

## CDM VERIFICATION REPORT

- 4<sup>th</sup> Periodic Verification –  
(2<sup>nd</sup> Periodic Verification of 2<sup>nd</sup> crediting period)

INTERNATIONAL BANK FOR RECONSTRUCTION AND  
DEVELOPMENT (IBRD) AS TRUSTEE OF THE PROTOTYPE CARBON  
FUND (PCF)

PROJECT: “Chacabuquito Hydroelectric Power Project”

UNFCCC REFERENCE NUMBER: 1052

MONITORING PERIOD:

FROM 01/01/2013 TO 31/12/2013

AENOR Reference N<sup>o</sup>: 2014/018/CDM/13

"2<sup>nd</sup> Periodic Verification of 2<sup>nd</sup> Crediting Period"

"Chacabquito Hydroelectric Power Project"

<b>Verification Report:</b>	AENOR Reference No.:		Version of this document:		Date of this rev.:	
	2014/018/CDM/13		02		23/10/2014	
<b>Project:</b>	Title:		Registration date:		UNFCCC Reference	
	Chacabuquito Hydroelectric Power Project		07/07/2007 (Renewal Date 04/11/2011)		1052	
<b>Project Participant(s):</b>	Host Party: Chile		Other involved Parties: Sweden, France, Netherlands, Norway, Canada*, Finland, and Japan.			
	Hidroeléctrica Guardia Vieja S.A.		<b>Sweden:</b> Government of Sweden - Swedish Energy Agency; <b>France:</b> GDF Suez <b>Netherlands:</b> Electrabel S.A.; Netherlands' Ministry of Infrastructure and the Environment (IenM); Netherlands' Ministry of Economic Affairs, Agriculture and Innovation (EL&I); Deutsche Bank AG <b>Norway:</b> Government of Norway - Ministry of Foreign Affairs; Norsk Hydro ASA; Statoil ASA <b>Canada*:</b> Government of Canada - Ministry of Foreign Affairs and International Trade <b>Finland:</b> Government of Finland - Ministry of Foreign Affairs; Fortum Corporation; <b>Japan:</b> Chubu Electric Power Co., Inc.; The Chugoku Electric Power Co., Inc.; Japan International Cooperation Agency (JICA); Kyushu Electric Power Co., Inc.; Mitsubishi Corporation; Shikoku Electric Power Co., Inc.; Tohoku Electric Power Co. Inc.; The Tokyo Electric Power Co., Inc.; Mitsui & Co., Ltd. <b>Bilateral and Multilateral Funds:</b> International Bank for Reconstruction and Development (IBRD) as Trustee of the Prototype Carbon Fund (PCF)			
<b>Applied methodology/ies:</b>	Title:		Code:		Nº. revision	
	Methodology for zero-emissions grid-connected electricity generation from renewable sources in Chile or in countries with merit order based dispatch grid		AM0026		03	
<b>Monitoring report:</b>	Title:		Draft version:		Final version:	
	MR Chacabuquito v2 Final		01		02	
<b>Emissions reductions:</b>	Monitoring period:		Verified amount		As per draft MR:	
	01/01/2013 - 31/12/2013		55,927 tCO <sub>2</sub> e		54,920 tCO <sub>2</sub> e	
<b>Previous versions of this document:</b>			Version:		Date:	
			01		17/10/2014	

<p><b>Summary of verification:</b></p>	<p>The Spanish Association for Standardisation and Certification (AENOR) has performed the second verification of second crediting period of the emissions reductions of the project "Chacabucito Hydroelectric Power Project" (Registration Ref No. 1052). This monitoring period was from 01/01/2013 to 31/12/2013.</p> <p>The Chacabucito Hydroelectric Power Project consists of the construction of a run-of-river hydropower plant with an installed capacity of 30 MW that utilizes the water of the Aconcagua River.</p> <p>The purpose of the project is to generate zero emission energy to be injected in the Central Interconnected System (SIC), using the hydrological sources and displacing the use of fossil fuels.</p> <p>The project is located near to Los Andes; city placed 100 km north from Santiago (capital of the country). The hydro power plant is located in a small valley surrounded by mountains (Aconcagua Valley).</p> <p>During the on-site visit, the quality assurance of the data used for the calculation of the emissions reduction was verified. The installation of the project was also verified and the proper use of the meter and procedure controls was also tested.</p> <p>Calibration evidence allowed the verification team to verify that the meter worked correctly during the monitoring period</p> <p>A risk-based verification approach was employed to identify key risks to emission reduction estimations.</p> <p>All Corrective Action Requests (CAR) and Clarification Actions (CL) have been checked by the verification team and have been adequately resolved.</p> <p>AENOR confirms that the project is implemented in accordance with the registered Project Design Document. Furthermore, the monitoring system is in place and the emission reductions are calculated without material misstatements.</p> <p>The GHG emission reductions were calculated correctly on the basis of the approved methodologies AM0026 (version 3), and the Monitoring Plan and formula given in the renewed PDD.</p> <p>Therefore, in AENOR's opinion, the GHG emission reductions of monitoring period; from 01/01/2013 to 31/12/2013 are correct and amount 55,927 tons of CO2 equivalent.</p>
<p><b>Report prepared by:</b></p>	<p>Climate Change Unit. AENOR</p>

(\*) Party withdrawn from KP effective 15/12/2012.

## Abbreviations

AENOR	Spanish Association for Standardisation and Certification
AM0026 v3	Methodology for zero-emissions grid-connected electricity generation from renewable sources in Chile or in countries with merit order based dispatch grid, version 3.
CAR	Corrective Action Request
CDEC-SIC	Economic Dispatch Centre in the Central Interconnected System
CDM	Clean Development Mechanism
CDM EB	CDM Executive Board
CER	Certified Emission Reductions
CL	Clarification Request
CMP	Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol
CNE	National Energy Commission
CO <sub>2</sub>	Carbon Dioxide
CO <sub>2</sub> e	Carbon Dioxide equivalent
DOE	Designated Operational Entity
ER	Emission Reductions
FAR	Forwarded Action Requested
GHG	Greenhouse Gases
GWh	Gigawatt hour
IPCC	Intergovernmental Panel on Climate Change
IBRD	International Bank for Reconstruction and Development
Km	Kilometre
Kv	Kilovolts
MoV	Means of Verification
MP	Monitoring Plan
MR	Monitoring Report
MWh	Megawatt hour
MW	Megawatt
PDD	Project Design Document
PP	Project Participants
PS	Clean Development Mechanism Project Standard
SIC	Central Interconnected System
tCO <sub>2</sub> e	Carbon dioxide equivalent tonnes
UNFCCC	United Nations Framework Convention for Climate Change
VVS	Validation and Verification Standard

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## 1 INTRODUCTION

IBRD has commissioned AENOR to carry out the second periodic verification of second crediting period and certification of the emission reductions generated by the "Chacabuquito Hydroelectric Power Project" in Chile for the period from 01/01/2013 to 31/12/2013. This report contains the findings from the verification and a certification statement for the certified emission reductions.

### 1.1 Objective

According to the Modalities and Procedures for the CDM (Decision 3/CMP1, paragraph 61), the purpose of the verification is the periodic independent review and ex-post determination by the DOE of the monitored reductions in anthropogenic emissions by sources of GHG that have occurred as a result of a registered CDM project activity during the verification period.

Certification is the written assurance by the DOE that, during a specified period of time and based upon verifiable evidence, a project activity achieved the reductions in anthropogenic emissions by sources of greenhouse gases as verified.

### 1.2 Scope

The verification, as an independent and objective review, shall assess and verify that the implementation of the project activity and the steps taken to report emission reductions comply with the CDM criteria and relevant guidance provided by the CMP and the CDM Executive Board.

The verification shall:

1. Ensure that the project activity has been implemented and operated as per the renewed registered PDD /1/ and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place. It is therefore necessary to:
  - Interview relevant personnel to confirm that the operational and data collection procedures are implemented in accordance with the Monitoring Plan /2/ included in the PDD.
  - Check the monitoring equipment, including calibration performance and observations of monitoring practices, against the requirements of the PDD and the selected methodology.
  - Check that the manual operating provisions are duly followed (processes, routines, instructions, forms and related provisions).
2. Ensure that the final version of the Monitoring Report and other supporting documents provided are complete and verifiable and in accordance with applicable CDM requirements. It is therefore necessary to carry out a review of:
  - Relevant documentation as well as the on-site visit(s).
  - Data and information presented to verify their completeness.
  - Indicators that must be addressed in the Monitoring Plan.
  - The Monitoring Plan and monitoring methodology, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the quality assurance and quality control procedures.
3. Ensure that actual monitoring systems and procedures comply with the monitoring systems and procedures described in the Monitoring Plan and the approved methodology, carrying out:
  - A review of information flows for generating, aggregating and reporting the monitoring parameters.
  - A cross-check between information provided in the Monitoring Report and data from other sources such as plant logbooks, inventories, purchase records or similar data sources.

- A review of calculations and assumptions made in determining the GHG data and emission reductions.
  - A review of the project documentation provided by the project participants to check that it is based upon both quantitative and qualitative information on emission reductions. Quantitative information comprises the reported numbers in the Monitoring Report submitted to the DOE. Qualitative information comprises information on internal management controls, calculation procedures, and procedures for transfer of data, frequency of emissions reports, and review and internal audit of calculations.
4. Evaluate the data recorded and stored as per the monitoring methodology, carrying out:
    - An evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions.
    - An identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.
  5. Identify and inform the project participants of any concerns related to the project's activity and operation conformance with the registered project design document. The project participants shall address the concerns and supply additional relevant information.
  6. Provide a verification report to the project participants, the Parties involved and the CDM Executive Board. The report shall be made publicly available.

The verification is not meant to provide any consultancy services to the client. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the Monitoring Report.

AENOR, based on the Specific Instruction for the Validation, Verification and Certification of Clean Development Mechanism (CDM) Project Activities (IE/DTC/039) [3], which is in turn based on the CDM Validation and Verification Standard version 07.0 (CDM-EB 79) [4], has used a risk-based approach in the verification, focusing on the identification of significant risks for the generation of CERs and verifying the mitigation measures for these issues.

### 1.3 Description of the Project Activity

Host Country:	Chile
Title of project activity:	Chacabuquito Hydroelectric Power Project
UNFCCC registration No:	1052
Project Participants:	<b>Hidroelectrica Guardia Vieja S.A.</b> Av. Apoquindo 4775, Piso 11 – Santiago – Chile +56-2-2460-4000 <a href="mailto:cmosella@colbun.cl">cmosella@colbun.cl</a> <b>Government of Sweden - Swedish Energy Agency</b> <b>GDF Suez</b> <b>Electrabel S. A.</b> <b>Netherlands' Ministry of Infrastructure and the Environment (IenM)</b> <b>Netherlands' Ministry of Economic Affairs</b> <b>Agriculture and Innovation (EL&amp;I)</b> <b>Deutsche Bank AG</b> <b>Government of Norway - Ministry of Foreign Affairs</b> <b>Norsk Hydro ASA</b> <b>Statoil ASA</b> <b>Government of Finland - Ministry of Foreign Affairs</b> <b>Fortum Corporation</b>

**Chubu Electric Power Co., Inc.**  
**The Chugoku Electric Power Co., Inc.**  
**Japan International Cooperation Agency (JICA)**  
**Kyushu Electric Power Co., Inc.**  
**Mitsubishi Corporation**  
**Shikoku Electric Power Co., Inc.**  
**Tohoku Electric Power Co. Inc.**  
**The Tokyo Electric Power Co., Inc.**  
**Mitsui & Co., Ltd.**  
**Government of Canada - Ministry of Foreign Affairs and International Trade** (Party withdrawn from KP effective 15/12/2012)  
**Bilateral and Multilateral Funds: International Bank for Reconstruction and Development (IBRD) as Trustee of the Prototype Carbon Fund (PCF)**  
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[IBRD-carbonfinance@worldbank.org](mailto:IBRD-carbonfinance@worldbank.org)

Location of the project activity: The coordinates of the project are:  
32°51'12.35" S - 70°30'22.21" W

Project's crediting period: 04/11/2011 to 03/11/2018 (Second Crediting Period)  
Verification period: 01/01/2013 to 31/12/2013  
Project starting date: 12/03/2001

The validation and previous verifications are summarised below:

Process	DOE	Crediting period	Registration Date	Amount of CERs tCO <sub>2</sub> e
Renewal of Crediting Period	TÜV NORD	04/11/2011 to 03/11/2018	04/11/2011	54,179 (per year)
First verification of the second crediting period	AENOR	04/11/2011 to 31/12/2012	07/05/2014	82,053

The Chacabuquito Hydroelectric Power Project is a run-of-river hydropower plant with an installed capacity of 30 MW, given by four Francis turbines of 7.5 each one, which utilizes the water of the Aconcagua River. Main facilities consists of a diversion weir, a system of channels (11 km) and tunnels (3 km), a pressure penstock, water fall of 137 m (134.58 m net water fall), a powerhouse and a high voltage line, and upgrade of existing transmission system.

The Chacabuquito plant is in cascade with two existing upstream hydropower plants (Aconcagua of 81 MW and Los Quilos of 39 MW).

The project is located near to Los Andes, city placed 100 km north from Santiago (capital of the country). The hydro power plant is located in a small valley surrounded by mountains (Aconcagua Valley).

The purpose of the project is to generate zero emission energy to be injected in the Central Interconnected System (SIC), using the hydrological sources and displacing the use of fossil fuels.



The construction of Chacabuquito Hydroelectric Power Project began on 28/02/2001 and the commissioning took place on 01/07/2002 to successfully start of commercial operation on 22 July 2002. Since then, Chacabuquito Hydroelectric plant has been continuously operating and delivering energy to the National Grid.

During year 2005, Colbún S.A. merged with Hidroeléctrica Cnelca S.A., including the assets that belonged to this company, which considered the set of hydroelectric power plants owned by Hidroeléctrica Guardia Vieja S.A. Consequently, management responsibilities of Hidroeléctrica Guardia Vieja, S.A. as project participant have been are currently conducted by Colbún S.A.

This monitoring period comprises the period 01/01/2013 to 31/12/2013. In this period the project produced 122,393 MWh of net energy to the grid, which accounts for emission reduction of 55,927 tCO<sub>2</sub>.

According to the MR, Chacabuquito Power Plant had been operating continuously and no mayor events occurred during the monitoring period, other than normal events that face most hydropower plants. However, the MR includes most important events; which were verified during the visit, against electronic log books and the audit team found that they properly overcame.

## 2 METHODOLOGY

The verification has assessed the quality of the information, including:

- A desk review of the relevant information of all issues that constitute the basis for emission reductions from the project.
- On-site inspections; a review of performance records, interviews with the project participants, collection of measurements, observation of established practices and testing of the accuracy of monitoring equipment.
- A review of additional data from other sources relevant to the project activity's resulting emission reductions (IPCC reports, data on electricity generation in the electricity system of the Host Country, calibration reports).

Special focus is given to:

- The proper implementation of the project activity as described in the registered PDD.
- The data collection system, verifying that it meets the requirements of the Monitoring Plan as per the applied methodology.
- Whether sufficient evidence is available, both in terms of frequency (time period between evidence) and in covering the full monitoring period.
- The source and nature of the evidence (external or internal, oral or documented).

The available information from sources other than those used in the latest version of the Monitoring Report were cross-checked against the data in the Monitoring Report to confirm that the stated figures included in it are correct.

The verification of emission reductions has assessed all factors and issues that constitute the basis for emission reductions from the project, as detailed in the verification protocol, included in this report as Annex 1.

### 2.1 Verification Steps

Preparations	:	01/07/2014 to 22/07/2014
On-site verification	:	23/07/2014 to 24/07/2014
Reporting	:	25/07/2014 to 23/10/2014

## 2.1.1 Appointment of team members and technical reviewers

The list of involved personnel and the qualification status are summarised in the following table:

Name	Qualification	
	Position in the team	Technical areas
Luis Javier ARRIBAS ALONSO	Chief Verifier	TA 1.2
Richard Daniel GONZALES TOLEDO	Verifier	TA 1.2
José Luis FUENTES	Technical Reviewer	TA 1.2

Technical areas (TA) mentioned above correspond to the following:

TA code	Technical area
TA 1.1	Thermal energy generation from fossil fuels and biomass including thermal electricity from solar (COMPLEX)
TA 1.2	Energy generation from renewable energy sources
TA 2.1	Electricity distribution
TA 2.2	Heat distribution
TA 3.1	Energy demand
TA 4. 1	Cement sector (COMPLEX)
TA 4.2	Aluminium (COMPLEX)
TA 4.3	Iron and steel (COMPLEX)
TA 4.4	Refinery (COMPLEX)
TA 5.1	Chemical process industries (COMPLEX)
TA 6.1	Construction
TA 7.1	Transport
TA 8.1	Mining and mineral processes, excluding those included in TA 8.2 below
TA 8.2	Oil and gas industry, coal mine methane recovery and use (COMPLEX).
TA 9.1	Metal production
TA 10.1	Mining and mineral processes, excluding those included in TA 10.2 below
TA 10.2	Oil and gas industry, coal mine methane recovery and use (COMPLEX)
TA 11.1	Chemical process industries (COMPLEX)
TA 11.2	GHG capture and destruction
TA 12.1	Chemical process industries (COMPLEX)
TA 13.1	Waste handling and disposal
TA 13.2	Animal waste management
TA 14.1	Forestry

TA 15.1	Agriculture
TA 15.2	Animal waste management

### **2.1.2 Publication of the Monitoring Report**

AENOR made the MR Version 1, dated on 13/05/2014, publicly available on the UNFCCC web site on 01/07/2014, before the on-site visit.

### **2.1.3 Review of Documentation**

After the on-site visit, and due to the on-site visit conclusions, the Monitoring Report was updated to address the CARs and CLs, and a final version of the Monitoring Report dated 15/09/2014 /6/ had to be edited.

The desk review involved a review of:

- Project documentation: PDD registered (renewed), validation of renewal of the crediting period /7/ and previous verification reports /8/
- Relevant decisions, clarifications and guidance from the CMP and the CDM Executive Board.
- The Monitoring Plan and the applied monitoring methodologies, paying close attention to the frequency of measurements, the quality of metering equipment and the quality assurance and quality control procedures.
- The data and information presented to verify their completeness, including the Monitoring Report and the measuring records of the different monitored parameters.
- The influence of data management and the quality assurance and quality control system on the generation and reporting of emission reductions.

A complete list of all documents reviewed is attached in section 6 of this report.

### **2.1.4 Site Visits**

From 23/07/2014 to 24/07/2014 AENOR's verification team (Luis Javier Arribas Alonso and Richard Daniel Gonzales Toledo) visited the "Chacabuquito Hydroelectric Power Project" (Registration Ref. No. 1052). During the on-site visit the verification team was able to see the project facilities and carry out:

- An assessment of the implementation and operation of the project activity as per the registered PDD.
- A review of information flows for generating, aggregating and reporting the monitoring parameters.
- A cross-check between information provided in the Monitoring Report and data from other sources such as plant logbooks, inventories, purchase records or similar data sources.
- A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the PDD and the selected methodology.
- A review of calculations and assumptions made in determining the GHG data and emission reductions.
- An identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.
- Interviews with relevant personnel to confirm that the operational and data collection procedures are implemented in accordance with the Monitoring Plan included in the registered PDD.

The persons interviewed are indicated below:

Interviewed organisation Person/Position	Interview topics
<p><b><u>COLBÚN, S.A. – Headquarters</u></b></p> <p>Cristián Mosella Vial, Sustainable development department.</p> <p>Paula Reyes Figueroa, Project Engineer. Sustainable development department</p> <p>Cristian Fuentes, TI area staff</p> <p><b><u>POCH - CDM Consultant</u></b></p> <p>María Luz Farah G., CDM consultant</p> <p>Soledad Palma, CDM consultant</p> <p>Mariela Ramos, CDM consultant</p> <p><b><u>IBRD</u></b></p> <p>Javier Freire, Carbon Finance Specialist</p>	<ul style="list-style-type: none"> <li>• Flows for generating, aggregating and reporting the monitoring parameters.</li> <li>• Crosscheck between information provided in the monitoring report and data from monitoring system, plant log books, purchase records, etc.</li> <li>• Monitoring report and emission reduction calculations.</li> <li>• Estimates and assumptions for determining GHG data.</li> <li>• Controls established to detect and correct any error or omission in monitoring parameters.</li> <li>• Testing of monitoring equipment and observation of monitoring practices.</li> <li>• Calibration of meters.</li> <li>• Running of specific checks and trials on data sources and data management practices where risks are detected.</li> <li>• Clarifications related to monitoring procedures.</li> <li>• Generation of data verification. Electrical energy generation reports.</li> <li>• Sufficiency of Monitoring Plan.</li> <li>• Reliability of internal and external data.</li> <li>• Internal data quality control.</li> </ul>
<p><b><u>COLBÚN, S.A. - Chacabucito hydroelectric plant</u></b></p> <p>Eduardo Aguilera, Operation Power Plant Manager</p> <p>Mauricio Sandoval, Operation supervisor</p> <p>Marna Alvarado, Masso unit supervisor</p> <p>Mauricio Orellana, Deputy Manager of the Aconcagua Complex</p> <p>Javier Arancibia, Chacabucito plant operator</p> <p>Claudio Urtubia, Assistant operator of the load camera</p>	<ul style="list-style-type: none"> <li>• Crosscheck between information provided in the monitoring report and data from monitoring system, plant log books, etc.</li> <li>• Controls established to detect and correct any error or omission in monitoring parameters.</li> <li>• Testing of monitoring equipment and observation of monitoring practices.</li> <li>• Calibration of meters.</li> <li>• Running of specific checks and trials on data sources and data management practices where risks are detected.</li> <li>• Clarifications related to monitoring procedures.</li> <li>• Generation of data verification.</li> <li>• Reliability of internal and external data.</li> <li>• Internal data quality control.</li> </ul>

## 2.1.5 Findings

As an outcome of the verification process, the team can raise different types of findings according to the CDM Validation and Verification Standard, related to the monitoring, implementation or operations of the proposed CDM project activity that could impair the capacity of the proposed CDM project activity to achieve emissions reductions, or influence the reporting of emissions reductions.

Findings established during the verification could either be seen as a non-fulfilment of criteria ensuring the proper implementation of a project or as an instance in which a risk to deliver high quality emission reductions is identified.

Corrective Action Requests (CARs) are issued, when:

- (a) Non-conformities with the Monitoring Plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;
- (b) Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impair the estimate of emission reductions;
- (c) Issues identified in a FAR during verification to be verified during verification have not been resolved by the project participants.

Clarification Requests (CLs) are issued if information is insufficient or is not clear enough to determine whether the applicable CDM requirements have been met and additional information is needed to fully clarify an issue. Failure to address a CL may result in a CAR. Information or clarifications provided as a result of a CL may also lead to a CAR.

Forward Action Requests (FARs) are issued for actions if the monitoring and reporting require attention and/or adjustment for the next verification period.

The project participants were requested to address all verification findings and finally provided the verification team with sufficient evidence to determine that the applicable CDM requirements have been met. The project participants modified the initial monitoring report to resolve the verification team concerns and resubmitted a final version. AENOR has prepared this report based on the final monitoring report.

All of the verification findings are summarised in section 3 and documented in further detail in section 5 and in the verification protocol included in Annex 1.

## 2.1.6 Internal Quality Control

Following the completion of the assessment process by the verification team, all documentation undergoes an internal quality control through a technical review before the request for Issuance of CERs is submitted. The Technical reviewer is a qualified member of AENOR, independent from the team that carried out the verification of the project activity. The technical reviewer or the team appointed for the technical review is qualified in the technical area and sectoral scope of the project activity.

## 3 VERIFICATION FINDINGS

The summary of CARs, FARs and CLs issued are shown in following table:

	Verification topic	Nº. of CAR	Nº. of CL	Nº. of FAR
<b>1</b>	Project history	-	-	-
<b>2</b>	Project implementation	-	<b>1</b>	-
<b>3</b>	Monitoring report	<b>1</b>	-	-
<b>4</b>	Compliance with the monitoring methodology	-	-	-

	Verification topic	Nº. of CAR	Nº. of CL	Nº. of FAR
<b>5</b>	Compliance with the Monitoring Plan	<b>1</b>	-	-
<b>6</b>	Monitoring Parameters	<b>2</b>	-	-
<b>7</b>	Compliance with the calibration frequency	-	-	-
<b>8</b>	Emission Reduction Calculations	-	-	-
<b>9</b>	Quality of Evidence to determine ER	-	-	-
<b>10</b>	Management System and Quality Assurance	-	<b>1</b>	-
	<b>SUM</b>	<b>4</b>	<b>2</b>	<b>0</b>

All corrective action requests and clarification requests have been checked by the verification team and have been adequately resolved.

In the following paragraphs the findings from the desk review of the Monitoring Report, the calculation spreadsheets, the registered PDD, the validation report, the previous verification report, Monitoring Plan and other supporting documents as well as findings from the on-site assessment and the interviews are summarised.

All CARs and CLs raised are explained briefly in the following sections. An in-depth evaluation of all verification items can be found by referring to the verification protocol (see Annex 1 and Section 5).

### **3.1 Remaining issues, CARs, FARs from Previous Validation or Verification.**

During the previous verification process, the DOE might have raised issues that could not be closed or resolved during that monitoring period. For this purpose, FARs might have been raised. No remaining issues from the previous verification were identified for this project.

### **3.2 Post Registration Changes**

#### **3.2.1 Temporary deviation from the registered monitoring plan or applied methodology**

For the current monitoring period no deviation from the registered monitoring plan or applied methodology has been requested.

#### **3.2.2 Corrections**

No corrections to the project information or parameters fixed at validation as is described in the revised PDD have been requested.

#### **3.2.3 Permanent changes from the registered monitoring plan or applied methodology**

For the current monitoring period no changes to the monitoring plan contained in the registered PDD have been requested

### **3.2.4 Changes to the project design of registered project activity**

During this verification process the audit team verified that the project activity was implemented and operated according to registered PDD, and no new changes had to be requested.

### **3.2.5 Changes to start date of crediting period**

No changes to the start date of the crediting period stated in the registered PDD have been requested.

## **3.3 Implementation of Project Activity**

During the on-site visit, the audit team verified that:

- The implementation and operation of the project activity was as per the registered PDD.
- The information provided in the Monitoring Report was in accordance with data from other sources such as plant logbooks, inventories, purchase records or similar data sources.
- The monitoring equipment, including calibration performance and observations of monitoring practices, complied with the requirements of the PDD and the selected methodology.
- The operational and data collection procedures are implemented in accordance with the Monitoring Plan and the registered PDD.

The renewed registered PDD, previous verification reports and other documents related to the project are available on the UNFCCC website:

(<http://cdm.unfccc.int/Projects/DB/DNV-CUK1175238807.52/view>)

The renewal of the crediting period was accepted on 04 November 2011 against AM0026 version 3 [9].

This is the second monitoring period of second crediting period, under verification, which began on 01/01/2013 and ended on 31/12/2013. Therefore, the previous monitoring period was the first verification of this crediting period, corresponding to the period from 04/11/2011 to 31/12/2012.

Through the on-site visit and desk-review of documents provided by the project participants, the audit team reviewed the technical features of turbines, generators and transformers among other facilities.

The final version of the Monitoring Report includes clear, correct and complete information in accordance with the registered PDD.

Through the on-site visit and desk-review of documents provided by the project participants, the audit team reviewed the main technical features of the project activity, including all turbines, meters and transformers. It was verified that the project implementation, the equipment installation and the project boundary are in compliance with the revised PDD. The equipment installed is described and listed below:

- Four vertical Francis turbines with a nominal capacity of 7.5 MW each one
- Four generators with a nominal capacity of 8020 KVA and a nominal capacity factor of 0.9
- One transformer with a nominal capacity of 33000 KVA

According to the registered PDD the installed power capacity is given by the turbines. Therefore, the installed capacity is 30 MW (4 X 7.5 MW).

No fossil fuels were used for power generation by the project during this monitoring period. This has been confirmed through the on-site visit and interview with the project participants. There are no other sources of GHG emissions attributable to the project activity.

The audit team also checked the hourly generation data of the project activity and the adequate maintenance and operation of the electric meter during the monitoring period.

The verification team reviewed whether the Monitoring Report and other supporting documents, such as the calculation spreadsheets, were in accordance with the requirements of the “Issuance information and reporting checklist” /10/, the instructions for completing the monitoring report form included in the attachment of the “CDM-MR-FORM” /11/ and the “Issuance completeness checklist” /12/. Also, the verification team reviewed the monitoring report was free of material misstatements, was transparent, clear and unequivocal.

The monitoring of reductions in GHG emissions to result from the proposed CDM project activity is implemented in accordance with registered PDD and the project participants are recoding the data and parameters following the monitoring plan included in the registered PDD.

In accordance with the requirements of the Clean Development Mechanism Project Standard /13/ (paragraph 257 of the PS) PP shall provide a comparison of actual GHG emission reductions or net anthropogenic removal of the registered CDM project activity with estimates in the registered PDD. Hence, the final version of the Monitoring Report contains a comparison of the actual emission reductions claimed in the monitoring period with the estimate in the registered PDD.

In the first version of the monitoring report the estimated emission reduction (54,920 tCO<sub>2</sub>e) were lower than actual claimed emission reduction due to fact that the grid emission factor was updated with the most recent data available currently.

The claimed emission reductions for this monitoring period are 55,927 tCO<sub>2</sub>e compared with the estimated emission reductions of 82,746 tCO<sub>2</sub>e as per the registered PDD for the same period. Then, the emission reductions achieved during the current monitoring period are lower than the registered CDM-PDD.

During this monitoring period the project has produced 122,393 MWh of net energy to the grid, lower than 170,000 MW, which is the average net annual generation of the project estimated in the registered PDD (version 5). In addition, the grid emission factor stated in the PDD is 0.5038 tCO<sub>2</sub>/MWh; whereas, the grid emissions factor for 2013 is 0.45695 tCO<sub>2</sub>/MWh. Therefore, the values for energy generation and grid emission factors are lower than the established in the PDD.

In AENOR’s opinion, the difference between estimated ERs in the registered PDD and this monitoring is only due to the real condition of operation. Therefore, it can be concluded that the project was adequately implemented and it can be confirmed that technology, project equipment and monitoring and metering equipment have been implemented and operated in line with the registered PDD.

### **3.4 Update on changes and incidents**

During the on-site visit and the desk review process, the audit team reviewed different information from the operational system of the plant, as logbooks, generation records and internal reports, the metering system and communications from CDEC-SIC, and met several plant operators in order to identify incidents, deviation operation modes or downtime during the operation of the plant during the monitoring period.

After crosschecking the available information, the audit team found that the project was operating normally during the monitoring period, according to the requirements established in the registered PDD, and there have not been significant incidents (overhauled, downed or exchanged equipment) regarding the operation of the project activity during this monitoring period; except the programmed stops for maintenance and common operational failures that faces hydropower plants.

Furthermore, it was verified that there were new personnel involved in the monitoring of the energy production. However, after the interview, it was verified that new personnel received training by qualified COLBÚN staff.

### **3.5 Compliance of the monitoring plan with the monitoring methodology**

The verification team reviewed whether the CDM project activity was in accordance with the applied methodologies and if any other monitoring aspect of the project activity that is not specified in the methodologies was established.



During the on-site visit, the auditing team was able to review different records and found that the most important aspects of monitoring methodology were adequately considered and documented.

The audit team verified that the monitoring of reductions in GHG emissions to result from the proposed CDM project activity is implemented in accordance with registered PDD and the project participants are recording the data and parameters following the monitoring methodologies applied.

Therefore, the audit team considers that the monitoring plan is in compliance with the approved methodologies applied (AM0026, version 3) by the CDM project activity.

### 3.6 Compliance of monitoring with the Monitoring Plan

Regarding compliance with the Monitoring Plan, the verification team confirmed that:

- The monitoring of reductions in GHG emissions to result from the proposed CDM project activity was implemented in accordance with the Monitoring Plan contained in the registered PDD.
- The Monitoring Plan and the applied methodology had been properly implemented and followed by the project participants.
- All parameters stated in the Monitoring Plan, the applied methodology and relevant CDM EB decisions have been sufficiently monitored and updated.
- The responsibilities and authorities for monitoring and reporting were in accordance with the responsibilities and authorities stated in the Monitoring Plan.

The monitoring system and all applied procedures are in compliance with the Monitoring Plan contained in the registered PDD and the applied methodologies.

The audit team has verified that the monitoring of reductions in GHG emissions to result from the proposed CDM project activity is implemented in accordance with the Monitoring Plan contained in the registered PDD.

The project complies with the requirements. The Monitoring Plan and the applied methodologies have been properly implemented and followed by the PPs, and all management and operational system parameters have been sufficiently monitored and updated.

The parameters for achieving emission reduction calculation by the prescribed equations for baseline emissions, project emissions, leakage and emission reductions have been listed in section D. of the MR in a complete manner.

The audit team verified the information flow (from data generation, aggregation, to recording, calculation and reporting) for the monitoring parameters including the values in the monitoring report, as detailed in section 7 of the verification protocol (Annex I).

Therefore, the monitoring system and all applied procedures are in compliance with the monitoring plan contained in the registered PDD and the applied methodologies.

### 3.7 Compliance with calibration frequency requirement for measuring instruments

According to the monitoring plan, equipment used for monitoring the parameter "Electricity exported to the grid by proposed CDM project, in year y" (*Generation<sub>y</sub>*) is calculated as per net electricity measurements from e-meters located at Totoralillo substation as the sum from meters M2 and M3. Furthermore, monitored data from those meters are cross checked against electricity measurements from power plant, recorded by meter M1, and the most conservative values are chosen for emission reduction calculation

In AENOR's opinion the meters are adequately controlled and calibrated in accordance with the monitoring plan. Furthermore, no delays or equipment changes were detected during monitoring period.

The following table summarises the principal information of the meter involved in the verification process:

Meter	Details of Meter
<b><u>Meter M2:</u></b>	Type: Ion 8500 Accuracy class: 0.2% Serial number: PQ-0502A117-03 Calibration frequency: At least every two years  ✓ Previous Calibration : 27/06/2012 ✓ Last Calibration: 11/09/2013
<b><u>Meter M3:</u></b>	Type: Ion 8500 Accuracy class: 0.2% Serial number: PQ-0502A188-03 Calibration frequency: At least every two years  ✓ Previous Calibration : 27/06/2012 ✓ Last Calibration: 12/09/2013
<b><u>Meter M1:</u></b>	Type: Ion 8600 Accuracy class: 0.2% Serial number: PT-0809A131-01 Calibration frequency: At least every two years  ✓ Previous Calibration : 29/06/2012 ✓ Last Calibration: 12/09/2013

The audit team could verify the calibration certificates /14/ provided by the project participant. Therefore, AENOR confirmed that the calibrations were conducted at the frequency specified by the methodology and revised monitoring plan.

### 3.8 Assessment of data and calculation of greenhouse gas emission reductions

The audit team carried out a review of information flows for generating, aggregating and reporting the monitoring parameter to assess a completeness of monitoring in line with the registered Monitoring Plan and the applied methodology, including:

- The measurement/determination method used.
- Relevant monitoring equipment, their features and the control and calibration procedures.
- Significant inaccuracies occurred in case of measured or estimated values of some parameters.
- Measuring, reading and/or recording frequency.
- QA/QC procedures applied to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

Monitoring of reductions in GHG emissions to result from the registered project has been implemented in accordance with the Monitoring Plan. The monitoring mechanism is effective and reliable. All applicable parameters stated in the monitoring plan, the applied methodology and relevant CDM Executive Board decisions have been sufficiently monitored.

According to the applied methodologies, the emission reduction ( $ER_y$ ) by the project activity during year  $y$  is the difference between the baseline emissions ( $BE_y$ ), project emissions ( $PE_y$ ) and emissions due to leakage ( $L_y$ ).

#### **Leakage ( $L_y$ )**

According to the applied baseline methodology, Project Participants do not need to consider leakage ( $L_y=0$ ).

#### **Project emissions ( $PE_y$ )**

According to registered PDD, since the Project is a hydro power plant, there are no project emissions ( $PE_y=0$ ).

#### **Baseline emissions ( $BE_y$ )**

Baseline emissions are calculated as follow:

$$BE_y = EF_y * Generation_y$$

Where:

$EF_y$  : Baseline emission factor, in tCO<sub>2</sub>/MWh

$Generation_y$  : Electricity generated by the proposed CDM Project in year y (in MWh).

The baseline emission factor ( $EF_y$ ) is calculated as a combined margin (CM) emission factor, consisting of the combination of operating margin (OM) and build margin (BM) emission factors according to the following formula:

$$EF_y = W_{OM} * EF_{OM,y} + W_{BM} * EF_{BM}$$

Where:

$EF_{OM,y}$  : Emission factor for operating margin power generation sources, in tCO<sub>2</sub>/MWh

$EF_{BM}$  : Emission factor for build margin power generation sources, in tCO<sub>2</sub>/MWh

$W_{OM}$  : Weight for operating margin emission factor.

$W_{BM}$  : Weight for build margin emission factor

In accordance to the monitoring plan and applied methodology AM0026, version 3; the operating margin has been determined ex-post from the dispatch data obtained from CDEC-SIC and data by the CNE. In the case of build margin it had been fixed in the renewed PDD, owing to this monitoring corresponds to the second crediting period.

The weights established in the PDD for calculating the combined margin are:

$$W_{OM}=0.25$$

$$W_{BM}=0.75$$

As the monitoring period is from 01/01/2013–31/12/2013, the emission factor of the grid, the operating margin is calculated for this same year.

During the verification process, the audit team has evaluated the  $EF_{OM,y}$  calculated by the Project Participants for the monitoring period, and after checking all information received by the Project Participants, AENOR has found that they are correct and comply with the Monitoring Plan and the applied methodologies.

However, due to the complexity of calculations required by the methodology, which requires monitoring of many parameters, most of them by the hour, it is necessary to use a large amount of data and formulae to determine the  $EF_{OM,y}$ .

For this reason, the Project Participants have created many spreadsheets in order to obtain the emission operating margin. The spreadsheet "EF OM 2013 v2" [15] contains  $EF_{OM,y}$  calculations and their sources. The spreadsheet "EF Calc 2013 Chacabquito v2" [16] contains  $EF_{CM,y}$  calculations and their sources.

The Project Participants have also created several monthly spreadsheets ("Hourly OM Data month" [17] and "Marginal Plants Data Base\_month" [18]), which show the traceability of all calculations as stated in the methodology.

AENOR was able to cross check the results obtained from these excel files against CDEC-SIC web page (dispatch data [19]), CNE web page and CDEC-SIC yearbooks [20]. The auditing team has reproduced the calculation made by the PPs in spreadsheets and the same results have been obtained. Therefore, the calculation is deemed appropriate and consistent with the evidence provided and cross-checked by AENOR. Furthermore, appropriate methods and formulae for calculating baseline emissions, project emissions and leakage have been followed, and assumptions and emission factor correctly applied and justified, being in accordance with the approved methodology and the revised Monitoring Plan.

Following the review of the remaining monitoring parameters needed to determine the operating margin and build margin emission factors, the verification team verified their information flow (from data generation, aggregation, to recording, calculation and reporting) as described with details in the verification protocol, included in this report as Annex I.

On the other hand, following the Monitoring Plan, the other important monitoring parameter is the net electricity supplied by the project activity to the grid in MWh. According to the Monitoring Plan, the "Generation," should be measured with a meter with a maximum error of 0.2% and calibrated periodically.

The monitoring of energy generation was measured directly with a calibrated meter, in accordance with all requirements of the monitoring plan, which states that the electricity delivered to the grid is calculated as per net electricity measurements from e-meters located at Totoralillo substation as the sum from meters M2 and M3, monitored data is cross checked against electricity measurements at the generator of the power plant (M1).

All involved meters have not been exchanged and there is no case of failure. The monitored data of this parameter are registered in the spreadsheet "Generation and ER Chacabucito\_04092014" [21], where also it is included the final calculation of the emission reductions.

During the on-site visit, the verification team was able to check technical characteristics, control and maintenance of the meter and found that it is in accordance with the monitoring plan. Furthermore, Calibration certificates were submitted to AENOR, which verified that the meter was calibrated properly.

The metering data are recorded every 15 minutes and they are integrated hourly for recording and sent every two hours to CDEC-SIC.

## Emission reductions (ER)

Thus, according to the AM0026 v3, the emission reductions ( $ER_y$ ) are calculated as follows:

$$ER_y = BE_y = EF_y * Generation_y$$

The last version of the Monitoring Report and spreadsheets were updated with the correct information in accordance with the registered PDD and the Monitoring Plan.

Finally, after reviewing the spreadsheets and all the documents referred to in this report, AENOR was able to verify the net amount of electricity for the monitoring period, 01/01/2013–31/12/2013, which is summarized below:

Considering  $W_{OM}=0.25$  and  $W_{BM}=0.75$ , for determining baseline emission factor ( $EF_y$ ); then:

Year/Parameter	$EF_{BM,y}$ (tCO <sub>2</sub> /MWh)	$EF_{OM,y}$ (tCO <sub>2</sub> /MWh)	$EF_y$ (tCO <sub>2</sub> /MWh)
<b>2013</b>	0.44810	0.48350	0.45695

And,

Year/Parameter	Generation <sub>y</sub> (MWh)	$EF_y$ (tCO <sub>2</sub> /MWh)	$ER_y$ (tCO <sub>2</sub> )
<b>2013</b>	122,393	0.45695	55,927

Therefore, the emissions reductions corresponding to this monitoring period amounts to 55,927 tCO<sub>2</sub>e.

The verification team checked the following evidence and information:

- Characteristics of equipment installed. After performing the on-site assessment, AENOR can confirm that these technical characteristics are correct and have been stated in the MR.
- Net electricity generation measured in Chacabucito power meters.
- Cross-check of the energy generation data measured against the energy generation data provided by the CDEC-SIC.

In AENOR's opinion, the monitoring process carried out during the current period is deemed appropriate and consistent with the registered Monitoring Plan and the relevant guidance provided by the CDM Executive Board.

### **3.9 Quality of Evidence to Determine Emission Reductions**

The verification team confirmed that:

- The reported emission reductions were supported by sufficient evidence and records, with the adequate frequency and covering the full monitoring period, in accordance with the requirements established in the monitoring plan and the approved monitoring methodology.
- The source and nature of the evidence was adequate, verifiable and correctly defined or identified.
- Information provided in the monitoring report is correct because it was cross-checked against comparable data from other sources such as plant logbooks, inventories, purchase records or similar data sources.

In the desk review and during the on-site visit, the audit team cross-checked all information provided in the monitoring report and in the calculation spreadsheets against data from other sources such as the plant logbook, technical documents, purchase records, and other similar data sources included in the references section of this report (section 6). The team found that the quality of evidence and the data collection system used to determine emission reductions of the project activity were in accordance with the Monitoring Plan of the registered PDD and the applied methodology.

The net amount of electricity of 122,393 MWh and thus the claimed emission reductions of 55,927 tCO<sub>2</sub>e reported for the period 01/01/2013 to 31/12/2013 was verified by reviewing the data from the original source (CDEC-SIC databases). The audit team also verified the internal registers of the plant's operator.

Sufficient evidence was presented for the reported net electricity generation since the official measure registers and the Calibration Certificates with a positive opinion have been provided to the verification team.

In AENOR's opinion, the evidence provided are adequate to support and validate the figures stated in the Monitoring Report and they are in accordance with the Monitoring Plan of the registered PDD and the selected methodology.

### **3.10 Management System and Quality Assurance**

During the on-site visit, the verification team performed an identification of quality control and quality assurance procedures to prevent or identify and correct any errors or omissions in the reported monitoring parameters, and verified the level of implementation of the management system and quality assurance required by the Monitoring Plan.

During the on-site visit, the audit team was able to verify that monitoring systems and all applied procedures are in compliance with the Monitoring Plan and the approved methodology. The different QA/QC procedures established in the Monitoring Plan are applied.

All important monitoring tasks are established adequately and the audit team considers that the responsibilities and authorities for monitoring and reporting are in accordance with the ones stated in the Monitoring Plan. All roles and positions are well defined and implemented. Qualified personnel are involved in the monitoring procedures (monitoring plan, job descriptions, and organization chart [22]). Moreover, training for personnel involved in the monitoring procedures was held. All above statements were verified during the on-site visit and document review.

After the audit team reviewed the evidence of the fulfilment of data collection and processing, data quality control system and daily recording provided by the project participants, the team found that the procedure applied to the emission reduction calculation was in accordance with the QA/QC procedure of the monitoring plan.

"2<sup>nd</sup> Periodic Verification of 2<sup>nd</sup> Crediting Period"

"Chacabuquito Hydroelectric Power Project"

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In AENOR's opinion, the management system and quality assurance procedures have been implemented in accordance with the Monitoring Plan of the registered PDD.

### **3.11 Hints for next periodic Verification**

No FAR has been raised during this verification.

## 4 VERIFICATION AND CERTIFICATION STATEMENT

**Reporting period:** From 01/01/2013 to 31/12/2013

**Verified emission reductions in the above reporting period:**

**Emission reductions:** **55,927 tCO<sub>2</sub>equivalent**

AENOR has performed the verification of the emission reductions of the "Chacabuquito Hydroelectric Power Project" for the period 01/01/2013 to 31/12/2013.

Verification is performed in accordance with the Validation and Verification Standard version 07.0, and relevant decisions of the CDM EB and COP/MOP.

AENOR planned and performed the verification by obtaining evidence, the information and explanations that AENOR considers necessary to give reasonable assurance that the reported amount of GHG emission reductions for the period is fairly stated.

AENOR conducted the verification having regard to the Monitoring Plan included in the Renewed Project Design Document, and the applied baseline as registered for the project. This assessment included:

- Collection of evidence supporting the reported data.
- Checking whether the provisions of the Monitoring Plan, were consistently and appropriately applied.

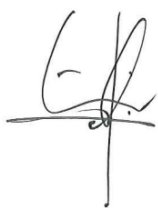
AENOR has verified whether the information included in the monitoring report version 2 is correct and that the emission reductions achieved have been determined correctly.

In AENOR's opinion, GHG emission reported for the project in monitoring report version 2 are fairly stated.

The GHG emissions reductions were calculated correctly on the basis of the approved baseline and monitoring methodology AM0026, version 3; and the monitoring plan and formulae provided in the PDD.

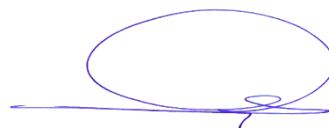
AENOR is able to certify that the emission reductions from the "**Chacabuquito Hydroelectric Power Project**" for the period 01/01/2013 to 31/12/2013 amount to **55,927 tCO<sub>2</sub>** equivalent.

Madrid, 23 October 2014



Luis Javier Arribas Alonso

Chief Verifier



Luis Robles Olmos

Authorised person

## 5 CLARIFICATION, CORRECTIVE ACTION REQUESTS AND FORWARD ACTION REQUEST

<b>PROJECT ACTIVITY</b>	<b>Chacabuquito Hydroelectric Project</b>		
<b>FINDING</b>	<b>Nº 1</b>		
<b>Classification</b>	<b>CAR</b> <input checked="" type="checkbox"/>	<b>CL</b> <input type="checkbox"/>	<b>FAR</b> <input type="checkbox"/>
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	<b>The project participants are requested to complete the monitoring report using the latest version of the monitoring report form (version 04.0.)</b>		
<b>PP RESPONSE #1</b> <i>It shall address the corrective action taken in details</i> <i>It shall provide and indentified the evidences proposed (if applicable)</i>	<i>This section shall be filled by the PP.</i> The monitoring report has been modified accordingly.		
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues. In case of non-closure additional corrective action and DOE assessments (#2, #3, etc.) shall be added</i>	<p>Section A.4 shall include the reference to the "Tool to calculate the emission factor for an electricity system".</p> <p>The date format of the crediting period used in section A.5 shall be the format DD/MM/YYYY.</p> <p>In the appendix 1, the information regarding the project participant and/or responsible person/entity is different to the information included in the current CDM-MR form, and it is not indicated clearly if the organization is project participant and/or responsible entity.</p> <p>The organization name indicated in the appendix 1 of "International Bank for Reconstruction and Development (IRBD) as Trustee of the Prototype Carbon (PCF) is different to the name indicated in section A.6 (World Bank Group).</p>		
<b>PP RESPONSE #1</b> <i>It shall address the corrective action taken in details</i> <i>It shall provide and indentified the evidences proposed (if applicable)</i>	<i>This section shall be filled by the PP.</i> The monitoring report has been modified accordingly.		
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues. In case of non-closure additional corrective action and DOE assessments (#2, #3, etc.) shall be added</i>	The final version of the monitoring report is completed using the latest version of the monitoring report form, and all information included is in accordance with the instruction described in the attachment 1 of the CDM-MR-FORM.		
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<b>CAR/CL CLOSED</b> <input checked="" type="checkbox"/>	To be checked during the periodic verification <input type="checkbox"/>	



<b>PROJECT ACTIVITY</b>	<b>Chacabuquito Hydroelectric Project</b>		
<b>FINDING</b>	<b>Nº 2</b>		
<b>Classification</b>	<b>CAR</b> <input checked="" type="checkbox"/>	<b>CL</b> <input type="checkbox"/>	<b>FAR</b> <input type="checkbox"/>
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	<b>Rounding shall be consistent in the whole documents. i.e. monthly net energy does not sum net energy considered for emission reduction calculation.</b>		
<b>PP RESPONSE #1</b>	<i>This section shall be filled by the PP.</i>		
<i>It shall address the corrective action taken in details</i>	Energy generation rounding was eliminated and in order to be consistent all values indicated in the spreadsheet considers the same amount of decimals. Rounding process was done only at CERs level calculation (to zero decimals).		
<i>It shall provide and indentified the evidences proposed (if applicable)</i>			
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues. In case of non-closure additional corrective action and DOE assessments (#2, #3, etc.) shall be added</i>	The emission reduction calculation has been carried out in accordance with the monitoring plan contained in the registered PDD and in accordance with the applied methodology, applying conservative assumptions.		
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<b>CAR/CL CLOSED</b> <input checked="" type="checkbox"/>	To be checked during the periodic verification <input type="checkbox"/>	

<b>PROJECT ACTIVITY</b>	<b>Chacabuquito Hydroelectric Project</b>		
<b>FINDING</b>	<b>Nº 3</b>		
<b>Classification</b>	<b>CAR</b> <input checked="" type="checkbox"/>	<b>CL</b> <input type="checkbox"/>	<b>FAR</b> <input type="checkbox"/>
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	<b>The values of the NCV<sub>i,y</sub> and CEF<sub>OM,i</sub> for Butane and Propane included in the sheet "Power Plant" of the spreadsheet "EF Calc" are not in accordance with the values of the original sources</b>		
<b>PP RESPONSE #1</b>	<i>This section shall be filled by the PP.</i>		
<i>It shall address the corrective action taken in details</i>	As there is no available data on NCV or EF for butane and propane in IPCC or National information sources (National Energy Balance), no data was considered in the calculation. In addition, there is only a few power plants consuming propane and butane, and for those cases, fuel consumption is not reported as well. Nevertheless, the fuels were added to the "Fuels data" sheet and also a comment explaining that no values are available or reported on data sources was included. This modification was also applied to "EF Calc 2012".  In addition, fuel consumption of power plants data was updated according to the recently published version of the CDEC-SIC yearbook that contains statistical data up to year 2013.		
<i>It shall provide and indentified the evidences proposed (if applicable)</i>			
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues. In case of non-closure additional corrective action and DOE assessments (#2, #3, etc.) shall be added</i>	According to the IPCC, the Butane and the propane shall be considered as LPG.		
<b>PP RESPONSE #1</b>	<i>This section shall be filled by the PP.</i>		
<i>It shall address the corrective action taken in details</i>	The Butane and the Propane were considered as LPG. This modification was applied to the spreadsheet "EF Calc 2013" and to the spreadsheets "Monthly Marginal Plants Data Base" corresponding to the year 2013.		
<i>It shall provide and indentified the evidences proposed (if applicable)</i>			
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues. In case of non-closure additional corrective action and DOE assessments (#2, #3, etc.) shall be added</i>	The final version of the calculation spreadsheets includes the correct value of the NCV <sub>i,y</sub> and CEF <sub>OM,i</sub> for Butane and Propane.		
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<b>CAR/CL CLOSED</b> <input checked="" type="checkbox"/>	To be checked during the periodic verification <input type="checkbox"/>	

<b>PROJECT ACTIVITY</b>	<b>Chacabuquito Hydroelectric Project</b>		
<b>FINDING</b>	<b>Nº 4</b>		
<b>Classification</b>	<b>CAR</b> <input checked="" type="checkbox"/>	<b>CL</b> <input type="checkbox"/>	<b>FAR</b> <input type="checkbox"/>
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	<b>The description of the parameter B<sub>i</sub>, included in section D.2 of the monitoring report, is not in accordance with the description of the PDD and applied methodology.</b>		
<b>PP RESPONSE #1</b> <i>It shall address the corrective action taken in details</i>	<i>This section shall be filled by the PP.</i>		
<i>It shall provide and indentified the evidences proposed (if applicable)</i>	The description of the parameter B <sub>i</sub> was corrected accordingly with the description of the PDD and applied methodology		
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues. In case of non-closure additional corrective action and DOE assessments (#2, #3, etc.) shall be added</i>	The final version of the monitoring report includes the description of the parameter B <sub>i</sub> in accordance with the registered PDD and the applied methodology.		
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<b>CAR/CL CLOSED</b> <input checked="" type="checkbox"/>	To be checked during the periodic verification <input type="checkbox"/>	

<b>PROJECT ACTIVITY</b>	<b>Chacabuquito Hydroelectric Project</b>		
<b>FINDING</b>	<b>Nº 1</b>		
<b>Classification</b>	<b>CAR</b> <input type="checkbox"/>	<b>CL</b> <input checked="" type="checkbox"/>	<b>FAR</b> <input type="checkbox"/>
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	<b>The PPs shall provide evidence of the proper qualification of the staff with new responsibilities.</b>		
<b>PP RESPONSE #1</b> <i>It shall address the corrective action taken in details</i>	<i>This section shall be filled by the PP.</i>		
<i>It shall provide and indentified the evidences proposed (if applicable)</i>	The evidences are attached in the folder named CL1.		
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues. In case of non-closure additional corrective action and DOE assessments (#2, #3, etc.) shall be added</i>	The PP has provided evidence of the contract as specialist of J. Maturana in December 1997 and of R. Benatti in September 2013, but there is no evidence of the position change of J. Maturana as Supervisor of the new area I&C Maintenance. The PP shall provide evidence of the date when J. Maturana began to have the new responsibilities as supervisor of I&C Maintenance area and evidence of the training received by him before assuming the new responsibilities.		
<b>PP RESPONSE #1</b> <i>It shall address the corrective action taken in details</i>	<i>This section shall be filled by the PP.</i>		
<i>It shall provide and indentified the evidences proposed (if applicable)</i>	New evidences are provided.		
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues. In case of non-closure additional corrective action and DOE assessments (#2, #3, etc.) shall be added</i>	Evidence provided by the PPs justified properly the qualification of the staff with new responsibilities.		
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<b>CAR/CL CLOSED</b> <input checked="" type="checkbox"/>	To be checked during the periodic verification <input type="checkbox"/>	

<b>PROJECT ACTIVITY</b>	<b>Chacabuquito Hydroelectric Project</b>		
<b>FINDING</b>	<b>Nº 2</b>		
<b>Classification</b>	<b>CAR</b> <input type="checkbox"/>	<b>CL</b> <input checked="" type="checkbox"/>	<b>FAR</b> <input type="checkbox"/>
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	<b>The project participants shall provide a copy of the current certificate of the management system</b>		
<b>PP RESPONSE #1</b> <i>It shall address the corrective action taken in details</i>	<i>This section shall be filled by the PP.</i>		
<i>It shall provide and indentified the evidences proposed (if applicable)</i>	Copies of the current certificate of the management system are attached in the folder name CL2		
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues. In case of non-closure additional corrective action and DOE assessments (#2, #3, etc.) shall be added</i>	Evidence provided by the PPs is considered correct.		
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<b>CAR/CL CLOSED</b> <input checked="" type="checkbox"/>	To be checked during the periodic verification <input type="checkbox"/>	

## 6 REFERENCES

- /1/ Renewed Registered PDD, version 5 and dated on 21/04/2011.
- /2/ Monitoring Plan
- /3/ Validation, Verification and Certification of Clean Development Mechanism (CDM) Project Activities (IE/DTC/039)
- /4/ CDM Validation and Verification Standard (VVS) version 07.0 (EB 79)
- /5/ Monitoring Report, version 1
- /6/ Monitoring Report, Version 2 (final version)
- /7/ Validation of renewal of the crediting period
- /8/ Previous verification reports
- /9/ AM0026, version 3: "Methodology for zero-emissions grid-connected electricity generation from renewable sources in Chile or in countries with merit order based dispatch grid"
- /10/ Issuance information and reporting checklist
- /11/ Monitoring Report Form, Version 4.0.
- /12/ Issuance completeness checklist
- /13/ Clean Development Mechanism Project Standard, version 07.0.
- /14/ Calibration Certificates
- /15/ Operating margin calculation spreadsheet: "*EF OM 2013 v2*"
- /16/ Grid emission factor ( $EF_{CM}$ ) calculation spreadsheet for 2013: "*EF Calc 2013 Chacabquito v2*"
- /17/ Hourly data spreadsheets: Hourly OM Data\_ "month"
- /18/ Monthly Marginal Plants spreadsheets: Marginal Plants Data Base\_ "month"
- /19/ CDEC-SIC Dispatch data
- /20/ CDEC-SIC Yearbooks
- /21/ Emission reduction calculation spreadsheet: "*Generation and ER Chacabquito\_04092014*"
- /22/ Organization chart

## **ANNEX 1. CDM VERIFICATION PROTOCOL**

VERIFICATION PROTOCOL

PROJECT: "CHACABUQUITO HYDROELECTRIC POWER PROJECT"

UNFCCC REFERENCE NUMBER: 1052

MONITORING AND REPORTING PERIOD:

FROM 2013/01/01 TO 2013/12/31

**2<sup>nd</sup> Periodic Verification**

**2<sup>nd</sup> Crediting Period**

Verification Team: Luis Javier Arribas Alonso Richard Daniel Gonzales Toledo	
Version of this Verification Protocol: 02	Date: 17/10/2014



TABLE 1 Verification requirements based on the Validation and Verification Standard (VVS) version 07.0 (CDM-EB79 Annex 4)

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<b>1. Project history</b>				
<b>Open issues from validation</b>  <i>Check (in case of 1st periodic verification) whether there are any open issues indicated in the validation report (e.g. FAR) Have they been addressed appropriately?</i>	1.1.	N/A. This is the 2 <sup>nd</sup> periodic verification of 2 <sup>nd</sup> crediting period.	N/A	N/A
<b>Open issues from previous verification</b>  <i>Check (in case of further periodic verifications) whether there are any open issues indicated in previous verification (FAR) Have they been addressed appropriately?</i>	1.2.	The verification report of the previous monitoring period has been reviewed and no open issues are indicated.	OK	OK
<b>Requests for Deviations/Revisions of Monitoring Plan</b>  <i>Check if there have been any requests for deviations from the monitoring methodology or requests for revisions of the monitoring plan. If any, make sure that they are considered during verification</i>	1.3.	During the document review, the information submitted on the UNFCCC website was checked and no request for deviation/revision has been requested. Furthermore, It has not been necessary to request any deviation or revision of the Monitoring Plan during the current verification process.	OK	OK
<b>2. Project implementation in accordance with the registered project design document</b>				

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<i>Has the CDM project activity been implemented as per the registered PDD?</i>	2.1.	<p>Yes.</p> <p>During the on-site visit, it was verified that the project is located in the physical location established in the registered PDD; version 5, dated on 21/04/2011.</p> <p>Moreover, the equipment installed in the project has similar features to the technical design of the project described in the accepted PDD, version 5.</p> <p>The main equipment installed includes:</p> <ul style="list-style-type: none"> <li>• Four vertical Francis turbines with a nominal capacity of 7.5 MW each one</li> <li>• Four generators with a nominal capacity of 8020 KVA and a nominal capacity factor of 0.9</li> <li>• One transformer with a nominal capacity of 33000 KVA</li> </ul> <p>According to the registered PDD the installed power capacity is given by the turbines. Therefore, the installed capacity is 30 MW (4 X 7.5 MW )</p>	OK	OK
<p><i>Are all physical features of the CDM project activity proposed in the registered PDD, in place?</i></p> <p><i>All figures and features included in the registered PDD shall be checked during the on-site visit. Any discrepancy found shall be reported and the post registration changes procedure shall be applied</i></p>	2.2.	<p>Yes, all physical features of the project activity are in place in accordance with the registered PDD (dated on 21/04/2011, version 5)</p>	OK	OK
<i>Have the project participants operated the CDM project activity as per the registered PDD?</i>	2.3.	<p>Yes, the project participants have operated the CDM project activity as per the registered PDD.</p>	OK	OK
<p><b>Actual status of installation works</b></p> <p><i>Project installation should be finished at time of initial verification in so far as the project should be ready to generate</i></p>	2.4.	<p>This is the 2<sup>nd</sup> verification of 2<sup>nd</sup> crediting period. Therefore, when the on-site was carried out, the installation was already generated and supplied electrical energy to the grid and the audit team could verify that the power plant was operating without any relevant incident during the monitoring</p>	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<i>emission reductions afterwards.</i>  <i>It shall be clearly described the starting date of operation and the progress of the project activity? Is the implementation delayed? What were the reasons for the delay?</i>		period. According to the monitoring report the relevant dates for the project activity are the following: <ul style="list-style-type: none"> <li>- 28/02/2001; the construction activities started</li> <li>- 01/07/2002; commissioning date</li> <li>- 22/07/2002; Start of commercial operation</li> <li>- 07/07/2007; Registration date</li> <li>- 01/07/2002; Starting date of the first crediting period</li> <li>- 04/11/2011; Starting date of the second crediting period</li> </ul>		
<b>Contractors for equipment and installation works</b> <i>Who has installed the equipment? Who was contracted for planning etc.?</i>	2.5.	The civil Works was made by Zublin and the electro mechanic equipment was installed by VATECH HYDRO Zurich.	OK	OK
<b>Project boundaries</b> <i>Check whether the project boundaries are still in compliance with the ones indicated by the PDD.</i>	2.6.	The project boundaries are in compliance with the ones indicated by the PDD	OK	OK
<b>On-site visit</b> <i>Was an on-site visit conducted? If not, justify the rationale of the decision.</i>	2.7.	Yes.  The visit to the power plant was from 23/07/2014 to 24/07/2014.  During the visit to the power plant the audit team verified the data generation, testing of monitoring equipment, calibration of official meters, sufficiency of monitoring plan and internal data quality control, monitoring procedures, among others.  The visit included a meeting at the COLBÚN headquarters; which was on 23/07/2014. During that meeting, different data from the monitoring report and spreadsheets calculation were verified.	OK	OK
<b>3. Update on Changes and Incidents (during the Monitoring Period)</b>				
<b>Incidents</b>  <i>Identify if there have been any significant incidents, deviant operation modes</i>	3.1.	During the on-site visit, the DOE reviewed documents (logbook, maintenance data base) and met to different operators. It was verified that there have not been any significant incident, deviant operation modes or downtimes of the equipment during the monitoring period. All downtimes	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<p><i>and/or downtimes of the equipment?</i></p> <p><i>Consider e.g. interviews with operational personnel, operational log sheets and analysis of performance data.</i></p>		<p>identified in the monitoring report by the Project Participants have been due to normal operation of power plant.</p> <p>In addition, the audit team could verify the maintenance shutdowns and downtimes, listed in the monitoring report, against the original source, the information inserted by the different plant operators with all the incidents and special events in the software called SIGO.</p> <p>The monitoring report includes a complete list of the downtimes events of the project activity during the monitoring period, in accordance with the evidence provided during the on site visit.</p>		
<p><i>Is the information (data and variables) provided in the monitoring report different from that stated in the registered PDD? Has it caused an increase in estimates of the emission reductions in the current monitoring period or is highly likely to increase the estimates of emission reductions in the future monitoring periods?</i></p>	3.2.	<p>No. During this monitoring period, recorded energy has been lower than expected in registered PDD. Estimated Energy in the PDD is 170 GWh/year; while energy for 2013 has been 122.393 GWh.</p> <p>In addition, the grid emission factor stated in the PDD is 0.5038 tCO<sub>2</sub>/MWh; whereas the grid emissions factor for year 2013 is 0.45695 tCO<sub>2</sub>/MWh. Then, the values are rather similar to the established in the PDD.</p> <p>Therefore, there are no data or variables that caused an increase of emission reduction in the current monitoring period.</p> <p>In fact, emissions reductions achieved during this monitoring period, 55,927 tCO<sub>2</sub>e, are lower than the amount expected as per the PDD estimations (82,746 tCO<sub>2</sub>e).</p>	OK	OK
<p><b>Personnel</b></p> <p><i>Find out, if relevant monitoring personnel have been exchanged?</i></p> <p><i>In case of changes, assure that the implemented monitoring procedures have not been affected.</i></p>	3.3.	<p>During document on-site visit it was found that there were new personnel involved in the monitoring of the energy production as consequence of the creation of the new area of I&amp;C maintenance, which has been separated of the area of electrical maintenance.</p> <p>Due to this structural change, an electrical specialist was promoted to I&amp;C supervisor and a new person was hired as electrical specialist.</p> <p>The personnel interviewed during the on-site visit were:</p> <ul style="list-style-type: none"> <li>• Eduardo Aguilera: Operation Power Plant Manager</li> <li>• Mauricio Sandoval: Operation supervisor</li> <li>• Marna Alvarado: Masso unit supervisor</li> </ul>	<b>CL 1</b>	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
		<ul style="list-style-type: none"> <li>• Mauricio Orellana: Deputy Manager of the Aconcagua Complex</li> <li>• Javier Arancibia: Chacabucito plant operator</li> <li>• Claudio Urtubia: Assistant operator of the load camera</li> <li>• Mariela Ramos: CDM Consultant</li> <li>• Soledad Palma: CDM Consultant</li> <li>• María Luz Farah: CDM Consultant</li> <li>• Cristian Fuentes: TI area staff</li> <li>• Cristián Mosella Vial : Sustainable Development Department</li> <li>• Paula Reyes Figueroa: Sustainable Development Department</li> </ul> <p><b>CL 1: The PPs shall provide evidence of the proper qualification of the staff with new responsibilities.</b></p> <p><b>CL 1 is closed.</b></p> <p>Although some relevant monitoring personnel have been exchanged, the PPs have provided proper evidence to assure that the implemented monitoring procedures have not been affected.</p>		
<b>Legislation</b>  <i>Find out whether relevant legislation with effect on the project activity in the host country has been changed.</i>	3.4.	Relevant legislation was considered. No relevant changes since the validation were identified.	OK	OK
<b>4. Monitoring Report – General</b>				
<i>Is the monitoring report (and other supporting documents) provided complete in accordance with latest applicable version of the Issuance information and reporting checklist?</i>	4.1.	Yes, the monitoring report is complete in accordance with the applicable version of the Completeness checklist, and Information and reporting checklist for request for issuance of CERs.	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<i>Is the Monitoring Report Form (CDM-MR) used by the Project participants in the monitoring report?</i>	4.2.	<p>No, the project participants are using the monitoring report form (F-CDM-MR) Version 03.2.</p> <p><b>CAR 1: The project participants are requested to complete the monitoring report using the latest version of the monitoring report form (version 04.0.)</b></p> <p><b>CAR 1 is closed.</b></p> <p>The final version of the monitoring report is completed using the latest version of the monitoring report form.</p>	<b>CAR 1</b>	OK
<i>Is the monitoring report and other supporting documents provided complete in accordance with latest applicable version of the Guidelines for completing the monitoring report form (CDM-MR)?</i>	4.3.	<p>All information included in the final version of the monitoring report is in accordance with the instruction described in the attachment 1 of the CDM-MR-FORM.</p>	<b>CAR 1</b>	OK
<p><b>Monitoring period</b></p> <p><i>Check if the monitoring period is in line with a) the crediting period and/or b) previous monitoring periods?</i></p>	4.4.	<p>This is the second crediting period and according to the PDD the starting date of the second crediting period was estimated on 01/07/2009, but the renewal of the project was delayed until 04/11/2011. Therefore, the starting date of the second crediting period is the renewal date of the project.</p> <p>On the other hand, according to UNFCCC website:</p> <ul style="list-style-type: none"> <li>• The first crediting period is from 01/07/2002 to 30/06/2009</li> <li>• The second crediting period is from 04/11/2011 03/11/2018</li> <li>• The first periodic verification, of second crediting period is from 04/11/2011 to 31/12/2012</li> </ul> <p>The current monitoring period is from 01/01/2013 to 31/12/2013; therefore, is in line with the renewal of the crediting period (second crediting period) and its first verification</p>	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<b>Publication of Monitoring Report</b>  <i>Check if the monitoring report has been made publicly available on the UNFCCC website before the verification commenced.</i>	4.5.	The monitoring report, as received from the project participants was made public on 01/07/2014, before the verification commenced.	OK	OK
<b>Transparency</b>  <i>Assess if the monitoring report is transparent, i.e. clear and unequivocal</i>	4.6.	All information included in the final version of the monitoring report is transparent, clear and unequivocal.	<b>CAR 1</b>	OK
<b>Misstatements on general issues</b>  <i>Assess whether the monitoring report is free of material misstatements regarding issues other than the monitoring parameters.</i>  <i>Discuss the monitoring parameters in detail in chapter "Monitoring Parameters".</i>	4.7.	All information included in the final version of the monitoring report is free of material misstatements.	<b>CAR 1</b>	OK
<b>5. Compliance of the monitoring plan with the monitoring methodology.</b>				
<i>Is the validated monitoring plan of the proposed CDM project activity in accordance with the applied methodology?</i>	5.1.	During the document review, the Project Design Document, including the Monitoring Plan and Monitoring Report were verified. The audit team found that the monitoring plan is in accordance with applied methodology:  <i>AM0026 ver. 3 - Methodology for zero-emissions grid-connected electricity generation from renewable sources in Chile or in countries with merit order based dispatch grid</i>	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<i>Are there any monitoring aspects of the project activity that are not specified in the methodology, particularly in the case of small-scale methodologies (e.g. additional monitoring parameters, monitoring frequency and calibration frequency)?</i>	5.2.	Yes.  Although the methodology does not specify the frequency of calibration, the PP has included the calibrations procedures in the monitoring plan.  The calibration is performed every two years by qualified and competent certifier, authorized by the national official organisms. If the equipment does not fulfill the Class 02, it will be replaced.	OK	OK
<b>6. Compliance of monitoring with the monitoring plan</b>				
<i>Is the monitoring of reductions in GHG emissions to result from the proposed CDM project activity implemented in accordance with the monitoring plan contained in the registered PDD or the accepted revised monitoring plan?</i>	6.1.	Yes, the proposed CDM project activity is implemented in accordance with the monitoring plan contained in the registered PDD.  The baseline emissions and emission reduction are calculated in the spreadsheet called: " <i>Generation and ER Chacabquito</i> "  <b>CAR 2: Rounding shall be consistent in the whole documents. i.e. monthly net energy does not sum net energy considered for emission reduction calculation.</b>  <b>CAR 2 is closed.</b>  The monitoring of reductions in GHG emissions to result from the proposed CDM project activity and included in the final version of the monitoring report and the calculation spreadsheets has been carried out in accordance with the monitoring report.	<b>CAR 2</b>	OK
<i>Have the monitoring plan and the applied methodology been properly implemented and followed by the project participants?</i>	6.2.	Yes. The monitoring plan and the applied methodology have been properly implemented and followed by the project participants.  The power plant has three electricity meters, M1, M2 and M3. The electricity meter M1, which is located between the generation bar and the power transformer, measures the electricity generated by the four units. The meters M2 and M3 (main meters for the CDM monitoring plan) measure the net electricity delivered to the grid by the project activity at the interconnection point.  During the on-site visit the verification team found that the meters used for recording the energy, generated by the project, were properly registering the energy submitted to CDEC-SIC.	OK	OK



Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<i>Have all parameters stated in the monitoring plan, the applied methodology and relevant CDM Executive Board decisions been sufficiently monitored and updated as applicable (Project emission, baseline emission, leakage, management and operational system and environmental and social parameters)</i>	6.3.	<p>The audit team could verify that all parameters stated in the monitoring plan, the applied methodology and relevant CDM Executive Board decisions have been sufficiently monitored and updated.</p> <ul style="list-style-type: none"> <li>• All project emission parameters have been monitored.</li> <li>• All baseline emission parameters have been monitored.</li> <li>• No leakage parameters have to be monitored, as there is no leakage as per the methodology.</li> </ul>	OK	OK
<i>Are the responsibilities and authorities for monitoring and reporting in accordance with the responsibilities and authorities stated in the monitoring plan?</i>	6.4.	Yes. All important monitoring tasks are established adequately and are in accordance with the responsibilities and authorities stated in the Monitoring Plan.	OK	OK
<b>7. Monitoring Parameters</b> (List all parameters of the PDD chapter B.7.1; pl. copy the lines below for each parameter)				
<b>7.1. Symbol of parameter: Generation,</b>	<b>7.1.</b>	<b>Description: <i>Electricity exported to the grid by proposed CDM project, in year y</i></b>		
<b>Measurement   Determination method</b>  <i>Describe how the monitoring parameter was measured   determined.</i>  <i>Check if relevant equipment has been exchanged and if in cases of failures   downtimes of standard equipment other measurement   determination methods have been used.</i>  <i>Assess whether the measurement or determination method (data generation,</i>	7.1.1.	<p>According to the monitoring report, the power plant has three electricity meters, M1, M2 and M3. The electricity meter M1, which is located between the generation bar and the power transformer, measures the electricity from the four units. The meters M2 and M3 (main meters for the CDM monitoring plan) measure the net electricity submitted to the grid.</p> <p>On the other hand, registered PDD version 5 states that the sum of energy measured by M2 and M3 meters is directly sent and validated by the CDEC-SIC.</p> <p>Verification reviewed monitored data and compared with energy considered in the emission reduction calculation. All the assumption is considered conservative and in line with applied methodology and monitoring plan.</p> <p>Electricity measurements are taken automatically every 15 minutes. Then, the hourly total is calculated. Electricity delivered to the grid is calculated as per net electricity measurements from e-</p>	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion														
<i>frequency, aggregation, equipment, recording, reporting, standards) is in line with the registered monitoring plan of the PDD and the applied methodology.</i>		<p>meters located at Totoralillo substation as the sum from meters M2 and M3. Furthermore, monitored data from those meters are cross checked against electricity measurements from power plant, recorded by meter M1.</p> <p>The verification team verified on-site that all indicated meters were properly installed.</p> <p>The monitoring report provided clear and unequivocal information regarding the calibration dates of the different meters, in accordance with the evidence provided.</p> <p>Calibration certificates were submitted to AENOR, which verified that all installed meters were calibrated in accordance with the requirements of the monitoring plan.</p> <p>The relevant equipment has not been exchanged during the monitoring period and no failures or downtimes have been produced during the monitoring period.</p>																
<b>Monitoring Equipment</b>  <i>Is the equipment of used for monitoring (quality, type, accuracy, calibration requirements) in accordance with the relevant guidance provided by the CDM Executive Board and is equipment controlled and calibrated in accordance with the monitoring plan?</i>	7.1.2.	<p>Equipment used for monitoring is adequate and is controlled and calibrated in accordance with the monitoring plan. Furthermore, during the on-site visit, the verification team could check technical characteristics, control and maintenance of the meters and found that they are in accordance with the monitoring plan.</p> <p>Net energy is registered by two electricity meters, with following characteristics:</p> <table><tr><td><b><u>Meter M2:</u></b></td><td><b><u>Meter M3:</u></b></td></tr><tr><td>Type: Ion 8500</td><td>Type: Ion 8500</td></tr><tr><td>Accuracy class: 0.2%</td><td>Accuracy class: 0.2%</td></tr><tr><td>Serial number: PQ-0502A117-03</td><td>Serial number: PQ-0502A188-03</td></tr><tr><td>Calibration frequency: At least every two years</td><td>Calibration frequency: At least every two years</td></tr><tr><td>Previous Calibration : 27/06/2012</td><td>Previous Calibration : 27/06/2012</td></tr><tr><td>Last Calibration: 11/09/2013</td><td>Last Calibration: 12/09/2013</td></tr></table>	<b><u>Meter M2:</u></b>	<b><u>Meter M3:</u></b>	Type: Ion 8500	Type: Ion 8500	Accuracy class: 0.2%	Accuracy class: 0.2%	Serial number: PQ-0502A117-03	Serial number: PQ-0502A188-03	Calibration frequency: At least every two years	Calibration frequency: At least every two years	Previous Calibration : 27/06/2012	Previous Calibration : 27/06/2012	Last Calibration: 11/09/2013	Last Calibration: 12/09/2013	OK	OK
<b><u>Meter M2:</u></b>	<b><u>Meter M3:</u></b>																	
Type: Ion 8500	Type: Ion 8500																	
Accuracy class: 0.2%	Accuracy class: 0.2%																	
Serial number: PQ-0502A117-03	Serial number: PQ-0502A188-03																	
Calibration frequency: At least every two years	Calibration frequency: At least every two years																	
Previous Calibration : 27/06/2012	Previous Calibration : 27/06/2012																	
Last Calibration: 11/09/2013	Last Calibration: 12/09/2013																	

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
		<p>Energy from the four units is recorded by the following meter:</p> <p><b><u>Meter M1:</u></b></p> <p>Type: Ion 8600</p> <p>Accuracy class: 0.2%</p> <p>Serial number: PT-0809A131-01</p> <p>Calibration frequency: At least every two years</p> <p>Previous Calibration : 29/06/2012</p> <p>Last Calibration: 12/09/2013</p> <p>Therefore, the audit team considers that the equipment of used for monitoring (quality, type, accuracy, calibration requirements) is in accordance with the relevant guidance provided by the CDM Executive Board and is controlled and calibrated in accordance with the monitoring plan.</p>		
<p><b>Accuracy</b></p> <p><i>In case of measured (or estimated) values, check whether significant inaccuracies occur; in this case, make sure that appropriate discounts have been considered for ER calculation.</i></p>	7.1.3.	The calibration certificates of the meters, verified by the audit team, indicate that the meters did not have significant inaccuracies during the monitoring period.	OK	OK
<p><b>Monitoring results</b></p> <p><i>Are monitoring results consistently recorded as per approved frequency?</i></p>	7.1.4.	Yes, monitoring results were recorded as per approved frequency in the monitoring plan.	OK	OK
<p><b>Quality assurance and quality</b></p>	7.1.5.	Yes, there is a quality assurance and quality control procedure.	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<b>control procedures</b>  <i>Have quality assurance and quality control procedures been applied in accordance with the monitoring plan to prevent or identify and correct any errors or omissions in the reported monitoring parameters?</i>		The measurement equipment has to comply with Chilean Official Regulation NCh 2542.Of2001: "Alternating Current Watt-Meter for Active Energy Classes 0.2 S and 0.5 S" will be applied. The elaboration of the NCh 2542 considered the international norm IEC 60687 "Alternating Current Watt-Meter for Active Energy (Classes 0.2 S and 0.5 S)" in addition to others like NCh 2024/1 and IEC 61036.  Furthermore, project participant has developed a procedure for gathering recorded energy: Procedure PO.18, which accounts the procedures for data collection related to the CDM.		
<b>Verification</b>  <i>Describe how the value and the information flow (from data generation, aggregation, to recording, calculation and reporting) were verified. Consider the measurement   determination procedure, accuracies,</i>  <i>QA/QC procedure, source and nature of the evidence. Consider as well plausibility checks as far as possible. Check if the applied value could be backed up by corresponding evidence covering the full monitoring period.</i>	7.1.6.	The audit team verified the data from the original source (CDEC-SIC databases). The audit team also verified the internal registers of the plant's operator and the operator of Colbún Operations Centre, finding that the information flow was in accordance with the implemented procedures and Monitoring Plan.	OK	OK
<b>7.2. Symbol of parameter: EF<sub>y</sub></b>	<b>7.2.</b>	<b>Description: CO<sub>2</sub>e Emission factor of the displaced energy from the grid</b>		
<b>Measurement   Determination method</b>  <i>Describe how the monitoring parameter was measured   determined.</i>  <i>Check if relevant equipment has been</i>	7.2.1.	The monitoring parameter is calculated as the weighted sum of the build margin - EF <sub>BM</sub> - fixed for the second crediting period, and operating margin - EF <sub>OM</sub> - emission factors, according to the formula (7) of the methodology AM0026 version 3.	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<i>exchanged and if in cases of failures   downtimes of standard equipment other measurement   determination methods have been used.</i>  <i>Assess whether the measurement or determination method (data generation, frequency, aggregation, equipment, recording, reporting, standards) is in line with the registered monitoring plan of the PDD and the applied methodology.</i>				
<b>Monitoring Equipment</b>  <i>Is the equipment of used for monitoring (quality, type, accuracy, calibration requirements) in accordance with the relevant guidance provided by the CDM Executive Board and is equipment controlled and calibrated in accordance with the monitoring plan?</i>	7.2.2.	Not applicable, as this parameter is not measured.	OK	OK
<b>Accuracy</b>  <i>In case of measured (or estimated) values, check whether significant inaccuracies occur; in this case, make sure that appropriate discounts have been considered for ER calculation.</i>	7.2.3.	There is no significant inaccuracy in the calculation of this parameter.	OK	OK
<b>Monitoring results</b>  <i>Are monitoring results consistently</i>	7.2.4.	This parameter is calculated annually, according to the methodology.	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<i>recorded as per approved frequency?</i>				
<b>Quality assurance and quality control procedures</b>  <i>Have quality assurance and quality control procedures been applied in accordance with the monitoring plan to prevent or identify and correct any errors or omissions in the reported monitoring parameters?</i>	7.2.5.	Yes, the quality assurance and quality control procedures determined in the Monitoring Plan have been applied.	OK	OK
<b>Verification</b>  <i>Describe how the value and the information flow (from data generation, aggregation, to recording, calculation and reporting) were verified. Consider the measurement   determination procedure, accuracies,</i>  <i>QA/QC procedure, source and nature of the evidence. Consider as well plausibility checks as far as possible. Check if the applied value could be backed up by corresponding evidence covering the full monitoring period.</i>	7.2.6.	The verification team checked spreadsheets "EF OM 2013" and "EF calc 2013 Chacabquito".  The used data and supporting document were checked against energy records provided by CDEC-SIC, CNE node price report, official statistics and 2006 IPCC Guidelines for National Greenhouse Gas Inventories.	OK	OK
<b>7.3. Symbol of parameter: EF<sub>OM,y</sub></b>	<b>7.3.</b>	<b>Description: <i>Operating margin emission factor for year y</i></b>		
<b>Measurement   Determination method</b>  <i>Describe how the monitoring parameter</i>	7.3.1.	The parameter EF <sub>OM,y</sub> is calculated in accordance with the formula (8) of the monitoring methodology AM0026 version 3.  During the verification process, AENOR, evaluated the EF <sub>OM,y</sub> calculated by the Project Participants for	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<p><i>was measured   determined.</i></p> <p><i>Check if relevant equipment has been exchanged and if in cases of failures   downtimes of standard equipment other measurement   determination methods have been used.</i></p> <p><i>Assess whether the measurement or determination method (data generation, frequency, aggregation, equipment, recording, reporting, standards) is in line with the registered monitoring plan of the PDD and the applied methodology.</i></p>		<p>2013. After checking all information received, the audit team found that it is correct and complies with the Monitoring Plan and the methodology, AM0026 v3.</p> <p>However, due to the complexity of calculations required by the methodology, which requires monitoring of many parameters, most with hourly frequency, it is necessary to use a large amount of data and formulae to determine the parameters. For that reason, the project participants developed many spreadsheets for the calculation.</p> <p>Hourly data generation and dispatch priority are obtained from CDEC-SIC (dispatch centre). Data are downloaded to the spreadsheet "EF Calc 2013 Chacabquito" contains EF<sub>OM,y</sub>, EF<sub>BM</sub> (Fixed) and EF<sub>CM</sub> calculation</p> <p>In order to verify the results obtained, provided data was checked by the audit team against provided evidence (dispatch priority) and official information on CDEC-SIC web page, assessed the results and the traceability of all calculations are in accordance with the methodology.</p>		
<p><b>Monitoring Equipment</b></p> <p><i>Is the equipment of used for monitoring (quality, type, accuracy, calibration requirements) in accordance with the relevant guidance provided by the CDM Executive Board and is equipment controlled and calibrated in accordance with the monitoring plan ?</i></p>	7.3.2.	Not applicable, as this parameter is not measured.	OK	OK
<p><b>Accuracy</b></p> <p><i>In case of measured (or estimated) values, check whether significant inaccuracies occur; in this case, make sure that appropriate discounts have been considered for ER calculation.</i></p>	7.3.3.	There is no significant inaccuracy in the calculation of these parameters.	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<b>Monitoring results</b>  <i>Are monitoring results consistently recorded as per approved frequency?</i>	7.3.4.	This parameter is calculated annually, according to the methodology.	OK	OK
<b>Quality assurance and quality control procedures</b>  <i>Have quality assurance and quality control procedures been applied in accordance with the monitoring plan to prevent or identify and correct any errors or omissions in the reported monitoring parameters?</i>	7.3.5.	Yes, the quality assurance and quality control procedures determined in the Monitoring Plan have been applied.	OK	OK
<b>Verification</b>  <i>Describe how the value and the information flow (from data generation, aggregation, to recording, calculation and reporting) were verified. Consider the measurement   determination procedure, accuracies,</i>  <i>QA/QC procedure, source and nature of the evidence. Consider as well plausibility checks as far as possible. Check if the applied value could be backed up by corresponding evidence covering the full monitoring period.</i>	7.3.6.	The verification team checked all data, their sources and the calculations of the excel file used to calculate the parameters.  The results obtained in the Excel files have been checked against provided evidence and available downloaded data from dispatch centre (CDEC-SIC) web page.	OK	OK
<b>7.4. Symbol of parameter: <math>EF_{j,h}</math></b>	<b>7.4.</b>	<b>Description: <i>Operating Margin Emission Factor for proposed CDM project j for hour h</i></b>		



Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<b>Measurement / Determination method</b>  <i>Describe how the monitoring parameter was measured   determined.</i>  <i>Check if relevant equipment has been exchanged and if in cases of failures   downtimes of standard equipment other measurement   determination methods have been used.</i>  <i>Assess whether the measurement or determination method (data generation, frequency, aggregation, equipment, recording, reporting, standards) is in line with the registered monitoring plan of the PDD and the applied methodology.</i>	7.4.1.	<p>The parameter <math>EF_{j,h}</math> is calculated in accordance with the formula (9) of the monitoring methodology AM0026 version 3.</p> <p>During the verification process, AENOR, evaluated the <math>EF_{OM,y}</math> calculated by the Project Participants for 2013. After checking all information received, the audit team found that it is correct and complies with the Monitoring Plan and the methodology, AM0026 v3.</p> <p>However, due to the complexity of calculations required by the methodology, which requires monitoring of many parameters, most with hourly frequency, it is necessary to use a large amount of data and formulae to determine the parameters. For that reason, the project participants developed many spreadsheets for the calculation.</p> <p>Hourly data generation and dispatch priority are obtained from CDEC-SIC (dispatch centre). Data are downloaded to the spreadsheet "EFOM 2013", which contain <math>EF_{j,h}</math> and <math>EF_{OM,y}</math> calculation.</p> <p>In order to verify the results obtained, provided data was checked against provided evidence (dispatch priority) and official information on CDEC-SIC web page.</p> <p>AENOR could cross-check the results and the traceability of all calculations as stated in the methodology.</p>	OK	OK
<b>Monitoring Equipment</b>  <i>Is the equipment of used for monitoring (quality, type, accuracy, calibration requirements) in accordance with the relevant guidance provided by the CDM Executive Board and is equipment controlled and calibrated in accordance with the monitoring plan?</i>	7.4.2.	Not applicable, as this parameter is not measured.	OK	OK
<b>Accuracy</b>  <i>In case of measured (or estimated) values, check whether significant</i>	7.4.3.	There is no significant inaccuracy in the calculation of these parameters.	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<i>inaccuracies occur; in this case, make sure that appropriate discounts have been considered for ER calculation.</i>				
<b>Monitoring results</b>  <i>Are monitoring results consistently recorded as per approved frequency?</i>	7.4.4.	This parameter is calculated hourly, according to the methodology.	OK	OK
<b>Quality assurance and quality control procedures</b>  <i>Have quality assurance and quality control procedures been applied in accordance with the monitoring plan to prevent or identify and correct any errors or omissions in the reported monitoring parameters?</i>	7.4.5.	Yes, the quality assurance and quality control procedures determined in the Monitoring Plan have been applied.	OK	OK
<b>Verification</b>  <i>Describe how the value and the information flow (from data generation, aggregation, to recording, calculation and reporting) were verified. Consider the measurement   determination procedure, accuracies,</i>  <i>QA/QC procedure, source and nature of the evidence. Consider as well plausibility checks as far as possible. Check if the applied value could be backed up by corresponding evidence covering the full</i>	7.4.6.	The verification team checked all data, their sources and the calculations of the excel file used to calculate the parameters.  The results obtained in the Excel files have been checked against provided evidence and available downloaded data from dispatch centre (CDEC-SIC) web page.	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<i>monitoring period.</i>				
<b>7.5. Symbol of parameter: <math>D(f,i)</math></b>	<b>7.5.</b>	<b>Description: <i>Energy displacement of the marginal plant <math>f^h</math> due to the proposed CDM project <math>f^h</math></i></b>		
<b>Measurement / Determination method</b>  <i>Describe how the monitoring parameter was measured   determined.</i>  <i>Check if relevant equipment has been exchanged and if in cases of failures   downtimes of standard equipment other measurement   determination methods have been used.</i>  <i>Assess whether the measurement or determination method (data generation, frequency, aggregation, equipment, recording, reporting, standards) is in line with the registered monitoring plan of the PDD and the applied methodology.</i>	7.5.1.	This parameter is calculated in accordance with the formula (11) of the monitoring methodology AM0026 version 3. The calculation is done in a monthly and using the spreadsheets called <i>Hourly_OM_Data_"month".xls</i>	OK	OK
<b>Monitoring Equipment</b>  <i>Is the equipment of used for monitoring (quality, type, accuracy, calibration requirements) in accordance with the relevant guidance provided by the CDM Executive Board and is equipment controlled and calibrated in accordance</i>	7.5.2.	Not applicable, as this parameter is not measured.	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<i>with the monitoring plan ?</i>				
<b>Accuracy</b>  <i>In case of measured (or estimated) values, check whether significant inaccuracies occur; in this case, make sure that appropriate discounts have been considered for ER calculation.</i>	7.5.3.	There is no significant inaccuracy in the calculation of this parameter.	OK	OK
<b>Monitoring results</b>  <i>Are monitoring results consistently recorded as per approved frequency?</i>	7.5.4.	This parameter is calculated hourly, according to the methodology. Data from 2013 have been used for this monitoring period	OK	OK
<b>Quality assurance and quality control procedures</b>  <i>Have quality assurance and quality control procedures been applied in accordance with the monitoring plan to prevent or identify and correct any errors or omissions in the reported monitoring parameters?</i>	7.5.5.	Yes, the quality assurance and quality control procedures determined in the Monitoring Plan have been applied.	OK	OK
<b>Verification</b>  <i>Describe how the value and the information flow (from data generation, aggregation, to recording, calculation and reporting) were verified. Consider the measurement   determination procedure, accuracies,</i>	7.5.6.	The verification team checked all data and their sources and the calculations of the Excel files used to calculate the parameter "Hourly OM Data_"month".xls".  The Excel files have been compared with data used from others spreadsheets used in the calculation, and official data provided by the project participant and the dispatch centre (CDEC-SIC) web page.	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<i>QA/QC procedure, source and nature of the evidence. Consider as well plausibility checks as far as possible. Check if the applied value could be backed up by corresponding evidence covering the full monitoring period.</i>				
<b>7.6. Symbol of parameter: <math>d_i</math></b>	<b>7.6.</b>	<b>Description: <i>Emission factor for electricity displaced <math>D(f,i)</math></i></b>		
<b>Measurement   Determination method</b>  <i>Describe how the monitoring parameter was measured   determined.</i>  <i>Check if relevant equipment has been exchanged and if in cases of failures   downtimes of standard equipment other measurement   determination methods have been used.</i>  <i>Assess whether the measurement or determination method (data generation, frequency, aggregation, equipment, recording, reporting, standards) is in line with the registered monitoring plan of the PDD and the applied methodology.</i>	7.6.1.	This parameter is calculated in accordance with the formula (12) of the monitoring methodology AM0026 version 3, using the monthly calculation spreadsheet <i>Hourly OM Data_ "month"</i> .	OK	OK
<b>Monitoring Equipment</b>  <i>Is the equipment of used for monitoring (quality, type, accuracy, calibration requirements) in accordance with the relevant guidance provided by the CDM</i>	7.6.2.	Not applicable, as this parameter is not measured.	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<i>Executive Board and is equipment controlled and calibrated in accordance with the monitoring plan ?</i>				
<b>Accuracy</b>  <i>In case of measured (or estimated) values, check whether significant inaccuracies occur; in this case, make sure that appropriate discounts have been considered for ER calculation.</i>	7.6.3.	There is no significant inaccuracy in the calculation of this parameter.	OK	OK
<b>Monitoring results</b>  <i>Are monitoring results consistently recorded as per approved frequency?</i>	7.6.4.	This parameter is calculated according to the methodology	OK	OK
<b>Quality assurance and quality control procedures</b>  <i>Have quality assurance and quality control procedures been applied in accordance with the monitoring plan to prevent or identify and correct any errors or omissions in the reported monitoring parameters?</i>	7.6.5.	Yes, the quality assurance and quality control procedures determined in the Monitoring Plan have been applied.	OK	OK
<b>Verification</b>  <i>Describe how the value and the information flow (from data generation, aggregation, to recording, calculation and reporting) were verified. Consider the measurement   determination procedure,</i>	7.6.6.	The verification team checked all data and their sources and the calculations of the Excel files used to calculate the parameter; " <i>Marginal Plants Data Base_ "month".xls</i> ".	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<p><i>accuracies,</i></p> <p><i>QA/QC procedure, source and nature of the evidence. Consider as well plausibility checks as far as possible. Check if the applied value could be backed up by corresponding evidence covering the full monitoring period.</i></p>				
<b>7.7. Symbol of parameter: SCFi</b>	<b>7.7.</b>	<b>Description: <i>Specific fuel consumption per unit of electric energy produced in the "i" marginal plant</i></b>		
<p><b>Measurement / Determination method</b></p> <p><i>Describe how the monitoring parameter was measured   determined.</i></p> <p><i>Check if relevant equipment has been exchanged and if in cases of failures   downtimes of standard equipment other measurement   determination methods have been used.</i></p> <p><i>Assess whether the measurement or determination method (data generation, frequency, aggregation, equipment, recording, reporting, standards) is in line with the registered monitoring plan of the PDD and the applied methodology.</i></p>	7.7.1.	This parameter is calculated by dividing annual fuel consumption by annual generation of each power source (information available in the CDEC-SIC databases). If this information is not available, the specific fuel consumption presented in the CNE node price report is used.	OK	OK
<p><b>Monitoring Equipment</b></p> <p><i>Is the equipment of used for monitoring</i></p>	7.7.2.	Not applicable, as this parameter is not measured.	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<i>(quality, type, accuracy, calibration requirements) in accordance with the relevant guidance provided by the CDM Executive Board and is equipment controlled and calibrated in accordance with the monitoring plan ?</i>				
<b>Accuracy</b>  <i>In case of measured (or estimated) values, check whether significant inaccuracies occur; in this case, make sure that appropriate discounts have been considered for ER calculation.</i>	7.7.3.	There is no significant inaccuracy	OK	OK
<b>Monitoring results</b>  <i>Are monitoring results consistently recorded as per approved frequency?</i>	7.7.4.	This parameter is obtained annually, according to the Monitoring Plan.	OK	OK
<b>Quality assurance and quality control procedures</b>  <i>Have quality assurance and quality control procedures been applied in accordance with the monitoring plan to prevent or identify and correct any errors or omissions in the reported monitoring parameters?</i>	7.7.5.	Yes, the quality assurance and quality control procedures determined in the Monitoring Plan have been applied.	OK	OK
<b>Verification</b>  <i>Describe how the value and the information flow (from data generation,</i>	7.7.6.	The audit team verified the data from the original source.	OK	OK



Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
aggregation, to recording, calculation and reporting) were verified. Consider the measurement   determination procedure, accuracies,  QA/QC procedure, source and nature of the evidence. Consider as well plausibility checks as far as possible. Check if the applied value could be backed up by corresponding evidence covering the full monitoring period.				
<b>7.8. Symbol of parameter: <math>NCV_{i,y}</math></b>	<b>7.8.</b>	<b>Description: <i>Net calorific value of fossil fuel type i in year y</i></b>		
<b>Measurement   Determination method</b>  Describe how the monitoring parameter was measured   determined.  Check if relevant equipment has been exchanged and if in cases of failures   downtimes of standard equipment other measurement   determination methods have been used.  Assess whether the measurement or determination method (data generation, frequency, aggregation, equipment, recording, reporting, standards) is in line with the registered monitoring plan of the PDD and the applied methodology.	7.8.1.	<p><b>CAR 3: The values of the <math>NCV_{i,y}</math> and <math>CEF_{OM,i}</math> for Butane and Propane included in the sheet "Power Plant" of the spreadsheet "EF Calc" are not in accordance with the values of the original sources.</b></p> <p><b>CAR 3 is closed.</b></p> <p>NCV is determined from gross calorific values published by CNE in the Energy Balance Report; these values were corrected to Net Calorific Values based on the IPCC 2006 assumption, which states that for liquid fuels, Net Calorific Value is 5% lower than its Gross Calorific Value and for Gas fuels; Net Calorific Value is 10% lower than its Gross Calorific Value.</p>	<b>CAR 3</b>	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<b>Monitoring Equipment</b>  <i>Is the equipment of used for monitoring (quality, type, accuracy, calibration requirements) in accordance with the relevant guidance provided by the CDM Executive Board and is equipment controlled and calibrated in accordance with the monitoring plan ?</i>	7.8.2.	Not applicable, as this parameter is not measured.	OK	OK
<b>Accuracy</b>  <i>In case of measured (or estimated) values, check whether significant inaccuracies occur; in this case, make sure that appropriate discounts have been considered for ER calculation.</i>	7.8.3.	There is no significant inaccuracy in these parameters.	<b>CAR 3</b>	OK
<b>Monitoring results</b>  <i>Are monitoring results consistently recorded as per approved frequency?</i>	7.8.4.	Annually, according to the monitoring plan	<b>CAR 3</b>	OK
<b>Quality assurance and quality control procedures</b>  <i>Have quality assurance and quality control procedures been applied in accordance with the monitoring plan to prevent or identify and correct any errors or omissions in the reported monitoring parameters?</i>	7.8.5.	Yes, the quality assurance and quality control procedures determined in the Monitoring Plan have been applied.	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<b>Verification</b>  <i>Describe how the value and the information flow (from data generation, aggregation, to recording, calculation and reporting) were verified. Consider the measurement   determination procedure, accuracies,</i>  <i>QA/QC procedure, source and nature of the evidence. Consider as well plausibility checks as far as possible. Check if the applied value could be backed up by corresponding evidence covering the full monitoring period.</i>	7.8.6.	Data included in the spreadsheets were checked against official sources. Gross calorific values are published in the CNE Energy Balance Report. The values are in accordance with the source.	<b>CAR 3</b>	OK
<b>7.9. Symbol of parameter: <math>CEF_{OM,i}</math></b>	<b>7.9.</b>	<b>Description: <math>CO_2</math> emission factor of fuel used in <math>i^{th}</math> marginal power plant.</b>		
<b>Measurement   Determination method</b>  <i>Describe how the monitoring parameter was measured   determined.</i>  <i>Check if relevant equipment has been exchanged and if in cases of failures   downtimes of standard equipment other measurement   determination methods have been used.</i>  <i>Assess whether the measurement or determination method (data generation, frequency, aggregation, equipment, recording, reporting, standards) is in line</i>	7.9.1.	This data is obtained from IPCC.  Default values at the lower limit of the uncertainty at 95% confidence interval, provided in Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories is used.	<b>CAR 3</b>	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<i>with the registered monitoring plan of the PDD and the applied methodology.</i>				
<b>Monitoring Equipment</b>  <i>Is the equipment of used for monitoring (quality, type, accuracy, calibration requirements) in accordance with the relevant guidance provided by the CDM Executive Board and is equipment controlled and calibrated in accordance with the monitoring plan ?</i>	7.9.2.	Not applicable, as this parameter is not measured.	OK	OK
<b>Accuracy</b>  <i>In case of measured (or estimated) values, check whether significant inaccuracies occur; in this case, make sure that appropriate discounts have been considered for ER calculation.</i>	7.9.3.	There is no significant inaccuracy in the calculation of these parameters.	<b>CAR 3</b>	OK
<b>Monitoring results</b>  <i>Are monitoring results consistently recorded as per approved frequency?</i>	7.9.4.	Annually, according to the monitoring plan.	OK	OK
<b>Quality assurance and quality control procedures</b>  <i>Have quality assurance and quality control procedures been applied in accordance with the monitoring plan to prevent or identify and correct any errors or omissions in the reported monitoring</i>	7.9.5.	Yes, the quality assurance and quality control procedures determined in the Monitoring Plan have been applied.	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
parameters?				
<b>Verification</b>  <i>Describe how the value and the information flow (from data generation, aggregation, to recording, calculation and reporting) were verified. Consider the measurement   determination procedure, accuracies,</i>  <i>QA/QC procedure, source and nature of the evidence. Consider as well plausibility checks as far as possible. Check if the applied value could be backed up by corresponding evidence covering the full monitoring period.</i>	7.9.6.	Data included in the monitoring report and spreadsheets have been checked against the data of table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.	<b>CAR 3</b>	OK
<b>7.10. Symbol of parameter: <i>M</i></b>	<b>7.10.</b>	<b>Description: <i>Number of electricity generation plants on the margin, that would supply to the system in the absence of the CDM projects in the system</i></b>		
<b>Measurement   Determination method</b>  <i>Describe how the monitoring parameter was measured   determined.</i>  <i>Check if relevant equipment has been exchanged and if in cases of failures   downtimes of standard equipment other measurement   determination methods have been used.</i>  <i>Assess whether the measurement or</i>	7.10.1.	This parameter is calculated using formula (10) of the monitoring methodology AM0026 version 3, using the spreadsheets <i>Hourly OM Data_"month"</i>	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<i>determination method (data generation, frequency, aggregation, equipment, recording, reporting, standards) is in line with the registered monitoring plan of the PDD and the applied methodology.</i>				
<b>Monitoring Equipment</b>  <i>Is the equipment of used for monitoring (quality, type, accuracy, calibration requirements) in accordance with the relevant guidance provided by the CDM Executive Board and is equipment controlled and calibrated in accordance with the monitoring plan ?</i>	7.10.2.	Not applicable, as this parameter is not measured.	OK	OK
<b>Accuracy</b>  <i>In case of measured (or estimated) values, check whether significant inaccuracies occur; in this case, make sure that appropriate discounts have been considered for ER calculation.</i>	7.10.3.	There is no significant inaccuracy in the calculation of this parameter	OK	OK
<b>Monitoring results</b>  <i>Are monitoring results consistently recorded as per approved frequency?</i>	7.10.4.	This parameter is calculated hourly, according to the methodology.	OK	OK
<b>Quality assurance and quality control procedures</b>  <i>Have quality assurance and quality control procedures been applied in</i>	7.10.5.	Yes, the quality assurance and quality control procedures determined in the Monitoring Plan have been applied.	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<i>accordance with the monitoring plan to prevent or identify and correct any errors or omissions in the reported monitoring parameters?</i>				
<b>Verification</b>  <i>Describe how the value and the information flow (from data generation, aggregation, to recording, calculation and reporting) were verified. Consider the measurement   determination procedure, accuracies,</i>  <i>QA/QC procedure, source and nature of the evidence. Consider as well plausibility checks as far as possible. Check if the applied value could be backed up by corresponding evidence covering the full monitoring period.</i>	7.10.6.	The verification team checked all data and their sources and the calculations of the Excel files used to calculate the parameter.	OK	OK
<b>7.11. Symbol of parameter: <i>N</i></b>	<b>7.11.</b>	<b>Description: <i>Total number of CDM projects in the system, where <i>N</i> is the CDM project built first and 1 is the last CDM project built in the system.</i></b>		
<b>Measurement   Determination method</b>  <i>Describe how the monitoring parameter was measured   determined.</i>  <i>Check if relevant equipment has been exchanged and if in cases of failures   downtimes of standard equipment other measurement   determination methods</i>	7.11.1.	The information of this parameter is obtained from CDEC-SIC and UNFCCC registered projects for the country.	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<p><i>have been used.</i></p> <p><i>Assess whether the measurement or determination method (data generation, frequency, aggregation, equipment, recording, reporting, standards) is in line with the registered monitoring plan of the PDD and the applied methodology.</i></p>				
<p><b>Monitoring Equipment</b></p> <p><i>Is the equipment of used for monitoring (quality, type, accuracy, calibration requirements) in accordance with the relevant guidance provided by the CDM Executive Board and is equipment controlled and calibrated in accordance with the monitoring plan ?</i></p>	7.11.2.	Not applicable, as this parameter is not measured.	OK	OK
<p><b>Accuracy</b></p> <p><i>In case of measured (or estimated) values, check whether significant inaccuracies occur; in this case, make sure that appropriate discounts have been considered for ER calculation.</i></p>	7.11.3.	There is no significant inaccuracy.	OK	OK
<p><b>Monitoring results</b></p> <p><i>Are monitoring results consistently recorded as per approved frequency?</i></p>	7.11.4.	As required, the correct information is obtained every monitoring period or when a new plant in Chile is registered as a CDM project activity.	OK	OK



Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<b>Quality assurance and quality control procedures</b>  <i>Have quality assurance and quality control procedures been applied in accordance with the monitoring plan to prevent or identify and correct any errors or omissions in the reported monitoring parameters?</i>	7.11.5.	Yes, the quality assurance and quality control procedures determined in the Monitoring Plan have been applied.	OK	OK
<b>Verification</b>  <i>Describe how the value and the information flow (from data generation, aggregation, to recording, calculation and reporting) were verified. Consider the measurement   determination procedure, accuracies,</i>  <i>QA/QC procedure, source and nature of the evidence. Consider as well plausibility checks as far as possible. Check if the applied value could be backed up by corresponding evidence covering the full monitoring period.</i>	7.11.6.	The audit team checked CDM registered plants against the UNFCCC web page	OK	OK
<b>7.12. Symbol of parameter: <math>C_j</math></b>	<b>7.12.</b>	<b>Description: <i>Electricity generated by <math>j^{th}</math> CDM plant in hour <math>h</math></i></b>		
<b>Measurement   Determination method</b>  <i>Describe how the monitoring parameter was measured   determined.</i>	7.12.1.	The data of this parameter are obtained from CDEC-SIC databases.	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<p><i>Check if relevant equipment has been exchanged and if in cases of failures   downtimes of standard equipment other measurement   determination methods have been used.</i></p> <p><i>Assess whether the measurement or determination method (data generation, frequency, aggregation, equipment, recording, reporting, standards) is in line with the registered monitoring plan of the PDD and the applied methodology.</i></p>				
<p><b>Monitoring Equipment</b></p> <p><i>Is the equipment of used for monitoring (quality, type, accuracy, calibration requirements) in accordance with the relevant guidance provided by the CDM Executive Board and is equipment controlled and calibrated in accordance with the monitoring plan ?</i></p>	7.12.2.	Not applicable, as this parameter is obtained from CDEC-SIC databases.	OK	OK
<p><b>Accuracy</b></p> <p><i>In case of measured (or estimated) values, check whether significant inaccuracies occur; in this case, make sure that appropriate discounts have been considered for ER calculation.</i></p>	7.12.3.	There is not any significant inaccuracy in the calculation of this parameter.	OK	OK
<p><b>Monitoring results</b></p>	7.12.	This parameter is calculated hourly, according to the methodology. 2013 data was used.	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<i>Are monitoring results consistently recorded as per approved frequency?</i>	4.			
<b>Quality assurance and quality control procedures</b>  <i>Have quality assurance and quality control procedures been applied in accordance with the monitoring plan to prevent or identify and correct any errors or omissions in the reported monitoring parameters?</i>	7.12.5.	Yes, the quality assurance and quality control procedures determined in the Monitoring Plan have been applied.	OK	OK
<b>Verification</b>  <i>Describe how the value and the information flow (from data generation, aggregation, to recording, calculation and reporting) were verified. Consider the measurement   determination procedure, accuracies,</i>  <i>QA/QC procedure, source and nature of the evidence. Consider as well plausibility checks as far as possible. Check if the applied value could be backed up by corresponding evidence covering the full monitoring period.</i>	7.12.6.	The audit team verified the data from the original source.	OK	OK
<b>7.13. Symbol of parameter: <math>A_i</math></b>	<b>7.13.</b>	<b>Description: <i>Generation capacity of the <math>i^{\text{th}}</math> plant on the margin during hour <math>h</math></i></b>		
<b>Measurement / Determination method</b>	7.13.1.	The data of this parameter are obtained from CDEC-SIC databases.	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<p><i>Describe how the monitoring parameter was measured   determined.</i></p> <p><i>Check if relevant equipment has been exchanged and if in cases of failures   downtimes of standard equipment other measurement   determination methods have been used.</i></p> <p><i>Assess whether the measurement or determination method (data generation, frequency, aggregation, equipment, recording, reporting, standards) is in line with the registered monitoring plan of the PDD and the applied methodology.</i></p>				
<p><b>Monitoring Equipment</b></p> <p><i>Is the equipment of used for monitoring (quality, type, accuracy, calibration requirements) in accordance with the relevant guidance provided by the CDM Executive Board and is equipment controlled and calibrated in accordance with the monitoring plan ?</i></p>	7.13.2.	Not applicable, as this parameter is obtained from an external source.	OK	OK
<p><b>Accuracy</b></p> <p><i>In case of measured (or estimated) values, check whether significant inaccuracies occur; in this case, make sure that appropriate discounts have been</i></p>	7.13.3.	There is no significant inaccuracy in the calculation of these parameters.	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<i>considered for ER calculation.</i>				
<b>Monitoring results</b>  <i>Are monitoring results consistently recorded as per approved frequency?</i>	7.13.4.	This parameter is calculated hourly, according to the methodology. 2013 data was used.	OK	OK
<b>Quality assurance and quality control procedures</b>  <i>Have quality assurance and quality control procedures been applied in accordance with the monitoring plan to prevent or identify and correct any errors or omissions in the reported monitoring parameters?</i>	7.13.5.	Yes, the quality assurance and quality control procedures determined in the Monitoring Plan have been applied.	OK	OK
<b>Verification</b>  <i>Describe how the value and the information flow (from data generation, aggregation, to recording, calculation and reporting) were verified. Consider the measurement   determination procedure, accuracies,</i>  <i>QA/QC procedure, source and nature of the evidence. Consider as well plausibility checks as far as possible. Check if the applied value could be backed up by corresponding evidence covering the full monitoring period.</i>	7.13.6.	The audit team verified the data from the original source.	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<b>7.14. Symbol of parameter: <math>B_i</math></b>	<b>7.14.</b>	<b>Description: Electricity generated by <math>i^{\text{th}}</math> plant on the margin during hour <math>h</math></b>		
<b>Measurement / Determination method</b>  <i>Describe how the monitoring parameter was measured   determined.</i>  <i>Check if relevant equipment has been exchanged and if in cases of failures   downtimes of standard equipment other measurement   determination methods have been used.</i>  <i>Assess whether the measurement or determination method (data generation, frequency, aggregation, equipment, recording, reporting, standards) is in line with the registered monitoring plan of the PDD and the applied methodology.</i>	7.14. 1.	The data of this parameter are obtained from CDEC-SIC databases.  <b>CAR 4: The description of the parameter <math>B_i</math>, included in section D.2 of the monitoring report, is not in accordance with the description of the PDD and applied methodology.</b>  <b>CAR 4 is closed.</b>	<b>CAR 4</b>	OK
<b>Monitoring Equipment</b>  <i>Is the equipment of used for monitoring (quality, type, accuracy, calibration requirements) in accordance with the relevant guidance provided by the CDM Executive Board and is equipment controlled and calibrated in accordance with the monitoring plan ?</i>	7.14. 2.	Not applicable, as this parameter is obtained from an external source.	OK	OK
<b>Accuracy</b>  <i>In case of measured (or estimated)</i>	7.14. 3.	There is no significant inaccuracy in the calculation of this parameter.	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<i>values, check whether significant inaccuracies occur; in this case, make sure that appropriate discounts have been considered for ER calculation.</i>				
<b>Monitoring results</b>  <i>Are monitoring results consistently recorded as per approved frequency?</i>	7.14.4.	This parameter is calculated hourly, according to the methodology. 2013 data was used.	OK	OK
<b>Quality assurance and quality control procedures</b>  <i>Have quality assurance and quality control procedures been applied in accordance with the monitoring plan to prevent or identify and correct any errors or omissions in the reported monitoring parameters?</i>	7.14.5.	Yes, the quality assurance and quality control procedures determined in the Monitoring Plan have been applied.	OK	OK
<b>Verification</b>  <i>Describe how the value and the information flow (from data generation, aggregation, to recording, calculation and reporting) were verified. Consider the measurement   determination procedure, accuracies,</i>  <i>QA/QC procedure, source and nature of the evidence. Consider as well plausibility checks as far as possible. Check if the applied value could be backed up by</i>	7.14.6.	The audit team verified the data from the original source.	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<i>corresponding evidence covering the full monitoring period.</i>				
<b>7.15. Symbol of parameter:</b> <b>Oxid<sub>i</sub></b>	<b>7.15.</b>	<b>Description: <i>Fraction of fuel oxidized on combustion</i></b>		
<b>Measurement / Determination method</b>  <i>Describe how the monitoring parameter was measured   determined.</i>  <i>Check if relevant equipment has been exchanged and if in cases of failures   downtimes of standard equipment other measurement   determination methods have been used.</i>  <i>Assess whether the measurement or determination method (data generation, frequency, aggregation, equipment, recording, reporting, standards) is in line with the registered monitoring plan of the PDD and the applied methodology.</i>	7.15. 1.	The data of this parameter are obtained from IPCC.	OK	OK
<b>Monitoring Equipment</b>  <i>Is the equipment of used for monitoring (quality, type, accuracy, calibration requirements) in accordance with the relevant guidance provided by the CDM Executive Board and is equipment controlled and calibrated in accordance</i>	7.15. 2.	Not applicable, as this parameter is obtained from an external source.	OK	OK



Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<i>with the monitoring plan ?</i>				
<b>Accuracy</b>  <i>In case of measured (or estimated) values, check whether significant inaccuracies occur; in this case, make sure that appropriate discounts have been considered for ER calculation.</i>	7.15.3.	There is no significant inaccuracy in the calculation of these parameters.	OK	OK
<b>Monitoring results</b>  <i>Are monitoring results consistently recorded as per approved frequency?</i>	7.15.4.	This parameter is monitored in accordance with the approved frequency.	OK	OK
<b>Quality assurance and quality control procedures</b>  <i>Have quality assurance and quality control procedures been applied in accordance with the monitoring plan to prevent or identify and correct any errors or omissions in the reported monitoring parameters?</i>	7.15.5.	Yes, the quality assurance and quality control procedures determined in the revised Monitoring Plan have been applied.	OK	OK
<b>Verification</b>  <i>Describe how the value and the information flow (from data generation, aggregation, to recording, calculation and reporting) were verified. Consider the measurement   determination procedure, accuracies,</i>	7.15.6.	The audit team verified the data from the original source.	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<i>QA/QC procedure, source and nature of the evidence. Consider as well plausibility checks as far as possible. Check if the applied value could be backed up by corresponding evidence covering the full monitoring period.</i>				
<b>8. Compliance with the calibration frequency requirements for measuring instruments</b>				
<p><i>Has the calibration been delayed and the calibration has been implemented after the monitoring period in consideration (results of delayed calibration are available)?</i></p> <p><i>If so, which conservative approach has been adopted:</i></p> <p>a) <i>Applying the maximum permissible error of the instrument to the measured values taken during the period between the schedule date of calibration and the actual date of calibration, if the results of the delayed calibration do not show any error, or if the error is smaller than maximum permissible error, or</i></p> <p>b) <i>Applying the error identified in the delayed calibration test, if the error is beyond the maximum permissible error.</i></p>	8.1	The calibrations were properly performed, according to the MP. No delays were registered during the monitoring.	OK	OK
<p><i>Has the error been applied:</i></p> <p>a) <i>In a conservative manner, such that</i></p>	8.2	Not applicable.	N/A	N/A

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<i>the adjusted measured values of the delayed calibration has result in fewer claimed emission reductions?, and b) For all measures taken during the period between the scheduled date of calibration and the actual date of calibration.</i>				
<i>If the results of the delayed calibration are not available, or the calibration has not been conducted at the time of the verification; has been request to the project participants to conduct the required calibration? If so, has the project participants calculated the emission reductions conservatively?</i>	8.3	Not applicable.	N/A	N/A
<i>If it is not possible for the project participant to conduct the calibration at a frequency specified by either the applied methodology, guidance provided by the Board, and/or registered monitoring plan due to reasons beyond the control of project participants; has been followed the requirements for post registration changes in accordance with VVS?</i>	8.4	Not applicable.	N/A	N/A
<i>If calibration frequency for measuring equipments are not specified neither the monitoring methodology nor the monitoring plan; has the equipments been calibrated in accordance with specifications of the local/national standards, or as manufacturer's</i>	8.5	N/A, as the calibration frequency for measuring equipment is specified in the monitoring plan.	N/A	N/A

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<i>specification, or international standards?</i>				
<i>Has the project participant provided information regarding the accreditation of the entity performing the test of the measurement equipment and/or standard/regulation against which calibration was done and/or acceptance criteria for the calibration of the measurement equipment?</i>	8.6	PP has provided calibration certificates, developed by CAM Chile S.A. The conclusion of the certificates states that the meters are within the accuracy class (0.2) and comply with the standard IEC 62053-22.	OK	OK
<b>9. Assessment of data and calculation of greenhouse gas emission reductions</b>				
<i>It is assessed if GHG emission reductions achieved by the proposed CDM project activity are calculated applying the selected methodology.</i>	9.1.	Yes. The emission reductions achieved by the proposed CDM project activity have been calculated applying the selected methodology	OK	OK
<i>Is a complete set of data for the specified monitoring period available? Are available evidence sufficient both in terms of frequency and in covering the full monitoring period? Are the source and the nature of evidence identified (external or internal, oral or documented, etc.)?</i>	9.2.	Yes. A complete set of data is available for the specified monitoring period and the properly evidence to support them.  The monitoring report and calculations spreadsheets provide the correct reference or link of the source or evidence to obtain the necessary data for covering the full monitoring period, with the frequency required in the monitoring plan.	OK	OK
<i>Whether data were not available because activity levels or non-activity parameters were not monitored in accordance with the registered monitoring plan has the most conservative assumption</i>	93.	Not Applicable.  All data is available	N/A	N/A

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<i>theoretically possible been made?</i>				
<i>Assess if the calculation is fully traceable. In case of complex calculations an Excel calculation spreadsheet shall be used. All applied formulae must be visible.</i>	9.4	The calculation spreadsheets include all applied formulae, which are visible, and the calculation is fully traceable.	OK	OK
<i>Is the spreadsheet with the emission reductions calculations provided complete in accordance with latest applicable version of the Issuance information and reporting checklist?</i>	9.5.	The audit team was able to verify that the final version of the spreadsheets with the emissions reductions calculations were in accordance with the latest applicable version of the issuance information and reporting checklist	OK	OK
<i>Has information provided in the monitoring report been cross-checked with other sources such as plant log books, inventories, purchase records, laboratory analysis?</i>	9.6.	Data included in the Monitoring Report and spreadsheets provided by the project participants have been checked against data included on the CDEC-SIC website, data from IPCC Guidelines on National GHG Inventories, calibration certificates, manufacturer documents and technical reports.	OK	OK
<i>Have calculations of baseline emissions, CDM project activity emissions and leakage, as appropriate, been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology document?</i>	9.7.	The audit team found that calculations of baseline emissions, CDM project activity emissions and leakage have been carried out in accordance with the formulae and methods described in the Monitoring Plan and the applied methodology.	OK	OK
<i>Have any assumptions used in emission calculations been justified?</i>	9.8.	All assumptions used in emission calculations have been adequately justified.	OK	OK
<i>Have appropriate emission factors, IPCC default values and other reference values been correctly applied?</i>	9.9.	The project participant has used appropriate emissions factors, IPCC default values and other reference values, incorporating into the calculation of the ex-post grid emission factor the most recent data.	<b>CAR 3</b>	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<i>Are the most recent data incorporated into the calculation of the ex-post grid emission factor?</i>				
<b>10. Quality Management; defined organizational structure, responsibilities and competencies Internal QA/QC and document control</b>				
<b>Management System</b>  <i>Have the GHG data monitoring system and all CDM monitoring procedures been implemented? Do they comply with the monitoring systems and procedures described in the monitoring plan and the approved methodology?</i>	10.1.	<p>The Emissions Reductions Calculation Procedure, Energy Generation Data, Quality Control and Monitoring Procedure are in accordance with procedures described in the monitoring plan. Moreover, the company has a certified management system; therefore, the company has many procedures integrated into the management system, allowing having a better quality in monitoring procedures.</p> <p>The renovation audit of the certified management system was carried out in 2013, but the project participants did not provide evidence of the renovation of the certification during the on site visit.</p> <p><b>CL 2: The project participants shall provide a copy of the current certificate of the management system.</b></p> <p><b>CL 2 closed.</b></p>	<b>CL 2</b>	OK
<b>Roles and Positions</b>  <i>Check if all roles and positions of each person in the GHG data management process are clearly defined and implemented, from raw data generation to submission of the final data.</i>  <i>Check further if only duly qualified personnel is involved in the monitoring procedures.</i>	10.2.	<p>All roles and positions of each person in the GHG data management process are implemented in accordance with the monitoring plan and clearly defined in the final version of the monitoring report and/or internal procedures.</p>	<b>CL 1</b>	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<b>Trainings</b> <i>Check if initial trainings have been carried out, in case deemed necessary.</i>	10.3.	During the on-site visit AENOR was able to verify that the team involved in CDM procedures is well trained. Also, the new staff was properly trained by qualified personnel from COLBÚN.	<b>CL 1</b>	OK
<b>Troubleshooting procedures</b> <i>Assess whether troubleshooting procedures have been implemented.</i>	10.4.	During the on-site visit the audit team found that troubleshooting procedures have been implemented. Furthermore, due to the company has a certified management system, the procedures are included in the management system. The troubleshooting procedures are described in the Management and Operation System Manual.	OK	OK
<b>Maintenance procedures</b> <i>Are appropriate maintenance procedures in place?</i>	10.5.	During the on-site visit the audit team found that maintenance procedures have been implemented, according to the monitoring plan and manufacturer requirements. Furthermore, due to the company has a certified management system, the procedures are included in the management system. The Maintenance procedures are properly described in the Management and Operation System Manual.	OK	OK
<b>Reporting procedures</b> <i>Check how reports with relevance for the later determination of emission reductions will be generated.</i> <i>Is the frequency of emissions reports established?</i>	10.6.	The project participant has developed a Management and Operation System Manual in order to establish all the procedures and responsibilities related to the fulfillment of the CDM related issues. This System includes all the procedures related to the monitoring plan, such as the monitoring and verification procedures, in order to assure the proper development of the activities of the monitoring plan.	OK	OK
<b>Internal QA/QC</b> <i>Assess whether there are any procedures in place on when, where and how checks and reviews are to be carried out, and what evidence needs to be documented?</i> <i>(This might include spot checks by a second person not performing the calculations over manual data transfers, changes in assumptions and the overall</i>	10.7.	The project participant has developed a Management and Operation System Manual in order to establish all the procedures and responsibilities related to the fulfillment of the CDM related issues. This System includes all the procedures related to the monitoring plan, such as the monitoring and verification procedures, in order to assure the proper development of the activities of the monitoring plan.  As part of the management system, the Project participants have carried out internal audits in October 2012 and May 2013.	OK	OK

Checklist Question	Ref	Comments	Draft conclusion	Final conclusion
<i>reliability of the calculation processes.)</i>				
<b>Data collection and data processing systems</b> <i>Check the eligibility of used systems.</i>  <i>Does data collection system meet the requirements of the monitoring plan as per the applied methodology?</i>	10.8.	<p>The project participant has developed a Management and Operation System Manual in order to establish all the procedures and responsibilities related to the fulfillment of the CDM related issues. This System includes all the procedures related to the monitoring plan, such as the monitoring and verification procedures, in order to assure the proper development of the activities of the monitoring plan.</p> <p>Moreover, the project participant has developed a specific procedure for data collection: PO.18. Data collection from energy meters, established in the Management and Operation System Manual</p>	OK	OK
<b>Data archive</b>  <i>Check whether all data of monitoring parameters are recorded and archived according to the monitoring plan and the approved methodology.</i>	10.9.	<p>All records of monitoring parameters are archived according to the monitoring plan and the approved methodology.</p> <p>Several different software are used for this reason by the project participants, such as SIGO, for operational data; ION Enterprise, for measurement data; or, LIVELINK, for documentation.</p>	OK	OK
<b>Data protection</b>  <i>Assess whether appropriate measures have been take in order to avoid unintended or intended manipulation of the measured data.</i>	10.10	<p>During the on-site visit the audit team checked the security procedures implemented in the power plant, the audit team verified that appropriate measures have been taking to avoid unintended or intended manipulation of the measured data.</p>	OK	OK



## ANNEX 2. APPOINTMENT CERTIFICATES

### CERTIFICATE OF QUALIFICATION

**Subject:** Verification and Technical Review Team for "Chacabuquito Hydroelectric Power Project"

Madrid, 23/10/2014

Hereby I confirm the following records of qualification, according with AENOR internal instruction "Validation, Verification and Certification of Clean Development Mechanism (CDM) project activities" IE-DTC-039, and in relation with the verification process of the above mentioned project activity:

Name: **Luis Javier ARRIBAS ALONSO**

CDM Chief Validator: N/A

CDM Validator: N/A

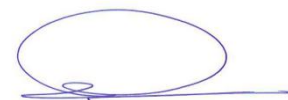
CDM Chief Verifier: Yes

CDM Verifier: Yes

External Technical Expert: N/A

Technical areas related with the project activity:

TA1.2: Energy generation from renewable energy sources.



Luis Robles Olmos  
Technology Coordinator

## CERTIFICATE OF QUALIFICATION

**Subject:** Verification and Technical Review Team for "Chacabuquito Hydroelectric Power Project"

Madrid, 23/10/2014

Hereby I confirm the following records of qualification, according with AENOR internal instruction "Validation, Verification and Certification of Clean Development Mechanism (CDM) project activities" IE-DTC-039, and in relation with the verification process of the above mentioned project activity:

Name: **Richard Daniel GONZALES TOLEDO**

CDM Chief Validator: N/A

CDM Validator: N/A


CDM Chief Verifier: Yes

CDM Verifier: Yes

External Technical Expert: N/A

Technical areas related with the project activity:

TA1.2: Energy generation from renewable energy sources.



Luis Robles Olmos  
Technology Coordinator

## CERTIFICATE OF QUALIFICATION

**Subject:** Verification and Technical Review Team for "Chacabuquito Hydroelectric Power Project"

Madrid, 23/10/2014

Hereby I confirm the following records of qualification, according with AENOR internal instruction "Validation, Verification and Certification of Clean Development Mechanism (CDM) project activities" IE-DTC-039, and in relation with the verification process of the above mentioned project activity:

Name: **José Luis FUENTES PÉREZ**

CDM Chief Validator: N/A

CDM Validator: N/A


CDM Chief Verifier: Yes

CDM Verifier: Yes

External Technical Expert: N/A

Technical areas related with the project activity:

TA1.2: Energy generation from renewable energy sources.



Luis Robles Olmos  
Technology Coordinator