



VALIDATION REPORT

“LA CASCADA 2.3 MW HYDROELECTRIC PROJECT” IN COLOMBIA

REPORT No. 2007-0609

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DET NORSKE VERITAS



VALIDATION REPORT

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Summary:

Det Norske Veritas Certification AS (DNV) has performed a validation of the “La Cascada 2.3 MW Hydroelectric Project” project in Colombia on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures and the subsequent decisions by the CDM Executive Board. This validation report summarizes the findings of the validation.

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

In summary, it is DNV’s opinion that the “La Cascada 2.3 MW Hydroelectric Project”, as described in the project design document version 5 of 1 October 2007, meets all relevant UNFCCC requirements for the CDM and correctly applies the approved baseline and monitoring methodology AMS-I.D (Version 10 of 23 December 2006). Hence, DNV requests the registration of the “La Cascada 2.3 MW Hydroelectric Project” project as CDM project activity.

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Abbreviations

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CL	Clarification request
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
CORNARE	Corporación Autonoma Regional Rio Negro-Nare – Environmental local authority
DNV	Det Norske Veritas
DNA	Designated National Authority
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
MP	Monitoring Plan
MVP	Monitoring and Verification Plan
NGO	Non-governmental Organisation
ODA	Official Development Assistance
PDD	Project Design Document
UNFCCC	United Nations Framework Convention on Climate Change
UPME	Unidad de Planeación Minero Energética - maximum authority on electricity generation and distribution in the Colombian grid



1 INTRODUCTION

Prestadora de Servicios Públicos La Cascada S.A. has commissioned Det Norske Veritas Certification AS (DNV) to perform a validation of the “La Cascada 2.3 MW Hydroelectric Project” at San Roque Jurisdiction, Antioquia Department, Colombia (hereafter called “the project”).

This report summarizes the preliminary findings of the validation of the project, performed on the basis of UNFCCC and host Party criteria for CDM projects, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The validation team consists of the following personnel:

Mr. Felipe Lacerda Antunes	DNV Certification, Porto Alegre	Team leader, GHG auditor
Mr. Luis Filipe Tavares	DNV Certification, Rio de Janeiro	CDM validator
Mr. Michael Lehmann	DNV Certification, Oslo	Sector Expert
Mr. Hendrik W. Brinks	DNV Certification, Oslo	Technical reviewer

1.1 Validation Objective

The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, the monitoring plan, and the project's compliance with relevant UNFCCC and host Party criteria are validated in order to confirm that the project design as documented is sound and reasonable and meets the identified criteria. Validation is a requirement for all CDM projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of certified emission reductions (CERs).

1.2 Scope

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords and the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology AMS-I.D (Version 10 of 23 December 2006) /13/. The validation team has, based on the recommendations in the Validation and Verification Manual /12/, employed a risk-based approach, focusing on the identification of significant risks for project implementation and the generation of CERs.

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

1.3 Description of Proposed CDM Project

The project consists of a small run-of-river La Cascada hydroelectric power plant, with an installed capacity of 2.3 MW located in San Roque Jurisdiction, Antioquia Department, Colombia, utilizing water from the Guacas River. The construction of the facility started in December 2006.

The plant is connected to the Colombian national grid.

Emission reductions are claimed from displacing the isolated grid electricity with the estimated



electricity generated by the small hydroelectric power plant and supplied to the grid. Estimated GHG emission reductions from the project are 51 390 tonnes CO₂ equivalent (tCO₂e) during the 10 years crediting period, which results in estimated average annual emission reductions of 5 139 tCO₂e.

2 METHODOLOGY

The validation consists of the following three phases:

- I a desk review of the project design documents;
- II follow-up interviews with project stakeholders;
- III the resolution of outstanding issues and the issuance of the final validation report and opinion.

In order to ensure transparency, a validation protocol was customized for the project, according to the Validation and Verification Manual /12/. The protocol shows in transparent manner criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organises, 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 for the “La Cascada 2.3 MW Hydroelectric Project” is enclosed in Appendix A to this report.

Findings established during the validation can either be seen as a non-fulfillment of validation protocol criteria or where a risk to the fulfillment of project objectives is identified. Corrective action requests (CAR) are issued, where:

- i) mistakes have been made with a direct influence on project results;
- ii) validation protocol requirements have not been met; or
- iii) there is a risk that the project would not be accepted as a CDM project or that emission reductions will not be certified.

The term clarification may be used where additional information is needed to fully clarify an issue.



Validation Protocol Table 1: Mandatory Requirements for CDM Project Activities			
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 (OK), a Corrective Action Request (CAR) of risk or non-compliance with stated requirements or a request for Clarification (CL) where further clarifications are needed.	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 organised 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 (OK), or a Corrective Action Request (CAR) due to non-compliance with the checklist question (See below). A request for Clarification (CL) is used when the validation team has identified a need for further clarification.

Validation Protocol Table 3: Resolution of Corrective Action Requests and Requests for Clarification			
Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final 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 project participants during the communications with the validation team should be summarised in this section.	This section should summarise 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 PDD (version 5 of 1 October 2007) /4/ submitted by Prestadora de Servicios Públicos La Cascada S.A., the previous versions of the PDD /1/ - /3/ as well as other supporting documents submitted by the project developer /5/ - /11/ were assessed by DNV as a part of the validation.

2.2 Follow-up Interviews

On May 2007 DNV performed interviews with project stakeholders to confirm selected information and to resolve issues identified in the document review. Representatives of MGM International – the project consultant – were interviewed. The main topics of the interview are summarised in Table 1.

Table 1: Interview topics

Interviewed organisation	Interview topics
MGM International	<ul style="list-style-type: none">➤ Management System➤ Environmental Licenses➤ Consultation of local stakeholders➤ Additionality of the project➤ Baseline emission calculations➤ Emission factor calculation

2.3 Resolution of Clarification and Corrective Action Requests

The objective of this phase of the validation is to resolve any outstanding issues which needed to be clarified for DNV's positive conclusion on the project design.

The initial validation of the project identified two *corrective action requests* and eleven requests for *clarification*. The project participant's response to DNV's draft validation report findings and the PDD final version 5 of 1 October 2007 addressed the *corrective action requests* and requests for *clarification* to DNV's satisfaction.

To guarantee the transparency of the validation process, the concerns raised and the response provided by the project participants are documented in more detail in the validation protocol in Appendix A.

2.4 Internal Quality Control

The draft validation report including the initial validation findings underwent a technical review before being submitted to the project participants. The final validation report underwent another technical review before requesting registration of the project activity. The technical review was performed by a technical reviewer qualified in accordance with DNV's qualification scheme for CDM validation and verification.



3 VALIDATION FINDINGS

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

3.1 Participation Requirements

The project participant is Prestadora de Servicios Públicos La Cascada S.A.. The host Party Colombia meets all relevant participation requirements. No participating Annex I Party is yet identified.

The “La Cascada 2.3 MW Hydroelectric Project” has received the Letters of Approval from the DNA of Colombia (dated 6 August 2007) /11/.

The project will provide job opportunities for skilled and non-skilled labour during the construction phase of the project, and the operation of the project will create long-term employment. 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 Country /11/.

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

3.2 Project Design

The “La Cascada 2.3 MW Hydroelectric Project” comprises a small run-of-river hydroelectric power plant located in the Guacas River. The hydroelectric power station will have a power house with a horizontal axis Francis type turbine connected to a generator with capacity to generate up to 2.57 MVA at 4.16 kV. 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. The total installed capacity for the power plant is 2.3 MW. As the nominal installed capacity of the project is less than 15 MW and the plants will supply generated electricity to the grid, the project is eligible as a type I.D small-scale CDM project activity (*Renewable Energy Projects / Renewable electricity generation for a grid*) as outlined in Appendix B of the simplified modalities and procedures for small-scale CDM project activities /13/. The project is not a de-bundled component of a larger project activity.

A 10 years crediting period is selected, starting on 2 January 2008. The starting date of the project activity is 1 August 2006, corresponding to the project’s approval. The expected operational lifetime of the project is 50 years.

3.3 Baseline Determination

The project applies the approved simplified baseline methodology for selected small-scale CDM project activity categories, category I.D – *Renewable electricity generation for a grid* (AMS-I.D)



/13/. This category is applicable as the project is a run-of-river hydroelectric power plant that supplies electricity to Colombian National Interconnected Grid System, which is supplied by several types of fossil fuel and non-renewable biomass fired generating units.

As stipulated in AMS-I.D, the baseline emission coefficient is determined in accordance with ACM0002 /14/ as the average of the simple adjusted operating margin (OM) and the build margin (BM), i.e. the combined margin. For the estimative of the *ex-ante* calculation of emission reductions, the Colombian official emission factor for small-scale CDM projects was considered.

3.4 Additionality

The additionality of the project is demonstrated through an analysis of the following barriers: (a) investment barriers, (b) technological barriers, (c) barriers due to prevailing practice for the two scenarios: i) continuation of current activities (produce energy by thermal sources) and ii) construction of new renewable energy plants.

While the continuation of current activities does not face any barriers, the construction of new renewable energy plants faces investments and technological barriers. DNV's assessment of the presented investment and technological barriers is as follows:

(a) Investment barriers: The project faces an investment barrier due to national regulations that incentive thermal investment, difficulties to obtain funding, long lead times and uncertainties like changes in tax laws, expected water availability in the river, expected water flow rate and expected behaviour of electricity prices.

Recent regulations in Colombia /8/ provide incentives to thermal operators, who can provide reliable capacity to the energy system in order to reduce the country's high dependence upon hydro generation, decreasing periodic energy supply problems due to shortages of water availability as a result of weather cycles.

Small projects such as La Cascada hydropower plant face significant barriers to obtain funding for their implementation. Lenders generally are seeking larger projects and more experienced shareholders and project developers in the hydro sector. Since this is the first project to be developed by Empresa de Servicios Públicos La Cascada S.A. E.S.P., lenders may be willing to take risk only after a time in operation. Because of that, the project capital structure was 100% equity financed leading to an IRR of 13%, which was much lower than the one that would have been, had project participants been able to leverage the project through typical project finance terms (70% debt). However, with the inclusion of CER, the IRR improved to 14% /6/. Although project participants require a rate of return for unleveraged projects of 15%, the inclusion of the CDM benefits brought them close enough to this threshold to move forward on the project. Hence, funding was not needed because CDM revenues were included in the financial analysis. The benchmark of 15% was calculated accordingly to the model WACC (weighted average cost of capital). Thus the project faces financial/economic barriers compared to the business as usual scenario.

(b) Technical/technological barriers: The project faces technological barriers associated with the lack of experience of project participants in the energy sector.

(c) Prevailing business practice barriers: This barrier do not has primary application to the Project.



The barrier analysis demonstrates that the most plausible scenario is the continuation of current practice (continuation of use of electricity from isolated systems fuelled by thermal energy).

3.5 Monitoring Plan

The project applies the approved monitoring methodology AMS-I.D (Version 10 of 23 December 2006) - “Grid connected renewable electricity generation” for Type I – Renewable Energy Projects, according to the “*Appendix B of the "Simplified modalities and procedures for small-scale CDM project activities"*” - Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activities /13/.

The main parameter to monitor is the electricity generated and supplied to the grid, to be obtained from two energy meters connected to an Automatic Control System through a communication network, which allows its access for visualization of energy measures, and by modem, to the Electrical Distributing Company (Utility Company of Medellín). Data collected by the project participant will be cross-checked with electricity invoice issued by Prestadora de Servicios Públicos La Cascada S.A.. The generated energy by the power plant will be multiplied by the combined margin emission coefficient for the Colombian grid.

Regarding leakage, no sources of emission were identified. The electricity generating equipment is not transferred from any other activity. The energy conversion equipment for the project was manufactured new for the specific site conditions.

No specific procedures beyond the already established QA/QC procedures will be necessary. The established procedures reflect good monitoring and reporting practices.

3.6 Calculation of GHG Emissions

Since the project consists of a run-of-river power plant without a reservoir, project emissions are considered zero for this project. According to paragraph 9, option (a), of AMS-I.D /13/, baseline emissions are calculated as amount of electricity generated by the project hydroelectric power plants (14 350 MWh/year) multiplied by the grid emission coefficient (kg CO₂e/kWh). According to AMS I.D, grid emission coefficient is calculated *ex-post* as the average of the “simple adjusted operating margin” and the “build margin” according to the procedures described in the ACM0002 methodology /14/. The system boundary is the Colombian National Interconnected Grid System.

The baseline emission factor for the project is estimated *ex-ante* as a combined margin, consisting of combination of the operating margin (OM) and build margin (BM). This emission factor will be monitored *ex-post* during the crediting period.

The operating margin (OM) is calculated using the “simple adjusted OM” method which is justified because low-cost/must-run projects constitute more than 50% of the total grid generation (82.3% in 2004, 81.4% in 2005 and 81.5% in 2006).

Information was obtained from “Unidad de Planeación Minero Energética” (UPME) from the Ministry of Mines and Energy, and from the IPCC 2006 Guidelines for National Greenhouse Inventories. The operating margin was calculated using the information of the latest 3 years available: 2004, 2005 and 2006 to be 0.4446 tCO₂/MWh. The ex-post values will be monitored by the PP.



The BM emission factor will be determined following the BM emission factor estimation process option 2 described in ACM0002 version 6, which is calculated on an *ex-post* basis as the generation-weighted average emission factor (tCO₂/MWh) of the most recent 20% capacity added to the SIC. The BM is calculated to 0.2715 tCO₂/MWh.

The weights ω_{OM} and ω_{BM} are selected as 0.50 and 0.50 respectively and the combined margin of 0.3581 tCO₂/MWh is estimated *ex-ante* for the crediting period /7/. The combined margin will be monitored *ex-post*.

La Cascada Hydroelectric Power plant is expected to generate around 14 350 MWh per year. Estimated GHG emission reductions from the project are 51 390 tonnes CO₂ equivalent (tCO_{2e}) during the 10 years crediting period, which results in estimated average annual emission reductions of 5 139 tCO_{2e} /5/.

3.7 Environmental Impacts

According to the Colombian procedures, the project does not need an environmental license and a study of the environmental impact because it is less than 10 MW. However, it is necessary to obtain different permissions with the local environmental authorities: water collecting permission; riverbed occupation permission; forest utilization permission; and waste water discharge permission. All these permissions were preceded in CORNARE who is the environmental local authority /9/. The project has all the permissions required. To attend the impacts considered by project participants and to obtain the permissions required, a plan for environmental management was designed.

3.8 Comments by Local Stakeholders

Prestadora de Servicios Públicos La Cascada S.A. conducted two meetings in order to present the project activity and explain the characteristics and requirements of the CDM to all the invited stakeholders. The first part of the stakeholder consultation intended to collect comments from local authorities, like the mayor of San Roque and other San Roque mayoralty employees. The second part of the stakeholder consultation intended to collect comments from local communities. The stakeholder comment process was completed through a survey, where the local stakeholders had the opportunity to express their opinions. Comments received by local stakeholders were highly positive about the implementation of the project activity /10/.



COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

The PDD version 1 of 5 April 2007 was made publicly available on DNV's climate change website (www.dnv.com/certification/climatechange) and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 20 April 2007 to 19 May 2007. No comments were received.



4 VALIDATION OPINION

Det Norske Veritas Certification AS (DNV) has performed a validation of the “La Cascada 2.3 MW Hydroelectric Project” in Colombia. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host country criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The project participant is Prestadora de Servicios Públicos La Cascada S.A.. The host Party Colombia meets all relevant participation requirements and has provided written approval of voluntary participation in the project and contribution to sustainable development. No participating Annex I Party is yet identified.

The “La Cascada 2.3 MW Hydroelectric Project” aim is to reduce Greenhouse Gas (GHG) emissions through the displacing of the isolated grid electricity with the estimated electricity generated by the small hydroelectric power plant and supplied to the grid. It comprises a small run-of-river hydroelectric power plant located in the Guacas River. The generation of the renewable electricity partly displaces electricity generation based on fossil fuels supplied to the national interconnection grid of Colombia.

The project applies the approved baseline methodology AMS-I.D – “Grid connected renewable electricity generation” Version 10 of 23 December 2006 for Type I – Renewable Energy Projects, according to the “Appendix B of the “Simplified modalities and procedures for small-scale CDM project activities” - Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activities. The baseline methodology has been correctly applied and the assumptions made for the selected baseline scenario are sound. It is sufficiently demonstrated that the project is not a likely baseline scenario and that emission reductions attributable to the project are additional to any that would occur in the absence of the project activity.

By promoting renewable energy and displacing fossil fuel-based electricity, the project results in reductions of CO₂ emissions that are real, measurable and give long-term benefits to the mitigation of climate change. Given that the project is operated as designed, the project is likely to achieve the estimated amount of emission reductions.

The total emission reductions from the project are estimated to be on the average 5 139 tCO₂e over the selected 10 year crediting period. The emission reduction forecast has been checked and is deemed likely that the state amount is achieved given that the underlying assumptions do not change.

The monitoring methodology has been correctly applied. The monitoring plan sufficiently specifies the monitoring requirements.

In summary, it is DNV’s opinion that the “La Cascada 2.3 MW Hydroelectric Project”, as described in the revised and submitted project design document 5 of 1 October 2007 meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology AMS-I.D (Version 10 of 23 December 2006). Hence, DNV will request the registration of the “La Cascada 2.3 MW Hydroelectric Project” as a CDM project activity.



REFERENCES

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

- /1/ Prestadora de Servicios Públicos La Cascada S.A.: Project Design Document for the “La Cascada 2.3 MW Hydroelectric Project” Version 1 of 5 April 2007.
- /2/ Prestadora de Servicios Públicos La Cascada S.A.: Project Design Document for the “La Cascada 2.3 MW Hydroelectric Project” Version 3 of 20 June 2007.
- /3/ Prestadora de Servicios Públicos La Cascada S.A.: Project Design Document for the “La Cascada 2.3 MW Hydroelectric Project” Version 4 of 20 September 2007.
- /4/ Prestadora de Servicios Públicos La Cascada S.A.: Project Design Document for the “La Cascada 2.3 MW Hydroelectric Project” Version 5 of 1 October 2007.
- /5/ Prestadora de Servicios Públicos La Cascada S.A.: Spreadsheets for emission reduction calculation – 1 August 2007.
- /6/ Prestadora de Servicios Públicos La Cascada S.A.: Spreadsheets for IRR calculation – 20 June 2007.
- /7/ MGM International: Spreadsheets for Colombian EF calculation.
- /8/ Ministry of Mines and Energy: Resolution 071/2006.
- /9/ CORNARE: water collecting permission; riverbed occupation permission; forest utilization permission; and waste water discharge permission.
- /10/ Prestadora de Servicios Públicos La Cascada S.A.: Stakeholder’s meeting minutes – 23 March 2007
- /11/ Letter of Approval of Colombian’s Ministry of the Environmental Housing and Territorial Development of 6 August 2007.

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

- /12/ International Emission Trading Association (IETA) & the World Bank’s Prototype Carbon Fund (PCF): *Validation and Verification Manual*. <http://www.vvmanual.info>
- /13/ “Appendix B of the “Simplified modalities and procedures for small-scale CDM project activities” - Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activities: AMS-I.D – “Grid connected renewable electricity generation” for Type I – Renewable Energy Projects. Version 10 of 23 December 2006.
- /14/ CDM-EB: Approved Consolidated Baseline and Monitoring Methodology ACM0002 - “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”, version 06 of 19 May 2006
- /15/ Attachment A to the “Appendix B of the “Simplified modalities and procedures for small-scale CDM project activities” - Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activities. Version 06 of



September 2005.

Persons interviewed during the validation, or persons who contributed with other information that are not included in the documents listed above:

/16/ Diego Ezcurra – MGM International Buenos Aires

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APPENDIX A

CDM VALIDATION PROTOCOL

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	OK	Table 2, Section E.4.1 No participating Annex I Party is yet identified.
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, Simplified Modalities and Procedures for Small Scale CDM Project Activities §23a	OK	Table 2, Section A.3. Letter of Approval of Colombian's Ministry of the Environmental Housing and Territorial Development of 6 August 2007.
3. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC	Kyoto Protocol Art. 12.2.	OK	Table 2, Section E.4.1
4. The project shall have the written approval of voluntary participation from the designated national authority of each party involved	Kyoto Protocol Art. 12.5a, Simplified Modalities and Procedures for Small Scale CDM Project Activities §23a	OK	Letter of Approval of Colombian's Ministry of the Environmental Housing and Territorial Development of 6 August 2007.
5. The emission reductions should be real, measurable and give long-term benefits related to the mitigation of climate change	Kyoto Protocol Art. 12.5b	OK	Table 2, Section E.1 to E.4
6. Reduction in GHG emissions must be additional to any that would occur in absence of the project activity, i.e. a CDM project activity is 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	Kyoto Protocol Art. 12.5.c, Simplified Modalities and Procedures for Small Scale CDM Project Activities §26	OK	Table 2, Section B.2.1
7. In case public funding from Parties included in Annex I is used for the project activity, these Parties shall provide an affirmation that such funding does not	Decision 17/CP.7, CDM Modalities and Procedures Appendix B,	OK	The validation did not reveal any information that indicates that the project can be seen as a diversion of

Requirement	Reference	Conclusion	Cross Reference/ Comment
result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties.	§ 2		ODA funding towards Colombia.
8. Parties participating in the CDM shall designate a national authority for the CDM	CDM Modalities and Procedures § 29	OK	The Colombian designated national authority for the CDM is the Ministry of the Environmental Housing and Territorial Development.
9. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol	CDM Modalities and Procedures § 30, 31b	OK	Colombia ratified the Kyoto Protocol on 30 November 2001.
10. The participating Annex I Party's assigned amount shall have been calculated and recorded	CDM Modalities and Procedures §31b	NA	No participating Annex I Party is yet identified.
11. The participating Annex I Party shall have in place a national system for estimating GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7	CDM Modalities and Procedures §31b	NA	No participating Annex I Party is yet identified.
12. The proposed project activity shall meet the eligibility criteria for small scale CDM project activities set out in § 6 (c) of the Marrakesh Accords and shall not be a debundled component of a larger project activity	Simplified Modalities and Procedures for Small Scale CDM Project Activities §12a,c	OK	Table 2, Section A.1
13. The project design document shall conform with the Small Scale CDM Project Design Document format	Simplified Modalities and Procedures for Small Scale CDM Project Activities, Appendix A	OK	PDD is in accordance with CDM-SSC-PDD (version 3 of 22 December 2006).
14. The proposed project activity shall confirm to one of the project categories defined for small scale CDM project activities and uses the simplified baseline and monitoring methodology for that project category	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22e	OK	Table 2, Section A.1.3, B and D
15. Comments by local stakeholders are invited, and a summary of these provided	Simplified Modalities and Procedures for Small Scale CDM Project	OK	Table 2, Section G

Requirement	Reference	Conclusion	Cross Reference/ Comment
	Activities §22b		
16. If required by the host country, an analysis of the environmental impacts of the project activity is carried out and documented	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22c	OK	Table 2, Section F
17. Parties, stakeholders and UNFCCC accredited NGOs have been invited to comment on the validation requirements and comments have been made publicly available	Simplified Modalities and Procedures for Small Scale CDM Project Activities §23b,c,d	OK	The PDD version 1 of 5 April 2007 was made publicly available on DNV's climate change website (www.dnv.com/certification/climatechange) and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 20 April 2007 to 19 May 2007. No comments were received.

Table 2 Requirements Checklist

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
A. Project Description The project design is assessed.					
A.1. Small scale project activity It is assess whether the project qualifies as small scale CDM project activity.					
A.1.1. Does the project qualify as a small scale CDM project activity as defined in paragraph 6 (c) of decision 17/CP.7 on the modalities and procedures for the CDM?	/4/	DR	Yes. The project has an installed capacity of 2.3 MW, which is below the stipulated limit of 15 MW, qualifying as a small scale CDM project activity as Type I, Category D defined in paragraph 6 (c) of decision 17/CP.7 on the modalities and procedures for the CDM.		OK
A.1.2. The small scale project activity is not a debundled component of a larger project activity?	/4/	DR	No. The proponent has not registered any small scale CDM projects in the last 2 years and the project boundary is not within 1 km radius of any other proposed small scale CDM project		OK
A.1.3. Does proposed project activity conform to one of the project categories defined for small scale CDM project activities?	/4/	DR	Yes. The project conforms to the type (i) category of small-scale CDM project activities, “renewable energy project activities with a maximum output capacity equivalent to up to 15 megawatts”		OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
A.2. Project Design Validation of project design focuses on the choice of technology and the design documentation of the project.					
A.2.1. Are the project's spatial (geographical) boundaries clearly defined?	/4/	DR	Yes.		OK
A.2.2. Are the project's system (components and facilities used to mitigate GHG's) boundaries clearly defined?	/4/	DR I	The project boundary encompasses the physical, geographical site of the hydropower generation source. For calculation of the grid emission factor, all power sources connected to the Colombian National Interconnected Grid are also included in the spatial extent of the project boundary.		OK
A.2.3. Does the project design engineering reflect current good practices?	/4/	DR	Yes. The project design engineering is based on established technology suitable for small hydroelectric plants. DNV requests evidence for the power factor of the generator, considered to convert from 2.57 MVA to 2.3 MW.	CL-6	OK
A.2.4. Will the project result in technology transfer to the host country?	/4/	DR	Yes. Technology will be transferred to the host party through the appropriate commercial guarantees and support service packages established for the implementation of the project activity.		OK
A.2.5. Does the project require extensive initial training and maintenance efforts in order to work as presumed during the project period? Does the project make provisions for meeting training and maintenance	/4/	DR I	The project will require additional training and project maintenance. There is a lack of experience in the generation sector, and a lack of skilled or properly trained labour to operate and maintain the technology.	CL-10	OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
needs?			DNV requests an explanation about what kind of training will be provided to operate and maintain the technology.		
A.3. Contribution to Sustainable Development The project's contribution to sustainable development is assessed					
A.3.1. Will the project create other environmental or social benefits than GHG emission reductions?	/4/	DR	The project will have environmental and social benefits like job opportunities.		OK
A.3.2. Will the project create any adverse environmental or social effects?	/4/	DR I	Run-off-river power plants are not expected to result in large flooded areas. To attend the impacts considered by project participants and to obtain the permissions required, a plan of environmental management was designed. No evidences of the plan of environmental management were provided.	CL-5	OK
A.3.3. Is the project in line with sustainable development policies of the host country?	/4/	DR I	Yes.		OK
A.3.4. Is the project in line with relevant legislation and plans in the host country?	/4/	DR I	An environmental license was not required because the project is less than 10 MW. The Concession for Water Use, which is necessary for the plant to generate electricity, has been obtained and the final permit needed to proceed has been granted. No evidences of the plan of environmental management were provided.	CL-5	OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
B. Project Baseline The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.					
B.1. Baseline Methodology It is assessed whether the project applies an appropriate baseline methodology.					
B.1.1. Is the selected baseline methodology in line with the baseline methodologies provided for the relevant project category?	/4/	DR	Yes. The project belongs to the renewable energy category, and is a small-scale project; therefore the selected baseline methodology is appropriate.		OK
B.1.2. Is the baseline methodology applicable to the project being considered?	/4/	DR	Yes. The baseline methodology is applicable as the project is a run of river hydroelectric power plant that supplies electricity to Colombian National Interconnected Grid System, which is supplied by several types of fossil fuel and non-renewable biomass fired generating units. DNV requests an explanation about what kind of non-renewable biomass is fired in generation units that supply electricity to the Colombian National Interconnected Grid System, as stated in section B.2 of the PDD.	CL-1	OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
B.2. Baseline Determination It is assessed whether the project activity itself is not a likely baseline scenario and whether the selected baseline represents a likely baseline scenario.					
B.2.1. Is it demonstrated that the project activity itself is not a likely baseline scenario due to the existence of one or more of the following barriers: investment barriers, technology barriers, barriers due to prevailing practice or other barriers?	/4/	DR I	<p>The additionality of the project is demonstrated through an analysis of the following barriers for the two scenarios: i) continuation of current activities (produce energy by thermal sources) and ii) construction of new renewable energy plants.</p> <p>While the continuation of current activities does not face any barriers, the construction of new renewable energy plants faces investments and technological barriers:</p> <p>(a) <i>Investment barriers</i>: The project faces an investment barrier due to national regulations that incentive thermal investment, difficulties to obtain funding, and long lead times and multiple uncertainties and barriers presented in this kind of project activity.</p> <p>DNV requests an explanation about what kind of non-renewable biomass is fired in generation units that supply electricity to the Colombian National Interconnected Grid System, as stated in section B.2 of the PDD.</p> <p>(b) <i>Technical/technological barriers</i>: The project faces technological barriers associated with meteorological cycles that could affect</p>	CL-2 CL-3 CL-7 CL-10	OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
			<p>water availability. Another barrier faced is the lack of experience of project participants in the energy sector.</p> <p>DNV requests an explanation about what kind of training will be provided to operate and maintain the technology.</p> <p><i>(c) Prevailing business practice barriers:</i> This barrier do not has primary application to the Project.</p> <p>The barrier analysis demonstrates that the most plausible scenario is the continuation of current prevailing practice (continuation of use of electricity from isolated systems fuelled by thermal energy).</p> <p>The PDD presents barriers to the implementation of a hydropower plant in Colombia. It is also stated that, in the absence of the “La Cascada 2.3 MW Hydroelectric Project”, the viable alternative would be for the Colombian Grid to generate the equivalent of the electricity generated by La Cascada mostly with thermal generation plants. However, according to the “Energetic and Mining Monthly Report” (January 2007) published by the “Unidad de Planeación Minero Energética” (UPME) of the Ministry of Mines and Energy, approximately 64.1% of the energy in Colombia is generated by hydropower plants. DNV requests more clarification about that.</p> <p>Since the project has already started, it needs to be documented that CDM was considered at</p>		

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
			the time of the decision, and that it was a prerequisite for the investment, i.e. that the project is different from the baseline scenario.		
B.2.2. Is the application of the baseline methodology and the discussion and determination of the chosen baseline transparent and conservative?	/4/	DR	The baseline is defined as the Colombian system.		OK
B.2.3. Are relevant national and/or sectoral policies and circumstances taken into account?	/4/	DR I	The project complies with the framework of the energy sector policies of Colombia in aspects related to renewable energy electricity generation and technological innovation. No evidences of the plan of environmental management were provided.	CL-5	OK
B.2.4. Is the baseline selection compatible with the available data?	/4/	DR	For the estimative of the <i>ex-ante</i> calculation of emission reductions, the Colombian official emission factor for small-scale CDM projects was considered. The data used for emission factor calculation were obtained from the period 2002 – 2004. However, according to the methodology ACM0002 version 6, for ex-ante emission factors calculation it must be used the full generation-weighted average of the most recent 3 years for which data are available at the time of PDD submission. Even though ex-post calculations are selected, the ex-ante estimate made should comply with the requirements of ACM0002.	CAR-1	OK
B.2.5. Does the selected baseline represent the most likely scenario describing what would have occurred in absence of the project	/4/	DR I	See B.2.1.	CL-2	OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
activity?					
C. Duration of the Project / Crediting Period It is assessed whether the temporary boundaries of the project are clearly defined.					
C.1.1. Are the project's starting date and operational lifetime clearly defined?	/4/	DR I	Yes. The project starting date is defined as the date of the decision to move forward with the project, which happened on 1 August 2006. The expected operational lifetime is 30 years. Since the project has already started, it needs to be documented that CDM was considered at the time of the decision, and that it was a prerequisite for the investment, i.e. that the project is different from the baseline scenario. The starting date of a project activity is the earliest of implementation, construction and real action. Evidence for this is requested.	CL 7 CL 11	
C.1.2. Is the assumed crediting time clearly defined (renewable crediting period of seven years with two possible renewals or fixed crediting period of 10 years with no renewal)?	/4/	DR I	Yes. The project asks for a fixed crediting period of 10 years, starting on 2 January 2008. It needs to be confirmed that the crediting period will only start after the date of registration.	CL 4	OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
D. Monitoring Plan The monitoring plan review aims to establish whether all relevant project aspects deemed necessary to monitor and report reliable emission reductions are properly addressed.					
D.1. Monitoring Methodology It is assessed whether the project applies an appropriate monitoring methodology.					
D.1.1. Is the selected monitoring methodology in line with the monitoring methodologies provided for the relevant project category?	/4/	DR	Yes. The chosen monitoring methodology (paragraph 13 of AMS-I.D) corresponds to the project category (renewable energy generation of less than 15 MW installed capacity).		OK
D.1.2. Is the monitoring methodology applicable to the project being considered?	/4/	DR	Yes.		OK
D.1.3. Is the application of the monitoring methodology transparent?	/4/	DR I	The application of the monitoring methodology is transparent when it comes to monitoring the electricity production.		OK
D.1.4. Will the monitoring methodology give opportunity for real measurements of achieved emission reductions?	/4/	DR	Yes.		OK
D.2. Monitoring of Project Emissions It is established whether the monitoring plan provides for reliable and complete project emission data over time.					
D.2.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for estimation or measuring the	/4/	DR I	According to the project category and the corresponding methodology, project emissions are zero.		OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
greenhouse gas emissions within the project boundary during the crediting period?					
D.2.2. Are the choices of project GHG indicators reasonable?	/4/	DR	N/A		OK
D.2.3. Will it be possible to monitor / measure the specified project GHG indicators?	/4/	DR	N/A		OK
D.2.4. Will the indicators give opportunity for real measurements of project emissions?	/4/	DR	N/A		OK
D.3. Monitoring of Leakage If applicable, it is assessed whether the monitoring plan provides for reliable and complete leakage data over time.					
D.3.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining leakage?	/4/	DR I	N/A. According to AMS I.D Version 10, a leakage calculation is only needed if the renewable energy equipment is transferred from another activity or to another activity. The energy conversion equipment for the project was manufactured new for specific site conditions. DNV requests an evidence about that.	CL-8	OK
D.3.2. Are the choices of leakage indicators reasonable?	/4/	DR	N/A		OK
D.3.3. Will it be possible to monitor / measure the specified leakage indicators?	/4/	DR	N/A		OK
D.3.4. Will the indicators give opportunity for real measurements of leakage effects?	/4/	DR	N/A		OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
D.4. Monitoring of Baseline Emissions It is established whether the monitoring plan provides for reliable and complete project emission data over time.					
D.4.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining baseline emissions during the crediting period?	/4/	DR	Yes, the monitoring plan provides for reading the net amount of electricity supplied to the grid by the project activity. The annex 4 of the PDD establishes that the data needed to recalculate the operating and build margin emissions factors will be monitored. However, this data is not considered in section B.7.1.	CAR-2	OK
D.4.2. Is the choice of baseline indicators, in particular for baseline emissions, reasonable?	/4/	DR	Yes. For renewable grid-based energy projects, the crucial indicator to monitor is the net amount of electricity fed into the grid.		OK
D.4.3. Will it be possible to monitor / measure the specified baseline indicators?	/4/	DR	Yes. See D.4.3.		OK
D.4.4. Will the indicators give opportunity for real measurements of baseline emissions?	/4/	DR	Yes. See D.4.3.		OK
D.5. Project Management Planning It is checked that project implementation is properly prepared for and that critical arrangements are addressed.					
D.5.1. Is the authority and responsibility of project management clearly described?	/4/	DR	Prestadora de Servicios Públicos La Cascada S.A. is the responsible of project management.		OK
D.5.2. Is the authority and responsibility for registration monitoring measurement and	/4/	DR I	See D.5.1		OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
reporting clearly described?					
D.5.3. Are procedures identified for training of monitoring personnel?	/4/	DR I	The project will require additional training and project maintenance. There is a lack of experience in the generation sector, and a lack of skilled or properly trained labour to operate and maintain the technology. DNV requests an explanation about what kind of training will be provided to operate and maintain the technology.	CL-10	OK
D.5.4. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/4/	DR	N/A		OK
D.5.5. Are procedures identified for calibration of monitoring equipment?	/4/	DR	Before their on-site installation, energy meters and instrumentation transformers will be taken to the laboratory of measures of the Public Electrical Distributing Company in Medellín, for calibration and programming of the energy meters, and accuracy verification of the current and voltage transformers measurement cores.		OK
D.5.6. Are procedures identified for maintenance of monitoring equipment and installations?	/4/	DR	Yes.		OK
D.5.7. Are procedures identified for monitoring, measurements and reporting?	/4/	DR	Yes. Electricity generated will be measured continuously, daily checked and registered electronically. Production records will be crosschecked with sales records to the grid.		OK
D.5.8. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	/4/	DR I	See D.5.7		OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
D.5.9. Are procedures identified for dealing with possible monitoring data adjustments and uncertainties?	/4/	DR	See D.5.1		OK
D.5.10. Are procedures identified for internal audits of GHG project compliance with operational requirements as applicable?	/4/	DR	See D.5.1		OK
D.5.11. Are procedures identified for project performance reviews?	/4/	DR	See D.5.1		OK
D.5.12. Are procedures identified for corrective actions?	/4/	DR	See D.5.1		OK
E. Calculation of GHG emission 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.					
E.1. Project GHG Emissions The validation of ex-ante estimated project GHG emissions focuses on transparency and completeness of calculations.					
E.1.1. Are all aspects related to direct and indirect project emissions captured in the project design?	/4/	DR	N/A. According to the baseline and monitoring methodology AMS-I.D		OK
E.1.2. Have all relevant greenhouse gases and sources been evaluated?	/4/	DR	N/A		OK
E.1.3. Do the methodologies for calculating project emissions comply with existing	/4/	DR	N/A		OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
good practice?					
E.1.4. Are the calculations documented in a complete and transparent manner?	/4/	DR	N/A		OK
E.1.5. Have conservative assumptions been used?	/4/	DR	N/A		OK
E.1.6. Are uncertainties in the project emissions estimates properly addressed?	/4/	DR	N/A		OK
E.2. Leakage 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 and estimated ex-ante.					
E.2.1. Are leakage calculation required for the selected project category and if yes, are the relevant leakage effects assessed?	/4/	DR	N/A. According to baseline and monitoring methodology AMS-I.D, leakage is to be considered “if the energy generating equipment is transferred from another activity or if the existing equipment is transferred to another activity”. The energy conversion equipment for the project was manufactured new for specific site conditions. DNV requests an evidence about that.	CL-8	OK
E.2.2. Are potential leakage effects properly accounted for in the calculations (if applicable)?	/4/	DR	N/A		OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
E.2.3. Do the methodologies for calculating leakage comply with existing good practice (if applicable)?	/4/	DR	N/A		OK
E.2.4. Are the calculations documented in a complete and transparent manner and (if applicable)?	/4/	DR	N/A		OK
E.2.5. Have conservative assumptions been used (if applicable)?	/4/	DR	N/A		OK
E.2.6. Are uncertainties in the leakage estimates properly addressed (if applicable)?	/4/	DR	N/A		OK
E.3. Baseline GHG Emissions The validation of ex-ante estimated baseline GHG emissions focuses on transparency and completeness of calculations.					
E.3.1. Are the baseline emission boundaries clearly defined and do they sufficiently cover sources for baseline emissions?	/4/	DR	Baseline emissions are calculated on the basis of the emission factor for the Colombian National Interconnected Grid System. The data used for emission factor calculation were obtained from the period 2002 – 2004. However, according to the methodology ACM0002 version 6, for ex-ante emission factors calculation it must be used the full generation-weighted average of the most recent 3 years for which data are available at the time of PDD submission. Even though ex-post calculations are selected, the ex-ante estimate made should comply with the requirements of ACM0002.	GAR-1	OK
E.3.2. Are all aspects related to direct and	/4/	DR	Yes.		OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
indirect baseline emissions captured in the project design?					
E.3.3. Have all relevant greenhouse gases and sources been evaluated?	/4/	DR	Yes. The evaluation of the greenhouse gases and sources is deemed reasonable.		OK
E.3.4. Do the methodologies for calculating baseline emissions comply with existing good practice?	/4/	DR I	The emission factor will be calculated <i>ex-post</i> .		OK
E.3.5. Are the calculations documented in a complete and transparent manner?	/4/	DR	DNV requests an explanation about how was estimated the electricity generation.	GL-9	OK
E.3.6. Have conservative assumptions been used?	/4/	DR I	For estimating the <i>ex-ante</i> calculation of emission reductions, the Colombian official emission factor for small-scale CDM projects of 0.4392 tCO ₂ e/MWh is considered as the average between the Operating Margin Coefficient (0.5728 tCO ₂ e/MWh) and the Build Margin Coefficient (0.3056 tCO ₂ e/MWh). The data used for emission factor calculation were obtained from the period 2002 – 2004. However, according to the methodology ACM0002 version 6, for ex-ante emission factors calculation it must be used the full generation-weighted average of the most recent 3 years for which data are available at the time of PDD submission. Even though ex-post calculations are selected, the ex-ante estimate made should comply with the requirements of ACM0002.	CAR-1	OK
E.3.7. Are uncertainties in the baseline emissions estimates properly addressed?	/4/	DR	Yes		OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
E.4. Emission Reductions Validation of ex-ante estimated emission reductions.					
E.4.1. Will the project result in fewer GHG emissions than the baseline case?	/4/	DR	The project is forecasted to reduce CO ₂ emissions to the extent of 51 390 tCO ₂ e (5 139 tCO ₂ e / year average) over the defined 10 years crediting period.		OK
F. Environmental Impacts It is assessed whether environmental impacts of the project are sufficiently addressed.					
F.1.1. Does host country legislation require an analysis of the environmental impacts of the project activity?	/4/	DR I	The project is minor of 10MW. According to the Colombian procedures, the project does not need an environmental license; therefore, it is not necessary to do a study of environmental impact. However, it is necessary to obtain different permissions with the local environmental authorities: water collecting permission; riverbed occupation permission; forest utilization permission; and waste water discharge permission. All these permissions were preceded in CORNARE who is the environmental local authority. Nowadays the project has all the permissions required. No evidences of the plan of environmental management were provided.	CL-5	OK
F.1.2. Does the project comply with environmental legislation in the host country?	/4/	DR I	See F.1.1	CL-5	OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
F.1.3. Will the project create any adverse environmental effects?	/4/	DR I	To attend the impacts considered by project participants and to obtain the permissions required, a plan of environmental management was designed. No evidences of the plan of environmental management were provided.	CL-5	OK
F.1.4. Have environmental impacts been identified and addressed in the PDD?	/4/	DR	Yes.		OK
G. Comments by Local Stakeholder Validation of the local stakeholder consultation process.					
G.1.1. Have relevant stakeholders been consulted?	/4/	DR I	Prestadora de Servicios Públicos La Cascada S.A. conducted two meetings in order to present the project activity and explain the characteristics and requirements of the CDM to all the invited stakeholders. The first part of the stakeholder consultation intended to collect comments from local authorities, like the mayor of San Roque and other San Roque mayoralty employees. The second part of the stakeholder consultation intended to collect comments from local communities. The stakeholder comment process was completed trough a survey, where the local stakeholders had the opportunity to express their opinions.		OK
G.1.2. Have appropriate media been used to invite comments by local stakeholders?	/4/	DR I	See G.1.1		OK
G.1.3. If a stakeholder consultation process is required by regulations/laws in the host	/4/	DR I	See G.1.1		OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?					
G.1.4. Is a summary of the comments received provided?	/4/	DR	See G.1.1		OK
G.1.5. Has due account been taken of any comments received?	/4/	DR	Comments received by local stakeholders were highly positive about the implementation of the project activity.		OK

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Table 3 Resolution of Corrective Action and Clarification Requests

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
<p>CAR 1</p> <p>The data used for emission factor calculation were obtained from the period 2002 – 2004. However, according to the methodology ACM0002 version 6, for ex-ante emission factors calculation it must be used the full generation-weighted average of the most recent 3 years for which data are available at the time of PDD submission. Even though ex-post calculations are selected, the ex-ante estimate made should comply with the requirements of ACM0002.</p>	<p>B.2.4 E.3.6</p>	<p>OK, PDD was changed accordingly. Ex ante emission factor calculation was made with data from period 2004-2006.</p> <hr/> <p>- Hourly generation was taken from XM compañía de expertos de mercado, who gave us access to data through “servicio virtual NEON” paying a login fee</p> <p>Dirección Servicios Asociados XM Compañía de Expertos en Mercados S.A. E.S.P. PBX: (574) 317 29 29 Fax: (574) 317 09 89 Medellín - Colombia servicio virtual NEON</p>	<p>DNV requests more information about the following issues:</p> <ul style="list-style-type: none"> - Please provide the source where hourly generation data was taken, so we could check the load duration curve; - Some energy generators are identified as “central”. They are classified as low-cost-must-run, and present an EF of 0.553 tCO₂/MWh. What kind of plant is this? - There seems to be a mistake in BM calculations: the starting date of operation of Riomayo generator is presented as 1/12/2006, but there are generation data from this hydroelectric since at least January 2004. <p>Therefore this CAR remains opened.</p> <hr/> <p>All necessary data was provided and corrected. CAR closed.</p>

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
		<p>http://sv04.xm.com.co/neonweb/</p> <ul style="list-style-type: none"> - Those plants are low cost biomass co generators and the EF of 0.553 was obtained from UPME1. See already provided document: <p>“Doc. UPME_METODOLOGÍA SIMPLIFICADA PARA EL CÁLCULO DE LA LÍNEA BASE 2004”</p> <ul style="list-style-type: none"> - BM calculation was modified accordingly leading to EFBM = 0.2715 tCO₂/MWh 	

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
CAR 2 The annex 4 of the PDD establishes that the data needed to recalculate the operating and build margin emissions factors will be monitored. However, this data is not considered in section B.7.1.	D.4.1	OK, PDD was changed accordingly. Data needed to recalculate the operating and build margin emission factors was included in section B.7.1.	The monitoring plan was updated. Therefore this CAR is closed.
CL 1 DNV requests an explanation about what kind of non-renewable biomass is fired in generation units that supply electricity to the Colombian National Interconnected Grid System, as stated in section B.2 of the PDD.	B.1.2	This paragraph had been extracted from an old version of AMS-I.D (version 6). However, the Board agreed, at its twenty-first meeting, to delete the references to “non-renewable biomass” in Appendix B. This deletion shall become effective after the twenty-second meeting (23-25 November 2005) of the Board. Therefore, the PDD was modified accordingly.	PDD was reviewed accordingly. Therefore this CL is closed.
CL 2 The PDD presents barriers to the implementation of a hydropower plant in Colombia. It is also stated that, in the absence of the “La Cascada 2.3 MW Hydroelectric Project”, the viable alternative would be for the Colombian Grid to generate the equivalent of the electricity generated by La Cascada mostly with thermal generation plants. However, according to the “Energetic and Mining Monthly Report” (January 2007) published by the “Unidad de Planeación Minero Energética” (UPME) of the Ministry of Mines and Energy, approximately 64.1% of the energy in Colombia is generated by hydropower plants. DNV requests more	B.2.1 B.2.5	Barrier in PDD says: “...if the project were not implemented, the energy that had been generated from La Cascada would have been produced with current or added power plants connected to the grid, mostly thermal plants. This would have been the most probable scenario, especially given recent regulations, which provide incentives to thermal operators, who can provide reliable capacity to the energy system in order to reduce the country’s high dependence upon hydro generation, decreasing periodic energy supply problems due to shortages of water availability as a result of weather	It was evidenced (Creg071-2006) that thermal operators receive more incentives, as they are able to guarantee higher firm capacity than hydro operators, since they do not depend on water availability. Therefore this CL is closed.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
clarification about that.		<p>cycles”. These incentives favour the addition of new thermal plants over hydro generation. Documentation with the regulations that provide incentives to thermal operators was already provided (Creg071-2006). Specifically, the incentives consist of an extra remuneration due to firm power availability. Thermal operators are able to guarantee higher firm capacity than hydro operators, since they do not depend on water availability.</p> <p>On the other hand, when looking at the lambda factor, it can be shown that around 75-80% of the time, thermal plants are in the margin; therefore, generation displaced will be mostly from thermal plants.</p> <p>Besides, Colombia has more than 50% hydro electricity and that is why simple adjusted EF is required, which takes into account thermal and hydro generation. Baseline EF is determined according to ACM0002, taking into account all current and possible added power plants as reflected in the combined margin EF. Then, the percentage of hydro generation is considered in the calculation of the EF, assuring that only actual emission reductions are claimed.</p>	

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
CL 3 DNV requires a spreadsheet presenting the IRR calculation. Evidences are also required on the IRR that would have been, had project participants been able to leverage the project through typical project finance terms (70% debt), and the rate of return for unleveraged projects of 15% required by project participants.	B.2.1	Ok, we are sending it.	DNV requests the IRR calculations in an Excel spreadsheet format. Therefore this CL remains opened. <hr/> IRR calculations were received in an Excel spreadsheet format and were considered appropriate. Therefore this CL is closed.
CL 4 It needs to be confirmed that the crediting period will only start after the date of registration.	C.1.2	OK, crediting period was changed to start on August.	OK, the crediting period was changed. Therefore this CL is closed.
CL 5 No evidences of the plan of environmental management were provided.	A.3.2 A.3.4 B.2.3 F.1.1 to F.1.3	OK, the environmental management plan was already sent (21690010210 Plan de manejo Ambiental).	The environmental management plan was received. Therefore this CL is closed.
CL 6 DNV requests evidence for the power factor of the generator, considered to convert from 2.57 MVA to 2.3 MW.	A.2.3	OK, we are sending it. Document “FD-35697-4-2006” is sent.	Document “FD-35697-4-2006” presents a power factor of 0.9. CL closed.
CL 7 Since the project has already started, it needs to be documented that CDM was considered at the time of the decision, and that it was a prerequisite for the investment, i.e. that the project is different from the baseline scenario.	B.2.1 C.1.1	OK, document was sent (060828 La Cascada Presentation)	The presentation of 28 August 2006 about applying CDM in the project was received. Therefore this CL is closed.
CL 8 The PDD states that the energy conversion	D.3.1 E.2.1	OK, we are sending it.	Invoices for the turbines, the generator, current and voltage transformers were

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
equipment for the project was manufactured for the specific site conditions. DNV requests an evidence about that.			provided as evidence. CL closed.
CL 9 DNV requests an explanation about how was estimated the electricity generation.	E.3.5	This estimation was based on the daily average water flows, efficiency of equipments supplied by the manufacturer, and the typical availability for run of river plants. The daily average water flows were estimated from water flows of Caramanta plant, located downstream from the intake. This plant has a 28 years data series.	Clarifications were provided to DNV's satisfaction. Therefore this CL is closed.
CL 10 DNV requests an explanation about what kind of training will be provided to operate and maintain the technology.	A.2.5 B.2.1 D.5.3	It will be provided training in operation, environment impacts, industrial security and occupational health.	Clarifications were provided to DNV's satisfaction. Therefore this CL is closed.
CL 11 The starting date of a project activity is the earliest of implementation, construction and real action. Evidence for this is requested.	C.1.1	Section C.1.1. of the PDD will be changed to 01/08/2006.	This CL is closed.

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APPENDIX B

CERTIFICATES OF COMPETENCE



CERTIFICATE OF COMPETENCE

Michael Lehmann

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1

GHG Auditor:	Yes		
CDM Validator:	Yes	JI Validator:	Yes
CDM Verifier:	Yes	JI Verifier:	Yes
Industry Sector Expert for Sectoral Scope(s):	Sectoral scope 1,2,3 & 9		
Technical Reviewer for (group of) methodologies:			
ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G	Yes	AM0021	Yes
ACM002, AMS-I.A-D, AM0019, AM0026, AM0029	Yes	AM0023	Yes
ACM003, ACM0005, AM0033, AM0040	Yes	AM0024	Yes
ACM0004	Yes	AM0027	Yes
ACM0006, AM0007, AM0015, AM0036, AM0042	Yes	AM0028, AM0034	Yes
ACM0007	Yes	AM0030	Yes
ACM0008	Yes	AM0031	Yes
ACM0009, AM0008, AMS-III.B	Yes	AM0032	Yes
AM0006, AM0016, AMS-III.D	Yes	AM0035	Yes
AM0009, AM0037	Yes	AM0038	Yes
AM0013, AM0022, AM0025, AM00379, AMS-III.H, AMS-III.I	Yes	AM0041	Yes
AM0014	Yes	AM0034	Yes
AM0017	Yes	AMS-II.A-F	Yes
AM0018	Yes	AMS-III.A	Yes
AM0020	Yes	AMS-III.E, AMS-III.F	Yes

Høvik, 5 February 2007

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director



CERTIFICATE OF COMPETENCE

Hendrik Brinks

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1)

GHG Auditor:	Yes		
CDM Validator:	Yes	JI Validator:	--
CDM Verifier:	--	JI Verifier:	--
Industry Sector Expert for Sectoral Scope(s):	Sectoral scope 1, 2, 3 & 12		
Technical Reviewer for (group of) methodologies:			
ACM002, AMS-I.A-D, AM0019, AM0026, AM0029, AM0045	Yes	AM0013, AM0022, AM0025, AM00379, AMS-III.H, AMS- III.I	Yes
ACM0006, AM0007, AM0015, AM0036, AM0042	Yes		

Høvik, 18 July 2007

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director



CERTIFICATE OF COMPETENCE

Felipe Lacerda Antunes

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1)

GHG Auditor:	Yes		
CDM Validator:	No	JI Validator:	No
CDM Verifier:	No	JI Verifier:	No
Industry Sector Expert for Sectoral Scope(s):	Sectoral scope		
Technical Reviewer for (group of) methodologies:			
ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G	No	AM0021	No
ACM002, AMS-I.A-D, AM0019, AM0026, AM0029	No	AM0023	No
ACM003, ACM0005, AM0033, AM0040	No	AM0024	No
ACM0004	No	AM0027	No
ACM0006, AM0007, AM0015, AM0036, AM0042	No	AM0028, AM0034	No
ACM0007	No	AM0030	No
ACM0008	No	AM0031	No
ACM0009, AM0008, AMS-III.B	No	AM0032	No
AM0006, AM0016, AMS-III.D	No	AM0035	No
AM0009, AM0037	No	AM0038	No
AM0013, AM0022, AM0025, AM00379, AMS- III.H, AMS-III.I	No	AM0041	No
AM0014	No	AM0034	No
AM0017	No	AMS-II.A-F	No
AM0018	No	AMS-III.A	No
AM0020	No	AMS-III.E, AMS-III.F	No

Høvik, 5 February 2007

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director



CERTIFICATE OF COMPETENCE

Luis Filipe Tavares

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1)

GHG Auditor:	Yes		
CDM Validator:	Yes	JI Validator:	No
CDM Verifier:	Yes	JI Verifier:	No
Industry Sector Expert for Sectoral Scope(s):	Sectoral scope 13		
Technical Reviewer for (group of) methodologies:			
ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G	No	AM0021	No
ACM002, AMS-I.A-D, AM0019, AM0026, AM0029	No	AM0023	No
ACM003, ACM0005, AM0033, AM0040	No	AM0024	No
ACM0004	No	AM0027	No
ACM0006, AM0007, AM0015, AM0036, AM0042	No	AM0028, AM0034	No
ACM0007	No	AM0030	No
ACM0008	No	AM0031	No
ACM0009, AM0008, AMS-III.B	No	AM0032	No
AM0006, AM0016, AMS-III.D	No	AM0035	No
AM0009, AM0037	No	AM0038	No
AM0013, AM0022, AM0025, AM00379, AMS-III.H, AMS-III.I	No	AM0041	No
AM0014	No	AM0034	No
AM0017	No	AMS-II.A-F	No
AM0018	No	AMS-III.A	No
AM0020	No	AMS-III.E, AMS-III.F	No

Høvik, 5 February 2007

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director