes) to the local community.</p> <p>During the on site visit, the validation team assessed the four different kinds of social contributions of the project developer.</p> <p><del><b>CAR-7</b> – The four ways of contribution shall be detailed in the PDD. The social section of the PDD should be reinforced.</del></p>	<b>CAR-7</b>	OK

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<b>B. Project Baseline and Monitoring</b> <i>The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.</i>					
<b>B.1. Baseline Methodology</b> <i>It is assessed whether the project applies an appropriate baseline methodology.</i>					
B.1.1. Is the baseline methodology previously approved by the CDM Methodology Panel?		DR	<p>The project applies approved baseline methodology ACM0002 <del>“Consolidated methodology for grid-connected electricity generation from renewable sources – Version 7”</del>. The methodology was approved on November 2007 (EB 36)</p> <p>The ACM0002 is complemented with the version 01.1 of the <del>“Tool to calculate the emission factor of the electric system”</del>.</p> <p>The methodology ACM0002 “Consolidated methodology for grid-connected electricity generation from renewable sources –has been updated to number 10, and the “Tool to calculate the emission factor for an electric system” version 01.1 has been also updated to number 02. The tool for the demonstration and assessment of additionality has been updated, version 05.2. Thus, CAR 8 is solved.</p> <p><del><b>CAR 8 – The versions of the different tools shall be correctly referenced in the PDD.</b></del> (For resolution: See table 3, version 02)</p>	<b>CAR 8</b>	OK
B.1.2. Is the baseline methodology the one deemed most applicable for this project and is the appropriateness justified?		DR	<p>Yes. As it is established in Section B.2 of the PDD, approved baseline methodology ACM0002 is applicable to grid-connected renewable power generation project activities under several conditions since is a run of river hydro power plant that not involved switching from fossil fuels to renewable</p>	OK	OK

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			energy.  Furthermore, the geographic and system boundaries for the relevant electricity grid (National Interconnected System of Colombia) can be clearly identified. Moreover, the project is a run-of-river hydro power plant.		
<b>B.2. Baseline Determination</b>  <i>The choice of baseline will be validated with focus on whether the baseline is a likely scenario, whether the project itself is not a likely baseline scenario, and whether the baseline is complete and transparent.</i>					
B.2.1. Is the application of the methodology and the discussion and determination of the chosen baseline transparent?		DR I	<p>The baseline emission factor (EFy) has been calculated according to the three steps stated in ACM0002 and complemented according to the "Tool to calculate the emission factor for an electric system".</p> <p>The Operational Margin (OM) and the Build Margin (BM) have been calculated and combined to obtain the Baseline Emission factor.</p> <p>According to the description included in the PDD, the methods selected to calculate are following described:</p> <ul style="list-style-type: none"> <li>• <i>Operating margin:</i> Simple Adjusted, the Option 2 of the "Tool to calculate the emission factor for an electricity system"</li> <li>• <i>Building Margin:</i> Option 2, ex-post calculation of the emission factor for the first crediting period and ex ante during the second and third periods.</li> </ul> <p><b>CAR 9</b> — <del>The spreadsheets used for the emission reduction calculation shall be provided to the validation team.</del> (For resolution: See table 3, version 02)</p>	<b>CAR-9</b>	OK

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B.2.2. Has the baseline been determined using conservative assumptions where possible?		DR I	See B.2.1 <del>CAR 9 – The spreadsheets used for the emission reduction calculation shall be provided to the validation team.</del>	<b>CAR-9</b>	OK
B.2.3. Has the baseline been established on a project-specific basis?		DR	See B.2.1 <del>CAR 9 – The spreadsheets used for the emission reduction calculation shall be provided to the validation team.</del>	<b>CAR-9</b>	OK
B.2.4. Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?		DR I	Yes. Section B.5 the compliance with the current legislation and regulations has been detailed, and it was assessed during the on site visit to the Environmental Authority.  The correctness of the baseline scenario data has not been evaluated.  <del>CAR 9 – The spreadsheets used for the emission reduction calculation shall be provided to the validation team.</del>	<b>CAR-9</b>	OK
B.2.5. Is the baseline determination compatible with the available data?			Yes. The two main sources of data used for the baseline emission factor calculation have been: <ul style="list-style-type: none"> <li>• XM, Compañía de Expertos en Mercado SA. E.S.P - hourly generation data.</li> <li>• 2006 IPPC Guidelines for National Greenhouse Gas Inventories - heat rate of the fuels.</li> </ul>	OK	OK
B.2.6. Does the selected baseline represent the most likely scenario among other possible and/or discussed scenarios?		DR I	Yes, the baseline scenario is one where the electricity supplied by the project to the network will be generated by the operation of the plants that are currently connected to the network and by new plants added to the System, based on the current trends in the sector.  The current trends in the sector in Colombia have	<b>CAR-10</b>	OK

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			<p>been checked against the documents:</p> <ul style="list-style-type: none"> <li>Reference Expansion Plan 2008-2022.</li> <li>Colombia II Vision – Centenary 2019.</li> <li>National Strategy for the implementation of CDM in Colombia.</li> </ul> <p><b>CAR 10 – The references of all documents included in the PDD shall be revised, updated and submitted to the validation team.</b>—(For resolution: See table 3, version 02)</p>		
B.2.7. Is it demonstrated/justified that the project activity itself is not a likely baseline scenario (e.g. through (a) a flow-chart or series of questions that lead to a narrowing of potential baseline options, (b) a qualitative or quantitative assessment of different potential options and an indication of why the non-project option is more likely, (c) a qualitative or quantitative assessment of one or more barriers facing the proposed project activity or (d) an indication that the project type is not common practice in the proposed area of implementation, and not required by a Party's legislation-/regulations)?		DR I	<p>As it established in the PDD Section B.4, the baseline scenario is one where the electricity supplied by the project to the network will be generated by the operation of the plants that are currently connected to the network and by new plants added to the System, based on the current trends in the sector.</p> <p>The project itself is not a likely baseline scenario and it is justified through the demonstration of its additionality by applying the <i>"Tool for the demonstration and assessment of additionality"</i>, version 05.2.</p> <p><b>CAR 11 – Documented evidence shall be provided to the validation team regarding the importance of the incentive of the CDM to the project activity, and this documentation shall be explained in the section B.5 of the PDD.</b>—(For resolution: See table 3, version 02)</p> <p>This documentation shall be provided in order to submit it to the Executive Board of UNFCCC in a confidential manner.</p> <p><b>CAR 12 – The additionality analysis shall be improved according to the Annex 45 of the EB 41 "Guidance on the Assessment of Investment Analysis" and the Tool for the demonstration and assessment of additionality", version 05.2.</b></p> <p>An analysis of the 4 steps have been carried out as</p>	<p><b>CAR 11</b></p> <p><b>CAR 12</b></p> <p><b>CAR 16</b></p>	OK

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			<p>follow:</p> <p><u>Step 1. Identification of alternatives:</u></p> <p>In accordance to the "Tool for the demonstration of the additionality" four alternatives have been included in the PDD. All of them are credible and realistic, but not comparable because the description of the alternatives has not been detailed in the PDD.</p> <p><b><del>CAR 12.1 – Further explanation of each alternative shall be included in this section of the PDD.</del></b></p> <p><u>Step 2. Investment analysis:</u></p> <p>The method chosen seems adequate since the project activity and the alternatives generate other incomes different from the CERs.</p> <p><b><del>CAR 12.2 – Additional information shall be included in the PDD and justified in order to detail the additionality analysis in a transparent manner.</del></b></p> <p><b><del>CAR 12.3 – The spreadsheets of the IRR calculations shall be submitted to the validation team.</del></b></p> <p><u>Step 3. Barrier analysis:</u></p> <p>The barrier analysis is only detailed in order to reinforce the additionality analysis.</p> <p>Some inconsistencies have been found between the barrier analysis and the table included in page 23.</p> <p>The Barrier analysis shall be based in documented evidence, for example, how the social and institutional barrier affect less strongly to the hydro power plants with reservoir than to the proposed project activity</p> <p><b><del>CAR 12.4 – The inconsistencies of the tables shall be solved.</del></b></p> <p><b><del>CAR 12.5 – The barrier analysis shall be reinforced using official documentation and the evidences shall be submitted to the audit team.</del></b></p>		

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			<p><u>Step 4. Common practice analysis:</u></p> <p><del>CAR 12.6 – The justification of some central as no CDM project shall be included in this section of the PDD.</del></p> <p>The source of the information provided in the tables shall be included in the PDD.</p> <p><del>CAR 12.7 – An explanation of why the plants closed or modified are not considered in the analysis shall be included.</del></p> <p><del>CAR 16 Confidential PDD appendices have to be uploaded.</del></p> <p>Financial parameters under control (those related to Bajo Tulúa) have been made publicly available in the final PDD version.</p>		
B.2.8. Have the major risks to the baseline been identified?		DR	<p>The baseline calculations have not been provided, so the major risks have not been evaluated.</p> <p>See B.2.1 CAR 9</p>	<b>CAR 9</b>	OK
B.2.9. Is all literature and sources clearly referenced?		DR	<p>No. Not all the sources of information have been included and clearly referenced.</p> <p><del>CAR 10 – The sources of data of all the documents included in the PDD shall be included and clearly referenced.</del> (For resolution: See table 3, version 02)</p>	<b>CAR 10</b>	OK
<p><b>Monitoring Plan</b></p> <p><i>The monitoring plan review aims to establish whether all relevant project aspects deemed necessary to monitor and report reliable emission reductions are properly addressed</i></p>					
<p><b>B.3. Monitoring Methodology</b></p> <p><i>It is assessed whether the project applies an appropriate baseline methodology.</i></p>					

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
B.3.1. Is the monitoring methodology previously approved by the CDM Methodology Panel?		DR	Yes, the project applies approved consolidated monitoring methodology ACM0002. "Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources". The methodology was approved on November 2007 (EB 36).	OK	OK
B.3.2. Is the monitoring methodology applicable for this project and is the appropriateness justified?		DR	Yes, according to UNFCCC, the methodology is applicable to hydroelectric projects connected to the grid as Bajo Tuluá minor project activity. The appropriateness of the monitoring methodology is justified in the PDD.	OK	OK
<b>B.4. Monitoring of Project Emissions</b> <i>It is established whether the monitoring plan provides for reliable and complete project emission data over time.</i>					
B.4.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for estimation or measuring the greenhouse gas emissions within the project boundary during the crediting period?		DR	N/A. According to ACM0002 project emissions must not be considered because there is not reservoir.	OK	OK
B.4.2. Are the choices of project GHG indicators reasonable?		DR	Not applicable since project emissions are not considered.	OK	OK
B.4.3. Will it be possible to monitor / measure the specified project GHG indicators?		DR	Not applicable since project emissions are not considered.	OK	OK
B.4.4. Will the indicators give opportunity for real measurements of achieved emission reductions?		DR	Not applicable since project emissions are not considered.	OK	OK
B.4.5. Will the indicators enable comparison of project data and performance over time?		DR	Not applicable since project emissions are not considered.	OK	OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
<b>B.5. Monitoring of Leakage</b> <i>It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.</i>					
B.5.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining leakage?		DR	Leakage is not considered according with the ACM0002.	OK	OK
B.5.2. Have relevant indicators for GHG leakage been included?		DR	Not applicable since leakage is not considered.	OK	OK
B.5.3. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining leakage?		DR	Not applicable since leakage is not considered.	OK	OK
B.5.4. Will it be possible to monitor the specified GHG leakage indicators?		DR	Not applicable since leakage is not considered.	OK	OK
<b>B.6. Monitoring of Baseline Emissions</b> <i>It is established whether the monitoring plan provides for reliable and complete project emission data over time.</i>					
B.6.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining baseline emissions during the crediting period?		DR	<p>According to the methodology and the PDD, the relevant data necessary for determining baseline emissions are:</p> <ul style="list-style-type: none"> <li>Electricity generated by the project (kWh) measured hourly and download manually and annually from NEON System.</li> <li>Data required to the re-calculation of the operating margin emission factor.</li> <li>Data required to the re-calculation of the build margin emission factor.</li> </ul> <p>The provisions included in the PDD in order to</p>	OK	OK

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			monitor the relevant data are in accordance with the ACM0002.  The EF will be calculated once a year as specified in Section B.6.1 of the PDD.		
B.6.2. Is the choice of baseline indicators, in particular for baseline emissions, reasonable?		DR	Yes, the indicators chosen are included in the Plant's Operations Reports as it is established in Section B.7 of the PDD. They are as a reference and they include: <ul style="list-style-type: none"> <li>• Annual electricity production</li> <li>• Annual and monthly plan factor</li> <li>• Maximum annual and monthly demand</li> <li>• Annual and monthly load factor</li> <li>• Annual and monthly consumption of turbines and,</li> <li>• Relevant events during the year.</li> </ul> <p><del>CL 1—The parameters used to calculate the emission factor of the grid shall be included in the Monitoring Plan Section.</del> (For resolution: See table 3, version 02)</p>	<del>CL 1</del>	OK
B.6.3. Will it be possible to monitor the specified baseline indicators?		DR	Yes, in order to monitor the specified baseline indicators, the project developer uses the Plant's Operation Reports.  In order to monitor the emission factor of the grid, the data is downloaded manually from the NEON system once a year. It is included in the spreadsheets in order to re-calculate it.	OK	OK
<b>B.7. Monitoring of Sustainable Development Indicators/ Environmental Impacts</b>  <i>It is checked that choices of indicators are reasonable and complete to monitor sustainable performance over time.</i>					

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B.7.1. Does the monitoring plan provide the collection and archiving of relevant data concerning environmental, social and economic impacts?		DR I	Yes. The Monitoring Plan includes the monitoring of the social and environmental investments, and the ecological river flow. It includes also the Investment related to obtaining the CERs.  <del>CL 2 – Specific Environmental indicators stated in the Environmental Impact Assessment shall be included. (For instance, species of the area of the project activity).</del> -(For resolution: See table 3, version 02)	<del>CL 2</del>	OK
B.7.2. Is the choice of indicators for sustainability development (social, environmental, economic) reasonable?		DR I	Yes. The choice of indicators seems reasonable since it permits to monitor the contribution of the project activity to the protection of the environment and the communities involved.  The contribution of the project for sustainability development was assessed during the on site visit against the interviews with the stakeholders.  Faltan los indicadores	OK	OK
B.7.3. Will it be possible to monitor the specified sustainable development indicators?		DR I	Yes. See B.7.1	OK	
B.7.4. Are the sustainable development indicators in line with stated national priorities in the Host Country?		DR	Letter of Approval by the DNA of Colombia has to be obtained. A No Objection Letter is required.  Letter of Approval by the DNA of Spain has to be obtained as well, according to the applicable Spanish legislation RD 1031/2007, 20 July.	<b>CAR 1</b> <b>CAR 2</b>	OK
<b>B.8. Project Management Planning</b> <i>It is checked that project implementation is properly prepared for and that critical arrangements are addressed.</i>					
B.8.1. Is the authority and responsibility of project management clearly described?		DR	The project manager is responsible for the implementation and update of all data and parameters monitored, ensuring that the emission reduction calculations obtained are realistic and based	<del>CL 3</del>	OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
			<p>on evidence.</p> <p>EPSA will develop, own and operate the Bajo Tuluá minor project activity. It is the holder of the project-specific contracts and required permits.</p> <p>EPSA has developed different procedures in order to manage the emission reduction calculation.</p> <p><b><del>CL 3 – The procedures developed in order to describe the authority and the activities involved in the emission reduction calculation shall be referenced in the PDD.</del></b> (For resolution: See table 3, version 02)</p>		
B.8.2. Is the authority and responsibility for registration, monitoring, measurement and reporting clearly described?		DR	<p>As it is established in the PDD, the department responsible for carrying out the Monitoring Plan has all equipment required for the instantaneous measurement of the active and apparent power, power levels, current per phase, power factor and energy delivered per turbine generator group.</p> <p>The project manager will be directly responsible for monitoring activities for the first crediting period.</p> <p>The department in charge of the monitoring has been interviewed during the on site visit, and the relevant documentation (procedures used, instructions, etc) were submitted to the validation team.</p>	OK	OK
B.8.3. Are procedures identified for training of monitoring personnel?		DR	<p>See A.2.4.</p> <p>In the Monitoring works, personnel in charge of it should receive training about monitoring and calibration.</p> <p>EPSA has submitted difference registers of the training activities involved in the emission reduction calculation.</p>	OK	OK
B.8.4. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?		DR	<p>No unintended emissions produced by an emergency situation have been identified, so, no procedure has been prepared.</p>	OK	OK

\* MoV = Means of Verification, DR= Document Review, I= Interview

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
B.8.5. Are procedures identified for calibration of monitoring equipment?		DR	<p>Yes, there is a procedure, with reference PR.PRO.03.001 "Control of the measurement equipment", developed on 4<sup>th</sup> June of 2008. It includes the responsibilities and the main calibration activities.</p> <p>The procedure is developed in order to be used in different centrals of EPSA, so no equipment detail is included.</p> <p>As it is established in the Procedure, the meters to be used for monitoring parameters required will be calibrated. EPSA laboratory is accredited for the meters calibration. The Calibration accreditation and the register of the application for the re-calibration have been checked by the validation team.</p> <p>On the other hand, every meter shall be certified (Decree 2269/1993), and the administrator of the electricity market should have a copy of each certificate.</p>	OK	OK
B.8.6. Are procedures identified for maintenance of monitoring equipment and installations?		DR	<p>Yes, as it is established in Section B.8.5, there is a Procedure with reference PR.PRO.03.001 "Control of the measurement equipment", developed in June of 2008.</p>	OK	OK
B.8.7. Are procedures identified for monitoring, measurements and reporting?		DR	<p>The Monitoring Plan established in the PDD includes the procedures used for the monitoring and reporting.</p> <p>See B.8.2</p>	OK	OK
B.8.8. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)		DR	<p>EPSA has developed following procedures in order to manage all the stages involved in the emission reduction calculations:</p> <ul style="list-style-type: none"> <li>○ PR.PRO.03.001: "Control of the measurement equipment" for the calibration of the meters.</li> <li>○ PR.DIS.04.001: "Energy Balance management" for the information flow management, including the activities to develop in case of uncertainties.</li> </ul>	OK	OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
			<ul style="list-style-type: none"> <li>PR.DIS.04.002 "Energy data acquisition of borders points" for the tele-measurement management.</li> <li>PR.DIS.04.003 "Validation of the CND files" for the data adjustment of the CND data.</li> </ul>		
B.8.9. Are procedures identified for dealing with possible monitoring data adjustments and uncertainties?		DR	Yes. The procedures involved in the monitoring process include the activities to develop in case of uncertainty. See B.8.8.	OK	OK
B.8.10. Are procedures identified for review of reported results/data?		DR	Yes. EPSA has developed four procedures in order to manage the emission reduction calculation in every stage.	OK	OK
B.8.11. Are procedures identified for internal audits of GHG project compliance with operational requirements where applicable?		DR	Yes. EPSA includes in every procedure a section for the review of data.	OK	OK
B.8.12. Are procedures identified for project performance reviews before data is submitted for verification, internally or externally?		DR	Yes, as it is established in Section B.8.11, EPSA includes a section for the reviewing of data in every procedure involved in the emission reduction calculation.	OK	OK
B.8.13. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?		DR	Yes, as it is established in Section B.8.11, EPSA includes a section for the reviewing of data in every procedure involved in the emission reduction calculation.	OK	OK
<b>Calculation of GHG Emissions by Source</b> <i>It is assessed whether all material GHG emission sources are addressed and how sensitivities and data uncertainties have been addressed to arrive at conservative estimates of projected emission reductions.</i>					
<b>B.9. Predicted Project GHG Emissions</b> <i>The validation of predicted project GHG emissions focuses on</i>					

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
<i>transparency and completeness of calculations.</i>					
B.9.1. Are all aspects related to direct and indirect GHG emissions captured in the project design?		DR	Not applicable since project emissions are not considered.	OK	OK
B.9.2. Are the GHG calculations documented in a complete and transparent manner?		DR	Not applicable since project emissions are not considered.	OK	OK
B.9.3. Have conservative assumptions been used to calculate project GHG emissions?		DR	Not applicable since project emissions are not considered.	OK	OK
B.9.4. Are uncertainties in the GHG emissions estimates properly addressed in the documentation?		DR	Not applicable since project emissions are not considered.	OK	OK
B.9.5. Have all relevant greenhouse gases and source categories listed in Kyoto Protocol Annex A been evaluated?		DR	Not applicable since project emissions are not considered.	OK	OK
<b>B.10. Leakage</b> <i>It is assessed whether there leakage effects, i.e. change of emissions which occurs outside the project boundary and which are measurable and attributable to the project, have been properly assessed.</i>					
B.10.1. Are potential leakage effects beyond the chosen project boundaries properly identified?		DR	Not applicable since leakage is not considered.	OK	OK
B.10.2. Have these leakage effects been properly accounted for in calculations?		DR	Not applicable since leakage is not considered.	OK	OK
B.10.3. Does the methodology for calculating leakage comply with existing good practice?		DR	Not applicable since leakage is not considered.	OK	OK
B.10.4. Are the calculations documented in a complete and transparent manner?		DR	Not applicable since leakage is not considered.	OK	OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
B.10.5. Have conservative assumptions been used when calculating leakage?		DR	Not applicable since leakage is not considered.	OK	OK
B.10.6. Are uncertainties in the leakage estimates properly addressed?		DR	Not applicable since leakage is not considered.	OK	OK
<b>B.11. Baseline Emissions</b> <i>The validation of predicted baseline GHG emissions focuses on transparency and completeness of calculations.</i>					
B.11.1. Have the most relevant and likely operational characteristics and baseline indicators been chosen as reference for baseline emissions?		DR I	See B.2.1 – CAR 9  <del>CAR 9 – The spreadsheets used for the emission reduction calculation shall be provided to the validation team.</del> (For resolution: See table 3, version 02)	<b>CAR 9</b>	OK
B.11.2. Are the baseline boundaries clearly defined and do they sufficiently cover sources and sinks for baseline emissions?		DR	Baseline boundaries are established according to rules of the approved methodology ACM0002, and they are clearly defined.  The baseline emissions shall be assessed checking the spreadsheets against NEON data.  See B.2.1 – CAR 9  <b>CAR 9 - The spreadsheets used for the emission reduction calculation shall be provided to the validation team.</b>	<b>CAR 9</b>	OK
B.11.3. Are the GHG calculations documented in a complete and transparent manner?		DR I	See B.2.1 – CAR 9	<b>CAR 9</b>	OK
B.11.4. Have conservative assumptions been used when calculating baseline emissions?		DR I	See B.2.1 – CAR 9	<b>CAR 9</b>	OK
B.11.5. Are uncertainties in the GHG emission estimates		DR	See B.2.1 – CAR 9	<b>CAR 9</b>	OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
properly addressed in the documentation?		I			
B.11.6. Have the project baseline(s) and the project emissions been determined using the same appropriate methodology and conservative assumptions?		DR	Not applicable since project emissions are not considered.	OK	OK
<b>B.12. Emission Reductions</b> Validation of baseline GHG emissions will focus on methodology transparency and completeness in emission estimations.					
B.12.1. Will the project result in fewer GHG emissions than the baseline scenario?		DR I	The project will result in fewer GHG emissions than the baseline scenario through the production of clean energy. It is demonstrated in the Section B.6 of the PDD.  See B.2.1 – CAR 9  <b>CAR 9 - The spreadsheets used for the emission reduction calculation shall be provided to the validation team.</b>	<b>CAR 9</b>	OK
<b>C. Duration of the Project/ Crediting Period</b> <i>It is assessed whether the temporary boundaries of the project are clearly defined.</i>					
C.1.1. Are the project's starting date and operational lifetime clearly defined and reasonable?		DR I	The planned date of operation of the Bajo Tuluá minor hydroelectric Project Activity included in the PDD is 15 <sup>th</sup> September 2008.  The Bajo Tuluá hydroelectric project activity is expected to have a minimum operational life of 21 years from its operation date.  <del><b>CAR 13 — The start date of the project shall be in accordance to the last version of the Glossary of terms (EB 41): "the start date shall be considered to be the date on which the project participant has committed to expenditures related to the implementation or</b></del>	<b>CAR 13</b>	OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
			<del>related to the construction of the project activity" The equipment contract shall be submitted to the validation team in order to check the start date of the project in accordance to the new definition.</del> (For resolution: See table 3, version 02)		
C.1.2. Is the assumed crediting time clearly defined and reasonable (renewable crediting period of max. two x 7 years or fixed crediting period of max. 10 years)?		DR I	This crediting period is a renewable crediting period. The date included in the PDD is 1 <sup>st</sup> July 2011.  <del>CAR 14 – The last chronogram has to be submitted to the validation team.</del> (For resolution: See table 3, version 02)	<b>CAR-14</b>	OK
<b>D. Environmental Impacts</b>  <i>Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the validator.</i>					
D.1.1. Has an analysis of the environmental impacts of the project activity been sufficiently described?		DR I	In Section D of the PDD, the Environmental Impact Assessment Study has been correctly summarized. The Audit Team has checked the summary with the environmental impact assessment study, and they have interviewed the Environment Authority in Cali, the CVC (Corporación Autónoma Regional del Valle del Cauca).  <del>CAR 15 – Section D of the PDD shall be more specific according to the EIA submitted for the Bajo Tuluá project activity.</del> (For resolution: See table 3, version 02)  The Environmental License is not yet awarded to Empresa de Energía del Pacífico S.A. E.S.P. – EPSA E.S.P. for the project of the "Minor Hydroelectric Power Plant of Bajo Tuluá 1800", and it has to be provided to the validation team.  <del>CAR 5 – The Environment License has to be obtained and submitted to the validation team.</del>  (For resolution: See table 3, version 02)	<b>CAR-15</b> <b>CAR-5</b>	OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
D.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?		DR I	An EIA and the corresponding approval are needed to develop electrical power plants according to Decree 12/20, 2005. The Environmental Competent Authority is CVC in projects with power capacity between 10-100 MW.  See Section D.1.1 CAR 5	<b>CAR-5</b>	OK
D.1.3. Will the project create any adverse environmental effects?		DR I	Yes, several topics of the EIA are summarized in section D.1 and D.2 of the PDD.  The existing impacts are evaluated in three different periods (current period, construction period, and operation period). All of them are summarized in Section D.2 of the PDD.  The Handling Plan has been drafted to guarantee the environmental sustainability of the project and the environment where it will be located and operated.  The Environment Impact Assessment and the Handling Plan have been submitted to the audit team.  See D.1.1 CAR 5 and CAR 15	<b>CAR-15</b> <b>CAR-5</b>	OK
D.1.4. Are transboundary environmental impacts considered in the analysis?		DR	N/A	OK	OK
D.1.5. Have identified environmental impacts been addressed in the project design?		DR I	The environmental impacts have been correctly identified and addressed in the Section D.1 of the PDD.	OK	OK
D.1.6. Does the project comply with environmental legislation in the host country?		DR I	Yes. During the on site visit to the CVC, the analysis of the relevant regulation was made, and Bajo Tuluá minor project activity complied with all of them.  See D.1.1 CAR 5	<b>CAR 5</b>	
<b>E. Stakeholder Comments</b>  <i>The validator should ensure that a stakeholder comments have been invited</i>					

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
<i>and that due account has been taken of any comments received.</i>					
E.1.1. Have relevant stakeholders been consulted?		DR I	<p>According to the PDD, in order to guarantee the right to social participation and allow the involvement of the general public in the evaluation of the Project, the Bajo Tuluá Project's EIA was made available for public commentaries.</p> <p>Different socialization meetings were held with the municipalities of Buga, Tuluá and San Pedro, different councilors, and the CVC.</p> <p>During the on-site visit in October 2008, some issues were verified:</p> <ul style="list-style-type: none"> <li>○ EPSA is going to make four different kinds of donation. Two of them are mandatory by the national regulation (1190/2006 and 6/33), but the other two are voluntary. This issue has to be explained in the PDD.</li> <li>➤ During the opening meeting held in Cali on 27<sup>th</sup> October, the Director of the RSE Department made a presentation about the social activities and the high investment in this kind of work.</li> <li>➤ Because of the social company politic, EPSA is currently involved in many social activities, and during all the phases of Bajo Tuluá Hydroelectric Project they will continue with them. 1.145 families have been benefited by the company, and the number will be increased.</li> </ul> <p>See A.3.4</p>	OK	OK
E.1.2. Have appropriate media been used to invite comments by local stakeholders?		DR I	<p>Yes. In order to invite comments EPSA made several information meetings (01<sup>st</sup> April, 02<sup>sd</sup> April and 5<sup>th</sup> April of 2008) with the chairmen of the municipalities. EPSA prepared also a visit to another hydroelectric central (Rio Frio II) in order to show them the</p>	OK	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
			operation.  The media used to invite the participation of the stakeholders were by official letters and by the newspaper. The different communities that attended are stated in the PDD and were checked by the validation team with the minutes of the meetings.  All the minutes of the meetings were assessed during the on-site visit.		
E.1.3. If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?		DR I	Yes, a stakeholder process is required by Decree 12/20, 2005 in Colombia, and it has been carried out in accordance with it.  See E.1.1	OK	OK
E.1.4. Is a summary of the stakeholder comments received provided?		DR I	A summary of the stakeholder's comments is included in section E.2 of the PDD.  E.1.2	OK	OK
E.1.5. Has due account been taken of any stakeholder comments received?		DR I	The PPD describes different actions to be implemented based on the feedback received from the environmental authorities.  The requirements of the EIA approval are included in the Management Plan and shall be audited during the verification stage.  The company Energía del Pacífico, EPSA is committed to different interventions, based on the projects identified and prioritized in the meetings held with the communities and their representatives. All of them shall be audited during the verification stage.  See E.1.1	OK	OK

**Table 2.1 Additional requirements checklist for VVM version 1 (EB 44)**

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
<b>A.1. LETTER OF APPROVAL</b>					
A.1.1 Is the LoA received directly from the DNA or through the project participant.	VVM	DR I	The LOA has been received though the project participant, but its authenticity was checked during the on site visit interviewing the DNA personnel.	<b>OK</b>	<b>OK</b>
<b>A.2. PROJECT DESIGN</b>					
A.2.1 Does the PDD describe the CDM project activity with all relevant elements in a transparent and accurate way?	VVM	DR I	Yes, the PDD describes the CDM project activity with all relevant elements in a transparent and accurate way. The project location, technology and install capacity are clearly described in the PDD.	<b>OK</b>	<b>OK</b>
A.2.2 Has the CDM project activity at the start of the validation been constructed or does the CDM project activity use existing facilities or equipment?	VVM	DR I	The project is a new built hydropower project in the Department of the Cauca Valley, Colombia. The project starting date is 15 <sup>th</sup> January 2009, the date of the purchase of the equipment.	<b>OK</b>	<b>OK</b>
A.2.3 Is the project a large scale project, a small scale project with average annual emission reductions above 15 000 tonnes or a bundled small scale project? has on-site visit been carried out?	VVM	DR I	Bajo Tuluá Hydropower Project is a new small scale hydropower project with a total installed capacity of 20 MW. Through the documents which the project participant provided, the validation team can confirm the project design, construction, operation and monitoring plan and all baseline scenario information.  The on site visit was made during 27-30 <sup>th</sup> of October 2008. The main stakeholders were interviewed, and the project site was visited in order to check the coordinates and the location of the project activity.	<b>OK</b>	<b>OK</b>
A.2.4 Does the project activity involved alteration of existing installations? if so, have the differences between pre-project and	VVM	DR	Non applicable since the project activity is a new hydroelectric power plant. There is none installations	<b>OK</b>	<b>OK</b>

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Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
post-project activity been clearly described in the PDD?		I	in the project site.		
<b>A.3. PROJECT EMISSIONS NOT ADDRESSED BY THE METHODOLOGY</b>					
A.3.1 Does the methodology describe all project emission source for the project activity that contributes all 1% of the emission reductions? Sources that the methodology considers not to take into account are not relevant (e.g. cement and iron consumption for building hydropower plants).	VVM	DR I	No other project emission or leakage sources contributing more than 1% and not mentioned by the methodology have been found.	OK	OK
<b>A.4. DOCUMENTATION OF BASELINE EMISSIONS</b>					
A.4.1 Documentation of the baseline determination: All assumptions and data used by the project participants are listed in the PDD and related document to be submitted for registration. Is the data are properly referenced? <ul style="list-style-type: none"> <li>All documentation is relevant as well as correctly quoted and interpreted.</li> <li>Assumptions and data can be deemed reasonable.</li> <li>Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD.</li> <li>The methodology has been correctly applied to identify what would occur in the absence of the proposed CDM project activity.</li> </ul>	VVM	DR I	(1) All data in the PDD used to determine the baseline emissions has been crosschecked against the relevant documentation referenced in Section 6 of the validation report.  (2) According to the reference list, all documents of the baseline determination were correctly quoted and interpreted.  (3) Assumptions and data can be deemed reasonable (4) Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD. (5) The project is a new-built hydropower project with installing capacity is 6.91 MW. The project correctly applies the approved baseline methodology AMS.I.D (version 10)	OK	OK
<b>A.5. DOCUMENTATION OF THE CALCULATIONS</b>					
A.5.1 Algorithms and/or formulae used to determine emission reductions	VVM	DR I	(1) All data in the PDD used to determine the calculation are from the technical document, XM, IPCC 2006 and other reference document. The data are	OK	OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
<ul style="list-style-type: none"> <li>All assumptions and data used by the project participants are listed in the PDD and related document submitted for registration. The data has to be properly referenced.</li> <li>All documentation is correctly quoted and interpreted.</li> <li>All values used can be deemed reasonable in the context of the project activity</li> <li>The methodology has been correctly applied to calculate the emission reductions and this can be replicated by the data provided in the PDD and supporting files to be submitted for registration.</li> </ul>			<p>properly referenced.</p> <p>(2) According to the reference list, all documents of the calculation were correctly quoted and interpreted.</p> <p>(3) All values used can be deemed reasonable in the context of the project activity.</p> <p>(4) The project is a new-built hydropower project with installing capacity is 20 MW. The project correctly applies the approved baseline methodology ACM0002 (version 10).</p>		
<b>A.6. IMPLEMENTATION OF THE MONITORING PLAN</b>					
A.6.1 How were the plans for implementation of the monitoring plan, data management, QA/QC procedures assessed? To what extent can the emission reductions achieved by the project be monitored ex-post and verified later by a DOE?	VVM	DR I	<p>The parameter monitored ex-post is the net electricity generation from the project activity and the data used for the combined emission factor calculation.</p> <p>The net electricity generated from the project will be measured continuously and recorded monthly. This data will be cross verified against the electricity sale invoices. The monitoring plan clearly defines the parameter, data management and QA/QC.</p> <p>Regarding the data used for the emission factor calculation, they will be downloaded through the NEON system. All the provisions regarding the monitoring of the emission factor calculation are included in the Monitoring Plan section of the PDD.</p>	<b>OK</b>	<b>OK</b>
<b>A.7. CDM CONSIDERATION PRIOR TO STARTING DATE</b>					
A.7.1 The prior consideration of CDM for the project activity complies with EB49.	VVM	DR I	According to the Glossary of terms (version 05) of the UNFCCC, it was selected as the starting date the date which the project participants has committed to expenditures related to the implementation of the project (15/01/2009), so the date of the purchase of the	<b>OK</b>	<b>OK</b>

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Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			equipment was selected in the new version of the PDD. The contract signed was provided to the validation team as the documented evidence of the starting date of the project activity. This date is considered in accordance with the Glossary of terms (Version 05) of the UNFCCC.		

TABLE 3

TITLE: **BAJO TULUÁ HYDROELECTRIC POWER PLANT**

Date: **2009-07-27**

**Version 3**

**Table 3 Resolution of Corrective Action and Clarification Requests**

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
<b>CAR 1</b> The approval letter of the Colombian Designated National Authority has to be obtained.	A.3.2 A.3.3 B.7.4	See Annex 5 "Additional Documentation", Reference 1	The Approval Letter of Colombia has been obtained. <b>CAR 1 is solved</b>
<b>CAR 2</b> The approval letter of the Spain Designated National Authority has to be obtained.	A.3.2 A.3.3 B.7.4	The Spanish Designated National Authority will give an approval letter only if it has the validation report carried out by the DOE. Therefore, once that such report is obtained, the approval letter will be requested.	A draft validation report shall be issued in order to request the approval letter of Spain. The approval letter of Spain was provided. <b>CAR 2 is solved</b>
<b>CAR 3</b> The format of the PDD used (Version 03.1) is not in accordance with the last format (Version 03.2) published in the UNFCCC web page. Furthermore, some tables are not in accordance to the Guidelines for completing the project design document (CDM-PDD) and the proposed new baseline and monitoring methodologies (CDM-NM) – Version 7.	Table 1	- See Resolution of Corrective Action and Clarification Request, Date 2009-05-30, Bajo Tuluá Hydroelectric Power Plant.	The PDD submitted to the validation team is in accordance with the guidelines for completing the project design document (version 03) and the guidelines for completing the project design document. <b>CAR 3 is solved</b>
<b>CAR 4</b> The differences detected between the technical description of PDD and the EIA have to be solved.	A.1.1 A.1.2 A.2.1	The design flow of the project is 12 m <sup>3</sup> /s (Page 47 of the Environmental License: Fourth Article of the Resolution – 1 <i>Concesión de aguas superficiales - ... "Otorgar concesión de aguas superficiales ... hasta un máximo de doce metros cúbicos por segundo (12 m<sup>3</sup>/s) para uso en generación de energía"</i> ). Therefore, the design flow of each	The differences between the annual electricity production and the gross drop shall be solved These differences have to be solved. The differences were solved.

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Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		turbine (there are two units) is 6 m <sup>3</sup> /s. - The gross drop of the project (225 m) has been taken from page 4, chapter 2 of the EIA. (See Annex 5 – Additional Documentation, Reference 3, Cap_2:LOW_REV1_abril 19.pdf)	<b>CAR 4 is solved</b>
<b>CAR 5</b> The Environmental License has to be obtained.	A.1.1 A.1.2 A.2.1 A.2.3 D.1.1 D.1.2 D.1.3 D.1.6	See Resolution of Corrective Action and Clarification Request, Date 2009-05-30, Bajo Tuluá Hydroelectric Power Plant.	On 14 <sup>th</sup> November 2008 the Environmental Study Assessment of Bajo Tuluá was approved by CVC. Resolution 0100 No.0730-0606. The environmental License was submitted to the validation team. <b>CAR 5 is solved</b>
<b>CAR 6</b> According to the national procedure, a No Objection Letter from the Colombia DNA has to be also obtained. It shall be submitted to the validation team.	A.3.2 A.3.3	The No Objection Letter has been requested to the Ministry of Environment, Housing and Territorial Development and the power plant of Bajo Tuluá is in procedure to receive it. Once it is received, it will be included in the Annex 5 “Additional Documentation”, Reference 5.	The No Objection letter shall be provided, once is issued by the Ministry of Environment, Housing and territorial Development. The approval letter was provided, so the No objection letter was not necessary. <b>CAR 6 is solved.</b>
<b>CAR 7</b> The four ways of contribution shall be detailed in the PDD. The social section of the PDD should be reinforced.	A.3.4	The different ways of contribution have been detailed in the PDD in section A.2. Description of the project activity (Contribution to Sustainable Development) and it has been specified for each project if it is mandatory or voluntary.	The PDD has stated clearly the four ways of sustainable contribution. Performance of the Mandatory Plan, Mandatory transferences. An internal document has been provided in order to assess this part. <b>CAR 7 is solved</b>
<b>CAR 8</b>	B.1.1	See Resolution of Corrective Action and Clarification Request, Date	The “Tool to calculate the emission factor for an

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
The versions of the different tools shall be correctly referenced in the PDD.		2009-05-30, Bajo Tuluá Hydroelectric Power Plant)	electric system" has been updated to version 02, and the tool for the demonstration and assessment of additionality has been updated as well to version 05.2.  <b>CAR 8 is solved</b>
<b>CAR 9</b> The spreadsheets used for the emission reduction calculation shall be provided to the validation team	B.2.1 B.2.2 B.2.3 B.2.4 B.2.8 B.11.1 B.11.2 B.11.3 B.11.4 B.11.5 B.12.1	See Resolution of Corrective Action and Clarification Request, Date 2009-05-30, Bajo Tuluá Hydroelectric Power Plant)  <b>Footnote in page 32 of the PDD has been corrected to indicate the option used for the build margin.</b>	EPSA uses spreadsheets designed to automate the process for the calculation of the emission factor. The source of the data is NEON.  The first file (Operating margin) includes four spreadsheets: <ul style="list-style-type: none"> <li>• <u>FE power station</u>: includes the list of the power installations of the national electricity system. The spreadsheet also incorporates the heat rate, the fuel, and the emission factor according to the Chapter 2 of the 2006 IPCC Guidelines. The efficiency of the installations is also detailed in the spreadsheet. The source of data has been checked by the validation team.</li> <li>• <u>Hourly generation</u>: Real hourly generation of the national system (KWh). Information generated by Neon between 01/01/2007 and 31/12/2007. The validation team has assessed all the data of July and December of 2007 and all of them were the same as the NEON information.</li> <li>• <u>Lambda</u>: the lambda calculation has been developed according to the "Tool for calculation of the emission factor for an electricity system". The sort of the load data from the highest to the lowest MW level is included in the column D. The load curve in descendent order has been</li> </ul>

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			<p>plotted in the same spreadsheet. And using the total generation of the low cost – must run power plants (calculated in other spreadsheet) the X, Y and Lambda have been correctly identified and calculated.</p> <ul style="list-style-type: none"> <li>• <u>MO 2007</u>: Includes the generation (KWh) of 96 agents of the Colombian national system.</li> <li>• The second file (Build Margin) includes following spreadsheet:</li> <li>• <u>History</u>: 242 installations included in the spreadsheet, detailing their type of generation, active installations (31 Thermic, 9 cogeneration 116 hydro), and the opening and closing date, if it is applicable.</li> <li>• <u>Calculation EFBM</u>: This spreadsheet includes the same information as the last spreadsheet about the installations, incorporating the capacity and the generation during 2007. Using the emission factor of each central (described in spreadsheet named “FUEL”) the emissions of each central have been calculated.</li> </ul> <p>On the other hand, the 20% of the national generation is calculated (10.733.132.514,04 KWh).</p> <p>The choice of the power centrals of the build margin is made according to the tool as the set of power capacity additions that comprises 20% of the system and have been built most recently.</p> <p><b>CAR 9 is solved</b></p>

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<b>CAR 10</b> The references of all documents included in the PDD shall be revised, updated and submitted to the validation team.	B.2.6 B.2.9	(See Resolution of Corrective Action and Clarification Request, Date 2009-05-30, Bajo Tuluá Hydroelectric Power Plant)	The references of the documents have been revised and updated <b>CAR 10 is solved</b>
<b>CAR 11</b> Documented evidence shall be provided to the validation team regarding the importance of the incentive of the CDM to the project activity, and this documentation shall be explained in the section B.5 of the PDD.	B.2.7	<b>SEE CAR 13</b>	Since the new starting date is after the process of validation. Documented evidence considered the incentive from CDM it is not needed. CAR 13 for the starting date shall be solved in order to solve this CAR. CAR 13 is solved. <b>CAR 11 is solved</b>
<b>CAR 12</b> The additionality analysis shall be improved according to the Annex 45 of the EB 41 "Guidance on the Assessment of Investment Analysis" and the Tool for the demonstration and assessment of additionality", version 05.2, and following issues shall be take into account: <b>12.1 Further explanation of each alternative shall be included in this section of the PDD.</b> 12.2 Additional information shall be included in the PDD and justified in order to detail the additionality analysis in a transparent manner. 12.3 The spreadsheets of the IRR calculations shall be submitted to the validation team. 12.4 The inconsistencies of the tables shall be solved. 12.5 The barrier analysis shall be reinforced using official documentation and the evidences shall be submitted to the audit team. 12.6 The justification of some central as no CDM project shall be included in this section of the PDD. 12.7 The source of the information provided in the tables shall be included in the PDD.	B.2.7	The financial spreadsheets of Alto Tuluá and Bajo Tuluá have been separated. The financial spreadsheet of Bajo Tuluá is included in Annex 5 "Additional Documentation", Reference 12, In the financial spreadsheet of Bajo Tuluá, the section "Tuluá Bajo without CERs" has been corrected. In the section B.5. of the PDD ( <i>Description of how anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality)</i> ) the following changes have been carried out: <ul style="list-style-type: none"> <li>- Sub-step 2d: It has been included an explanation about the probability of decreasing, 10%, the investment of the IRR project (without carbon credits), and an explanation about the probability of the increase of 10% in the power generation for the IRR project without carbon credits.</li> <li>- Sub-step 2c: It has been included an explanation about how the production of 117.4 GWh was estimated and. The summary of the calculation has been included in the references (See Annex 5 –Additional Documentation, Reference 18)</li> <li>- Step 4, Analysis of common practices: This section has been revised, and the table of the run-of-river hydraulic</li> </ul>	The spreadsheets of the IRR have been provided, the following issues shall be solved: <ul style="list-style-type: none"> <li><del>The financial spreadsheet of Alto Tuluá and Bajo Tuluá shall be separated.</del></li> <li><del>Sensitivity analysis: The PDD shall include an explanation about the probability of decrease, 10 %, the investment of the IRR project (without carbon credits) and an explanation of the increase of 10% in the power generation for the IRR project without carbon credits. In these cases the IRR of the project is above the IRR barrier.</del></li> <li>- According to page 17, a production of 117.4 GWh/y has been estimated for Bajo Tuluá due to technical characteristics of the machinery. This reduction of electricity generation shall be explained, and the data calculation shall be provided.</li> <li>- Data source on page 18 of the PDD is dated in 2008 when investment decision took place in 2007.</li> </ul>

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12.8 An explanation of why the plants closed or modified are not considered in the analysis shall be included.		<p>plants with 10-20MW capacity built since 2004 that was in the PDD in page 27 has been deleted, as this plant was La Junca, which had been removed from the comparative because it was not comparable as stated previously in the document <b>20090311 PAC Bajo Tuluá Versión Ingles-Ingles.doc</b>. The table should have been removed in the previous version of the PDD (version 03.2) but it was not due to an oversight.</p> <p>In the financial Confidential Annex:</p> <ul style="list-style-type: none"> <li>- The load factor has been corrected</li> </ul> <p>In the first page it is clarified that the Hydroelectric project Bajo Tuluá has neither income nor expenditure because its capacity is lower than 20MW (It is considered as a minor power plant)</p>	<p><del>The spreadsheet "Tuluá Bajo without CERs" has a row with the data of IPC of Colombia different from the data used.</del></p> <ul style="list-style-type: none"> <li>- The spreadsheets containing the sensitivity analysis have has a row with the data of IPC of Colombia different from the data used.</li> <li>- The spreadsheets contain a production value for Bajo Tuluá of 117.5 Gwh/y instead of 117.4 Gwh/y which appears in the PDD and the Financial Confidential Annex.</li> </ul> <p>Financial Confidential Annex:</p> <ul style="list-style-type: none"> <li><del>The load factor shall be corrected.</del></li> <li><del>Since the Hydroelectric project Bajo Tuluá has an installed capacity of 20 MW. It shall be clarified if the project activity has not have income nor expenditure because the capacity is lower than 20 MW.</del></li> </ul> <p>For the social and institutional barrier the Unique Integral Department Plan, Cauca Valley Government, has been assessed. Buga, Tuluá and San Pedro are affected by FARC EP and <i>Machos y Rastros</i></p> <p>The Political and investment barriers have been assessed against the National Energy Plan, 2006-2025 UPME, page 205. The high initial investment cost for renewable projects make that the renewable sources have not increased has expected.</p> <p><del>According to the common practise analysis there are hydroelectric between 10-20 MW non registered as CDM (0.14% capacity run-of-river</del></p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
			hydroelectric power plants with 10-20 MW). This run of river non-registered as CDM shall be explained.  The documented evidence required was provided. <b>CAR 12 is solved</b>
<b>CAR 13</b> The start date of the project shall be in accordance to the last version of the Glossary of terms (EB 41): "the start date shall be considered to be the date on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity" The equipment contract shall be submitted to the validation team in order to check the start date of the project in accordance to the new definition.	C.1.1	The document included in Annex 5 "Additional Documentation", Reference 13 is an official document and it has a purchase value for Union Fenosa. Moreover, the equipment contract is linked to this document in terms of conditions and as it can be seen in the first page, section 2, the equipment contract has the same date of this document (15/01/2009): "... minuta definitiva de contrato equipos principales de 15 de enero 2009."	The communication of the awarding of the engineering for the project activity has been provided, with an attachment of the contract of the equipment (15 <sup>th</sup> January 2009). The purchase order only has the signature of EPSA. The official document for the starting date has to be provided.  The official document was provided. <b>CAR 13 is solved</b>
<b>CAR 14</b> The last chronogram has to be submitted to the validation team.	C.1.2	The starting date of the first crediting period has been updated to 29 <sup>th</sup> November 2011 to be in accordance with the starting date of the commercial operation of the plant (that is to say, the final of the project activity). See Annex 5 "Additional Documentation" Reference 14, BAJO TULUÁ Chronogram.pdf, page 21	The final of the project activity has been assessed with the last chronogram of the project activity. <b>CAR 14 is solved</b>
<b>CAR 15</b> Section D of the PDD shall be more specific according to the EIA submitted for the Bajo Tuluá project activity.	D.1.1 D.1.3	See Resolution of Corrective Action and Clarification Request, Date 2009-05-30, Bajo Tuluá Hydroelectric Power Plant.	Section D.2 of the PDD has been completed with a table of significant impacts and the corresponding handling plans <b>CAR 15 is solved</b>
<b>CAR 16</b> Confidential PDD appendices have to be uploaded.	B.2.7	Financial parameters under control (those related to Bajo Tuluá) have been made publicly available in the final PDD version.  In order to avoid legal penalties with the technology provider investment comparison analysis against the fuel-fired power plant is deleted from the PDD and the financial spreadsheets.	Due to confidentiality liabilities, investment comparison analysis has been discarded. Project additionality is sufficiently substantiated by benchmark and barriers analysis <b>CAR 16 is solved</b>
<b>CL 1</b> The parameters used to calculate the emission factor of the grid	B.6.2	The format of the parameter of Section B.7.1 (Data and parameters monitored) is in accordance with the format published by United Nations in its page	The parameters for the calculation of the emission factor have been included.

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shall be included in the Monitoring Plan Section.		<a href="http://cdm.unfccc.int/Reference/PDDs_Forms/PDDs/index.html">/http://cdm.unfccc.int/Reference/PDDs_Forms/PDDs/index.html</a> ). This format is more complete than the one stated in the "Tool to calculate the emission factor for an electricity system". Therefore, and following the advice of AENOR (see Annex 5- Additional Documentation, Reference 17) the format has not been changed.	The format of the parameter of Section B.7.1 is in accordance with the last format of the PDD (Version 03.2) published in the UNFCCC web page. <b>CL 1 is solved</b>
<b>CL 2</b> Specific Environmental indicators stated in the Environmental Impact Assessment shall be included. (For instance, species of the area of the project activity).	B.7.1	See Resolution of Corrective Action and Clarification Request, Date 2009-05-30, Bajo Tuluá Hydroelectric Power Plant)	Section B.7.2 of the PDD includes the ecologic flow in the river section. Two measurements will be taken. These measurements will be recorded on a system. <b>CL 2 is solved</b>
<b>CL 3</b> The procedures developed in order to describe the authority and the activities involved in the emission reduction calculation shall be referenced in the PDD.	B.8.1	It has been included in the PDD the reference for the procedures: - "Procedure for the Develop of Competencies", PR.GRH.07.002 (section B.7 of the PDD) "Procedure for control of the production equipment", PR.PRO.03.0001 (section B.7.1 of the PDD)	The references of the procedures have been included. <b>CL 3 is solved</b>
<b>FAR 1</b> Documented evidence regarding the local people training, and the contract of the people of the communities should be verified during the initial verification.	A.2.4 A.2.5	This situation shall be solved during the first verification of Bajo Tuluá project activity.	<b>FAR 1 will be check during the first initial verification</b>
<b>FAR 2</b> Authorizations obtained by EPSA (project participant) should be revised during the initial verification: - Generation Permit - Operation Permit	A.3.1	This situation shall be solved during the first verification of Bajo Tuluá project activity.	<b>FAR 2 will be check during the first initial verification</b>