



VALIDATION OPINION

for the Renewal of Crediting Period of the CDM Project
Activity

La Vuelta and La Herradura Hydroelectric Project

In
Colombia

Report No. 01 997 9105064686

Version No. 05, 2014-07-07

Designated Operational Entity (DOE)

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I. Project description:

Project title:	La Vuelta and la Herradura Hydroelectric Project		Report No.: 01 997 9105064686
Host Country:	Colombia		Revision version No.: 04
Methodology:	ACM0002 Version 15.0.0	<input checked="" type="checkbox"/> Large Scale <input type="checkbox"/> Small Scale	Date of current report version: 07-07-2014 Date of first issue: 2011-08-08
Annual average emission reductions (estimate):			77,149 tCO ₂ e/yr
GHG reducing measure/technology:	Displacing fossil fuel based grid power generation with renewable hydro energy.		

Party	Project Participants	Party considered a project participant	Contract party
Switzerland	MGM Carbon Portfolio, S.a.r.l.	No	<input type="checkbox"/>
Colombia	Empresas Públicas de Medellín E.S.P.	No	<input checked="" type="checkbox"/>
Japan	Electric Power Development Co., Ltd.	No	<input type="checkbox"/>

II. Validation Team:

Validation Team			Role									
Full name	Affiliation TÜV Rheinland	Appointed for Sectoral Scopes (Technical Areas)	Team leader	Acting Team Leader	Local Expert	Team Member (Auditor)	Technical Expert	Acting Tech. Expert	Trainee Auditor	Technical Reviewer	Expert to TR	Trainee TR
Guadalupe Avendaño*	México	1.2, 13.1	X				X					
Arturo Lemus			X									
Jaime Ramos								X				
Danae Diaz	México	1.2, 13.1 and 13.2								X		

*Guadalupe Avendaño acted as team leader until 28/02/2014

Validation Phases	Validation Status
<input checked="" type="checkbox"/> Desk Review <input checked="" type="checkbox"/> Follow up interviews <input checked="" type="checkbox"/> Resolution of outstanding issues <input checked="" type="checkbox"/> Corrective Actions / Clarifications Requested	<input checked="" type="checkbox"/> Full Approval and Submission for Registration <input type="checkbox"/> Rejected

III. Validation Report:

Final approval	Released	Distribution
<input checked="" type="checkbox"/> Date: 08-07-2014	By: Mr. Henri Phan	<input type="checkbox"/> No distribution without permission from the Client or responsible organizational unit <input checked="" type="checkbox"/> Unrestricted distribution

Executive Summary – Validation Opinion

The validation team assigned by the DOE (TÜV Rheinland (China) Ltd.), here after called TRC, is been assigned by “Empresas Públicas de Medellín E.S.P.” to perform the validation of Renewal of Crediting Period for the project “La Vuelta and La Herradura Hydroelectric Project”, UNFCCC registration No. 0735. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism for renewal of crediting period. The scope of the validation is defined as an independent and objective review of the validity of the baseline and its update in the framework of the renewal of crediting period of the project. The information in these documents is revised against CDM Validation and Verification Standard (Version 06.0), Kyoto Protocol requirements, CDM Executive Board/UNFCCC rules.

The report is based on the assessment of the validity of the original baseline or its update through the assessment of the following issues:

- a. The impact of new relevant national and/or sectoral policies and circumstances on the baseline taking into account relevant guidance from the Board with regard to renewal of the crediting period at the time of requesting renewal of crediting period;
- b. The correctness of the application of an approved baseline methodology for the determination of the continued validity of the baseline or its update, and the estimation of emission reductions for the applicable crediting period.

Validation methodology and process

The validation has been performed as described in the VVS version 06.0 and constitutes the following steps:

- Registered CDM PDD [La Vuelta and La Herradura Hydroelectric Project], Version 6, Dated on 06 September 2006
- Desk review of the registered PDD on the UNFCCC website
- Desk review of the revised PDD and relevant documents (Version 7, Dated on 12 February 2014)
- On-site assessment (27/06/2011 – 30/06/2011)
- Issuance of Validation Report

Validation criteria

The following CDM requirements have been considered:

- Article 12 of the Kyoto Protocol,
- Modalities and procedures for CDM (Marrakech Accords) Para 49(a)
- Subsequent decisions by the COP/MOP and CDM Executive Board
- Host country criteria (National and/or Sectoral policies)
- Criteria given to provide for consistent project operations, monitoring and reporting.

The host part is Colombia and the Annex I countries are Switzerland and Japan. All the parties fulfill the participation criteria and have approved and authorized the project and the project participants. The DNA from Colombia confirms that the project assists in achieving sustainable development.

The project correctly applies the baseline and applicable monitoring methodology ACM0002, version 15.0.0, “Consolidated baseline Methodology for Grid-Connected Electricity Generation from Renewable Sources”.

The project results in reductions of CO₂ emissions that are real, measurable and give long-term benefits to the mitigation of climate change. It is demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

The monitoring plan provides for the monitoring of the project’s emission reductions. The monitoring arrangements described in the monitoring plan are feasible within the project design and it is TRC’s opinion that the project participants are able to monitor as per the monitoring plan.

By displacing fossil fuel based grid power generation with renewable hydro energy the project activity will result in reductions of greenhouse gas (GHG) emissions that are real, measurable and give long-term benefits to the mitigation of climate change.

The total emission reductions from the project are estimated to be 540,043 t of CO₂e over a 7 year crediting period, averaging 77,149t of CO₂e annually. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given the underlying assumptions do not alter.

The validation protocol describes a total of 20 findings which include:

14 Corrective Action Requests (CARs);
6 Clarification Requests (CLs);
Zero Forward Action Requests (FARs); and all findings have been closed satisfactorily.

TRC concludes that the CDM Project Activity “La Vuelta and La Herradura Hydroelectric Project” in Colombia, as described in the PDD (version 15, 16/06/2014), meets all relevant requirements of the UNFCCC for CDM project activities including article 12 of the Kyoto Protocol, the modalities and procedures for CDM (Marrakesh Accords) Para 49 (a) and the subsequent decisions by the COP/MOP and CDM Executive Board. The selected baseline and monitoring methodologies (ACM0002, Version 15.0.0) are applicable to the project and correctly applied. The TRC therefore requests the registration of the renewal of the crediting period for the registered CDM project with UNFCCC.

Arturo Lemus (Team Leader)



TÜV Rheinland de México
México, City, 07/07/2014

Mr. Henri Phan
(DOE/AIE Manager)



TÜV Rheinland (China) Ltd.
Beijing, China, 08/07/2014

Abbreviations

BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM EB	CDM Executive Board
CDM PCP	Clean Development Mechanism Project Cycle Procedure
CDM PS	Clean Development Mechanism Project Standard
CDM VVS	CDM Validation and Verification Standard
CER	Certified Emission Reduction(s)
CL	Clarification request
CM	Combined Margin
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
DNA	Designated National Authority
DOE	Designated operational entity
EF	Emission Factor
EPM	Medellin Public Company (Empresas Públicas de Medellin)
FAR	Forward Action Request
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
LoA	Letter of approval
OM	Operating Margin
PDD	Project Design Document
tCO ₂ e	Tonnes of CO ₂ equivalents
TRC	TÜV Rheinland (China) Ltd.
UNFCCC	United Nations Framework Convention on Climate Change
VVS	Validation and Verification Standard
XM	Electricity Market Administrator (Compañía de Expertos en Mercados S.A E.S.P)

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Appendix A: Validation Protocol

Appendix B: Certificates of Competence

1. Introduction:

The organization “Empresas Públicas de Medellín E.S.P.” has commissioned the DOE TÜV Rheinland (China) Ltd. to perform a validation of Renewal of Crediting Period for the registered CDM Project Activity “La Vuelta and la Herradura Hydroelectric Project” in Colombia (hereafter called “the project”). This report summarizes the findings of the validation of the project, performed on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. The term “UNFCCC criteria” refers to Article 12 of the Kyoto Protocol, the CDM modalities and procedures Para 49 (a) and the subsequent decisions by the CDM Executive Board.

1.1 Objective:

The purpose of a validation is to have an independent third party assess the project design at the renewal of crediting period. In particular, the project's baseline, emission reductions, monitoring plan, and the project's compliance with relevant host Party criteria (National and/or Sectoral policies) and UNFCCC guidelines 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 for 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 revised against the relevant criteria (see above) and decisions by the CDM Executive Board, including the approved baseline and monitoring methodology. The validation team has, based on the recommendations in the Validation and Verification Standard employed (latest version) a risk-based approach, focusing on the identification of significant risks application of baseline 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 improvement of the baseline assessment in the request for renewal of crediting period..

2. Methodology:

The validation consists of the following three phases:

- I A desk review of the project design documents
 - II On-site visit and follow-up interviews with project stakeholders as necessary
 - III The resolution of outstanding issues and the issuance of the final validation report and opinion.
- The following sections outline each step in more detail.

2.1 Desk Review of the Project Design Documentation:

The following table outlines the documentation revised during the validation:

Ref no.	Reference Document
/1/	Registered CDM PDD [La Vuelta and La Herradura Hydroelectric Project], Version 6, Date 06 September 2006
/2/	a) Revised PDD [La Vuelta and La Herradura Hydroelectric Project], Version 7, Dated on 12/02/2014 b) CDM PDD for renewal of crediting period [La Vuelta and La Herradura Hydroelectric Project], Version 15, Dated on 16/06/2014
/3/	Host Country Approval / Letter of Approval: (Colombia), DNA (name of DNA: “Ministerio de Ambiente, Vivienda y Desarrollo Territorial”), reference number (2000-2-62843), Date: 20/08/2004. http://cdm.unfccc.int/filestorage/I/9/M/I9MGS70NSIZWLP1BPUSEQ61932XTJM/LoA_Colombia.pdf?t=WW58bWs4Z3p1fDCkOGLI2MCVPE1V0IPVKEp_
/4/	Annex I party Letter or Approval: Japan, name of DNA: Minister of Economy, Trade and Industry of Japan, reference number: Not included; Date: 11/08/2006 http://cdm.unfccc.int/filestorage/F/Z/O/FZORBJCGV1I0CKAHZV9YZTV5X3SO3D/LoA_Japan.pdf?t=bXp8bWs4aDRlfDB-zEgfcq0UqEYejJGeubNq Annex I party Letter or Approval: Switzerland, name of DNA: Federal office for the Environment FOEN, reference number: H115-0624 / (Version: N/A), Date: 28/08/2008 http://cdm.unfccc.int/filestorage/O/1/O/01OXR3HNJT8CDIK597BYGU6AZSFEWM/loa.pdf?t=TEh8bWs4aDV6fDC_4H1TJHvFvVkIx9BGoeh_
/5/	Modalities of Communication dated 22/07/2012.
/6/	Clean Development Mechanism Validation and Verification Standard (version 06.0)
/7/	Clean Development Mechanism Project Cycle Procedure (version 04.0)
/8/	Clean Development Mechanism Project Standard (version 04.0)
/9/	Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period – version 3.0.1
/10/	CDM-PDD - Guidelines for completing the project design document form, Version 01.0 http://cdm.unfccc.int/Reference/Guidclarif/pdd/PDD_guid06.pdf
/11/	Approved Baseline & Monitoring Methodology: ACM0002, version 15.0.0 “Grid/connected electricity generation from renewable sources”. http://cdm.unfccc.int/methodologies/DB/UB3431UT9I5KN2MUL2FGZXZ6CV71LT
/12/	UNFCCC, Project 0735 «La Vuelta and La Herradura Hydroelectric Project» http://cdm.unfccc.int/Projects/DB/DNV-CUK1161865279.03/view
/13/	MGM Innova, “Emission Factor LV y LH 2010 -23 aug2013.xls” MGM innova, “ER estimation LV y LH 25aug2011.xlsx”, dated on 25/08/2011
/14/	Official Journal of the Republic of Colombia, “Public offering request”, dated on 05-06-2002
/15/	Engineering consulting of Medellin, “Power Development Plan of La Herradura River”, version 006665, no dated.
/16/	TÜV Rheinland, pictures of nameplates taken during the site visit.
/17/	EngPedia, Hydropower Advantages and Disadvantages, Engineering website. http://www.enggpedia.com/civil-engineering-encyclopedia/articles/1754-advantages-and-disadvantages-of-hydropower
/18/	Official Journal of Colombia, Law 697 of 2001, “Law that promotes rational and efficient use

	of Energy, and the use of alternative energy and other provisions". Released on 05/10/2011. http://www.secretariasenado.gov.co/senado/basedoc/ley/2001/ley_0697_2001.html
/19/	MGM International, "mail notifying to UNFCCC the intention to renewal of crediting period", version N/A, dated on 01/05/2011.
/20/	UNFCCC, "Tool to calculate the emission factor for an electricity system", version 3.0.0 http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.0.pdf/history_view
/21/	UNFCCC, "Assessment of the validity of the original/current and update of the baseline at the renewal of the crediting period" version 3.0.1 http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-11-v3.0.1.pdf/history_view
/22/	UNFCCC, "DNV-Validation Report of the project La Vuelta And La Herradura Hydroelectric Project In Colombia", version 02, dated on 23/10/2006 http://cdm.unfccc.int/filestorage/O/S/T/OST36ZVHNTL250KA46LOLZRBMLUWAT.1/DN_%20LVyLH_Val%20Report_v02_006-10-23.pdf?t=bzF8bWs5d201fDD270ZIUyYbRSF-6mp6K_sX6
/23/	National Constitution of Colombia , dated on 1991 http://www.banrep.gov.co/regimen/resoluciones/cp91.pdf
/24/	Law 142 from 1994, "Public Service Law," http://empresas.micodensa.com/BancoMedios/Documentos%20PDF/ley142.pdf
/25/	Law 143 from 1994 , "Electrical Law" http://empresas.micodensa.com/BancoMedios/Documentos%20PDF/ley143.pdf
/26/	Law 697 from 2001, "Promotion of Renewable Energy" http://www.secretariasenado.gov.co/senado/basedoc/ley/2001/ley_0697_2001.html
/27/	Description of the Colombian Electric Interconnected System /operation of the market http://www.xm.com.co/pages/descripciondelsistemaelectricocolombiano.aspx
/28/	Colombian Electric Information System- web site http://www.siel.gov.co/ http://www.simec.gov.co/LinkClick.aspx?fileticket=alMunz%2fR5qw%3d&tabid=70
/29/	Official Journal of Colombia, "Norm 180947- Emission Factor of the Host Country" dated on 04/06/2010 http://www.minminas.gov.co/minminas/kernel/usuario_externo_normatividad/form_consultar_normas_energia.jsp?parametro=2266&site=1
/30/	Ministry of Energy and Mines, "SIAME- Environmental Information System of Energy and Mining" Grid Emission Factor Calculation. http://www.siame.gov.co/Inicio/C%C3%A1lculofactordeemisi%C3%B3n/tabid/77/Default.aspx
/31/	Ministry of Energy and Mines, "Emission Factor for interconnected system of Colombia" Version 2009.3 For the year 2008 http://www.siame.gov.co/Portals/0/Factor_CO2/Calculo%20del%20Factor%20de%20Emission_2008_3.pdf . Ministry of Energy and Mines, "Emission Factor for interconnected system of Colombia" Version 2010.0 For the year 2009 http://www.siame.gov.co/Portals/0/Factor_CO2/Calculo%20del%20Factor%20de%20Emission_2009.pdf
/32/	Colombian Electrical Installed Capacity. https://www.xm.com.co/Pages/DescripciondelSistemaElectricoColombiano.aspx http://www.forcefulenergy.com/index.php/es/el-mercado-energetico-2/indicadores-nacionales-e-internacionales/97-sistema-electrico-colombiano-capacidad-instalada-en-el-sin
/33/	Source- Information System of Energy and Mines, «Average price of electricity period 2005-2011» http://www.upme.gov.co/GeneradorConsultas/Consulta_Indicador.aspx?Ind=4
/34/	Source- Information System of Energy and Mines, «Generation oer fuel, 2005-2011» http://www.upme.gov.co/generadorconsultas/consulta_ISA.aspx?grupo=G

/35/	Itron electricity meters, «MV-90xi», Data Management System https://www.itron.com/na/productsAndServices/Pages/MV90%20xi.aspx
/36/	Norm « NTC-ISO-IEC 17,025- General requirements for the competence of testing and calibration laboratories» , dated on 26/10/2005 http://www.itp.gob.pe/normatividad/demos/doc/Normas%20Internacionales/Union%20Europea/ISO/ISO17025LaboratorioEnsayo.pdf
/37/	UNFCCC,«Tool for the demonstration and assessment of additionality» version 7.0.0 http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf/history_view
/38/	Tool to determine the remaining lifetime of equipment –version 1 (EB50 Annex 15)
/39/	Glossary of CDM terms version 07
/40/	UNFCCC, approval of the request for post-registration changes of “0735 La Vuelta and la Herradura Hydroelectric Project” Approved on 20/05/2014

2.2. Follow-up Interviews with Project Stakeholders:

TÜV Rheinland validation team carried out an on-site visit dated (2011-06-27 to 30) and performed interviews with the project representatives and stakeholders.

Prior to the interview salient points to be discussed were planned. Date, persons interviewed and points discussed are given in the following table.

	Date	Name	Organization	Topic
/i/	27-30/06/2011	Carlos E. Velez R	EPM	Implementation of the project activity
/ii/	27-30/06/2011	Christian Errart	MGM Innova	CDM consideration Description of the project activity Baseline Monitoring parameters
/iii/	27-30/06/2011	Jaime Aramburo	EPM	Implementation of the project activity.
/iv/	27-30/06/2011	Guillermo Ortiz G	EPM	Implementation of the project activity
/v/	27-30/06/2011	Luis Fernando Salazar V	EPM	Implementation of the project activity
/vi/	27-30/06/2011	Oscar Alonso Fernandez	EPM	Implementation of the project activity
/vii/	27-30/06/2011	Juan Carlos Echeverri	EPM	Implementation of the project activity
/viii/	27-30/06/2011	Juan Carlos Jaramillo	EPM	Implementation of the project activity
/ix/	27-30/06/2011	Diego Mauricio Arroyanue	EPM	Implementation of the project activity

Validation Team considered the views obtained in these interviews while arriving at Validation Opinion.

2.3 Resolution of Outstanding Issues:

The objective of this phase of the validation is to resolve any outstanding issues which need be clarified prior to TÜV Rheinland's positive conclusion on the project design and its compliance with EB requirements renewal of crediting period. In order to ensure transparency a validation protocol is customized for the project. The protocol shows in transparent manner criteria (requirements), means of validation and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organizes details and clarifies the requirements of renewal of crediting period of 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 the figure below. The completed validation protocol for this project is enclosed in Appendix A to this report.

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

- Mistakes have been made with a direct influence the ability of the project activity to achieve on project results like real, measurable, verifiable and additional emission reductions;
- CDM and/or methodology specific requirements have not been met; or
- There is a risk that the project would not be accepted as a CDM project or that emission reductions will not be certified.

A request for clarification (CL) may be used where additional information is needed to fully clarify an issue.

A forward action request (FAR) is raised during validation to highlight issues related to project implementation that require review during the first verification of the project activity. FARs shall not relate to the CDM requirements for registration.

Validation Protocol Table 1: Validation requirements				
Checklist Question	Reference	Means of Validation (MoV)	Comment	Draft and/or Final Conclusion
The various UNFCCC requirements as specified in the VVS are linked to checklist questions the project should meet. The checklist is organised in different sections, following the logic of the VVS.	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 validation 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 2: List of Requests for Corrective Action (CAR) and Clarification (CL)			
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 CAR or a CL, these should be listed in this section.	Reference to the checklist question number in Table 2 where the CAR or CL 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".

Table 3: List of forward action requests (FARs)			
FAR number	Reference	Summary of project owner response	Validation team conclusion
Forward action request (FAR) to be raised during validation to highlight issues related To project implementation that requires review during the first verification of the project activity. FARs Shall not relate to the CDM requirements for registration.	Reference to the checklist question number in Table 2 where the CAR or CL 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

2.4 Internal Quality Control:

The final validation report underwent a technical review by a qualified independent reviewer before requesting approval of the renewal of crediting period project activity. The technical review was performed by a technical reviewer qualified in accordance with TÜV Rheinland's qualification scheme for CDM validation and verification that meets the criteria of EB guidelines for qualification.

2.5 Validation Team:

Before the assessment begins, members of the validation team are ensured to cover the technical area(s), sectoral scope(s) and relevant host country experience including local language ability for evaluating the CDM project activity. The qualification of the team is as per the criteria defined by the EB guidelines for qualification.

Validation Team			Type of Involvement					
Full name	Affiliation TÜV Rheinland	Appointed for Sectoral Scopes (Technical Areas)	Supervising the work	Desk review	Site Visit + Interview	Report and protocol Writing	Reporting Support	Technical Reviewer
Guadalupe Avendaño*	México	1.2, 13.1	X	X	X	X		
Arturo Lemus	México	1.2, 13.1	X	X				
Jaime Ramos	México	5.1				X	X	
Danae Diaz	México	1.2, 13.1 and 13.2						X

*Guadalupe Avendaño acted as team leader until 28/02/2014

3. Validation Findings:

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

The final validation findings related to the assessment of continued validity of the baseline and its update at the renewal of crediting period, is documented and described in the revised and resubmitted project design documentation.

3.1 Approval and Participation:

The below table summarizes the project participants and parties involved. The authenticity of the letters of approval has been validated by TÜV Rheinland validation team by verifying them in the website of the registered project activity, due to no changes in Parties applied; hence it is not necessary to obtain a new letter of approval from parties involved as per paragraph 247 of the “Project Cycle Procedure” /7/.

These LoAs are therefore regarded as valid and meeting the requirements.

Project participants	1.	2.	3.
Parties involved	Colombia (host)	Japan	Switzerland
APPROVAL			
LoA received	Corroborated in the project view page	Corroborated in the project view page	Corroborated in the project view page
Date of LoA	2004-08-20	2006-08-11	2008-08-28
Reference to document	Ref. # 2000-2-62843	Ref. # Not included	Ref. # H115-0624
LoA received from	N/A. Webhosted	N/A. Webhosted	N/A. Webhosted
Validation of authenticity	LoA is webhosted in the UNFCCC website and it is valid.	LoA is webhosted in the UNFCCC website and it is valid.	LoA is webhosted in the UNFCCC website and it is valid.
Validity of LoA	Valid	Valid	Valid
PARTICIPATION			
Party is party to Kyoto Protocol	Yes	Yes	Yes
Voluntary participation	Yes	Yes	Yes
Diversion of official development aid towards host country	No	No	No
Project contribution to Sustainable Development	Yes	Yes	Yes

As per paragraph 247 of the “Project Cycle Procedure” /7/: “For the purpose of renewal of crediting period is not necessary to obtain a new letter of approval from parties involved”, hence this point is fulfilled.

3.2 Project Design Document:

The Project Design Document is based on the currently valid PDD template and is completed in accordance with the applicable guidance document /10/.

3.3 Project Implementation:

The project activity consist of two hydroelectric power plants, taking advantage of the river “La Herradura”, equipment included in the project activity, the DOE confirmed the accuracy of the project described in the PDD, by physical inspection of the equipment described in the PDD during the site visit, equipment is described below :

- Turbine Regulator, which is an electronic device used for normal operations of synchronization, charge and discharge.
- Transformers; An outdoor transformer for the two generators is used on site, a three phase transformer with a capacity of 24MVA and a primary nominal voltage of 13.8 and 44kV for the secondary, operated at 60 Hz.
- Mechanical auxiliary equipment; defined as the oil and cooling system.
- Electric auxiliary equipment; a diesel generator unit of 480 V and 60 Hz is described as part of the project activity.
- Francis turbines commissioned on site, with a total nameplate capacity of 33.48 MW (1 francis turbine for La Vuelta and 2 francis turbine for La Herradura).

As it is a renewal of the crediting period, appropriate operation and maintenance of the project activity is guarantee, due to the learning during this years; furthermore, training and updates to staff is current practice in the project activity.

The project is located in the northwest of Colombia, in the Department of Antioquia, under the municipality of Cañasgordas, Frontino and Abriaquí. The project activity is using the water resources from “La Herradura” river.

The physical location coordinates of the project activity are:

La Herradura powerhouse: + 6.8028° / - 76.0814°
 La Vuelta powerhouse: + 6.7304° / - 76.0883°
 Substation Chorodó: + 6.8483° / - 76.1379°

A comparison between the information included in the original registered PDD /1/, the revised PDD and the requesting renewal of crediting period PDD regarding the technology to be implemented (Turbine and Generator) is summarized below:

La Vuelta:

Input	PDD version 6 of 06/09/2006 /1/	Revised PDD Version 7, Dated on 12/02/2014 /2a/	PDD for renewal of crediting period (Version 15, dated on 16/06/2014) /2b/
Power plant characteristics			
Installed Capacity	11.7 MW /14/	12.4 MW /2/	12,400 kW /2/
Plant nominal flow	12 m ³ /s /15/	12 m ³ /s /15/	12.3 m ³ /s /15/
Net design head	112.90 m /15/	112.9 /15/	112.9 /15/

Hydraulic turbine	PDD version 6 of 06/09/2006 /1/	Revised PDD Version 7, Dated on 12/02/2014/2a/	PDD for renewal of crediting period (Version 15, dated on 16/06/2014) /2b/
Type	Francis, horizontal axis	Francis, horizontal axis	Francis, horizontal axis
Number of Units	1	1	1
Nominal power output	12.25 MW	12.4 MW	12, 400 kW
Rotation speed	514.28 min ⁻¹	514.28 min ⁻¹	870 min ⁻¹
Design net head	112.90 m /15/	112.90 m /15/	112.9 m
Generator			
Type	Synchronic with horizontal axis	Synchronic, horizontal axis	Synchronic, horizontal axis
Number of units	1	1	1
Nominal power output	14,000 kVA	14,000 kVA	14,000 kVA
Nominal tension	13.8 kV	13,800 V	13,800 V
Nominal frequency	60 Hz	60 Hz	60 Hz
Power factor (cosine ϕ)	0.85 (lagging)	0.85	0.85
Synchronic speed	514.28 min ⁻¹	514.3 rpm	514.3 rpm

La Herradura:

Input	PDD version 6 of 06/09/2006	Revised PDD Version 7, dated on 12/02/2014	PDD for renewal of crediting period (Version 15, dated on 16/06/2014) /2b/

Power plant characteristics			
Installed Capacity	19.8 MW /14/	21.08 MW /14/	21.08 MW /14/
Central nominal flow	10 m ³ /s /15/	10 m ³ /s /15/	10 m ³ /s /15/
Net design head	230.6 m /15/	230.6 m /15/	230.6 m /15/

Hydraulic turbine	PDD version 6 of 06/09/2006	Revised PDD Version 7, Dated on 12/02/2014	PDD for renewal of crediting period (Version 15, dated on 16/06/2014) /2b/
Type	Francis, horizontal axis	Francis, horizontal axis	Francis, horizontal axis
Number of Units	2	2	2
Nominal power output	19.08 MW	21.08 MW	10,540 kW (21,080 kW)
Rotation speed	900 min ⁻¹	900 min ⁻¹	900 rpm
Design net head	230.6 m /15/	230.6m	230.6 m
Generator			
Type	Synchronic with horizontal axis	Synchronic, horizontal axis	Synchronic, horizontal axis
Number of units	2	2	2
Nominal power output	12.0 MVA	12,000 kVA	12,000 kVA
Nominal tension	13.8 kV	13.8 kV	13,800 V
Nominal frequency	60 Hz	60 Hz	60 Hz
Power factor (cosine ϕ)	0.85 (in delay)	0.85(in delay)	0.85
Synchronic speed	900 min ⁻¹	900 min ⁻¹	900 rpm

Approval “to request for post-registration changes” took place on 20/05/2014 /40/, hence changes observed on site by the DOE during the site visit (27/06/2011 – 30/06/2011), are justified.

The crediting time for the renewal project has been defined as 7 years.

TÜV Rheinland considers that the project description as stated on the revised PDD is reliable and credible, and reflects the current implementation of the project activity.

Starting date of renewal of crediting period	Validity of project operational lifetime	Crediting period
01/01/2012	The lifetime of the project activity is 50 years according to engineering sources that define a life time of 50 to 100 years for a hydro project; moreover and as per the default values from the “Tool to determine the remaining lifetime of equipment”, the lifetime of hydro turbines is 150,000 hours (approx 17 years); hence lifetime of the project activity is justified /17/. Lifetime of project activity fulfills the requirements included in the “Tool to determine the remaining lifetime of equipment” /38/. Crediting time for the renewal project is 7 years.	7 years (second period)

Herewith, the Validation Team summarizes major changes between revised PDD and final version of renewal of the crediting period PDD for submission as follows:

Subject	Revised PDD /2a/	Renewal of Crediting Period PDD /2b/
PDD (project title / participants involved etc.)	<p>Title: La Vuelta and La Herradura Hydroelectric Project Version: 7 Dated on: 06 February 2014 Project Participants: Empresas Públicas de Medellín E.S.P. (private)- Colombia (Host) Electric Power development Co. Ltd. – Japan (Annex I) MGM Carbon Portfolio S.A.R.L.</p>	<p>Title: La Vuelta and La Herradura Hydroelectric Project Version: 15 Dated on: 16/06/2014 Project Participants: Empresas Públicas de Medellín E.S.P. (private)- Colombia (Host) Electric Power development Co. Ltd. – Japan (Annex I) MGM Carbon Portfolio S.A.R.L. was included as Project Participant.</p> <p>The validation team assesses the project title and the names of the project participants are consistent with the revised PDD, complying with paragraph 305 of the VVS, version 06.0.</p>
Methodologies and tools applied (scope and version numbers)	<p>ACM0002/Version 06 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” ;and “Tool for demonstration and assessment of additionality”- No version is included.</p>	<p>ACM0002 “Grid-connected electricity generation from renewable sources”, version 15.0.0 Also, next tools are included, as per methodology: “Tool to calculate the emission factor for an electricity system” version 4.0.0/20/ Assessment of the validity of the original/current and update of the baseline at the renewal of the crediting period” version 3.0.1/21/</p>
CER calculations (formula applied/ amount of emission reduction)	<p>The estimated emission reductions were obtained as follows: $ER_y (\text{ton CO}_2/\text{yr}) = BE_y (\text{tonCO}_2/\text{yr})$ Emission factor: calculated ex post for the first crediting period. Consider that neither project emissions nor leakage were considered for the project activity.</p> <p>Amount of CERS: From year 2005 to 2011: 68,795 ERs, per year.</p>	<p>CERs calculations are estimated as follows: $ER_y = BE_y = EG_{\text{facility},y} * EF_{\text{grid},CM,y}$ Emission factor: Calculated ex-ante, for the second crediting period. Amount of CERS: From year 2012 to 2018: 77,149 ERs, per year.</p>
Monitoring (parameters / frequency)	<ol style="list-style-type: none"> 1. Electricity generated by La Vuelta and la Herradura hydroelectric plants (EG) / Unit: MW / Recording frequency: hourly measurements and monthly recording. 2. Plant dispatch order of the grid / Unit: not included/ Recording frequency: yearly. 3. Identification of the power plants for the OM (n) / Unit: not included/ Recording frequency: 	<p>As per methodology ACM0002/ version 15.0.0 Parameter: $EG_{\text{facility},y}$ Unit: MWh/yr Description: Quantity of net electricity generation supplied by the project plant/unit to the grid in year y. Monitoring frequency: Continuous measurement and at least monthly recording.</p> <p>For the second crediting period, to the tool indicates that EF shall be calculated ex-ante, practice which is applied by project participants, hence monitoring of parameters of emission factor are not</p>

	<p>yearly.</p> <p>4. Identification of the power plants for the BM (n) / Unit: not included/ Recording frequency: yearly.</p> <p>5. Electricity generated by each power plant (n or m) of the Colombian SIN (GEN) / Unit: MWh/ Recording frequency: yearly.</p> <p>6. Specific consumption of power plant for the fuel I (SC_i) / Unit: tonne fuel/ MWh Recording frequency: yearly.</p> <p>7. Heat rate of power plant for the fuel I (SC_i); Unit: TJ/MWh; Recording frequency: yearly.</p> <p>8. Net calorific value of fuel I consumed in each power plant (NCV_i), Unit: TJ/ktonne fuel; recording frequency: yearly.</p> <p>9. Emission coefficient of each fuel i (COEF_i); unit: tCO₂ per ton or GJ, recording frequency: yearly.</p> <p>10. Quantity of fuel i consumed by each power plant (F_i); unit: tonne, recording frequency: yearly.</p> <p>11. Operating margin emission factor of the grid (EF_{OM}), Unit: tCO₂/MWh. recording frequency: yearly</p> <p>12. Build margin emission factor of the grid (EF_{BM}), Unit: tCO₂/MWh. recording frequency: yearly</p> <p>13. Emission factor of the grid (EF); unit: tCO₂/MWh; recording frequency: yearly.</p> <p>14. Electricity imports to the electricity system; unit: MWh; recording frequency: yearly.</p>	necessary.
Crediting period (type / start date and end date, number of	The registered PDD confirms that the renewal crediting period was chosen and this is the first crediting	The present crediting period is from 01/01/2012 to 31/12/2018 which accounts 7 years. The start date of the crediting period is the first

crediting years)	period. The previous crediting period was from 01/01/ 2005 to 31/12/2011.	date after the end of the previous crediting period.
Relevant National and/or sectoral policies which are affective later to the date of submission of project for registration	The baseline in the registered PDD was validated against all the available relevant national and/or sectorial policies /18/ by an early DOE validation team in accepting a conservative baseline for the project, before submission for registration with positive opinion.	No relevant national and/or sectoral policies have come in place since the project been submitted for registration. The baseline remains the same as registered PDD. The analysis method to ensure this information being authentic is detailed in the baseline section of this report. The validation team has thoroughly validated the evidences before confirming the positive opinion. Please refer to baseline, section 3.4.4 for further details.
<p>The Validation Team has carried out the validation process based on the Renewal of crediting period PDD and raised CARs/CLs against the project by issuing the validation protocol.</p> <p>With the updated information and corrections done on final Renewal of crediting period PDD,, the PP has addressed all the CARs /CLs that were raised by the Validation Team.</p> <p>It is concluded that the Validation Team has revised the project in line with the VVS (version 06.0), "Assessment of the validity of the original/current baseline and update of the baseline at renewal of the crediting period" tool (version 3.0.1) /21/ and all the evidence, corrections, justifications and updating done on the final PDD with respect to CARs /CLs raised are accepted and closed by the Validation Team, issuing the positive validation opinion for project approval.</p>		

TÜV Rheinland validation team considers the project description (baseline selection, emission reduction, and monitoring plan) of the project contained in the PDD to be complete and accurate. The PDD complies with the relevant methodology, tools, forms and guidance at the time of PDD submission for registration.

3.3.1 Renewal of crediting period consideration:

The renewal of crediting period was notified to the UNFCCC 270 to 180 days prior to the date of expiration of the current crediting period, complying with paragraph 248 of the PCP

Timeline	Milestone	Determination by the validation team
10/05/2011	Notification to the UNFCCC on the renewal of crediting period.	Email evidenced /19/ proves that the communication was done within 234 days. According to project participants, no acknowledgment of renewal from UNFCCC was received.

Evidence has been provided which confirms that the secretariat has been informed within 270 days prior to the expiration of the previous crediting period and thus prior notification to UNFCCC has been appropriately satisfied.

3.4 Baseline and Monitoring Methodology:

3.4.1 Applicability of the selected methodology to the project activity renewal of crediting period:

Approved baseline and monitoring methodology ACM0002 "Grid/connected electricity generation from renewable sources" (version 15.0.0) has been applied for the renewal of crediting period of this project activity. This version is applicable for the requests for approval for the renewal of crediting period from 01/06/2014 onwards.

Is the applied methodology for renewal of crediting period valid?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Yes, as confirmed in the web site, applied methodology and version are valid. /11/
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The validation team determined the applicability of as follows:

Applicability criteria of the methodology ACM0002, version 15.0.0	Criteria fulfilled	Determination by the validation team
This methodology is applicable to grid-connected renewable power generation project activities that: (a) install a new power plant;; (b) involve a capacity addition to (an) existing plant(s); (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s).	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	The project activity is a renewal crediting period of a project activity which installed a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant), hence point (a) of this condition is fulfilled.
The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit;	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	The project activity fulfills this methodological requirement; due to it is the installation of a run-of-river hydro power plant.
In the case of capacity additions, retrofits or replacements (except for wind, solar, wave or tidal power capacity addition) projects the existing plant/unit started commercial operation prior the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit or rehabilitation of the plat/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	The project activity consisted in the installation of a new hydro power plant; hence, criterion is not applicable.
<p>In case of hydro power plants, one of the following conditions must apply:</p> <p>(a)The project activity is implemented in an existing reservoir, with no change in the volume of reservoir; or</p> <p>(b)The project activity is implemented in an existing single or multiple reservoirs, where the volume of reservoir(s) is increased and the power density calculated using equation (3), is greater than 4 W/m²; or</p> <p>c) the project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m²; or</p> <p>(d)The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (3), is lower than or equal to 4 W/m², all of the following conditions shall apply:</p> <p>(i) The power density calculated using the total installed capacity of the integrated project, as per</p>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	The project activity is a run-or-river hydro project, hence no reservoir exist on site. Hence, this point is not applicable.

Applicability criteria of the methodology ACM0002, version 15.0.0	Criteria fulfilled	Determination by the validation team
<p>equation (4), is greater than 4 W/m²;</p> <p>(ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity;</p> <p>(iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m² shall be:</p> <p>a. Lower than or equal to 15 MW; and</p> <p>b. Less than 10 per cent of the total installed capacity of integrated hydro power project.</p>		
<p>In the case of integrated hydro power projects, project proponent shall:</p> <p>a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or</p> <p>b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.</p>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<p>The project activity is a run-or-river hydro project, hence no reservoir exist on site. Hence, this point is not applicable.</p>
<p>The methodology is not applicable to:</p> <ul style="list-style-type: none"> • Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; • Biomass fired power plants; 	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<p>The proposed project activity does not involve switching from fossil fuels to renewable energy sources, at the site of the project activity, biomass fired is not used neither.</p>
<p>In the case of retrofits, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario," is the continuation of the current situation that is to use the power generation equipment that was already</p>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<p>The project activity consisted in the installation of a new hydro power plant; hence, criterion is not applicable.</p>

Applicability criteria of the methodology ACM0002, version 15.0.0	Criteria fulfilled	Determination by the validation team
in use prior to the implementation of the project activity and undertaking business as usual maintenance..		
Applicability of the “Tool to calculate the emission factor for an electricity system”, /20/ The tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	The tool is applicable, due to the electricity system is not located partially or totally in an Annex I country.

The PDD for the renewal of crediting period has been revised as per methodology “Grid-connected electricity generation from renewable sources” (version 15.0) **Error! Reference source not found.**, The assessment of the project’s compliance with the applicability criteria of the methodology ACM0002 (version 15.0) as documented in the PDD part B, are evaluated in detail under the validation protocol in Appendix A to this report based on the initial version PDD submitted for the purpose of renewing crediting period **Error! Reference source not found.**

3.4.2 Baseline Identification and Emission Reductions:

As per the registered PDD –the methodology used was ACM0002 (version 6) and the baseline was identified as *“E.E.P.P.M would not have implemented any project and that the electricity delivered to the grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin”/22/* which was considered conservative and applicable at the time of registration of the project activity by UNFCCC.

As per the current applied methodology ACM0002 (version 15.0.0) for renewal of crediting period, the applied baseline validity is been assessed as per the tool “Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period” version 03.0.1/9/, assessed step-wise in following sub-section:

3.4.2.1 Assessment of Baseline Validity:

Step 1: Assess the validity of the current baseline for the next-crediting period:

The following assessment is carried out by the DOE validation team to assess the impact of national and/or sectoral policies and circumstances existing at the time of requesting renewal of the crediting period on the registered baseline GHG emissions, without reassessing the baseline scenario.

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies:

Are there any relevant mandatory national and/or sectoral policies for the project activity? Which have come into effect after the submission of project for validation or the submission of the previous request for renewal of the crediting period and are applicable at the time of requesting renewal of the crediting period?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	No, the validation team revised the current and applicable laws to the project activity in the host country: a) National constitution of Colombia /23/ b) Law 142 (Law of public services) /24/ c) Law 143 (Law of electricity services) /25/ d) Law 697 (Law of renewable energy) /26/
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<p>Does the present chosen baseline in the renewal crediting period PDD complies with the relevant mandatory national and/or sectoral policies.</p>	<p> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No </p>	<p>Yes, as the project is a new grid-connected power plant and the methodology ACM0002 version 15.0.0, prescribes the baseline scenario for the case that the project activity is the installation of a new grid-connected renewable power plant/unit:</p> <p><i>Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system”.</i></p> <p>Also, the validation team verified all relevant mandatory national and sectoral policies:</p> <ul style="list-style-type: none"> a. National constitution of Colombia /23/ b. Law 142 (Public services law) /24/ c. Law 143 (Electrical Law) /25/ d. Law 697 (Renewable energy)/26/ <p>Hence, it is conclude that the present chosen baseline in the renewal crediting period PDD complies with the relevant mandatory national and/or sectoral policies. Further assessment is done with step 1.2 under this section.</p>
<p>If «NO» above → are these national and/or sectoral policies enforced and commonly practiced in the region/country?</p>	<p> <input type="checkbox"/> Yes <input type="checkbox"/> No </p>	<p>This point is not applicable to the proposed project activity.</p>

Step 1.2: Assess the impact of circumstances:

Conditions to determine baseline emissions differ from the ones in the previous crediting period in the next points:

Expected amount of electricity to be released to the grid is based on the last three years of operations of the project activity. The registered PDD estimated the amount of electricity to be released to the grid based on the information of the first seven months of 2005, and then extrapolated to the entire year, as indicated in the registered PDD /1/. For this renewal of crediting period, the expected amount of electricity to be released to the grid per year is: 182,000 MWh which is based on the average taken from the last three years of operation from year 2008 to year 2010 and represents a more realistic output versus the estimated 166,656 MWh of the registered PDD.

Amount of electricity released to the grid during the first crediting period is summarized as follows:

Net Generation of the plants (MWh)			
Year	La Vuelta	La Herradura	Total
2005	57,250.20	114,703.18	171,953.37
2006	42,849.23	113,188.00	156,037.23
2007	50,497.54	124,066.335	174,563.87
2008	110,932.10	66,726.66	177,658.76
2009	61,927.07	127,361.67	189,288.74
*2010	64,642.00	116,683.00	181,325.00

*at the time of submission, 2010 verification status is “Awaiting issuance request”.

Grid Emission factor is determined ex-ante (as indicated in the registered PDD /1/), as per revalidation activity the ”Tool to Calculate the Emission Factor for an Electricity System” version 03.0.0 was applied /20/. Vintage years are 2008, 2009 and 2010 which are the information available at the revalidation site visit time . As indicated in the tool, the next six steps must be followed:

	PDD	DOE Conclusion.
Step 1: Identify the relevant electricity systems	The project electricity system is given as the interconnected national system, i.e. the national power grid of Colombia.	The DOE verified that the DNA of the Host Country has not published a delineation of the project electricity system and connected electricity systems. Hence the DOE validated the interconnected system of Colombia as the relevant electric system, verifying that the information included in the PDD is correct /28/.
Step 2: Choose whether to include off-grid power plants in the project electricity system Option 1	Off-grid power plants are not included in the project electricity system (Option 1).	Option 1 is chosen. The Option 1 indicates that only grid power plants are included in calculation, hence this assumption is accepted by the DOE.
Step 3: Select a method to determine the operating margin (OM)	Simple adjusted OM is used by PP ex-ante option.	Ex-ante option is chosen as per tool /21/ and methodological requirements /11/, hence assumption is correct. Simple adjusted factor is used because: a) Simple OM can not be used as low-cost/must-run resources are higher than 50% of total grid generation in the Host Country as average in the five most recent years. /27/ c) Dispatch data analysis OM shall be monitoring ex-post. d) The average OM emission factor is not used by PP, utilization is not mandatory by the tool, hence exclusion is correct. Hence, to utilize the option b) “Simple adjusted OM” is considered correct by the DOE.
Step 4: Calculate the operating	Simple adjusted OM is used. Ex-ante	Vintage data used for calculation belongs to the years 2008, 2009 and 2010/32//33//34/, which are the latest years previous to the site visit (2011). As indicated in the tool /20/: “The simple adjusted operating margin emission

margin emission factor according to the selected method.	calculation is set in 0.5546 tCO ₂ /MWh	<p><i>factor $EF_{grid,OM-adj,y}$ (tCO₂e/MWh) is a variation of the simple operating margin emission factor, where the power sources (including imports) are separated in low-cost/must-run power sources (k) and other power sources (j),»</i></p> <p>Equation used is :</p> $EF_{grid,OM-adj,y} = (1 - \lambda_y) \cdot \frac{\sum_m EG_{m,y} \cdot EF_{EL,m,y}}{\sum_m EG_{m,y}} + \lambda_y \cdot \frac{\sum_{i,j} EG_{k,y} \cdot EF_{EL,k,y}}{\sum_k EG_{k,y}}$ <p>Where:</p> <ul style="list-style-type: none"> λ_y = Factor expressing the percentage of time when low-cost/must-run power units are on the margin in year y $EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh) $EG_{k,y}$ = Net quantity of electricity generated and delivered to the grid by power unit k in year y (MWh) $EF_{EL,m,y}$ = CO₂ emission factor of power unit m in year y (tCO₂/MWh) $EF_{EL,k,y}$ = CO₂ emission factor of power unit k in year y (tCO₂/MWh) m = All grid power units serving the grid in year y except low-cost/must-run power units k = All low-cost/must run grid power units serving the grid in year y <p>The parameter λ_y is defined as follows:</p> $\lambda = \frac{\text{number of hours per year low - cost / must - run sources are on the margin}}{8760 \text{ hours per year}}$ <p>And λ_y is should be calculated as follows:</p> <p>Step (i) Plot a load duration curve: Collect chronological load data (typically in MW) for each hour of the year y, and sort the load data from the highest to the lowest MW level. Plot MW against 8760 hours in the year, in descending order.</p> <p>PP provided to the DOE an excel file /13/ on which, it is included three tabs named “lambda 08, lambda, 09 and lambda 2010”, on which this requirement is included. Data, is based on the information submitted by PP to verification from second (2008), third (2009) and fourth (2010) verifications; verifications from 2008 and 2009 are already issued /12/.</p> <p>Step (ii) Collect electricity generation data from each power plant/unit. Calculate the total annual generation (in MWh) from low-cost/must-run power plants/units (i.e. $\sum_k EG_{k,y}$)</p> <p>PP provided to the DOE an excel file /13/ on which, it is included a tab named OM cal. Details of every low-cost/must-run plants are included on it.</p> <p>Step (iii) Fill the load duration curve. Plot a horizontal line across the load duration curve such that the area under the curve (MW times hours) equals the total generation (in MWh) from low-cost/must-run power plants/units (i.e. $\sum_k EG_{k,y}$)</p> <p>This step correctly applied, as it can be observed on the excel file provided by PP, tab “lambda 08, lambda 09 and lambda 2010” /13/.</p>
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		<p>Step iv) Interjection is identified in the excel file, and are described as follows: lambda 2008: 0.3124, lambda 2009:0.0501 and lambda 2010: 0.0172</p> <p>The parameter $EF_{EL,m,y}$ is determined using the option A1 for plants with an installed capacity of at least 20 MW, hence the next equation is applied:</p> $EF_{EL,m,y} = \frac{\sum_i FC_{i,m,y} \cdot NCV_{i,y} \cdot EF_{CO2,i,y}}{EG_{m,y}}$ <p>Where:</p> <p>$FC_{i,m,y}$ = Amount of fossil fuel type i consumed by power unit m in year y (mass or volume unit)</p> <p>$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type i in year y (GJ/mass or volume unit)</p> <p>$EF_{CO2,i,y}$ = CO₂ emission factor of fossil fuel type i in year y (tCO₂/GJ)</p> <p>$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)</p> <p>In the host country, there are plants which capacity is below 20 MW, which do not report fuel consumption, in this case, the equation used is the next:</p> $EF_{EL,m,y} = \frac{EF_{CO2,i,y} \cdot 3.6}{\eta_{m,y}}$ <p>Where:</p> <p>$\eta_{m,y}$ = Average net energy conversion efficiency of power unit m in year y (ratio)</p> <p>Calculation method and sources were revised and identified to be correct.</p>
Step 5. Calculate the Built Margin Emission Factor	BM: Ex-ante calculation is set at 0.3804 tCO ₂ /MWh	<p>Built margin (BM) is updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE, hence information is from years 2008, 2009 and 2010 /32//33//34/.</p> <p>Calculation method and sources was revised and identified to be correct according to the information of the grid based in the Information Sistem of Energy and Mines /32//33//34/..</p>
Step 6. Calculate the Combined Margin (CM) emission factor	CM- Set ex ante at 0.4239 tCO ₂ /MWh	<p>Calculation method and sources was revised and identified to be correct, comparison with official sources cannot be performed, due to the EF of the proposed project activity is fixed ex-ante, while official source /27/ is updated annually and a different method to calculate it is used.</p> <p>Furthermore, It is important to clarify that Combined Factor Obtained from National Entity uses a w_{OM} and w_{BM} of 50%, while the project activity uses a w_{OM} =0.25 and w_{BM} =0.75 for the second crediting period, as indicated in the tool.</p>

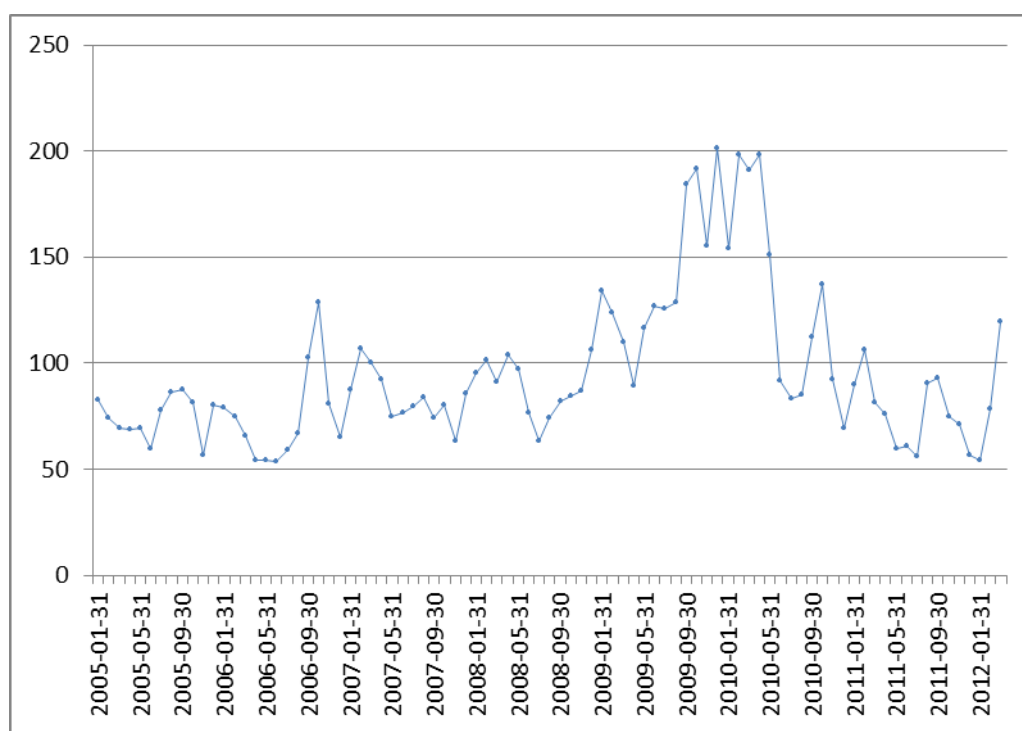
As indicated by Regulation 180947 of the Host Country /29/, Emission factor is calculated annually for the Ministry of Energy and Mines /30/. Two values are available at its web site:

BM 2008:0.3323 tCO₂/MWh OM₂₀₀₈: 0.2375 tCO₂/MWh
 Emission Factor of 2008 /31/: 0.2849 t CO₂/MWh

BM2009:0.2716 tCO₂/MWh OM₂₀₀₉: 0.3117tCO₂/MWh
 Emission Factor of 2009 /31/: 0.2917 tCO₂/MWh

It is important to clarify that Combined Factor Obtained from National Entity uses a w_{OM} and w_{BM} of 50%, while the project activity uses a w_{OM} =0.25 and w_{BM} =0.75 for the second crediting period, as indicated in the tool /20/.

The prices of electricity had a peak during 2009-2010, returning to values from 2005, as can be observed in the chart above:



Source- Information Sistem of Energy and Mines /33/ prices are given in Colombian Pesos.

Furthermore, fuels used in the installed capacity of the Colombian grid has not been significantly affected during the latest years:

	Installed Capacity (GW)					
	2005	2006	2007	2008	2009	2010
Biomass		0.003	0.003	0.003	0,0423	0.0423
Coal	0.69	0.7	0.7	0.7	0.7	0.7
Wind	0.01	0.02	0.02	0.02	0.02	0.02
Fuel Oil	002	0.02	0.02	0.02	0.01	0.01
Natural Gas	3.68	3.,59	3.68	3.74	3.76	3.93
Hydro	8.94	8.95	8.99	9.00	9.01	9.72

Source- Information Sistem of Energy and Mines /34/

The project activity was registered on 15/01/2007 and approval of request for post-registration changes of the PDD approved on 20/05/2014. At the time of renewal of crediting period the validation team has studied the market characteristics by way of reviewing evidence of the Information System of Energy and Mines /33//34/. The assessment has concluded that the current conditions remain same as in previous crediting period and thus the validation team confirms that the baseline identified at the time of PDD submission of registration is still valid.

Step 1.3: Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested:

During the site visit, it was confirmed that the equipment described in the registered PDD are still implemented on site. By interview with the project participants, it was confirmed that new investment – which represents acquisition of new equipment- is unlikely to happen due to an increased in the installed capacity is not attractive, because theoretical output of the hydroelectric plant has never been reached. Theoretical output can be set as 293,284 MWh for the turbine (i.e $33.48 \text{ MW} \times 24 \times 365 = 293,284 \text{ MWh/y}$); in the case of the generator, a power factor of 0.85 is used, hence; $32.3 \text{ MW} \times 24 \times 365 \times 0.85 = 282,948 \text{ MWh/y}$

The current baseline has been further revised, and that existing equipment remaining lifetime has been substantiated /17/ and validation team has accepted this as evidence that the equipment will continue to operate for the project activity. Without the project activity, the equipment would have still in operation, and is expected to have a technical lifetime of 17 years /38/. This is deemed acceptable by the validation team as this is in accordance to the Option (a)/(b) of the “Tool to determine the remaining lifetime of equipment” /38/. Therefore, the continuation of the use of current baseline equipment is also technically possible.

Step 1.4: Assessment of the validity of the data and parameters:

As explained in section 3.4.2.1, amount of expected electricity released to the grid was updated to a realistic figured based on the latest reported production.

Grid emission factor was updated, as per tool requirements, to an ex-ante fixed value, which will be applied for the second crediting period.

Fixed and monitoring parameters are still valid, however, value and adscription were updated. Furthermore, information contained for each parameter is described in more detail, as per technical information of the equipment installed on site.

These parameters are properly described in the following section 3.6.

Conclusion of Step 1:

The validation team confirms that the baseline in the revised PDD is valid in accordance with the approved baseline and monitoring methodology ACM0002 “Grid/connected electricity generation from renewable sources” (Version 15.0.0) **Error! Reference source not found..** The data and parameters determined at the submission of registration are still valid for the renewal of crediting period.

Step 2: Update the current baseline and the data and parameters:**Step 2.1 Update the current baseline:**

Baseline has been updated in two points, amount of expected electricity to be released to the grid and Emission Factor.

All the assumption and data used by the project participants are listed in the PDD and/or supporting documents. All documentation relevant for establishing the baseline scenario and correctly quoted and interpreted in the PDD. Assumptions and data used in the identification of the baseline scenario are

justified appropriately, supported by evidence and can be deemed reasonable. Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD.

Step 2.2 Update the data and parameters:

As explained, data of electricity released by the project activity to the grid has been updated as taking into account monitoring data produced in the latest year of operation, hence the update of electricity exported quantity to the grid is correct.

Furthermore, as per the “Tool to calculate the emission factor for an electricity system”, /21/, CEF shall be updated, and an ex-ante value must be determined, procedure and value obtained by project participants is correct.

Ex-ante emission factor was updated to latest information as per “Tool to calculate the emission factor for an electricity system” /21/, technical specifications and description of monitoring parameters were updated as per information of equipment commissioning on site.

3.4.4 Conclusion of assessment of Baseline validity:

The DOE assess that baseline applied in the updated PDD is reliable and credible, assumptions, formulae and calculations are correctly applied as per approved methodology /11/ and associated tool /20/.

3.5 Validity of monitoring plan

The validation team therefore concludes that the current baseline is still valid and that there is no change to the parameters that were determined in the initial crediting period.

GHG Emission Reductions:

As per applied methodology /11/, Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

Where:

ER_y Emission reductions in year y (tCO₂e/yr)

BE_y Baseline emissions in year y (tCO₂e/yr)

PE_y Project emissions in year y (tCO₂e/yr)

Furthermore, BE_y is defined as:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$$

$$EG_{PJ,y} = EG_{facility,y}$$

Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr). This project activity belongs to the greenfield renewable energy power plants –when the project was implemented- hence this parameter is identified as EG_{facility,y}.

$$EF_{grid,CM,y}$$

Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (tCO₂/MWh).

The expected amount of electricity to be released to the grid is based on the last three years of operations of the project activity. The registered PDD estimated the amount of electricity to be released to the grid based on the information of the first seven months of 2005, and then extrapolated to the entire year, as indicated in the registered PDD /1/. For this renewal of crediting period, the expected amount of electricity to be released to the

grid per year is: 182,000 MWh, which is based on the average taken from the last three years of operation from years 2008 to 2010) and represents a more realistic output versus the estimated 166,656 MWh of the registered PDD.

CEF was updated as per the “Tool to calculate the emission factor for an electricity system” version 2.2.1, explained in Step 1.2; CEF shall be updated and fixed during the second crediting period, also weight factors are set at $w_{OM} = 0.25$ and $w_{BM} = 0.75$. CEF for the current project activity was set ex-ante, its value is 0.4239 tCO₂/MWh

In summary, the calculation of emission reductions was correctly and conservatively demonstrated by the PP according to the methodology ACM0002 (version 15.0.0) and its tool “Tool to calculate the emission factor for an electricity system”, version 3.0.0. All values used in the PDD are considered reasonable and conservative in the context of the renewal of crediting period of the CDM project activity. The baseline methodology has been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions. All estimates of the baseline, project and leakage emissions can be replicated using the data and parameter values provided in the PDD.

The project monitoring plan is in compliance with the monitoring methodology ACM0002 (version 15.0.0).

3.5.1 Parameters determined ex-ante

The following data and parameters are available during the validation and will remain fixed ex-ante throughout the entire crediting period:

15.0.0

Sl. No.	Parameters	Description
1	EF _{grid,CM,y}	<p>Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (version 2.2.1).</p> <p>As per tool, parameter shall be updated and fixed ex-ante, calculated value is: 0.4239 tCO₂/MWh</p>

The validation team confirms that all relevant parameters have been sufficiently considered and the values of the parameters are real, measureable and conservative.

3.5.2 Parameters determined ex-post

The following parameters will be monitored throughout the crediting period:

Sl. No.	Parameters	Description
1	EG _{facility,y}	<p>Quantity of net electricity generation supplied by the project plant/unit to the grid in year y.</p> <p>Expected electricity released to the grid is based on the last three years of operation and is 182,000 MWh, which represents a realistic value.</p> <p>By directional electricity meters are used on site, characteristics of the meters were confirmed by the validation team and are summarized as follows:</p> <ul style="list-style-type: none"> La vuelta: <p>Main Meter: Serial number: 36099685 Type: SL761A061</p>

		<p>Class: 0.2S Calibration frequency: 2 years</p> <p>Back up Meter: Serial number: 36099687 Type: SL761A061 Class: 0.2S Calibration frequency: 2 years</p> <p>La Herradura:</p> <p>Main Meter: Serial number: 36099681 Type: SL761A061 Class: 0.2S Calibration frequency: 2 years</p> <p>Back up Meter: Serial number: 36099684 Type: SL761A061 Class: 0.2S Calibration frequency: 2 years</p> <p>The validation team confirms, that readings from meters are monitored and recording remotely utilizing a data management system supported by the software MV-90xi /35/.</p> <p>Finally, as per internal procedures developed by project participants based on in the NOM NTC-ISO-IEC 17025 /36/, calibration of electricity meters shall be done every two years. Since no regulation was identified.</p>
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In summary, the validation team is convinced of the compliance of the monitoring plan with the requirements of the approved baseline and monitoring methodology ACM0002 “Grid/connected electricity generation from renewable sources” (version 15.0.0) **Error! Reference source not found..** During the on-site assessment, the validation team interviewed the PP confirming that the monitoring arrangements described in the monitoring plan are feasible within the project design. The emission reductions resulting from the proposed CDM project activity can be reported ex post and be verified.

3.6 Management system and quality assurance

For the second crediting period, emission factor was determined ex-ante and will remain fixed, hence the only monitoring parameter is $EG_{\text{facility},y}$, the amount of electricity released to the grid by the proposed project activity.

Electricity is measured by bi-directional meters located at the substation of “Chorodó”, Each site has two bidirectional meters: a main one and a backup, readings from back up meters are used in case of failures of the main meter.

Staff from EPM is responsible to take measurements at the meters and compare them with the information recorded by the SCADA system, in case of any difference, corrective actions shall be done. Also, and supported by *MV-90xi* software, information is downloaded from SCADA system and uploaded to a data base which belongs to the Colombian Wholesale Market named “Large Energy Consumers- Grandes Clientes de Energía”, once this action is done, a report is released and it is submitted to Electricity Market Administrator “XM”, which assigns two codes (one per site) as follows: EVLT1001 LA VUELTA and EHRD1001 LA HERRADURA. Finally, this information is used by project participants to calculate the amount of emission reductions to be claimed.

- Roles and responsibilities:

CDM coordinators are in charge of monitoring, supervise and store all information used to calculate the amount of emissions reductions to be claimed. Monitoring reports and excel files to present to verifications are prepared by CDM coordinators.

The plant manager is responsible for verify and control the information downloaded by the instrumentation and control engineer.

Finally, instrumentation and control engineers are responsible of download the information from meters and maintain them under excellent conditions.

Appendix A

Renewal of the crediting period Validation Protocol

La Vuelta and La Herradura Hydroelectric Project

Report No. 01 997 9105064686

Table 1: Validation requirements

(based on § 49 (a) of the CDM Modalities and Procedures and on CDM Validation and Verification Standard version 6.0)

Checklist question	Ref.	MoV1	Findings, comments, references, data sources	Draft conclusion	Final conclusion
1. Approval (VVS 11 Section 7.7.2 and 11.1)					
1.1 Is there any change of project participants from those of the registered PDD? If so have Letters of Approval been obtained?	/4/	DR, www	No, no changes of project participants are included for this renewal of crediting period.	O.K.	O.K.
1.2 Are the modalities of communication updated including the approval of all the parties?	/5/	DR	Please refer to CL 1	CL 1	O.K.
1.9 As the Project Participant notified the EB regarding the renewal of the crediting period within 270 to 180 days prior to the date of expiration of current crediting period? (Para 242 of CDM project cycle)	/19/	DR	Yes, notification was submitted by PP to EB with the expected time.	O.K.	O.K.
2. Project Design Document (VVS Section 7.11)					

¹ MoV = Means of Validation, DR = Document Review, I = Interview, www = internet search.

2.1 Is the PDD presented for validation based on the latest template available at the UNFCCC website?	/2/10/	DR	<p>Yes, the validation is based on the latest template available at the UNFCCC website. Nevertheless, please refer to the following:</p> <p>CAR 2 However, the format dates stated in the PDD shall be presented as per Guidelines form completing PDD. Furthermore, please revise the version of the PDD.</p> <p>CAR 3 The geographic coordinates shall presented as per UNFCCC format, in the decimal format with +/- sign only and should have a precision of 4 (four) decimals.</p> <p>CAR 4 In accordance with the Guidelines for completing PDD, the section B.8 of the PDD shall address if the person/entity is also a project participant listed in Annex 1.</p>	CAR 2 CAR 3 CAR 4	O.K.
2.2 Has the PDD been established in accordance with the CDM requirements for completing PDDs issued by the CDM EB?	/2/10/	DR	Yes, the PDD has been established in accordance with CD requirements.	O.K.	O.K.
3. Project Implementation (PS Section 12.9)					
<p>3.1 Does the PDD contain a description, which provides the reader with a clear understanding of the precise nature of the project activity and the technical aspects of its implementation?</p> <p>3.1b) Is the description (incl. any process flow-charts, Spreadsheets etc.) complete, coherent and consistent with the provisions of the monitoring plan?</p>	/2/	DR	<p>CL 5 The PDD in Page 2 states "The plants have a total installed capacity of 31.5 MW". However, during the on/site visit was observed that the nominal power output of the La Vuelta project is 12.400 MW and for La Herradura sub-project is 10.540 MW x 2 therefore the nominal capacity for the project is the 33.48 MW, as per Paragraph 196 of VVM (v1.2) requires that a notification or request for approval of changes from the project activity as described in the registered PDD shall be submitted, a clarification is required from the PP due to these changes against the registered PDD.</p>	CL 5	O.K.

3.2 Is the project PDD consistent with the description of the project activity in the registered PDD?	/2/	DR	Yes, project is as per description of the PDD.	O.K.	O.K.
3.3 How was the design of the project assessed?	/2/	DR SV	Designed of the project was assessed by physical inspection.	O.K.	O.K.
3.4 Does the technical lifetime of the equipment's exceed the crediting period for which renewal is requested?	/2/	DR	Yes, lifetime of equipment's exceed the crediting period for which renewal was requested.	O.K.	O.K.
4. Baseline and Monitoring methodology(VVS Section 7.12)					
4.1 General requirements (VVS Section 7.12.1)					
4.1.1 Is the methodology used in the project activity approved by the CDM EB and is the selected version still valid?	/2/11/	DR www	Yes, methodology applied is approved and still valid.	O.K.	O.K.
4.1.2 If the methodology applied in the registered PDD was withdrawn after registration of the project activity and replaced by a consolidated methodology, how is the new applicable methodology selected?	/2/11/	DR www	Yes, methodology applied is approved and still valid.	O.K.	O.K.
4.2 Applicability of the selected methodology (VVS Section 7.12.2)					
4.2.1 How was it validated that the project complies with the applicability criteria set out in the methodology	/2/11/	DR	The applicability was verified by confirming the conditions included in the methodology by cross checking conditions included on site, please refer to section 3.4.1	O.K	O.K
4.2.3 Are all applicability conditions of the selected baseline and monitoring methodology and all tools involved satisfied by the project activity?	/2/11/	DR	The applicability has been discussed in the PDD. CAR 6 Nevertheless, the tool applied to calculate the emission factor shall be updated to the latest version 2.2.0, as per EB 61 annex 12. Furthermore, please include in section B.2 the tool applicability	CAR-6	O.K.
4.2.4 Is the selection of the applied baseline and monitoring methodology justified?	/2/11/	DR	Yes, the selection of the baseline and methodology is justified in the PDD.	O.K.	O.K.

4.2.5 Is the selected methodology and all relevant tools applied and quoted correctly in all related documents?	/2/11/	DR	Yes, the selected methodology is correctly quoted.	CAR-13	O.K.
4.2.6 Does the PDD sufficiently describe all the GHG emission sources or sinks occurring as a result of project activity, which have not been accounted for under the selected methodology and are expected to contribute more than 1% of the overall expected average annual emission reductions?	/2/11/	DR	Yes, all the GHG emission sources have been clearly described in the PDD.	O.K.	O.K.
Project Boundary (VVS Section 7.12.5)					
4.3.1 Does the PDD correctly describe the project boundary? Are they clearly defined and in accordance with the methodology?	/1/	DR	Yes, project boundary is as per former registered PDD and available methodology.	O.K	O.K
4.3.2 Does the PDD correctly indicate and describe the emission sources and sinks of GHG gases that are included in the project boundary?	Error! Reference source not found.	DR	Yes, project boundary is as per former registered PDD and available methodology.	O.K	O.K
4.3.3 In cases where the methodology allows project participants to choose whether a source or gas is to be included in the project boundary, is the choice explained and justified by PPs?	Error! Reference source not found.	DR	Methodology does not allowed to choose the source of gases to be included. Gas included is as per methodology.	O.K	O.K
4.3.4 Does the project involve other emissions sources not foreseen by the methodologies that may question the applicability of the methodology? Do these sources contribute with more than 1% of the estimated emission reductions of the project?	Error! Reference source not found.	DR	No other emission sources are included in the project activity.	O.K	O.K
5.4 Baseline validity (VVS Section 11.1)					
5.1 Assessment of the validity of the original/current baseline and update of the baseline at the renewal of crediting period					
5.1.1 Step 1: Assess the validity of the current baseline for the next crediting period:					

5.1.1.1 <u>Step 1.1 Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies</u>	/23/24/25/26/	DR	<p>The baseline scenario is in compliance with the registered PDD for the first crediting period, and is consistent with the methodology version 12.1.</p> <p>The original/current baseline was the electricity delivered to the grid by the project that would otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the “tool to calculate the emission factor for an electricity system.</p> <p>CAR 7 Link sources shall be addressed in the section B4 of the PDD.</p>	CAR-7	O.K.
5.1.1.2 <u>Step 1.2 Assess the impact of circumstances</u> Evaluate whether the conditions used to determine the baseline emissions in the previous crediting period are still valid, if there are changes in market characteristics for renewal of crediting period.	Error! Reference source not found.	DR	<p>Conditions of the market have not considerable changed, please refer to section 3.4.2.1 Assessment of baseline Validity; step 1.2</p>	O.K.	O.K.
5.1.1.3 <u>Step 1.3 Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested.</u> For equipment(s) that have been replaced due to the project activity, assess the remaining lifetime of the equipment to accept the renewal of crediting period.	Error! Reference source not found.	DR	<p>The Project activity is operating with the same equipment as current installed since the beginning of operation.</p>	OK	OK

5.1.1.4 <u>Step 1.4 Assessment of the validity of the data and parameters</u>	Error! Reference source not found.	DR	Parameters are valid for the second commitment period, EF was updated as per tool requirements.	OK	OK
5.1.2 Step 2: Update the current baseline and the data and parameters					
This step is only applicable if any of the Steps in 1.1, 1.2, 1.3 and/or 1.4 showed that the current baseline needs to be updated.	/2/	DR	Not applicable	OK	OK
5.1.2.1 <u>Step 2.1: Update the current baseline</u>	Error! Reference source not found.	DR	Not Applicable	OK	OK
5.1.2.2 <u>Step 2.2 Update the data and parameters</u>	Error! Reference source not found.	DR	Not Applicable	OK	OK
5.1.3 Conclusion					
5.1.3.1 What is the conclusion of this assessment?	Error! Reference source not found.	DR	Baseline is applicable to the second commitment period. Please refer to section 3.2 to further details.	OK	OK
5.5 Algorithm and/or formulae used to determine emission reductions					
5.5.1 Are all calculations applied and documented according to the selected methodology and in a complete and transparent manner to calculate emission reductions from the project activity?	/2/11/	DR	Yes, calculations are done as per selected methodology.	O.K.	O.K.
5.5.2 In case the methodology allows a selection between different options for equations or parameters, has adequate justification been given and have the correct equations and parameters been used, in accordance with the methodology selected?	/2/11/	DR	No, applied methodology does not allow selection of different options for equations.	O.K.	O.K.

5.5.3 In case some data and parameters will not be monitored throughout the crediting period, but have already been determined and fixed, are all data sources, assumptions and calculations correct, applicable to the proposed renewal of crediting period of the project activity ? Valid and conservative?	/2/	DR	The tool applied to calculate the emission factor shall be updated to the latest version 2.2.0, as per EB 61 annex 12. Furthermore, please include in section B.2 the tool applicability	CAR-6	O.K.
5.5.4 Have the major risks and uncertainties, which can influence the emission reduction estimates, been identified and addressed in the PDD?	/2/	DR	Yes, major risks are related measurements of electricity. Calibration of instruments and QA/QC management plan guarantee a correct measurement of monitoring parameters.	O.K.	O.K.
5.5.5 Are the calculations documented according to the approved methodology and in a complete and transparent manner in calculating the project emissions? Have conservative assumptions been used when calculating the project emissions?	/2/	DR	Yes, calculations are done in a complete and transparent manner, however please refer to CAR 13 incise 7.	CAR-13	O.K.
5.5.6 Are uncertainties in the project emission estimates properly addressed?	/2/	DR	Yes, uncertainties are address by the inclusion of an electricity meter with a defined accuracy.	O.K.	O.K.
5.2.7 Does any of the parameters require the use of sampling? If yes – how the sampling is been carried out	/2/	DR	No, in the case of the proposed project activity, no sample is necessary.	OK	OK
5.6 Leakage					
5.6.1 Has the leakage been identified and calculated according to the approved methodology?	/2/11/	DR	Leakage is not considered under the applied methodology.	O.K.	O.K.
5.6.2 Have the leakage been addressed in complete, conservative and substantiated manner?	/2/11/	DR	Leakage is not considered under the applied methodology.	O.K.	O.K.
5.6.3 Are uncertainties in the leakage emission estimates properly addressed?	/2/11/	DR	Leakage is not considered under the applied methodology.	O.K.	O.K.
6. Methodology-related issues for afforestation or reforestation CDM project activities					
Not applicable for this CDM project activity		DR	Not applicable for this CDM project activity	O.K.	O.K.

7. Monitoring plan (VVS 11)						
7.1	Is the monitoring plan documented according to the approved methodology and in a complete and transparent manner?	/2/11/	DR	<p>CAR 8 As per guidelines for completing the PDD the following information shall be addressed in the section B.7.1</p> <ul style="list-style-type: none">• Where data or parameters are supposed to be measured.• How the measurement is undertaken, which calibration procedures are applied, what is the accuracy of the measurement method, who is the responsible person/entity that should undertake the measurements and what is the measurement interval. <p>Relevant further background documentation shall be addressed in Annex 4.</p>	OK	O.K.
7.2	Are all parameters required by the selected approved methodology or tool identified, updated and listed in the PDD?	/2/11/	DR	<p>CAR 8 As per guidelines for completing the PDD the following information shall be addressed in the section B.7.1</p> <ul style="list-style-type: none">• Where data or parameters are supposed to be measured.• How the measurement is undertaken, which calibration procedures are applied, what is the accuracy of the measurement method, who is the responsible person/entity that should undertake the measurements and what is the measurement interval. <p>Relevant further background documentation shall be addressed in Annex 4.</p>	CAR 8	O.K.

<p>7.3 Are the parameters in the PDD clearly described and that the measurement method clearly stated for each value to be monitored and deem appropriate.</p>			<p>CAR 8 As per guidelines for completing the PDD the following information shall be addressed in the section B.7.1</p> <ul style="list-style-type: none"> • Where data or parameters are supposed to be measured. • How the measurement is undertaken, which calibration procedures are applied, what is the accuracy of the measurement method, who is the responsible person/entity that should undertake the measurements and what is the measurement interval. <p>Relevant further background documentation shall be addressed in Annex 4.</p>	<p>CAR-8</p>	<p>OK</p>
<p>7.4 Does the monitoring plan record data in the original form as generated, providing QA/QC procedures to be used on the measurement method?</p>	<p>/2/11/</p>	<p>DR</p>	<p>CAR 9 The PP shall ensure that the following procedures are being submitted in the monitoring plan.</p> <ul style="list-style-type: none"> a) How information is obtained, processed and revised b) How information will be stored c) QA/QC measures d) How to deal with erroneous measures and identified corrective actions e) How to deal with emergencies in case of failure of the meter or other unexpected situations? f) Values to be undertaken in case data is 	<p>CAR-9</p>	<p>O.K.</p>

			missing		
<p>7.5 Is the measurement method clearly stated for each value to be monitored and deemed appropriate?</p> <p>Are the locations of all measurement equipment clearly identified and consistently described, including process flow charts in the PDD?</p>	/2/11/	DR	<p>CAR 8 As per guidelines for completing the PDD the following information shall be addressed in the section B.7.1</p> <ul style="list-style-type: none"> Where data or parameters are supposed to be measured. How the measurement is undertaken, which calibration procedures are applied, what is the accuracy of the measurement method, who is the responsible person/entity that should undertake the measurements and what is the measurement interval. <p>Relevant further background documentation shall be addressed in Annex 4.</p>		
<p>7.6 Are values of the ex-ante parameters / monitoring parameters selected and updated correctly and conservative in accordance to methodology or tools or the renewal crediting period tool?</p>	/2/11/	DR	<p>For both the operating margin and the build margin have been calculated with the ex-ante option in accordance with the tool to calculate the emission factor for an electricity system.</p>	O.K.	O.K.

<p>7.6 Is the measurement accuracy addressed and deemed appropriate? Are the sampling, measurement methods and procedures defined?</p>	/2/11/	DR	<p>CAR 8 As per guidelines for completing the PDD the following information shall be addressed in the section B.7.1</p> <ul style="list-style-type: none"> • Where data or parameters are supposed to be measured. • How the measurement is undertaken, which calibration procedures are applied, what is the accuracy of the measurement method, who is the responsible person/entity that should undertake the measurements and what is the measurement interval. <p>Relevant further background documentation shall be addressed in Annex 4.</p>	CAR 8	O.K.
<p>7.7 Is the frequency of measurement identified and deemed appropriate?</p>	/2/11/	DR	<p>CAR 8 As per guidelines for completing the PDD the following information shall be addressed in the section B.7.1</p> <ul style="list-style-type: none"> • Where data or parameters are supposed to be measured. • How the measurement is undertaken, which calibration procedures are applied, what is the accuracy of the measurement method, who is the responsible person/entity that should undertake the measurements and what is the measurement interval. <p>Relevant further background documentation shall be addressed in Annex 4.</p>	O.K.	O.K.

7.8	Is the monitoring plan documented according to the approved methodology and in a complete and transparent manner?	Error! Reference source not found.	DR	Yes, it is documented according to the approved methodology and is complete and transparent, as has been demonstrated during the latest verifications and issuance	OK	OK
7.9	Are the sampling, measurement methods and procedures defined?	Error! Reference source not found.	DR	No sampling is necessary for the project activity.	OK	OK
7.10	Are procedures identified for maintenance of monitoring equipment and installations?	Error! Reference source not found.	DR	Yes procedures for maintenance for monitoring equipment and facilities are clearly identified and applied.	OK	OK
7.11	Are the equipment calibration intervals identified and justified? Is the calibration conducted by accredited person or intuition?	Error! Reference source not found.	DR	Calibration is in line with internal procedures, based on NOM NTC-ISO-IEC 17025 /36/,	OK	OK
7.12	Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)?	Error! Reference source not found.	DR	Yes, as measurement instruments are electronic	OK	OK
7.13	Are the monitoring arrangements described in the monitoring plan feasible within the project design?	Error! Reference source not found.	DR	Yes, monitoring arrangements are in line with the monitoring plan		

7.14 Are the means of implementation of the monitoring plan, including the data management and quality assurance and quality control procedures, sufficient to ensure that the emission reductions achieved by / resulting from the project activity can be reported ex post and verified?	/2/	DR	<p>CAR 8 As per guidelines for completing the PDD the following information shall be addressed in the section B.7.1</p> <ul style="list-style-type: none"> Where data or parameters are supposed to be measured. How the measurement is undertaken, which calibration procedures are applied, what is the accuracy of the measurement method, who is the responsible person/entity that should undertake the measurements and what is the measurement interval. <p>Relevant further background documentation shall be addressed in Annex 4.</p>	CAR 11	O.K.
7.20 Is the monitoring parameters for all project emissions captured?	/2/11/	DR	<p>CAR 8 As per guidelines for completing the PDD the following information shall be addressed in the section B.7.1</p> <ul style="list-style-type: none"> Where data or parameters are supposed to be measured. How the measurement is undertaken, which calibration procedures are applied, what is the accuracy of the measurement method, who is the responsible person/entity that should undertake the measurements and what is the measurement interval. <p>Relevant further background documentation shall be addressed in Annex 4.</p>	O.K.	O.K.

7.21 Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later?	Error! Reference source not found.	DR	Yes, all monitored data required for verification and issuance is kept for two years after the end of the crediting period.	OK	OK
7.22 Are the data management and quality assurance and quality control procedures sufficient to ensure that the emission reductions achieved by/resulting from the project can be reported ex post and verified?	Error! Reference source not found.	DR	Yes, as has been demonstrated during the latest successful issuance.	OK	OK
7.23 Is operational and management structure in place to implement the monitoring plan?	Error! Reference source not found.	DR	Yes, operational management and structure is in place to implement the monitoring plan. Currently, the monitoring plan has been already implemented.	OK	OK

Table 2: List of Requests for Corrective Action (CAR) and Clarification (CL)

Validation / Verification Standard

(25) The DOE shall raise a corrective action request (CAR) if one of the following occurs:

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

(26) The DOE shall raise a clarification request (CL) if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

The wording of CAR/CL shall clearly address nonconformity or seek clarification, and avoid instructive / consultative language in order to prevent actual or perceived consultancy.

No.	CAR/CL	Observation (CAR/CL)	Reference	Summary of project owner response	Validation team conclusion
1	X	CL 1 The PP shall clarify whether the update of the MoC is required; in this case the Procedures for Modalities of communication EB 45 annex 59 shall be followed accordingly.	/5/	No update of the MoC is required. The PPs and the modalities of communication will remain the same.	As per indicated by the PP the MoC will not requires any update. Hence the clarification can be considered closed by the audit team.
2	X	CAR 2 The format dates stated in the PDD shall be presented as per Guidelines form completing PDD (DD/MM/YYYY). Furthermore, please revise the version of the PDD.	/2/	The registered version for the first crediting period was no.6. Therefore the new PDD actually should have been version 7. Since new adjustments are made in accordance with the DVR, the new PDD submitted with this protocol is version 8.	The format date has been corrected in the latest version of the PDD dated 26/08/2011. Hence the CAR can be considered closed by the audit team.
3	X	CAR 3 The geographic coordinates shall presented as per UNFCCC format, in the decimal format with +/- sign only and should have a precision of 4 (four) decimals.	/2/	Corrected in the PDD. Further request from the DOE: The location of hydroelectric project could not be located through the google earth software. The PP shall clarify the specific location where geographic coordinates were taken, e.g. whether these come from to the power house?, a clarification is required by the PP. Included in the PDD.	Geographic coordinates are presented, in the last version of the PDD, with 4 (four) decimal. Coordinated were cross checked with the google earth software. Hence the CAR can be considered closed by the audit team.

					<p>Further request from the DOE:</p> <p>The geographic coordinates shall presented as per UNFCCC format, in the decimal format with +/- sign only and should have a precision of 4 (four) decimals, thus PDD shall be corrected accordingly.</p> <p>MGM: Corrected in the PDD</p>	
4	X		<p>CAR 4 In accordance with the Guidelines for completing PDD, the section B.8 of the PDD shall address if the person/entity is also a project participant listed in Annex 1.</p>	/2/	Corrected in the PDD.	Person/ entity have been identified as per guidelines. Hence the CAR can be considered closed by the audit team
5		X	<p>CL 5 The PDD in Page 2 states "The plants have a total installed capacity of 31.5 MW". However, during the on/site visit was observed that the nominal power output of the La Vuelta project is 12.400 MW and for La Herradura sub-project is 10.540 MW x 2 therefore the nominal capacity for the project is the 33.48 MW, as per Paragraph 196 of VVM (v1.2) requires that a notification or request for approval of changes from the project activity as described in the registered PDD shall be submitted, a clarification is required from the PP due to these changes against the registered PDD.</p>	/2/5/6/ /7/8/9/	<p>The capacity observed during the site visit is the nameplate capacity of the turbines, which refers to the nominal capacity at the specific site conditions. In the previous PDD, the nameplate capacity was not used, but the nominal capacity at laboratory conditions (12.25 MW and 2x10.4 MW). The total installed capacity of 31.5 MW refers to the capacity of the power plant (not the capacity of the turbines), i.e. at the alternator after power losses.</p> <p>In the new PDD we include the nameplate capacity instead of the capacity at lab conditions in order to avoid further confusion.</p> <p>This issue has also been addressed in</p>	<p>As can be observed, there is a difference between the installed capacity of the Hydraulic turbine declared in the PDD and the one observed on site and declared in the updated version of the PDD, however, and as per point 4of the Appendix 1 "Changes that do not require prior approval by the Board":</p> <p>1.Changes to the project designed of a registered project activity.</p> <p>6. Proposed or actual changes to the project design of a registered CDM project activity that do not adversely impact any of the following</p>

				<p>the past monitoring reports:</p> <p>“The difference between reported operative data and design data is because turbines manufacturers put in the nameplates the information at laboratory conditions where the equipment is calibrated. At operative level data are adjusted to the environmental conditions of the place where the generation plants are to be installed.”</p> <p><u>Further request from the DOE:</u></p> <p>a) As per relevant clarifications from the UNFCCC and the methodology is clearly stated that the maximum or rated/installed capacity can be determined (in the order of preference)1:</p> <p>1. Nameplate/rated capacity of turbine i.e., based on turbine manufacturer’s specification;</p> <p>or</p> <p>2. Generator capacity in MW (which is an appropriate equivalent of name plate/rated capacity in MVA times name plate/rated power factor, specified by the manufacturer.</p> <p>Installed power generation capacity (or installed capacity or nameplate capacity): The installed power generation capacity of a power unit is the capacity, expressed in Watts or one of its multiples, for which the power unit has been designed to operate at</p>	<p>do not require prior approval by the Board:</p> <p>(a) The applicability and application of the applied methodology under which the project activity has been registered;</p> <p>(b) The additionality of the project activity;</p> <p>(c) The scale of the project activity.</p> <p>PP demonstrates that any of the points included above is changed due to the nameplate’s issue, hence this point is considered closed.</p> <p style="text-align: center;">This CAR is Closed.</p>
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				<p>nominal conditions. The installed power generation capacity of a power plant is the sum of the installed power generation capacities of its power units.</p> <p>These criteria are not applicable for the capacity presented in the registered PDD of the first crediting period. The methodology ACM0002 applied was version 06, which did not have any clear definition of capacity to be included. As already explained, the capacity in that first PDD was based on manufacturer's specification for laboratory conditions, while the nameplate observed onsite corresponds to the conditions onsite, which can have a small differences for the turbine capacity.</p> <p><u>Further request from the DOE 2:</u></p> <p>As per procedure renewal of crediting period of a registered CDM project activity, the PPs shall use the latest approved version of a baseline and monitoring methodology ACM0002 / Version 12.1.0, where the definition regarding the installed capacity is clearly being addressed.</p> <p>The approach adopted by the PP where is referring the old version of methodology ACM0002 / Version 06 cannot be accepted by the DOE.</p> <p>However, the equipment is exactly the same and the difference results from comparing different data sources. As</p>	
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					<p>already mentioned, the nameplate capacity onsite cannot be directly compared to manufacturer's specification at lab conditions, although the equipment is identical. Moreover, the capacity of the generator is identical both in the registered PDD as well as on the nameplate capacity onsite (see "La Herradura Generator #1.jpg", La Herradura Generator #2.jpg" and "La Vuelta Generator.jpg"). Since the generator is some kind of bottleneck for the generation capacity of the plant, i.e. any higher turbine capacity is limited by the generators capacity, in this case this equipment is more decisive for the effective capacity.</p> <p>Therefore, it can be concluded that all information in the first PDD is compatible with applicable rules at the time of PDD registration and the equipment installed.</p> <p>b) The PP shall provide to the DOE the turbine manufacturer's specification to assess that all physical features of the proposed CDM project activity has been operated/ implemented in accordance with the registered PDD.</p> <p>The turbine capacity can be found in the manufacturers specification</p>	
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					<p>provided in an attachment to the contract that resulted from the EPM bidding #006665 from 02/06/2002. See “Especificaciones Técnicas Generales - Contratación 006665.pdf” on pg. 3 and 9.</p> <p><u>Further request from the DOE 2:</u></p> <p>In accordance with the stated in the methodology the installed power generation capacity of a power unit is the capacity, expressed in Watts, based on this, the nominal power output comes from the Hydroelectric turbines.</p> <p>Considering that the technical information of the turbines stated in the registered PDD does not conform with the technical information observed during the site visit, in accordance with Guidelines on assessment of different types of changes from the project activity as described in the registered PDD EB 48 annex 67, requires that a notification or request for approval of changes from the project activity as described in the registered</p> <p>In accordance with the procedures from the CDM EB, Notification of changes should be issued in the context of verifications, thus, if the last Monitoring Period of the 1st CP has not yet come to request for issuance, this issue should be covered by the Verifying DOE.</p> <p>MGM: As discussed in Emails, the</p>	
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				<p>turbine nameplate capacities are included in the PDD and an analysis based on paragraph 219 of EB65 is included in the revised PDD to explain and justify the change, and that it does not affect any of the five criteria of that paragraph.</p> <p>c) The PPs shall clarify to the DOE the source of the technical information stated in the table (Power plant characteristics) of the PDD and how information is in line with the specifications of the turbines and the Generators.</p> <p>The turbine and generator capacities stated in the PDD are</p> <table><tr><td></td><td>LV</td><td>LH</td></tr><tr><td>Inst.cap.</td><td>11.7 MW</td><td>19.8 MW</td></tr><tr><td>Turbine</td><td>12.25 MW</td><td>20.8 MW</td></tr><tr><td>Generat.</td><td>14 MVA</td><td>24 MVA</td></tr></table> <p>The capacities from the turbine and generator can be found in the manufacturer's specifications "Especificaciones Técnicas Generales - Contratación 006665.pdf" on pg. 3 and 9. Moreover, it can be observed that the nameplate capacity of the generators onsite (see "La Herradura Generator #1.jpg", La Herradura Generator #2.jpg" and "La Vuelta</p>		LV	LH	Inst.cap.	11.7 MW	19.8 MW	Turbine	12.25 MW	20.8 MW	Generat.	14 MVA	24 MVA	
	LV	LH															
Inst.cap.	11.7 MW	19.8 MW															
Turbine	12.25 MW	20.8 MW															
Generat.	14 MVA	24 MVA															

				<p>Generator.jpg”) are identical to the manufacturers specification.</p> <p>The installed capacity refers to the “effective net capacity of the power plant”, i.e. after the transformer. These capacities are taken from the public bidding process and refer to the published official value, see “Diario Oficial 02-06-2002.pdf” (http://servoaspr.imprenta.gov.co/diariop/diario2.nivel_2)</p> <p>The values in the manufacturer’s specifications are based on theoretical models and are less appropriate then those published for the bidding process.</p> <p>In the new PDD, only the nameplate capacities of the turbines and the generator as observed <u>onsite</u> are included to avoid further confusion.</p> <p>d) Considering that the technical information of the turbines stated in the registered PDD does not conform with the technical information observed during the site visit, in accordance with Guidelines on assessment of different types of changes from the project activity as described in the registered PDD EB 48 annex 67, requires that a notification or request for approval of changes from the project activity as described in the</p>	
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				<p>registered</p> <p>In accordance with the procedures from the CDM EB, Notification of changes should be issued in the context of verifications, thus, if the last Monitoring Period of the 1st CP has not yet come to request for issuance, this issue should be covered by the Verifying DOE.</p> <p>MGM: As discussed in Emails, the turbine nameplate capacities are included in the PDD and an analysis based on paragraph 219 of EB65 is included in the revised PDD to explain and justify the change, and that it does not affect any of the five criteria of that paragraph.</p> <p>As explained above, the technical information of the turbines stated in the registered PDD <u>does conform</u> to the technical information observed during the site visit. The information in the registered PDD refers to the technical specifications at laboratory conditions provided by the manufacturer and the observed information during the site visit corresponds to conditions onsite. However, the equipment is exactly the same and both sources of information correspond to it. Therefore no request notification is required.</p>	
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					<p><u>Further request from the DOE 3:</u></p> <p>PP is requested to provide the correct reference of the document “LV_y_LH_-_Analysis_EB_65_párrafo_219_(8May12)” which is written as “EB65 paragraph 219” due to this cause confusion, refer to the annex by which this analysis is based on.</p> <p>PP is requested to explain the source of the parameter $EG_{\text{facility},y} = 182,000$ MWh and how the turbines’ nameplate capacity was taken into account in defining this value. Also, confirm which PLF is used in order to estimate emission reductions.</p> <p>PP is requested to clarify how the investment analysis (which is part of the additionality of the project activity) is not affected due to the inclusion of turbine’s nameplates.</p> <p>As stated since the beginning of this CL, a difference between the installed capacity observed on site (33.48 Mw) and description of the PDD (31.48 MW). PP is requested to explain whether:</p> <p>-The additionality of the project is not affected, due to changes on the project activity observed on site respect to the registered PDD.</p>	
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					<p>-The Scale of the CDM project activity is not affected due to the changes on the project activity respect to the registered PDD.</p> <p>-And impact the applicability/application of the baseline methodology is not affected due to the changes on the project activity respect to the registered PDD.</p> <p>A notification and requesting approval of changes from the project activity, as described at the Annex 66 of the EB 48, has not been submitted to the EB by the DOE which attended the periodic verification, before the DOE released its final verification opinion as stated on Paragraph 196 of VVM (v1.2), due to the project had 3 verifications closed and one under “awaiting issuance request”</p>	
6	X		<p>CAR 6 The tool applied to calculate the emission factor shall be updated to the latest version 2.2.1, as per EB 61 annex 12. Furthermore, please include in section B.2 the tool applicability</p>	/2/20/	<p>The calculation of the emission factor has been updated to the version 2.2.1. All adjustments in the PDD were made and the ex ante estimation of emission reductions has been revised. The BM EF increases considerably when</p>	<p>The six steps have been correctly addressed in the PDD as per the tool version 2.2.1. Hence the CAR 6 subsection a) can be considered closed.</p>

					<p>applying the new version since several plants with more than 10 years have to be included in order to reach the margin of 20% of total generation.</p> <p>The applicability of the tool has been included in section B.2.</p> <p><u>Further request from the DOE:</u></p> <p>The applicability has been addressed in the section B.2.</p> <p>However, the following issues shall be corrected by the PPs:</p> <ul style="list-style-type: none"> a) The six steps used to calculate the emission factor shall be followed as per the latest version of the tool 2.2.1. <p>The six steps in the calculation sheet were already correctly applied, since it is required to include all steps (a) to (f). The formal procedure was included in the PDD as per the tool version 2.2.1.</p> <ul style="list-style-type: none"> b) Source of the data used for the analysis of the EF from “XM Compañía de Expertos en Mercados S.A. E.S.P shall be provided to the DOE, to confirm the traceability of the data. <p>The Neon information system from XM can be accessed through the website: http://sv04.xm.com.co/neonweb/</p>	<p>Incise b) “XM Compañía de Expertos en Mercados S.A. E.S.P was provided to the DOE and it confirms its validity, hence, this point is closed.</p>
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					<p>(user: 346142). Some information, such as heat rates of minor plants, have to be requested from XM by email (see “RV_ Solicitud de información _menores.pdf”).</p> <p>Further request from the DOE 2:</p> <p>Regarding the information such as heat rate of minor plants etc. it should be submitted to DOE with a formal letter from XM Compañía de Expertos en Mercados S.A. E.S.P., since e-mails cannot be accepted as reliable evidence.</p> <p>MGM: Please see email from 20/12/2011 received from XM (copy to Arturo Lemus from TUV Rheinland), where XM confirms the heat rate of the minor plants.</p> <p>Also, the most recent version 10 of the PDD includes version 2.2.1 of the Tool to calculate the grid emission factor.</p>	
7	X		CAR 7 Link sources shall be addressed in the section B4 of the PDD.	/2/	The relevant links have been included.	Links have been included in the section B.4 of the PDD. Hence the CAR can be considered closed by the audit team.
8		X	<p>CAR 8 As per guidelines for completing the PDD the following information shall be addressed in the section B.7.1</p> <ul style="list-style-type: none"> Where data or parameters are supposed to be measured. How the measurement is undertaken, 	/2/10/	<p>The relevant information has been included in section B.7.1.:</p> <ul style="list-style-type: none"> <u>Where</u>: substation Chorodó <u>How</u>: tele-measurement reading <u>Which calibration</u>: already included before 	Explanation regarding where, how, calibrations procedures and accuracy of equipment's have been included in the latest version of the PDD. Furthermore, it was clarified that on procedures are based

			<p>which calibration procedures are applied, what is the accuracy of the measurement method, who is the responsible person/entity that should undertake the measurements and what is the measurement interval.</p> <ul style="list-style-type: none"> Relevant further background documentation shall be addressed in Annex 4. 	<ul style="list-style-type: none"> <u>Accuracy</u>: already included before (Class 0.2S) <u>Responsible</u>: “Equipo de medida” (measurement team) <u>Interval</u>: hourly measured and read every 24 hours <p><u>Further request from the DOE:</u></p> <p>In order to assess the correct set of the calibration frequency. The Colombian technical norm NTC-ISO-IEC 17,025 and NTC 4,856, shall be provided to the DOE.</p> <p>See “ISO17025LaboratorioEnsayo.pdf” and “NTC4856.pdf”</p> <p><u>Further request from the DOE 2:</u></p> <p>The PP shall clarify to the DOE the page (paragraph) where the Colombian technical norm NTC-ISO-IEC 17,025 and NTC 4,856 specifies the calibration frequency of the electricity meters devices.</p> <p>MGM: There is no norm or regulatory standard defining the calibration frequency. However, EPM carries out calibrations maximum every two years, as included in the PDD.</p> <p><u>Further request from the DOE 3:</u></p> <p>The PP shall clarify how maximum calibration frequency of two years -as stated on the latest version of the PDD- goes in line with manufacturer</p>	<p>on the Colombian technicals norms NTC-ISO-IEC 17,025 and NTC 4,856, meters are calibrated in the interval defined in the PDD due to good practices, however this not requested by national requirements.</p>
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				<p>specifications; also clarify if there is any requirement of calibration or verification frequency stated on the PPA. Attached with the response, provide evidence.</p> <p>MGM: Basically there is no manufacturer's specification. The project does not sell the energy through a PPA! Therefore there is no such requirement. The energy sales are made within the general framework of the electricity sector given by the Laws 142 and 143 from 1994 (see PDD). Any "minor" plant, which is defined as a plant of less than 20 MW (in Spanish "Menores"), can sell all energy generated directly to the market and is not centrally dispatched as plants with more than 20 MW. Resolution 086 of 1996 provides also further definitions, see</p> <p>http://apolo.creg.gov.co/Publicac.nsf/Indice01/Resoluci%C3%B3n-1996-CRG86-96</p> <p>This regulatory framework does not provide any specification on calibration as mentioned before. The "Measurement Code"(Spanish: "Codigo de Medida") can be consulted in the following link, where it can also be seen, that there is no specific requirement:</p> <p>http://apolo.creg.gov.co/Publicac.nsf/Indice01/Codigos-1995-RES.025-</p>	
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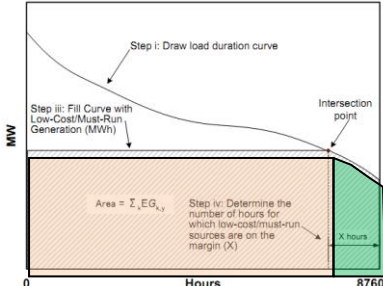
					1995.COD..REDES.- COD.MEDIDA?OpenDocument As explained before, EPM calibrates its meters at least every two years, usually inclusive more frequent (e.g. every year, but it is considered that the two years is more reasonable and completely in line with CDM requirements and typical calibration frequencies observed in the power sectors).	
9.	x		CAR 9 The PP shall ensure that the following procedures are being submitted in the monitoring plan. a) How information is obtained, processed and revised b) How information will be stored c) QA/QC measures d) How to deal with erroneous measures and identified corrective actions e) How to deal with emergencies in case of failure of the meter or other unexpected situations? f) Values to be undertaken in case data is missing	/2b/	a) The information was already in the PDD. Only minor adjustments have been made. b) All storing and backup information was already included. Only minor adjustments have been made. c) The QA/QC measures are included (e.g. calibration every two years) d) This is included in the MR. e) This has been included. Basically, each electricity meter has a backup meter as indicated in section B.7.1, which assures correct measurement in case of failures of the main electricity meters. If any other emergency would not allow measuring correctly the power generation of the plants or if data would be missing as a result of a failure in the monitoring process, no emission reductions shall be claimed during that period until guaranteeing again correct function	Procedures regarding the QA/QC procedures have been correctly applied in the section B.7.2 of the PDD. Hence the CAR can be considered closed by the audit team.

					of the meters and having reliable data. f) See answer before.	
10.	x		CAR 10 The project participant is requested to follow the Guideline for completing the Project Design Document and include the information regarding training provisions for the involved personnel.	/2b/	The provisions have been included.	Training provisions have been correctly addressed in the section B.7.2 of the PDD. Hence the CAR can be considered closed by the audit team.
11.	x		CAR 11 The project participant is requested to follow the Guideline for completing the Project Design Document and address an organization chart regarding the management of the CDM project.	/2b/	The organization chart has been included.	Organization chart has been correctly addressed in the section B.7.2 of the PDD. Hence the CAR can be considered closed by the audit team.
12.	x		CAR 12 All data collected as part of monitoring should be archived electronically and be kept at least for 2 years after the end of the last crediting period; the project participant is requested to comply with such request from the methodology in the PDD.	/2b/	Included in both sections B.7.1 and B.7.2	Data collection has been correctly addressed in sections B.7.1 and B.7.2. Hence the CAR can be considered closed by the audit team.
13.	x		CAR 13 , related to VVS PDD dated 02/03/2013. 1) PDD page 1. Please clarify the name of the PP of Colombia as is not coincident with LoA and registered PDD. 2) Please provide the email of acknowledgement from UNFCCC on the acceptance of notification of renewal. 3) Please do consistent the version of the methodology across all PDD. 4) Clarify the reason of exclusion of the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" and PEy were set to zero as on page 8 of PDD it is declared a	/2b/	1) This has been fixed in the PDD. 2) The email sent to UNFCCC has been provided to TUEV. No reception mail from UNFCCC has been received. 3) The version used 15.0.0 as provided throughout the entire PDD. If anything is not consistent, please indicate the specific page or section. 4) It says "It has a diesel electric generator of 480 V and 60 Hz emergency system." So the	1) Name of PP from Colombia has been addressed in the latest version of the PDD, Hence this point is closed. 2) As per response, PP did not received any email regarding the acknowledgement from UNFCCC on the acceptance of notification of renewal, this point is closed. 3) Consistence of version of the methodology has been updated in the latest version

		<p>Diesel generator for the project activity.</p> <p>5) PDD page 26. Please explain how “hourly” measured is considered as continuously.</p> <p>6) Include all “not applicable conditions” stated in the methodology in section B.2 of the PDD.</p> <p>7) PDD page 26.</p> <p>It is written: «...the historical data of the last three years of operation...»</p> <p>Please explain which years are considered and why the whole period was not considered.</p>		<p>generator is far away from continuously used, but only in emergency situations. Additionally the methodology excludes project emissions from hydroelectric projects. The tool mentioned is relevant for other types of renewables (e.g. geothermal).</p> <p>5) This is just the way it works in energy generation. Energy is continuously measured but only registered every hour. “Continuous” in this sense means that there is an ongoing measurement process as opposed to a “periodical” measurement that would be for instance a monthly sampling. To avoid confusion, this has been slightly modified in the PDD.</p> <p>6) All criteria have been included.</p> <p>7) It has been included in the PDD that the years 2008-2010 are used. These were the last three complete years available at the time of starting the revalidation. Three years is representative. It has been accepted by TÜV at the moment of the validation visit in all subsequent verification protocols! Moreover, this is not crucial for real emission</p>	<p>of the PDD, hence this point is closed.</p> <p>4) PP indicates that the diesel generator is used only for emergencies and emission reductions are negligible, hence the point is closed.</p> <p>5) Explanation regarding the continuity of measurements have been included by PP, hence this point is closed.</p> <p>6) PP included all conditions of methodologies and applicable tools; hence, this point is closed.</p> <p>7) As per explanation of PP, years considered are from 2008 to 2010, years are just considered as per ex-ante estimations, hence this point is closed.</p>
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					reduction, but is only used for ex ante estimation. The real values will be obtained during operation and monitoring.	
14.		X	Versions of tools shall be revised across whole PDD.	/2b/	a) Corrected. The latest version has been applied.	Latest versions of all tools have been applied, hence this point is closed.
15.		X	PP is requested to clarify if investment analysis section fulfills the Procedure for renewal of a crediting period of a registered CDM project activity.; PP is requested to amend the Graphic in page 19 (NPV) cannot be observed due number size.	/13/	This was an error. In the new version, the additionality analysis is included identically as in the approved PDD of the first crediting period. Thus the other requests in this CAR are not relevant anymore.	Latest version of the PDD includes Additionality as per original PDD, also size of graphic included in page 19 was updated, Hence this CL is closed.
16.		X	Clarify the utilization of Paragraph 15 and Paragraph 21 in the updated PDD version.	/2b/	There are two relevant paragraphs in the tool version 3.0.0. Paragraph 15 is in case the electricity system is connected to others in Annex I countries, which is not the case in Colombia. Paragraph 21 refers to electricity imports from other countries. In this case there is also an option to choose 0 tCO ₂ /MWh for imports, which is done for this project. The wording has been changed in the PDD to avoid confusion.	Wording has been improved in the latest version of the PDD, in order to avoid confusion. Hence this CL is considered closed.
17.	X		a) PP is requested to clarify the quality of the lambda graphic and provide the source of it.	/13/	a) Corrected. The reference to an external sheet only included the x-axis counting of the hours (1 to	a) Reference has been corrected, hence this point is closed.

			<ul style="list-style-type: none"> b) PP is requested to clarify the length of the lambda in year 2008. c) PP is requested to clarify the meaning of "Tebsa". d) PP is requested to clarify the source of the graph "Curva de cargo 2009" and "Curva de carga 2010" e) PP is requested to clarify if the formula used to calculate lambda is in line with the tool. Also, please clarify the source of LCMR parameter. 	<p>8760 hours). Therefore the graphic remains the same.</p> <ul style="list-style-type: none"> b) 2008 was a leap year which has additional 24 hours from 29th of February. Thus, the total hours is 8784 instead of 8760. c) The comment in the "summary" was deleted. This was erroneous. d) Not sure what you refer to. The mentioned series are included in the sheets "lambda 2008", "lambda 2009" and "lambda 2010". What you mention is just a name given in the formula, but not really an external resource. e) The formula was correct. The fraction was cancelled as per mathematical rules. To avoid confusion, in row 3 an additional step is included with the "No of hours of LC/MR on the margin". The lambda is then calculated and it can be seen that the result is the same as before. The intersection points are determined step by step. The column "constant" in the excel calculates each generation value multiplied with the number of hours (i.e. the red rectangle in the following image). The column "Accumulated" determines the sum 	<ul style="list-style-type: none"> b) It is clarified that 2008 was a leap year, hence 24 hours of February the 29th were included. c) Word has been cleaned in the latest version, hence this point is closed. d) Curves are referring to the names given in excel and not to an external link, hence, this point is closed. e) Latest version of the excel file was clarified and lambda can be easily traceable, hence this point is closed. f) Full explanation regarding how the hours included were determined was included as response, hence this point is closed.
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					<p>of the individual generations, beginning with the smallest from the right side of the following image (i.e. the green area)</p>  <p>After that, the column “Area LC/MR” sums both area, i.e. the total area under the curve as per step 57 of the tool. This is done for all hours. Finally, the total area of each hour is compared to the total generation of LC/MR resources in order to identify the hour where both values match and thus, defining the intersection point. The remaining steps are just math.</p>	
18.	X		<p>PDD p 22</p> <ol style="list-style-type: none"> PP is requested to explain the exclusion of parameter $EG_{m,y}$ in the determination of $EF_{EL,m,y}$ PP is requested to define the option applied for the net energy conversion efficiency. 	/2b/	<ol style="list-style-type: none"> $EG_{m,y}$ was already included in a formulae before, so it was not repeated. However, to avoid confusion we included it in the new PDD version. A clarification is included in the PDD. Basically both options are used. The fuel consumption is 	<ol style="list-style-type: none"> Latest version of the PDD includes the description and utilization of parameter $EG_{m,y}$ in the determination of $EF_{EL,m,y}$ It is clarified that option a is used when

					used for all power plants with at least 20 MW, which based on the regulatory requirement have to report fuel consumption that are published by the grid administrator (see EF spreadsheets “Cons Fuel 08”, “Cons Fuel 09” and “Cons Fuel 10”). The second option with the efficiency is only applied for a few plants, being the minor power plants with less than 20 MW. These do not have to report fuel consumption (see EF spreadsheets “Heat rates minors”).	data is available, but option b is used as well, when data is not available. Hence, this point is closed.
19.	X		PP is requested to check the size and font of all information included in the updated PDD-	/2b/	Table adjusted.	The table has been adjusted, hence this point is closed.
20.	X		PP is requested to complete information used of contact person.	/2b/	Completed	Information in table has been include, as requested.

Table 3: List of forward action requests (FARs)

Validation / Verification Standard

(27) The DOE shall raise a forward action request (FAR) during validation to highlight issues related to project implementation that require review during the first verification of the project activity. FARs shall not relate to the CDM requirements for registration.

FAR number	Reference	Summary of project owner response	Validation team conclusion
No FARs were raised.	-	-	-

Appendix B

Certificates of Competence

Qualification

Avendaño Reyes, Guadalupe /

Emission Trading

United Nations Framework Convention on Climate Change

Auditor No.:
(AuditorenRegNr)

Appointed:
(Zugelassen)

☒ ja

Qualification Level:
(Qualifikationsstufe)

Lead Auditor

External:
(Externer)

☐ ja

Add. reviewer:
(Zusätzlicher Prüfer)

☐ yes

EAC Scopes:
(EAC Branchen)

CDM 01 - Energy industries (renewable - / non-renewable sources)
CDM 13 - Waste handling and disposal

Add. qualification:
(zus. Qualifikation)

First Appointment:
(Erstberufung)

04/03/2010

Valid to:
(Gültig bis)

01/03/2016

Remarks:

Valid for TA 1.2, 13.1

Languages:

Spanish
English

Experience Exchange

Date

Location

Remarks

Accreditation(s)

Monitoring

Latest Monitoring:
(letzte Beurteilung)

Next Monitoring:
(nächste Beurteilung)

Remarks:

[View / Edit Monitoring](#)

History of scope allocation

Date: 2010-03-05
Change: EAC CDM, CDM, CDM added
By: Manfred Brinkmann
Reason:

History

Created:	28/01/2010 08:30:36 a.m.	Luis Javier Cerecedo/Mex/TUV
Modified:	06/03/2013 10:23:15 a.m. ZE8	Praveen Urs/Chn/TUV
	04/02/2011 11:52:14 a.m. ZE9	Manfred Brinkmann/Jpn/TUV
	04/02/2011 11:51:58 a.m. ZE9	Manfred Brinkmann/Jpn/TUV
	04/02/2011 11:49:32 a.m. ZE9	
	14/09/2010 03:59:20 p.m. ZE9	

Export to ICMS

Last Export:

Qualification

Diaz, Danae /

Emission Trading

United Nations Framework Convention on Climate Change

Auditor No.:
(AuditorenRegNr)

Appointed:
(Zugelassen)

☒ ja

Qualification Level:
(Qualifikationsstufe)

Lead Auditor

External:
(Externer)

☐ ja

Add. reviewer:
(Zusätzlicher Prüfer)

☐ yes

EAC Scopes:
(EAC Branchen)

CDM 13 - Waste handling and disposal
CDM 01 - Energy industries (renewable - / non-renewable sources)

Add. qualification:
(zus. Qualifikation)

First Appointment:
(Erstberufung)

27/10/2011

Valid to:
(Gültig bis)

26/10/2014

Remarks:

Valid for TA1.2, 13.1 and 13.2

Languages:

Spanish
English

Experience Exchange

Date

Location

Remarks

Accreditation(s)

Monitoring

Latest Monitoring:
(letzte Beurteilung)

Next Monitoring:
(nächste Beurteilung)

Remarks:

History of scope allocation

Date:

2012-04-04

Date: 2010-03-05
Change: EAC CDM, CDM, CDM added
By: Manfred Brinkmann
Reason:

History

Created:	28/01/2010 08:30:36 a.m.	Luis Javier Cerecedo/Mex/TUV
Modified:	06/03/2013 10:23:15 a.m. ZE8	Praveen Urs/Chn/TUV
	04/02/2011 11:52:14 a.m. ZE9	Manfred Brinkmann/Jpn/TUV
	04/02/2011 11:51:58 a.m. ZE9	Manfred Brinkmann/Jpn/TUV
	04/02/2011 11:49:32 a.m. ZE9	
	14/09/2010 03:59:20 p.m. ZE9	

Export to ICMS

Last Export:

Qualification

Lemus Martinez-Estape, Rafael Arturo /

Emission Trading

United Nations Framework Convention on Climate Change

Auditor No.:
(AuditorenRegNr)

Appointed:
(Zugelassen)

☒ ja

Qualification Level:
(Qualifikationsstufe)

Lead Auditor

External:
(Externer)

☐ ja

Add. reviewer:
(Zusätzlicher Prüfer)

☐ yes

EAC Scopes:
(EAC Branchen)

CDM 01 - Energy industries (renewable - / non-renewable sources)
CDM 13 - Waste handling and disposal

Add. qualification:
(zus. Qualifikation)

First Appointment:
(Erstberufung)

08/05/2014

Valid to:
(Gültig bis)

07/05/2017

Remarks:

Valid for TA 1.2, 13.1

Languages:

Spanish
English

Experience Exchange

Date

Location

Remarks

Accreditation(s)

Monitoring

Latest Monitoring:
(letzte Beurteilung)

Next Monitoring:
(nächste Beurteilung)

Remarks:

[View / Edit Monitoring](#)

History of scope allocation

Date: 2011-07-07
Change: EAC CDM, CDM added
By: Manfred Brinkmann
Reason: Valid for TA 1.2, 13.1

History

Created:	06/30/2011 09:08:28 AM CDT	Luis Javier Cerecedo/Mex/TUV
Modified:	07/18/2014 10:16:13 AM	Henri Phan/Chn/TUV
	05/10/2012 03:39:17 PM CDT	Arturo Lemus/Mex/TUV
	05/10/2012 03:35:53 PM CDT	Arturo Lemus/Mex/TUV
	05/08/2012 03:53:10 PM CDT	
	05/03/2012 10:33:34 PM	
	07/07/2011 03:42:19 PM ZE9	
	07/07/2011 03:39:54 PM ZE9	
	06/30/2011 09:08:42 AM CDT	

Export to ICMS

Last Export:

Qualification

Ramos Soto, Lauro Jaime /

Emission Trading

United Nations Framework Convention on Climate Change

Auditor No.:
(AuditorenRegNr)

Appointed:
(Zugelassen)

☒ yes

Qualification Level:
(Qualifikationsstufe)

Auditor

External:
(Externer)

☒ yes

Add. reviewer:
(Zusätzlicher Prüfer)

☐ yes

EAC Scopes:
(EAC Branchen)

CDM 05 - Chemical industry
CDM 01 - Energy industries (renewable - / non-renewable sources)

Add. qualification:
(zus. Qualifikation)

First Appointment:
(Erstberufung)

01/07/2013

Valid to:
(Gültig bis)

01/06/2016

Remarks:

TA 5.1 and TA 1.2

Languages:

Spanish
English

Experience Exchange

Date

Location

Remarks

Accreditation(s)

Monitoring

Latest Monitoring:
(letzte Beurteilung)

Next Monitoring:
(nächste Beurteilung)

Remarks:

[View / Edit Monitoring](#)

History of scope allocation

Date: 2014-07-14
Change: EAC CDM added
By: Henri Phan
Reason:

Date: 2013-02-04
Change: EAC CDM added
By: Praveen Urs
Reason:

History

Created:	01/25/2013 10:31:31 AM CST	Luis Javier Cerecedo/Mex/TUV
Modified:	07/11/2014 10:24:25 AM	Henri Phan/Chn/TUV
	02/04/2013 01:06:13 PM	Praveen Urs/Chn/TUV
	02/04/2013 01:05:45 PM	Luis Javier Cerecedo/Mex/TUV
	01/25/2013 10:31:46 AM CST	

Export to ICMS

Last Export: