

# VERIFICATION REPORT



Combined Cycle at Loma de la Lata Thermo Unit Project:  
UNFCCC REGISTRATION N° 7178

Central Térmica Loma de la Lata S.A.  
(Argentina)

VERIFICATION PERIOD  
11/03/2013 TO 31/12/2013

REPORT N° CDMVER-14-005-02

MARCH, 2015

## VERIFICATION REPORT



Date of First Issue:	27/10/2014	Registration N°	7178
Audit Team:	Cristian Grisales Lead Auditor and Technical Expert (Sector 1)	Organizational Unit:	Instituto Colombiano de Normas Técnicas y Certificación - ICONTEC Cra 37# 52-85 Bogotá-Colombia
Project Title:	Combined Cycle at Loma de la Lata Thermo Unit Project		
Version N°:	02	Last Version Date:	March 2015
Sectoral Scope	1 : Energy industries (renewable - / non-renewable sources)	Verified Monitoring Period:	01 11/03/2013 – 31/12/2013
Client:	Central Térmica Loma de la Lata S.A.		

### Summary:

ICONTEC performed the 1<sup>st</sup> verification of the registered CDM project *Combined Cycle at Loma de la Lata Thermo Unit Project* in Argentina on the basis of UNFCCC criteria contained in Article 12 of the Kyoto Protocol and CDM modalities and procedures according to the Marrakech Agreement, the criteria of the CDM Executive Board and the host country, as well as the operational and technical monitoring criteria specific to this type of project.

The proposed project activity under verification process is based on methodology ACM0007, version 06.1.0. The project involves the conversion of a pre-existing single cycle generation plant consisting of three natural gas turbines with 369.93 MW of gross installed capacity into a combined cycle power plant at the Central Térmica Loma de la Lata Facility.

The Project activity consists in three Heat Recovery Steam Generators (HRSG), which capture the heat from the exhaust gases released to the atmosphere by the three gas turbines and uses it to produce steam. The steam produced in the HRSG is used to drive a 175.73 MW gross capacity steam turbine.

The verification process consisted of the following three phases:

- I. Desk review of the monitoring documentation, registered PDD, validation report and if apply, relevant information (e.g. IPCC reports).
- II. On-site visit and follow up interviews with project stakeholders.
- III. Resolution of outstanding issues and the issuance of the final verification and certification report.

A step by step description of dates in which the activities related to the project were undertaken is presented as follows:

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Date	Undertaken Activity
19/05/2014	Sign of the verification contract between ICONTEC and the client
15/09/2014	Publication of the Monitoring Report on the UNFCCC CDM website
16/09/2014 - 19/09/2014	Desk review of the monitoring documentation
19/09/2014	Delivery to the client of the audit plan and identified findings during the desk review
01/10/2014 - 03/10/2014	On-site visit to the project activity
03/10/2014	Delivery to the client of the identified findings during the on-site visit
17/10/2014	Review of the proposed action plan for the raised findings and closing
27/10/2014 - 29/10/2014	Writing of the Draft Verification Report
04/12/2014 - 05/12/2014	ICONTEC's internal technical review
09/12/2014	Writing of the final Verification Report
11/12/2014	Attention of comments from the client
12/12/2014	Uploading of the project's documentation to UNFCCC web page.
27/01/2015	Request for issuance incomplete
26/02/2015	Corrections to the Verification Report
09/03/2015	Uploading of the project's documentation to UNFCCC web page.

The review of the monitoring documentation, registered PDD, validation report, relevant information and interviews during the on-site visit allowed ICONTEC to collect enough evidence to completely assess the verification criteria and determinate that the project has been implemented as planned and as it has been described in the registered PDD version 07. Emission reductions were correctly calculated based on the PDD and the monitoring equipment with an impact on the claimed emission reductions work reliably. The monitoring system is in place and has been calibrated appropriately. ICONTEC can confirm that the GHG emission reductions are calculated without material misstatements.

Hence ICONTEC can confirm the following:

Monitoring Period:	11/03/2013 – 31/12/2013
Baseline Emissions:	949,194 tCO <sub>2</sub> e
Project Emissions:	635,327 tCO <sub>2</sub> e
Leakage Emissions:	8,712 tCO <sub>2</sub> e
Emission Reductions:	305,155 tCO <sub>2</sub> e

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The proposed verification is the first verification of the project.

Work verified by:	Francy Ramirez CDM Technical Reviewer	<input checked="" type="checkbox"/> No distribution without permission from the client or responsible organizational unit <input type="checkbox"/> Limited distribution <input type="checkbox"/> Unrestricted distribution
Technical review date:	09/12/2014	
Number of pages:	60	

## Abbreviations

CAR	Corrective Action Request
CDM	Clean Development Mechanism
ERs	Emission Reductions
CERs	Certified emission reductions
CL	Clarification Request
CO <sub>2</sub> e	Carbon dioxide equivalent
DNA	Designated National Authority
DOE	Designated Operational Entity
GHG	Greenhouse Gases
ICONTEC	Colombian Institute of Technical Standards and Certification (Instituto Colombiano de Normas Técnicas y Certificación)
MoC	Modalities of Communication
PDD	Project Design Document
MR	Monitoring Report
UNFCCC	United Nations Framework Convention for Climate Change
VVS	CDM Validation and Verification Standard
PP	Project Participant
IPCC	Intergovernmental Panel on Climate Change
PS	CDM Project Standard
PCP	CDM Project Cycle Procedure
HRSG	Heat Recovery Steam Generator
CTLL	Central Térmica Loma de la Lata

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## **1. Introduction**

Central Térmica Loma de la Lata S.A. commissioned ICONTEC to perform the 1<sup>st</sup> verification of Combined Cycle at Loma de la Lata Thermo Unit Project (hereafter called “the project”).

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

The verification report contains the verification and certification statements for the certified emission reductions from the data collected from 11/03/2013 to 31/12/2013.

According to the documentation of the project activity, it consists in the conversion of a pre-existing single cycle generation plant consisting of three natural gas turbines with 369.93 MW of gross installed capacity into a combined cycle power plant at the Central Térmica Loma de la Lata Facility.

The Project activity consists in three Heat Recovery Steam Generators (HRSG), which capture the heat from the exhaust gases released to the atmosphere by the three gas turbines and uses it to produce steam. The steam produced in the HRSG is used to drive a 175.73 MW gross capacity steam turbine.

### **1.1. Objective**

According to CDM Modalities and Procedures (Decision 17/CP.7), the purpose of a verification process is the periodical independent review and ex-post determination of the monitored reductions which have occurred as a result of the registered CDM project activity during the verification period.

Based on the applicable requirements of paragraph 62 of the CDM modalities and procedures, the assessment shall:

- a. Ensure that the project activity has been implemented and operated as per the registered PDD and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place.
- b. Ensure that the MR and other supporting documents provided are complete and in accordance with the latest applicable version of the completeness checklist for requests of issuance of CERs and verifiable and in accordance with applicable CDM requirements.
- c. Ensure that the actual monitoring system and procedures comply with the monitoring system and procedures described in the monitoring plan and the approved methodology.
- d. Evaluate the data recorded and stored as per the monitoring methodology.



As a result of the application of the above mentioned assessment, a written certification of the emission reductions achieved and verified by ICONTEC is prepared for the specified time period.

## 1.2. Scope

The verification scope involves an independent and objective review to determine whether the monitoring documents comply with the registered monitoring plan and project design features.

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

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

## 1.3. Verification Team

The verification team consists of the following personnel:

**Table 1. Verification Team**

ROLE/QUALIFICATION	LAST NAME	FIRST NAME	COUNTRY
Lead Auditor and Technical Expert Sector 01	Grisales	Cristian	Colombia
CDM and Technical Reviewer	Ramirez	Francy	Colombia

## 1.4. Methodology

The verification consists of the following three phases:

- Desk review and investigation of secondary sources of information.
- On-site assessment and follow up interviews with project stakeholders.
- Resolution of outstanding issues and the issuance the final verification report with the conclusion on the emission reductions achievements.

ICONTEC, based on its ethics code and internal procedures, carries out validation, verification and certification audits of CDM project activities, focused on the identification of significant risks for CER generation and the verification of the contribution to climate change mitigation.

All documentation reviewed during the verification process was included in chapter 11 (REFERENCES).

The findings could take the form of a Corrective Action Request (CAR), Forward Action Request (FAR) or a Clarifications Request (CL).

Corrective action requests (CAR) are issued where:

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

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

A Clarification Request is raised when information is insufficient or not clear enough to establish whether a requirement was met.

According to the latest version of the VVS, ICONTEC “*shall resolve or close out CARs and CLs only if the PP modify the project design, rectify the PDD or provide additional explanations or evidence that satisfies the DOE’s concerns*”. In addition, this verification report explains findings raised during the verification process as well as responses provided by the PP, means of verification of such responses and references to any resulting changes in the PDD or supporting annexes.

### **1.5. Internal Quality Control**

This report includes the verification findings that underwent a technical review before being submitted to UNFCCC.

The technical review and the quality control process was performed by an internal technical reviewer team in accordance with the ICONTEC’s internal procedures for carrying out validation, verification and certification audits of CDM project activities.

The technical reviewers are qualified in accordance with the ICONTEC's professional qualification scheme for CDM validation and verification.

## 1.6. On-site Visit

An on-site visit to the project was undertaken between 01/10/2014 and 03/10/2014. Interviews were conducted with CTLL's personnel, other project stakeholders were also interviewed (see list below). ICONTEC audited in particular the procedures for data recording, processing, reporting and associated QA/QC procedures.

During the on-site visit the following people were interviewed:

**Table 2. List of Interviewees**

Interviewee's Name	Position	Entity
Talía Burgos	HSQ Manager	CTLL
Heéctor Lazzerini	Plant's General Manager	CTLL
Leonardo Pérez	Plant's Electrical Maintenance Manager	CTLL
Maria Valentina Armando	Process' Analyst	CTLL
Daniel Fanego	Operations Manager	CTLL
Fabián Gaioli	CDM Consultant	Coraliae SRL
Lida Wang	Responsible of the Verification Contract	CTLL
Mariano Batistella	Project's Manager	CTLL
Fabián Meca	Power Delivery Manager	CTLL
Pablo Calderon	External Professional	CTLL

## 1.7. Resolution of CLs, CARs and FARs

CARs, CLs and FARs raised by ICONTEC were presented to the PP and resolved through communication and meetings between CTLL's personnel and ICONTEC. To guarantee the transparency of the verification process, the concerns raised and the responses provided by the PP are documented inside this verification report.

Since modifications to the MR were necessary to resolve ICONTEC's concerns, the client decided to review the MR and re-submit corrected versions. After publication of the monitoring report on UNFCCC CDM website (17/09/2014 to 01/10/2014) and after reviewing latest version of the MR, ICONTEC issued the verification and certification report.

## 2. Compliance of the Project Implementation with the Registered Project Design Document

The status of implementation, progress and operation's starting date for each phase are shown on the next table:

**Table 3. Implementation Status**

Phase/Site	Status of Implementation	Progress	Comments
Civil Works	Concluded	100%	The civil works began on September 2008 and finished on November 2011.
Commissioning of the Combined Cycle	Concluded	100%	The commissioning of the Combined Cycle began on November 1 <sup>st</sup> 2011. There were some technical problems between 16 <sup>th</sup> November 2012 and 13 <sup>th</sup> June 2013.  The end of the combine cycle's commissioning was 13 <sup>th</sup> June 2013.

The starting date of the 1<sup>st</sup> crediting period was 11/03/2013.

The monitoring period evaluated during the current verification was: 11/03/2013 to 31/12/2013.

The information (data and variables) provided in the monitoring report is not different from that stated in the revised PDD /3/.

ICONTEC can confirm that:

- The implementation of the project is consistent with the information provided in the revised PDD.
- The project is operated as per the revised PDD.
- Information provided in the MR is in accordance with that stated in the registered PDD.

## 3. Compliance of the Monitoring Plan with the Monitoring Methodology Including Applicable Tools and the Standardized Baseline

According to the revised PDD /3/, the CDM project activity "*Combined Cycle at Loma de la Lata Thermo Unit Project*" was monitored following the guidelines of the approved monitoring methodology and tools:

- Approved consolidated monitoring methodology ACM0007 "Conversion from single cycle to combined cycle power generation ", version 06.1.0.
- Tool to calculate the emission factor for an electricity system, version 02.2.1.
- Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel combustion, version 02.
- Guideline on the application of materiality in verifications, version 01.0

ICONTEC verified through documental review that version 02 of the MR applied the latest version of the MR format (version 04) for the 1<sup>st</sup> monitoring period /21/.

## 4. Compliance of Monitoring Activities with the Registered Monitoring Plan

The monitoring parameters related to the GHG emission reductions in the project activity have been implemented in accordance with the monitoring plan contained in the revised PDD /3/.

The following table describes the parameters that were determined ex-ante and not monitored during the monitoring period:

**Table 4. Parameters Determined Ex-Ante in the Registered PDD**

Parameter	Description	Value		Source
EG <sub>x</sub> [MWh/y]	Quantity of electricity supplied by the project power unit(s) with three years operational history and no retrofit in this period, to the electricity grid in year x	2008	960,653	Revised PDD
		2009	509,833	
		2010	246,563	
FC <sub>i,x</sub> [M <sup>3</sup> /y]	Quantity of natural gas used by the project power unit(s) in year x	2008	322,153,492	Revised PDD
		2009	172,312,111	
		2010	85,075,455	
NCV <sub>NG,x</sub> [GJ/tonne]	Net calorific value of natural gas used by the project power unit(s) in year x	2008	47.798	Revised PDD
		2009	48.049	
		2010	47.944	

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Parameter	Description	Value			Source
EF <sub>CO<sub>2</sub>,min</sub> [tCO <sub>2</sub> /GJ]	CO <sub>2</sub> emission factor of the least carbon intensive fuel type (natural gas) used by the project power unit(s) during the three years operational history	0.0553980			Revised PDD
EF <sub>CO<sub>2</sub>,max</sub>	CO <sub>2</sub> emission factor of the most carbon intensive fuel type (natural gas) used by the project power unit(s) during three years operational history	0.0555500			Revised PDD
CAP <sub>max</sub>	Maximum gross power generation capacity of the project power unit(s) prior to the implementation of the project activity	369.93			Revised PDD
T <sub>max</sub> [hours/y]	Maximum amount of time during a year in which the project power unit(s) could have operated at full power generation capacity prior to the implementation of the project activity	4,271			Revised PDD
HMR <sub>x</sub> [hour/y]	Average number of hours during which the plant did not operate due to maintenance or repair in year x	2008	342		Revised PDD
		2009	1,573		
		2010	1,098		
GWP <sub>CH<sub>4</sub></sub> [tCO <sub>2</sub> e/tCH <sub>4</sub> ]	Global warming potential of methane valid for the relevant commitment period	25			Revised PDD
EF <sub>grid,BM,y</sub> [tCO <sub>2</sub> /MWh]	Build margin CO <sub>2</sub> emission factor for grid connected power generation	0.4660948			Revised PDD
w <sub>OM</sub>	Emission Factor OM Weighting	0.5			Revised PDD
w <sub>BM</sub>	Emission Factor BM Weighting	0.5			Revised PDD

The following table includes all parameters monitored and describes how ICONTEC verified the fulfillment of each parameter with the registered monitoring plan, including the information flow and the values as reported in the version 02 of the MR.

**Table 5. Monitored Parameters**

Monitored Parameter	Description	Value	Means of Verification
$EG_{PJ,y}$	Total amount of electricity supplied to the electricity grid by the Project power units in	1,523,067 <sup>1</sup> MWh/yr	<b>Source of Data and Frequency:</b> The information on generated electricity (Raw Data) is downloaded from CAMMESA's data base (through the dedicated interface for Pampa Energy), after the raw data are processed in an excel file in a monthly base with information taken every hour. In

<sup>1</sup> See Spreadsheet "Emission Reductions 11-03 - 31-12-2013.xls", tag "Raw data", cell "G14".

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Monitored Parameter	Description	Value	Means of Verification
	year y (year y is replaced by the monitoring period)		<p>spreadsheet "Raw data.xls" /5/ are included the aggregated values for each month of the monitoring period.</p> <p><b>Used Equipment:</b></p> <p>See section 5, table 6.</p> <p><b>Data Cross-Checking:</b></p> <p>ICONTEC verified the downloading of the files for each one of the months (March to December 2013) from the Pampa's dedicate interface, which in turns take the information from the official source CAMMESA<sup>2</sup>.</p> <p>Also, it was cross-checked the energy generation with the values reported by Secretariat of Energy of Argentina during March to December 2013. It was not identified any material misstatement.<sup>3</sup></p> <p><b>Consistency Between the QA/QC Defined in the Methodology:</b></p> <p>The energy billing is made by the Grid Operator CAMMESA and the data of metered energy used to the calculation of ERs is the one downloaded from the CAMMESA's data base. ICONTEC verified the above through the reviewing and downloading of the files for each one of the months included in the monitoring period.</p> <p><b>Consistency Between the QA/QC Established by the Project Participants in the PDD:</b></p> <p>ICONTEC verified that the PP undertakes a regular cross check of the generated energy with the information reported by CAMMESA (company designated for the energy billing) /19/. The technical description of the electricity meters, along with their calibration certificates is shown in section 5, table 6.</p> <p><b>Application of Default Values:</b></p> <p>N/A</p> <p><b>Findings:</b></p> <p>CL 1 and CL2</p> <p><b>Conclusions:</b></p> <p>ICONTEC raised CL 1 and CL 2, in order to request a better explanation about a permanent change from</p>

<sup>2</sup> <http://portalweb.cammesa.com/default.aspx>

<sup>3</sup> <http://www.energia.gov.ar/contenidos/verpagina.php?idpagina=1591>

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Monitored Parameter	Description	Value	Means of Verification
			<p>the registered monitoring plan related to the calibration frequency for the electricity meter MEGA (meter that is not under the control of the PP). The relevant explanation was included in section B.2.3 of the MR (version 02), including a description of the nature and extent of the non-conforming monitoring and the proposed alternative monitoring of the project activity. As well, a revised PDD (version 07) was submitted along with this MR. ICONTEC reviewed the information and given explanations and validated that the proposed change did not require prior approval by the board.</p> <p>During the verification, ICONTEC confirmed that the parameter is properly applied according to the monitoring plan and the registered /revised PDD, and that his information is consistent with the secondary information sources used for verification.</p>
FC <sub>i,y</sub>	Quantity of natural gas used by the project power units (gas turbines) in year y	338,297,052 <sup>4</sup> m <sup>3</sup> /yr	<p><b>Source of Data and Frequency:</b></p> <p>The data is taken from the information measured by the differential pressure transmitter in an hourly basis, and aggregated and reported in a monthly basis by REPSOL YPF<sup>5</sup> (Gas Supplier). The monthly values are conciliated between YPF and CTLLL in the monthly conciliation report /15/.</p> <p><b>Used Equipment:</b></p> <p>See section 5, table 6.</p> <p><b>Data Cross-Checking:</b></p> <p>It was verified the value reported in the ER's spreadsheet /4/ with the value reported each month in the conciliation minute /15/. There was not identified any material misstatement.</p> <p><b>Consistency Between the QA/QC Defined in the Methodology:</b></p> <p>ICONTEC verified the monthly reconciliation minutes /15/ signed by REPSOL YPF and CTLLL. The taken values for the calculation of ERs were the ones conciliated in the minutes.</p> <p><b>Consistency Between the QA/QC Established by the Project Participants in the PDD:</b></p> <p>ICONTEC verified the monthly reconciliation minutes</p>

<sup>4</sup> See spreadsheet "Emission Reductions 11-03 - 31-12-2013.xls", tag "Raw data", cell G16.

<sup>5</sup> [http://www.ypf.com/LaCompania/ADN\\_YPF/Paginas/Nuestra-gesti%C3%B3n.aspx?C=todo-sobre-ypf](http://www.ypf.com/LaCompania/ADN_YPF/Paginas/Nuestra-gesti%C3%B3n.aspx?C=todo-sobre-ypf)



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Monitored Parameter	Description	Value	Means of Verification
			<p>/15/ signed by REPSOL YPF and CTLL. The taken values for the calculation of ERs were the ones conciliated in the minutes.</p> <p><b>Application of Default Values:</b></p> <p>N/A</p> <p><b>Findings:</b></p> <p>CL 3</p> <p><b>Conclusions:</b></p> <p>ICONTEC raised CL 3 in order to request the updating of a guideline mentioned for the calculation of this parameter. The PP removed the outdated reference and included the valid one.</p> <p>The calibration delays for this parameter will be explained in section 5.</p> <p>During the verification, ICONTEC confirmed that the parameter is properly applied according to the monitoring plan and the registered /revised PDD, and that his information is consistent with the secondary information sources used for verification.</p>
NCV <sub>i,y</sub>	Average net calorific value of natural gas used by the project power units in year y	46.752 <sup>6</sup> GJ/tonne	<p><b>Source of Data and Frequency:</b></p> <p>The NCV for natural gas is reported in the monthly conciliation report along with the fuel consumption /15/.</p> <p>The NCV is monitored through a chromatograph under control of REPSOL YPF (fuel supplier).</p> <p>ICONTEC verified that the chromatographer is compared once a month with calibrated patterns in order to guaranty the reliability of his performing. The results of these comparisons are reported in section 5, table 6.</p> <p><b>Used Equipment:</b></p> <p>See section 5, table 6.</p> <p><b>Data Cross-Checking:</b></p> <p>ICONTEC verified that the reported value is within the uncertainty range [46.500; 50.400] of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines /22/.</p> <p><b>Consistency Between the QA/QC Defined in the</b></p>

<sup>6</sup> See spreadsheet "Emission Reductions 11-03 - 31-12-2013.xls", tag NCV – EF 2013, cell U 14.

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Monitored Parameter	Description	Value	Means of Verification
			<p><b>Methodology:</b></p> <p>ICONTEC verified that the calculated value is within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines /22/.</p> <p><b>Consistency Between the QA/QC Established by the Project Participants in the PDD:</b></p> <p>ICONTEC verified that the calculated value is within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines /22/.</p> <p><b>Application of Default Values:</b></p> <p>N/A</p> <p><b>Findings:</b></p> <p>CL 4 and CL 9.</p> <p><b>Conclusions:</b></p> <p>ICONTEC raised CL 4, given that on MR version 01, section D.2 It was not clear enough neither the calibrations made to the monitoring equipment nor whether the maximum permissible error of the instrument was applied to the measured values taken during the period between the scheduled date of calibration and the actual date of calibration.</p> <p>ICONTEC verified that the calibration frequency reported on the registered/revised PDD for the chromatograph ("The described values for calibration frequency will depend on the revised version of said Protocol, which is pending of signature") was incorrectly included in the section "QA/QC procedures to be applied" of the parameter "FC<sub>i,y</sub>". The PP corrected the mistake in a revised PDD /3/. The Protocol of Natural Gas /17/ "revised version of said Protocol, which is pending of signature" was reviewed by ICONTEC during the onsite visit and it was verified that the contrast could be made at any day, once every month. Hence it did not have any calibration delay for this parameter.</p> <p>ICONTEC raised CL 9, given that on MR version 01, section E.1. It was not clear enough how PP had weighting the NCV<sub>i,y</sub>. PP in version 02 of the MR explained that the weighting was done considering natural gas volumes.</p> <p>During the verification, ICONTEC confirmed that the</p>

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Monitored Parameter	Description	Value	Means of Verification
			parameter is properly applied according to the monitoring plan and the registered /revised PDD, and that his information is consistent with the secondary information sources used for verification.
$\eta_{PJ,y}$	Average energy efficiency of the project power units in year y of the crediting period	0.4365978 <sup>7</sup>	<p><b>Source of Data and Frequency:</b></p> <p>This parameter is calculated through the application of the formula:</p> $\eta_{PJ,y} = \frac{EG_{PJ,y} (MWh / yr) \times 3.6 (GJ / MWh)}{NCV_{L,v} (GJ / m^3) \times FC_{L,v} (m^3 / yr)}$ <p>The source of data for each one of the parameters included in the formula was explained above.</p> <p><b>Used Equipment:</b></p> <p>N/A</p> <p><b>Data Cross-Checking:</b></p> <p>The data cross-checking for this parameter was the one abovementioned for the parameters <math>EG_{PJ,y}</math>, <math>NCV_{i,y}</math> and <math>FC_{i,y}</math>.</p> <p><b>Consistency Between the QA/QC Defined in the Methodology:</b></p> <p>It was not defined any QA/QC.</p> <p><b>Consistency Between the QA/QC Established by the Project Participants in the PDD:</b></p> <p>ICONTEC through the reviewing of the monthly reconciliation minutes /15/ signed between REPSOL YPF and CTLL verified that the current value (0.4365978) is close the one calculated for 2012 (0.4721962). The decreasing of the efficiency was due to the fact that steam turbine was out of service.</p> <p><b>Application of Default Values:</b></p> <p>N/A</p> <p><b>Findings:</b></p> <p>There were not raised findings related to this parameter.</p> <p><b>Conclusions:</b></p> <p>During the verification, ICONTEC confirmed that the parameter is properly applied according to the</p>

<sup>7</sup> See spreadsheet "Emissions Reductions 11-03 - 31-12-2013.xls", tag "ER", cell E16.

# VERIFICATION REPORT



Monitored Parameter	Description	Value	Means of Verification
			monitoring plan and the registered / revised PDD, and that his information is consistent with the secondary information sources used for verification.
<b>EF<sub>i,upstream,CH4</sub></b>	Emission factor for upstream fugitive methane emissions from production, transportation, distribution of natural gas used in project power units in year y	$72 \times 10^{-6} \text{ t}_{\text{CH}_4}/\text{GJ}^8$	<p><b>Source of Data and Frequency:</b></p> <p>Default emission factor corresponding to US production, according to IPCC default Tier 1 emission factors provided in Volume 3 of the 1996 Revised IPCC Guidelines.</p> <p><b>Used Equipment:</b></p> <p>N/A</p> <p><b>Data Cross Checking:</b></p> <p>ICONTEC verified the IPCC default Tier 1 Emission Factors provided in Volume 3 of the 1996 Revised IPCC Guidelines /23/.</p> <p><b>Consistency Between the QA/QC Defined in the Methodology:</b></p> <p>It was not defined any QA/QC.</p> <p><b>Consistency Between the QA/QC Established by the Project Participants in the PDD:</b></p> <p>It was not defined any QA/QC.</p> <p><b>Application of Default Values:</b></p> <p>It was applied the value of <math>72 \times 10^{-6} \text{ t}_{\text{CH}_4}/\text{GJ}</math> from Volume 3 of the 1996 Revised IPCC Guidelines.</p> <p><b>Findings:</b></p> <p>There were not raised findings related to this parameter.</p> <p><b>Conclusions:</b></p> <p>During the verification, ICONTEC confirmed that the parameter is properly applied according to the monitoring plan and the registered / revised PDD, and that his information is consistent with the secondary information sources used for verification.</p>
<b>EG<sub>n,h</sub></b>	Net electricity generated and delivered to the grid by power unit n in hour h	See Access file "PO13month 0 1.MDB"	<p><b>Source of Data and Frequency:</b></p> <p>The information on generated electricity by each one of the energy generators in Argentina (raw data) is downloaded from CAMMESA's data base (through the dedicated interface for Pampa Energy), after the</p>

<sup>8</sup> See spreadsheet "Emissions Reductions 11-03 - 31-12-2013", tag "Technical data", cell E39.

## VERIFICATION REPORT



Monitored Parameter	Description	Value	Means of Verification
			<p>raw data are processed by a software that reads directly an access file in a monthly base with information taken every hour.</p> <p>The information is taken from CAMMESA, through an application based on the software Lotus Notes, after the information is saved in the internal servers from CTLLL in an extension MDB.</p> <p><b>Used Equipment:</b></p> <p>N/A</p> <p><b>Data Cross-Checking:</b></p> <p>During the onsite visit ICONTEC verified the Raw Data downloaded from the CAMESSAS's data base /19/. It was not identified any material misstatement in the automatic data transferring.</p> <p><b>Consistency Between the QA/QC Defined in the Methodology:</b></p> <p>The energy billing is made by the Grid Operator CAMMESA and the data of metered energy used to the calculation of EF is the one downloaded from the CAMMESA's data base. ICONTEC verified the above through the reviewing and downloading of the files for each one of the months included in the monitoring period.</p> <p><b>Consistency Between the QA/QC Established by the Project Participants in the PDD:</b></p> <p>ICONTEC verified the OM Grid Emission Factor resulting from the use of the CAMMESA's data (0.7732504 tCO<sub>2</sub>/MWh) and compared It with the OM grid emission factor published by the Secretariat of Energy for 2013 /24/ using also the dispatch method for year 2013 (0.8324423 tCO<sub>2</sub>/MWh; the last published by this public entity). The values obtained by Central Térmica Loma de la Lata are more conservative than the ones published by the Secretariat of Energy.</p> <p><b>Application of Default Values:</b></p> <p>N/A</p> <p><b>Findings:</b></p> <p>There were not raised findings related to this parameter.</p> <p><b>Conclusions:</b></p> <p>During the verification, ICONTEC confirmed that the parameter is properly applied according to the</p>

# VERIFICATION REPORT



Monitored Parameter	Description	Value	Means of Verification
			monitoring plan and the registered / revised PDD, and that his information is consistent with the secondary information sources used for verification.
FC <sub>i,n,h</sub>	Amount of fossil fuel type i consumed by grid power unit n in hour h	See Access file "PO13month 01.MDB"	<p><b>Source of Data and Frequency:</b></p> <p>The information on generated electricity by each one of the energy generators in Argentina (raw data) is downloaded from CAMMESA's data base (through the dedicated interface for Pampa Energy), after the raw data are processed by a software that reads directly an access file in a monthly base with information taken every hour.</p> <p>The access file contains information about:</p> <p>Each one of the machines generating energy in the Argentinean Grid and kind of fuel used by each one of them and the total energy generation introduced by each one of the machines.</p> <p><b>Used Equipment:</b></p> <p>N/A</p> <p><b>Data Cross Checking:</b></p> <p>During the onsite visit ICONTEC verified the Raw Data downloaded from the CAMESAS's data base /19/. It was not identified any material misstatement in the automatic data transferring.</p> <p><b>Consistency Between the QA/QC Defined in the Methodology:</b></p> <p>The Grid Operator is CAMMESA and the data of Amount of fossil fuel type i consumed by grid power unit used to the calculation of EF is the one downloaded from the CAMMESA's data base. ICONTEC verified the above through the reviewing and downloading of the files for each one of the months included in the monitoring period.</p> <p><b>Consistency Between the QA/QC Established by the Project Participants in the PDD:</b></p> <p>ICONTEC during the onsite visit verified the information downloaded from the CAMMESA's data base and did not identify any material misstatement in the transferring and reporting into the EF spreadsheets.</p> <p><b>Application of Default Values:</b></p> <p>N/A</p>

# VERIFICATION REPORT



Monitored Parameter	Description	Value	Means of Verification
			<p><b>Findings:</b></p> <p>There were not raised findings related to this parameter.</p> <p><b>Conclusions:</b></p> <p>During the verification, ICONTEC confirmed that the parameter is properly applied according to the monitoring plan and the registered / revised PDD, and that his information is consistent with the secondary information sources used for verification.</p>
EF <sub>CO2,i,y</sub>	CO <sub>2</sub> emission factor of fossil fuel type i in year y	<p>Natural Gas 0.0561400</p> <p>Fuel Oil 0.0779260</p> <p>Gasoil (Diesel) 0.0743540</p> <p>Mineral Coal 0.0945090</p> <p>[tCO<sub>2</sub>/GJ]</p>	<p><b>Source of Data and Frequency:</b></p> <p>The emission factors are taken from the Second National Communication of Argentina to the UNFCCC (GHG Inventory 2000, p. 197; Sept. 2005) /25/.</p> <p><b>Used Equipment:</b></p> <p>N/A</p> <p><b>Data Cross Checking:</b></p> <p>ICONTEC reviewed the reported values directly from the 2<sup>nd</sup> National Communication published on the UNFCCC web site<sup>9</sup>. It was not identified any material misstatement in the values.</p> <p><b>Consistency Between the QA/QC Defined in the Methodology:</b></p> <p>It was not defined any QA/QC in the version 02.2.1 of the Tool to Calculate the Emission Factor of an Electricity System.</p> <p><b>Consistency Between the QA/QC Established by the Project Participants in the PDD:</b></p> <p>ICONTEC verified from Table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories that the reported values were into 95% confidence interval. It was not identified any value out of the interval.</p> <p><b>Application of Default Values:</b></p> <p>N/A</p> <p><b>Findings:</b></p> <p>There were not raised findings related to this parameter.</p>

<sup>9</sup> [http://unfccc.int/essential\\_background/library/items/3599.php?rec=j&preref=6296#beg](http://unfccc.int/essential_background/library/items/3599.php?rec=j&preref=6296#beg)

# VERIFICATION REPORT



Monitored Parameter	Description	Value	Means of Verification
			<p><b>Conclusions:</b></p> <p>During the verification, ICONTEC confirmed that the parameter is properly applied according to the monitoring plan and the registered / revised PDD, and that his information is consistent with the secondary information sources used for verification.</p>
NCV <sub>i,y</sub>	Net calorific value (energy content) of fossil fuel type i in year y	<p>Natural gas 48.330</p> <p>Fuel oil 41.030</p> <p>Gasoil (Diesel) 42.710</p> <p>Mineral coal 24.700</p> <p>GJ/mass or volume unit</p>	<p><b>Source of Data and Frequency:</b></p> <p>The NCVs are taken from the Second National Communication of Argentina to the UNFCCC (GHG Inventory 2000, p. 197; Sept. 2005) /25/.</p> <p><b>Used Equipment:</b></p> <p>N/A</p> <p><b>Data Cross Checking:</b></p> <p>ICONTEC reviewed the reported values directly from the 2<sup>nd</sup> National Communication published on the UNFCCC web site<sup>10</sup>. It was not identified any material misstatement in the values.</p> <p><b>Consistency Between the QA/QC Defined in the Methodology:</b></p> <p>It was not defined any QA/QC neither on the methodology nor in the version 02.2.1 of the Tool to Calculate the Emission Factor of an Electricity System.</p> <p><b>Consistency Between the QA/QC Established by the Project Participants in the PDD:</b></p> <p>ICONTEC verified from Table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories that the reported values were into 95% confidence interval. It was not identified any value out of the interval.</p> <p><b>Application of Default Values:</b></p> <p>N/A</p> <p><b>Findings:</b></p> <p>There were not raised findings related to this parameter.</p> <p><b>Conclusions:</b></p> <p>During the verification, ICONTEC confirmed that the parameter is properly applied according to the</p>

<sup>10</sup> [http://unfccc.int/essential\\_background/library/items/3599.php?rec=j&preref=6296#beg](http://unfccc.int/essential_background/library/items/3599.php?rec=j&preref=6296#beg)



# VERIFICATION REPORT



Monitored Parameter	Description	Value	Means of Verification
			monitoring plan and the registered / revised PDD, and that his information is consistent with the secondary information sources used for verification.
EF <sub>CO<sub>2</sub>,i,y</sub>	Weighted average of CO <sub>2</sub> emission factor of natural gas combusted in year y	0.0560263 <sup>11</sup> tCO <sub>2</sub> /GJ	<p><b>Source of Data and Frequency:</b></p> <p>The data is calculated through the results of the chromatography made by the fuel supplier REPSOL YPF each month as the ratio between the Natural Gas EF and the NCV of the Natural Gas.</p> <p><b>Used Equipment:</b></p> <p>N/A</p> <p><b>Data Cross Checking:</b></p> <p>During the onsite visit ICONTEC reviewed for the information reported by REPSOL YPF the data recording, the data transferring and the calibration certificates of the chromatograph. It was not identified any material misstatement.</p> <p><b>Consistency Between the QA/QC Defined in the Methodology:</b></p> <p>It was not defined any QA/QC neither on the methodology nor in the version 02.2.1 of the Tool to Calculate the Emission Factor of an Electricity System.</p> <p><b>Consistency Between the QA/QC Established by the Project Participants in the PDD:</b></p> <p>ICONTEC verified from Table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories that the reported values were into 95% confidence interval. It was not identified any value out of the interval.</p> <p><b>Application of Default Values:</b></p> <p>N/A</p> <p><b>Findings:</b></p> <p>There were not raised findings related to this parameter.</p> <p><b>Conclusions:</b></p> <p>During the verification, ICONTEC confirmed that the parameter is properly applied according to the monitoring plan and the registered / revised PDD,</p>

<sup>11</sup> See spreadsheet "Emissions Reductions 11-03 - 31-12-2013.xls", tag "Technical data", cell E32.

# VERIFICATION REPORT



Monitored Parameter	Description	Value	Means of Verification
			and that his information is consistent with the secondary information sources used for verification.
FC <sub>ST,DO,y</sub>	Quantity of diesel oil used by the emergency project power unit	0.1932600 <sup>12</sup> Tonne/year	<p><b>Source of Data and Frequency:</b></p> <p>The quantity of liters is manually registered /18/ each time that the diesel generator is filled and after liters are converted into tones by using the gasoil density given in the Second National Communication of Argentina to the UNFCCC /25/ (GHG Inventory 2000, p. 197; Sept. 2005 = 0.8450000 kg/l)</p> <p><math>FC_{ST,DO,y} = 228.710^* \text{ lt} \times 0.8450000 \text{ kg/lt} / 1,000 \text{ kg/tonne} = 0.1932600 \text{ tonnes / y.}</math></p> <p><b>Used Equipment:</b></p> <p>See section 5, table 6.</p> <p><b>Data Cross-Checking:</b></p> <p>ICONTEC verified the manual registers of diesel oil consumption (electronically monitored) and compared them with the operational hours of the plant during the MP in order to verify that diesel consumption effectively corresponded with the operation hours, (ICONTEC during the onsite visit verified that the operative data of diesel consumption per hour is well known by the CTLL's personnel and works as cross-check). It was not identified any inconsistency in the values reported.</p> <p><b>Consistency Between the QA/QC Defined in the Methodology:</b></p> <p>It was not defined any QA/QC neither on the methodology nor in the version 02.2.1 of the Tool to Calculate the Emission Factor of an Electricity System.</p> <p><b>Consistency Between the QA/QC Established by the Project Participants in the PDD:</b></p> <p>During the onsite visit ICONTEC verified the diesel consumption with the product of the hours in service of the emergency power unit, times the average hour diesel consumption (80 liters per hour). The differences between the measured values and the calculated ones did not surpass the <math>\pm 2\%</math> of accuracy requested in the registered/revised PDD.</p>

<sup>12</sup> See spreadsheet "Emissions Reductions 11-03 - 31-12-2013.xls", tag "Technical data", cell E34.

\*See spreadsheet "Emissions Reductions 11-03 - 31-12-2013", tag "Genset", cell D12.

# VERIFICATION REPORT



Monitored Parameter	Description	Value	Means of Verification
			<p><b>Application of Default Values:</b></p> <p>N/A</p> <p><b>Findings:</b></p> <p>CL 5 and CL 7.</p> <p><b>Conclusions:</b></p> <p>ICONTEC raised CL 5 and CL 7 in order to request a better explanation about the equipment monitoring the parameter and its calibration procedure and the application of the maximum permissible error of the equipment in the case of a delay.</p> <p>On the MR version 02 It was improved the description of the equipment and added a calibration certificate that was missing.</p> <p>During the verification, ICONTEC confirmed that the parameter is properly applied according to the monitoring plan and the registered / revised PDD, and that this information is consistent with the secondary information sources used for verification.</p>
NCV <sub>ST,DO,y</sub>	Average net calorific value of diesel oil used by the emergency power unit	42.710 GJ/tonne	<p><b>Source of Data and Frequency:</b></p> <p>Default Average NCV of diesel oil used by the emergency power unit is taken from the Second National Communication of Argentina to the UNFCCC /25/ (GHG Inventory 2000, p. 197; Sept. 2005).</p> <p><b>Used Equipment:</b></p> <p>N/A</p> <p><b>Data Cross Checking:</b></p> <p>ICONTEC verified the value from the report published on UNFCCC<sup>13</sup>. It was not identified any inconsistency in the given value.</p> <p><b>Consistency Between the QA/QC Defined in the Methodology:</b></p> <p>It was not defined any QA/QC neither on the methodology nor in the version 02.2.1 of the Tool to Calculate the Emission Factor of an Electricity System.</p> <p><b>Consistency Between the QA/QC Established by the Project Participants in the PDD:</b></p>

<sup>13</sup> [http://unfccc.int/essential\\_background/library/items/3599.php?rec=j&preref=6296#beg](http://unfccc.int/essential_background/library/items/3599.php?rec=j&preref=6296#beg)

# VERIFICATION REPORT



Monitored Parameter	Description	Value	Means of Verification
			<p>ICONTEC during the onsite visit verified that the given value (42.710 GJ/tonne) is between the interval [41.400 - 43.300] provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories /22/.</p> <p><b>Application of Default Values:</b></p> <p>N/A</p> <p><b>Findings:</b></p> <p>There were not raised findings associated to this parameter.</p> <p><b>Conclusions:</b></p> <p>During the verification, ICONTEC confirmed that the parameter is properly applied according to the monitoring plan and the registered / revised PDD, and that his information is consistent with the secondary information sources used for verification.</p>
EF <sub>CO2,DO,y</sub>	Weighted average CO <sub>2</sub> emission factor of diesel oil in year y	0.0743540 <sup>14</sup> tCO <sub>2</sub> /GJ	<p><b>Source of Data and Frequency:</b></p> <p>The EFs are taken from the Second National Communication of Argentina to the UNFCCC (GHG Inventory 2000, p. 197; Sept. 2005) /25/.</p> <p><b>Used Equipment:</b></p> <p>N/A</p> <p><b>Data Cross Checking:</b></p> <p>ICONTEC reviewed the reported values directly from the 2<sup>nd</sup> National Communication published on the UNFCCC web site<sup>15</sup>. It was not identified any material misstatement in the values.</p> <p><b>Consistency Between the QA/QC Defined in the Methodology:</b></p> <p>It was not defined any QA/QC neither on the methodology nor in the version 02.2.1 of the Tool to Calculate the Emission Factor of an Electricity System.</p> <p><b>Consistency Between the QA/QC Established by the Project Participants in the PDD:</b></p> <p>ICONTEC verified from Table 1.2, Volume 4 of the 2006 Guidelines that the reported value was into the requested uncertainty range [0.0726000 -</p>

<sup>14</sup> See spreadsheet "Emissions Reductions 11-03 - 31-12-2013.xls", tag "Technical data", cell E36.

<sup>15</sup> [http://unfccc.int/essential\\_background/library/items/3599.php?rec=j&preref=6296#beg](http://unfccc.int/essential_background/library/items/3599.php?rec=j&preref=6296#beg)

## VERIFICATION REPORT



Monitored Parameter	Description	Value	Means of Verification
			0.0748000]. <b>Application of Default Values:</b> N/A <b>Findings:</b> There were not raised findings related to this parameter. <b>Conclusions:</b> During the verification, ICONTEC confirmed that the parameter is properly applied according to the monitoring plan and the registered / revised PDD, and that his information is consistent with the secondary information sources used for verification.

ICONTEC could verify the completeness and integrity of the data used by the project proponents for the emission reductions calculations. During the verification, ICONTEC was able to verify that the parameters are properly measured according to the monitoring plan and the registered revised PDD /2, 3/, and that the information is consistent with the secondary information sources used to verify it.

As a general cross check of the data, ICONTEC verified the backup system of the company and cross checked the information of the ERs spreadsheet /4/ with the backup files, which include the raw data information generated by the CTLL's system.

In conclusion the process of data management, transfer, storage and reporting was carried out in compliance with the monitoring plan, the registered PDD and the methodology ACM0007 version 06.1.0.

ICONTEC can thus conclude that:

The monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD.

All parameters stated in the monitoring plan of the registered PDD have been correctly and sufficiently monitored and listed. The monitored data for required parameters have been verified by ICONTEC and have been found complete, reliable and consistent.

## VERIFICATION REPORT



### 5. Compliance with the Calibration Frequency Requirements for Measuring Instruments

The following table includes the current monitoring equipment for the parameters above mentioned and the information about equipment identification and calibration records. ICONTEC verified that the calibration covered the entire 1<sup>st</sup> monitoring period from 11/03/2013 to 31/12/2013.

**Table 6. Monitoring Equipment**

Parameter	Equipment	Calibration Frequency	Calibration Records	Date of Calibration
EG <sub>PJ,y</sub>	Electricity Meter Schlumberger Type ST-Q121 Accuracy class 0.2 S	Annual	Calibration certificate 000915, issued by Transener Issued on: 16/08/2012 Valid until: 15/08/2013	Performed on: 16/08/2012
	Steam Turbine Main Meter S/N: 342908011		Calibration certificate 000948, issued by Transener Issued on: 24/05/2013 Valid until: 23/05/2014	Performed on: 24/05/2013
	Electricity Meter Schlumberger Type ST-Q121 Accuracy class 0.2 S	Annual	Calibration certificate 000916, issued by Transener Issued on: 16/08/2012 Valid until: 15/08/2013	Performed on: 16/08/2012
	Steam Turbine Back up Meter S/N: 342908012		Calibration certificate 000950, issued by Transener Issued on: 24/05/2013 Valid until: 13/05/2014	Performed on: 24/05/2013
	Electricity Meter Schlumberger Type ST-Q121 Accuracy class 0.2 S Gas Turbine 1 Main Meter S/N: 86312981	Annual	Calibration certificate 000901, issued by Transener Issued on: 10/08/2012 Valid until: 09/08/2013	Performed on: 10/08/2012

# VERIFICATION REPORT



Parameter	Equipment	Calibration Frequency	Calibration Records	Date of Calibration
			Calibration certificate 000940, issued by Transener Issued on: 21/05/2013 Valid until: 20/05/2014	Performed on: 21/05/2013
	Electricity Meter Schlumberger Type ST-Q121 Accuracy class 0.2 S Gas Turbine 1 Backup Meter S/N: 86312982	Annual	Calibration certificate 000905, issued by Transener Issued on: 15/08/2012 Valid until: 14/08/2013	Performed on: 15/08/2012
			Calibration certificate 000942, issued by Transener Issued on: 22/05/2013 Valid until: 21/05/2014	Performed on: 22/05/2013
	Electricity Meter Schlumberger Type ST-Q121 Accuracy class 0.2 S Gas Turbine 2 Main Meter S/N: 86312983	Annual	Calibration certificate 000906, issued by Transener Issued on: 09/08/2012 Valid until: 08/08/2013	Performed on: 09/08/2012
			Calibration certificate 000941, issued by Transener Issued on: 21/05/2013 Valid until: 20/05/2014	Performed on: 21/05/2013
	Electricity Meter Schlumberger Type ST-Q121 Accuracy class 0.2 S Gas Turbine 2 Backup Meter S/N: 86312984	Annual	Calibration certificate 000908, issued by Transener Issued on: 10/08/2012 Valid until: 09/08/2013	Performed on: 10/08/2012
			Calibration certificate 000943, issued by Transener Issued on: 22/05/2013 Valid until: 21/05/2014	Performed on: 22/05/2013

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Parameter	Equipment	Calibration Frequency	Calibration Records	Date of Calibration
	Electricity Meter Schlumberger Type ST-Q121 Accuracy class 0.2 S Gas Turbine 3 Main Meter S/N: 86312985	Annual	Calibration certificate 000911, issued by Transener Issued on: 10/08/2012 Valid until: 09/08/2013	Performed on: 10/08/2012
			Calibration certificate 000945, issued by Transener Issued on: 22/05/2013 Valid until: 21/05/2013	Performed on: 22/05/2013
EGPJ,y	Electricity Meter Schlumberger Type ST-Q121 Accuracy class 0.2 S Gas Turbine 3 Backup Meter S/N: 86312986	Annual	Calibration certificate 000912, issued by Transener Issued on: 15/08/2012 Valid until: 14/08/2013	Performed on: 15/08/2012
			Calibration certificate 000944, issued by Transener Issued on: 23/05/2013 Valid until: 22/05/2014	Performed on: 23/05/2013
	Electricity Meter CIRWATT Type 402 –MT1A-26D Accuracy class 0.2 S Gas Turbine 3 Backup Meter S/N: 15259078	Annual	See CL 1 and CL 2	N/A
FCi,y	Differential pressure transmitter Fisher Rosemount Type multivariable Accuracy class 0.5% S/N: 553462	Every three months	Calibration certificate issued by SERVAIND. Issued on 06/02/2013 Valid until 05/05/2013	Performed on: 06/02/2013
			Calibration certificate issued by SERVAIND. Issued on 12/06/2013 Valid until 11/09/2013	Performed on: 12/06/2013
			Calibration certificate issued by SERVAIND. Issued on 25/10/2013 Valid until 24/01/2014	Performed on: 25/10/2013



## VERIFICATION REPORT



Parameter	Equipment	Calibration Frequency	Calibration Records	Date of Calibration
	Orifice plate Fisher Rosemount Type Sealed Accuracy class 0.05% S/N: 553462	Annual	Calibration certificate issued by SERVAIND. Issued on 08/02/2013 Valid until 07/02/2014	Performed on: 08/02/2013
FC <sub>ST,DO,y</sub>	Level transmitter Efector LK3122 Accuracy class 2% S/N: 2069748	Annual	Calibration minute 2069748, issued by CTLLL <sup>16</sup> . Issued on 20/12/2012 Valid until 19/12/2013	Performed on: 20/12/2012
			Calibration certificate 13011, issued by VIDITEC Issued on 22/07/2013 Valid until 21/07/2014	Performed on: 22/07/2013

ICONTEC raised CL 3 in order to request the penalization for the calibration delays happened for the parameter FC<sub>i,y</sub> from 5/05/2013 to 11/06/2013 and 12/09/2013 to 24/10/2013. The PP in the version 02 of the MR /1/ and in the ERs spreadsheet /4/ applied the maximum permissible error of the monitoring equipment<sup>17</sup> (+0.5%)

For the abovementioned, ICONTEC confirms that the detected calibration delays were penalized in accordance with the established on VVS version 07.0 /11/, paragraph 283.

## 6. Assessment of Data and Calculation of Emission Reductions

Calculations executed by PP in order to determine baseline emissions, project emissions and leakage of the project in the Emission Reductions file /4/ and Emission Factor calculation file /6/ were properly prepared and they are in accordance with the methodology ACM0007, version 06.1.0 "Conversion from single cycle to combined cycle power generation" and related tools /9/, /10/.

<sup>16</sup> The calibration minute was issued by CTLLL, where is explained that the calibration was made with a Digital Multimeter Fluke, Model 289, serial number 12860158, with register of calibration LL13011 (valid at the time of the calibration.)

<sup>17</sup> ICONTEC confirmed that the maximum permissible error to be applied was the most conservative value between the one reported by the manufacturer (+0.5%) and the one gotten in the latest calibration (+0.01%). Please see file: "Emission Reductions 11-03 - 31-12-2013.xls", tag "PM81", cell N35.

On the other hand, the verification team assessed the whole set of data and calculations of GHG emission reductions resulting from the project activity by the application of selected methodology, formulae and default values.

A complete set of data for the specified monitoring period is available. As per registered PDD and methodology, emission reductions of the project activity during year “y” are the difference between the baseline emissions ( $BE_y$ ), the project emissions ( $PE_y$ ) and the emissions due to leakage ( $LE_y$ ).

### Baseline Emissions

From methodology ACM0007, version 06.1.0, and registered PDD /2/ the baseline emissions for year y ( $BE_y$ ) are given by:

$$BE_y = EG_{BL,AVR} \cdot EF_{CO_2,BL,y} + (EG_{MAX} - EG_{BL,AVR}) \cdot \min(EF_{CO_2,BL,y}; EF_{grid,y}) + (EG_{PJ,adj,y} - EG_{MAX}) \cdot EF_{grid,y}$$

Where the following values were fixed at the registration<sup>18</sup>:

$$EG_{BL,AVR} = 572,350 \text{ MWh/yr}$$

$$EF_{CO_2,BL} = 0.6290914 \text{ tCO}_2/\text{MWh}$$

$$EG_{MAX} = 1,579,971 \text{ MWh/yr}$$

The following parameters were calculated for the current MP and above explained:

$$\eta_{PJ,y} = 0.4365978 = \eta_{PJ,min,y}$$

$$EG_{PJ,adj,y} = 1,523,067 \text{ MWh/yr}$$

For the  $EF_{grid,y}$  ( $0.6196726 \text{ tCO}_2/\text{MWh}$ )<sup>19</sup>, ICONTEC verified the calculations and sources of data used for the determination of  $EF_{grid, OM}$  (see tables 4 and 5 ) through the reviewing of each one of the sources and calculations made /1/, /4/, /5/, /6/. The PP correctly applied each one of the steps requested by the tool to calculate the emission factor for and electricity system, version 02.2.1 /9/. All the calculations are reported in the OM Calculation File /6/.

<sup>18</sup> ICONTEC verified that the PP applied a proportionality factor (296/365) to  $EG_{BL,AVR}$  and  $EG_{MAX}$  given that the current MP did not get the whole 365 days of the year.

<sup>19</sup>  $EF_{grid,y} = W_{OM} \cdot EF_{grid, OM,y} + W_{BM} \cdot EF_{grid, BM,y} = 0.5 \cdot 0.7732504 + 0.5 \cdot 0.4660948 = 0.6196726 \text{ tCO}_2/\text{MWh}$

Hence we have that:

$$BE_y = 572,350 \text{ MWh/yr} \times 0.6290914 \text{ tCO}_2/\text{MWh} + (1,579,971 \text{ MWh/yr} - 572,350 \text{ MWh/yr}) \times 0.6196726 \text{ tCO}_2/\text{MWh} + (1,523,067 \text{ MWh/yr} - 1,579,971 \text{ MWh/yr}) \times 0.6196726 \text{ tCO}_2/\text{MWh}$$

$$BE_y = 572,350 \text{ MWh/yr} \times 0.6290914 \text{ tCO}_2/\text{MWh} + (1,523,067 \text{ MWh/yr} - 572,350 \text{ MWh/yr}) \times 0.6196726 \text{ tCO}_2/\text{MWh} = 949,194 \text{ tCO}_2/\text{yr}^{20}$$

### Project Emissions

From the registered PDD /2/, the project emissions for year y (PE<sub>y</sub>) are given by:

$$PE_y = \sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO_2,i,y}$$

For the proposed project activity we are going to have PE related to the Natural Gas consumption PE<sub>NG, y</sub> and project emissions from the Diesel Oil consumption in the back up diesel generator PE<sub>DO, y</sub>:

$$PE_y = PE_{NG, y} + PE_{DO, y}$$

$$PE_y = FC_{NG,y} * NCV_{NG,y} * EF_{CO_2,NG,y} + FC_{ST,DO,y} * NCV_{ST,DO,y} * EF_{CO_2,DO,y}$$

Where<sup>21</sup>:

$$FC_{NG,y} = 338,297,052 \text{ m}^3/\text{yr}$$

$$NCV_{NG,y} = 0.0335202 \text{ GJ/m}^3$$

$$EF_{CO_2,NG,y} = 0.0560263 \text{ tCO}_2/\text{GJ}$$

$$FC_{ST,DO,y} = 0.1932600 \text{ tonne/yr}$$

$$NCV_{ST,DO,y} = 42.710 \text{ GJ/tonne}$$

$$EF_{CO_2,DO,y} = 0.0743540 \text{ tCO}_2/\text{GJ}$$

Hence:

<sup>20</sup> See "Emission Reductions 11-03 - 31-12-2013.xls", tag "ER", cell E21.

<sup>21</sup> All the values used for the calculation of the Project Emissions were explained in tables 4 and 5.

$$PE_y = 338,297,052 * 0.0335202 * 0.0560263 + 0.1932600 * 42.710 * 0.0743540 = 635,327 \text{ tCO}_2^{22}$$

### Leakage Emissions

From the registered PDD /2/, the leakage emissions for year y ( $LE_y$ ) are calculated as follow:

$$LE_{\text{upstream},y} = \max \left[ 0, \left( \sum_i FC_{i,y} \cdot NCV_{i,y} \cdot EF_{i,\text{upstream},CH_4} \cdot GWP_{CH_4} \right) \cdot \left( 1 - \frac{\frac{1}{3} \cdot \sum_{x=1}^3 \sum_i FC_{i,x} \cdot NCV_{i,x}}{\sum_i FC_{i,y} \cdot NCV_{i,y}} \right) \right]$$

Where all the parameters were explained in sections 4, tables 4 and 5.

Hence:

$$LE_{\text{upstream},y} = 8,712 \text{ tCO}_2e^{23}$$

The overall calculation<sup>24</sup> of the project emissions is reported on the ER's spreadsheet /4/.

### Emission Reductions

From methodology ACM0007, version 06.1.0, the emission reductions for year y ( $ER_y$ ) are given by:

$$ER_y = BE_y - PE_y - LE_y = (949,194 - 635,327 - 8,712) \text{ tCO}_2e = 305,155 \text{ tCO}_2e$$

ICONTEC verified that the emission reductions achieved during this monitoring period are lower than the ex-ante values of emission reductions in the registered PDD or revised PDD /1, 2/ given that the steam turbine was out of service during more than three months during the monitoring period. Therefore emission reductions were lower than those expected in the registered PDD due to adjustment by the length of the monitoring period. It must be taken into account that the monitoring period started on 11 March 2013 and the steam turbine did not work properly until 13<sup>th</sup> June 2013 (95 days on reparations) thus, annual values are adjusted by the factor 201/365 for comparison assuming that the plant works

<sup>22</sup> See "Emission Reductions 11-03 - 31-12-2013.xls", tag "ER", cell E29.

<sup>23</sup> See "Emission Reductions 11-03 - 31-12-2013.xls", tag "ER", cell E35.

<sup>24</sup> See "Emission Reductions 11-03 - 31-12-2013.xls", tag "ER", cell E4.

regularly all days. There is also a difference in relation to the GWP of methane that is 25 for the second commitment period instead of 21 as assumed in the registered PDD.

All aspects related to direct and indirect emissions, including project, baseline and leakage emissions were considered appropriate and also the reductions claimed were covered during the verification. ICONTEC verified the correct application of the formulae according with the methodology and tools, and the data sources for each parameter and the application of default values.

ICONTEC can confirm that:

The data used for determination of the emission reductions are available and have been monitored in accordance with the registered monitoring plan and methodology ACM0007 version 06.1.0.

The data used the calculation of ERs in this monitoring period were verified and they were found consistent with those reported in the registered PDD.

The appropriate methods and formulae for calculating baseline emissions, project emissions and leakages emissions were followed in accordance with the registered PDD and applied methodology.

The assumptions, emission factors and default values applied in the MR and the calculations were correctly justified.

ICONTEC raised CAR 1, given that the value reported on MR version 01 for  $EG_{BL,AVR}$  (683,527 MWh/yr) did not correspond with the one reported on the registered PDD (1,039,341 MWh/yr); applying the factor that takes into account the length of the monitoring period ( $1,039,341 \text{ MWh/yr} \times 201/365 = 572,350 \text{ MWh/yr}$ ). The PP explained that there was a mistake and corrected the value. The finding was closed.

ICONTEC raised CAR 2 given that the project emissions from diesel oil combustion ( $PE_{FCj,y}$ ) reported on ER's spreadsheet /4/, tag "ER", cell E28 did not agree with the ones reported on MR version 01, section E.2, page 31. The PP corrected the typographical mistake in the version 02 of the MR and the finding was closed.

ICONTEC raised CL 8 in order to request a better explanation of the source of information, justifications about the assumptions made and applied formulae for the calculation of the  $EF_{grid,y}$  on PDD version 01. The PP improved the explanations in both, version 02 of the MR /1/ and ER's calculation file /4/ and the finding was closed.

## 7. Post Registration Changes

### 7.1. Temporary Deviations from the Registered Monitoring Plan, Monitoring Methodology or Standardized Baseline

There are no deviations from the registered monitoring plan and/or methodology.

### 7.2. Corrections

The PP submitted along with the MR the following correction:

- On the registered PDD there was a mistake in the inclusion of information about the calibration of the chromatographer in the parameter  $FC_{i,y}$  (quantity of natural gas used by the project power units in year y) instead of include it in the relevant parameters  $NCV_{i,y}$  (average net calorific value of natural gas used by the project power units in year y) and  $EF_{CO2,i,y}$  (weighted average  $CO_2$  emission factor of natural gas combusted in year y). This mistake was corrected into the revised PDD submitted with this Verification Report.

### 7.3. Changes to the Start Date of the Crediting Period

The project participant did not change the start date of the crediting period during the current monitoring period.

### 7.4. Permanent Changes from the Registered Monitoring Plan, Monitoring Methodology or Standardized Baseline

For the current MP, the PP submitted the following permanent change:

- Change in the calibration frequency of the power meters of the gas turbine N° 1 that belongs to a company that is not under the control of the project

participant<sup>25</sup>. In the registered PDD the calibration frequency was established as “annual”; but the external company MEGA follows the national standards established in “The Procedures” settled by the official Argentinean Grid Operator CAMMESA /26/, and in force to all power generation energy producers in Argentina.

ICONTEC verified from CDM PS, version 07.0, appendix 1, paragraph 5 a) that the abovementioned permanent change does require prior approval by UNFCCC and can be submitted (in a revised PDD) along with this Verification Report.

There are no other permanent changes from the registered monitoring plan and/or methodology identified during the current monitoring period.

### **7.5. Changes to the Project Design of a Registered Project Activity**

There are no proposed or actual changes to the project design of the registered CDM project activity reported or identified during the current monitoring period.

ICONTEC reviewed the new version of PDD (revised PDD) submitted by the PP to undertake the corrections and the permanent change abovementioned and was agreed with it.

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<sup>25</sup> <http://www.ciamega.com.ar/>

## **8. VERIFICATION STATEMENT**

ICONTEC was engaged by Central Térmica Loma de la Lata S.A to verify the greenhouse gas (GHG) emission reductions reported by the CDM project Combined Cycle at Loma de la Lata Thermo Unit Project, project registration number 7178, owned by PP for the period 11/03/2013 to 31/12/2013, equating to 305,155 tCO<sub>2</sub>e.

The verification was performed based on the requirements set by the CDM and relevant guidance provided by CMP and the CDM Executive Board. ICONTEC considers that the project's GHG emissions and resulting GHG emissions reductions reported in the monitoring report version 03 dated on 20/02/2015, are fairly stated.

ICONTEC confirms that the project is implemented as described in the validated and registered PDD. Installed equipment essential for generating emission reductions are running reliably and calibrated appropriately. The monitoring system is in place and the project is generating GHG emission reductions as a CDM project.

Combined Cycle at Loma de la Lata Thermo Unit Project is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project's monitoring and verification plan.

Combined Cycle at Loma de la Lata Thermo Unit Project is responsible for developing and keeping records and reporting procedures in accordance with the monitoring plan.

ICONTEC received the information and asked for explanations deemed necessary to provide enough evidence about the amount of GHG emissions and the calculation of the GHG emission reductions.

The verification consisted of the three following phases: i) desk review of the PDD, the MR and the monitoring plan ii) follow-up interviews with project stakeholders; iii) resolution of outstanding issues and the issuance of the final verification report and opinion.

It is ICONTEC's responsibility to set an independent GHG verification opinion on the GHG emissions from the project and approved a baseline for the monitoring period.



ICONTEC utilizes a risk-based approach that draws on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate them. ICONTEC's examination process includes test-based assessments of all evidence relevant to the amounts and disclosures of a project's GHG emissions and the calculations of such reductions for the reporting period.

ICONTEC can confirm that the GHG emissions reductions are calculated without material misstatements.

ICONTEC's opinion applies to the project's GHG emissions and the resulting GHG emission reductions reported and related to the validated and registered baseline, as well as the monitoring plan and its associated documents. ICONTEC confirms the following statements:

CDM project: Combined Cycle at Loma de la Lata Thermo Unit Project

Reporting period: 11/03/2013 to 31/12/2013

Baseline emissions: 949,194 tCO<sub>2</sub>e

Project emissions: 635,327 tCO<sub>2</sub>e

Leakage emissions: 8,712 tCO<sub>2</sub>e

Emission  
Reductions: 305,155 tCO<sub>2</sub>e

Bogotá D.C., March 09<sup>th</sup> 2015,

A handwritten signature in black ink, appearing to read 'Monica Vivas'.

Monica Vivas  
Director of Conformity Assessment Services  
ICONTEC

## 9. RESOLUTION OF CORRECTIVE ACTION, FORWARD ACTION AND CLARIFICATION REQUEST

During this verification, the issues identified 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 emission reductions or influence the reporting of emission reductions were discussed and concluded on this verification report.

This report includes all CARs, CLs and FARs raised in this verification. The reporting of them was undertaken in a transparent manner that allowed the reader to understand the issue raised, the responses provided by the project participants, the means of verification of such responses and references to any resulting changes in the monitoring report or supporting annexes.

Report Clarifications and Corrective Action Requests	VVS' Reference	Summary of Project Owner Response	Verification Conclusion
<p>CAR 1</p> <p>On MR version 01, section E.1, the reported value for <math>EG_{BL,AVR}</math> (683,527 MWh/yr) does not agree with the one reported on the registered PDD (1,039,341MWh/yr); applying the factor to take into account the length of the monitoring period <math>(1,039,341 \times 296/365) = 842,863</math> MWh/yr).</p>	<p>CDM VVS version 07.0, paragraph 290 (c).</p>	<p>The value was corrected according to the auditor observation.</p>	<p>Verification Team Response:</p> <p>ICONTEC verified that on version 02 of the MR the value was updated. As well the value was updated in the ER's spreadsheet.</p> <p>Verification Team Conclusion:</p> <p>Closed. 17/10/2014.</p>

# VERIFICATION REPORT



Report Clarifications and Corrective Action Requests	VVS' Reference	Summary of Project Owner Response	Verification Conclusion
<p>CAR 2</p> <p>The project emissions from diesel oil combustion (<math>PE_{FCi,y}</math>) reported on spreadsheet "Emissions Reductions 11-03 - 31-12-2013.xls", tag "ER", cell E28 do not agree with the ones reported on MR version 01, section E.2, page 31.</p>	<p>CDM VVS version 07.0, paragraph 290 (d).</p>	<p>The mistake was corrected.</p>	<p>Verification Team Response:</p> <p>ICONTEC verified that the value of project emissions was updated on version 02 of MR and ER's spreadsheet.</p> <p>Verification Team Conclusion:</p> <p>Closed. 17/10/2014</p>
<p>CL 1</p> <p>On MR version 01, section D.2, parameter <math>EG_{PJ,y}</math> it was reported by PP a permanent change from the registered monitoring plan related to the calibration frequency for the electricity meter MEGA (meter that is not under the control of the PP). This permanent change does not require prior approval and the PP shall describe the nature and extent of the non-conforming monitoring in a revised PDD and the proposed alternative</p>	<p>CDM VVS version 07.0, paragraph 307.</p> <p>CDM PS version 07.0, paragraph 277.</p>	<p>A revised PDD has been elaborated.</p>	<p>Verification Team Response:</p> <p>During the reviewing of the action plan, the PP submitted along with version 2 of MR a revised version of registered PDD. In the revised version the calibration frequency for the electricity meter MEGA (not under control of the PP) was updated. The calibration</p>

## VERIFICATION REPORT



Report Clarifications and Corrective Action Requests	VVS' Reference	Summary of Project Owner Response	Verification Conclusion
monitoring of the project activity.			<p>frequency for this equipment will strictly follow national standards established in "The Procedures" settled by CAMMESA (official Argentinean Grid Operator) instead of "once a year" as was established in the registered PDD.</p> <p>As well the post registration change was reported on section B.2.3 of version 2 of the MR.</p> <p>ICONTEC deemed correctly conducted the post-registration change by the PP and closed the finding.</p> <p>Verification Team Conclusion: Closed. 17/10/2014.</p>
CL 2 On MR version 01, section B.2.3 it was	CDM VVS version 07.0, paragraph	This change has been included in the MR, version	Verification Team Response:

## VERIFICATION REPORT



Report Clarifications and Corrective Action Requests	VVS' Reference	Summary of Project Owner Response	Verification Conclusion
not reported the permanent change to the calibration frequency for the electricity meter MEGA.	307.  CDM PS version 07.0, paragraph 277.	02.	ICONTEC verified that the permanent change to the calibration frequency for the electricity meter MEGA was correctly explained on MR, version 02, section B.2.3.  Verification Team Conclusion: Closed. 17/10/2014
CL 3 On MR version 01, section D.2, parameter $FC_{i,y}$ , the guideline reported in "calculation method" is outdated. The guideline was replaced by the CDM PS. As well the PP is requested to explain if there were calibration delays for the parameter.	CDM VVS version 07.0, paragraph 262 a), ii).	The reference to the guideline was removed and instead the CDM VVS is considered. The accepted uncertainties are used since they are larger than those obtained by measurement.	Verification Team Response: It was verified by ICONTEC that in the version 02 of the MR the information was updated with the latest one on CDM VVS, version 07.0, paragraph 283.  Verification Team Conclusion: Closed. 17/10/2014

## VERIFICATION REPORT



Report Clarifications and Corrective Action Requests	VVS' Reference	Summary of Project Owner Response	Verification Conclusion
<p>CL 4</p> <p>On MR version 01, section D.2, parameter <math>NCV_{i,y}</math>, is not clear enough whether it was applied the maximum permissible error of the instrument to the measured values taken during the period between the scheduled date of calibration and the actual date of calibration:</p> <ul style="list-style-type: none"> <li>• 05/04/2013 - 16/04/2013</li> <li>• 02/08/2013 - 19/08/2013</li> <li>• 19/09/2013 - 26/09/2013</li> <li>• 23/11/2013 - 25/11/2013</li> </ul>	<p>CDM VVS version 07.0, paragraph 283 a).</p>	<p>The calibration procedure follows the Protocol on Natural Gas Measurement Transfer Point N° 81, signed on May 2014, in which it is established that at any day, once every month, a contrast should be performed. Thus, there are not delays in calibration.</p>	<p>Verification Team Response:</p> <p>ICONTEC verified that the calibration frequency reported on the registered PDD for the chromatograph (<i>"The described values for calibration frequency will depend on the revised version of said Protocol, which is pending of signature"</i>) was incorrectly included in the section <i>"QA/QC procedures to be applied"</i> of the parameter <math>FC_{i,y}</math>. The PP corrected the mistake in a revised PDD. The protocol of Natural Gas <i>"revised version of said Protocol, which is pending of signature"</i> was reviewed by ICONTEC during the onsite visit and it</p>

## VERIFICATION REPORT



Report Clarifications and Corrective Action Requests	VVS' Reference	Summary of Project Owner Response	Verification Conclusion
			<p>was verified that the contrast could be made at any day, once every month. Hence it did not exist any calibration delay for this parameter</p> <p>Verification Team Conclusion: Closed. 17/10/2014.</p>
<p>CL 5</p> <p>On MR version 01, section D.2, parameter <math>FC_{ST,DO,y}</math> is not clear enough whether it was applied the maximum permissible error of the instrument to the measured values taken during the period between 19/12/2013-31/12/2013. The above mentioned period was not covered by the last calibration made on 20<sup>th</sup> December 2012 with validity of 1 year.</p>	<p>CDM VVS version 07.0, paragraph 283 a).</p>	<p>An additional control was made on 16 December 2013, covering the entire monitoring period.</p>	<p>Verification Team Response:</p> <p>ICONTEC verified during the onsite visit the calibration certificate that was missing to cover the entire monitoring period.</p> <p>The PP included the information of the calibration performed on the MR version 02 and the finding was closed</p> <p>Verification Team</p>

## VERIFICATION REPORT



Report Clarifications and Corrective Action Requests	VVS' Reference	Summary of Project Owner Response	Verification Conclusion
			Conclusion: Closed. 17/10/2014.
<p>CL 6</p> <p>On MR version 01, section E.1, the length of the monitoring period reported (97 days) does not agree with the total number of days from 11/03/2013 to 31/12/2013 (296 days).</p>	<p>CDM VVS version 07.0, paragraph 290 d).</p>	<p>The mistake was corrected.</p>	<p>Verification Team Response:</p> <p>ICONTEC verified that the PP corrected the figures in version 02 of the MR.</p> <p>Verification Team Conclusion:</p> <p>Closed.17/10/2014.</p>
<p>CL 7</p> <p>On MR version 1, section D.2, parameter <math>FC_{ST,DO,y}</math>, is not clear enough neither the monitoring equipment nor the procedure followed for its calibration.</p>	<p>CDM VVS version 07.0, paragraph 279 c).</p>	<p>The monitoring equipment is an electronic transmitter level meter (Efector LK3122).</p> <p>The calibration procedures consist of contrasting the level meter with a calibrated multimeter from a certified laboratory (Viditec).</p>	<p>VerificationTeam Response:</p> <p>ICONTEC verified during the onsite visit both, the monitoring equipment and the calibration procedure followed for the calibration.</p> <p>On version 02 of the MR it was improved the information on monitoring equipment.</p> <p>Verification Team</p>



# VERIFICATION REPORT



Report Clarifications and Corrective Action Requests	VVS' Reference	Summary of Project Owner Response	Verification Conclusion
			Conclusion: Closed. 17/10/2014
<p>CL 8</p> <p>On MR version 01, section E.1 is not clear enough the calculation of <math>EF_{grid,y}</math>. Please specify the source of information, justifications about the assumptions made and applied formulae.</p>	<p>CDM VVS version 07.0, paragraph 290 c).</p>	<p>The explanation was provided in file named "20140929 – Calculation of Emission Factor.docx". The remaining data is provided in emission calculations file "Emissions Reductions 11-03 - 31-12-2013-verif.xlsx".</p>	<p>Verification Team Response:</p> <p>During the onsite visit It was verified by ICONTEC the calculation of the <math>EF_{grid,y}</math> (the calculation of the factor for some days) without identification of any material misstatement.</p> <p>As well It was included an explanation of the calculation made by PP in the file 20140929 – Calculation of Emission Factor.docx.</p> <p>Verification Team Conclusion: Closed. 17/10/2014</p>
CL 9	CDM VVS version	A weighted average	Verification Team

## VERIFICATION REPORT



Report Clarifications and Corrective Action Requests	VVS' Reference	Summary of Project Owner Response	Verification Conclusion
On MR version 01, section E.1 is not clear enough the calculation of the average $NCV_{i,y}$ in accordance with the methodology.	07.0, paragraph 290 c).	considering natural gas volumes is performed based on monthly data starting from 11 March 2013. The original value calculated for the entire year was corrected.	Response: The PP updated the calculation of the weighted average $NCV_{i,y}$ through the consideration of the Gas Volume. The corrected calculation was shown in the ER's file and in version 02 of the MR. Verification Team Conclusion: Closed. 17/10/2014
CL 10 On spreadsheet Emissions Reductions 11-03 - 31-12-2013.xls, tag "Technical data", column "reference" there are some outdated references.	CDM VVS version 07.0, paragraph 290 d).	These references were updated.	Verification Team Response: ICONTEC verified that the PP correctly updated the ER's spreadsheet with the latest references. Verification Team Conclusion: Closed. 17/10/2014

## 10. EXPERIENCE AND KNOWLEDGE OF AUDIT TEAM AND REVIEWER TEAM

**Cristian Grisales**

**Lead Auditor and Technical Expert (Sector 01)**

### **Education:**

Master Executive in Renewable Energies

EOI-Madrid, Spain

March 2015

Certified ISO 14001

ICONTEC

May 2013

Certified ISO 9001

ICONTEC

August 2012

Electrical Engineer

National University of Colombia

Bogotá – Colombia

July 2009

### **Professional Background:**

Professional of Climate Change

ICONTEC

May 2012 - Today

Professional on developing validation and verification on CDM projects as lead auditor and as technical expert in the energy sector.

Electrical Maintenance Engineer

EMGESA S.A ESP. Colombia

November 2009 - May 2012

Electrical maintenance engineer in the Bogotá River Hydroelectric plants. Executing preventive, predictive and corrective maintenance of the generators, auxiliary services, power transformers and electrical substation. Developed the investment projects' inventory in accordance with the annual operating budget.

Implementation of RCM maintenance programs. Monthly service availability in the plant, and full-time availability in failure care. Electrical testing of generators, transformers, motors and substation equipment.

Engineering Intern

#### **INGENIERIA ESPECIALIZADA**

Commercial visits to different industries, sales, design and assembly of shielding systems, grounding grids, power quality studies, calculation of electrical installations, RETIE inspections, diagnostic grounding systems, implementation, supervision and maintenance of the developed projects.

#### **CDM Experience**

##### **Auditor and Specialist:**

- Validation of Biogas Project, Olmeca I, Santa Rosa, Guatemala
- Validation of CGR Catanduva Landfill Gas Project, Brazil
- Validation of Macaubas Landfill Gas Project, Brazil
- Validation of Taurichuco Hydropower Project, Perú
- Validation of Teresina Landfill Gas Project, Brazil
- Validation of Maceio Landfill Gas Project, Brazil
- Verification of Amaime Minor Hydroelectric Power Plant, Colombia
- Validation of Doña Teresa Small Hydro Power Plant, Colombia
- Verification of the Ciudad Juarez Landfill Gas Project, Mexico
- Verification and Renewal of the Crediting Period of LaGeo Geothermal Project, Salvador
- Verification of Santa Ana Hydro Power Project, Colombia.
- Validation of SHPS Tambaú, Das Pedras and Rio Do Sapo Cdm Project (JUN1132), Brazil
- Validation of SHPs Poço Fundo and Providência CDM Project (JUN1133), Brazil
- Verification of Conversion of Open Cycle Gas Turbines to Combined Cycle at Kallpa Thermoelectric Power Plant
- Verification of Biogas project, Olmeca III, Tecún Uman
- Verification of DOÑA JUANA LANDFILL GAS-TO-ENERGY PROJECT

**Technical Reviewer:**

- Validation of Thuan Nhien Phong Wind Farm, Vietnam
- Validation of Phuong Mai 3 Wind Power Project, Viet Nam
- Validation of Chamelecón 280 Hydroelectric project, Honduras
- Validation of Providencia I: 1.8MW Small Hydro Power Generation Plant, Colombia
- Validation of Providencia III: 9.11MW Small Hydro Power Generation Plant, Colombia
- Validation of SHP Itaguacu CDM Project (JUN 1146), Brazil, Brazil
- Renewal of Aguafresca Multipurpose and Environmental Service Project, Colombia
- Validation of Feira de Santana Landfill Gas Project, Brazil
- Validation of SHP Morro Azul CDM Project (JUN1164), Colombia
- Verification of Santa Ana Hydroelectric Plant, Colombia
- Verification of Methane recovery and effective use of power generation project Norte III-B Landfill, Argentina
- Verification of DOÑA JUANA LANDFILL GAS-TO-ENERGY PROJECT, Colombia
- Validation of Suba and Usaquen hydroelectric CDM umbrella project, Colombia
- VCS Validation of Hydroelectric Project Ituango, Colombia
- Verification of La Venta II Wind Power Project, México
- Validation of Panuco Bagasse Cogeneration Project, Brazil
- GS Validation of BK ENERGIA ITACOATIARA PROJECT, Brazil
- Verification of MIO Cali, Colombia
- VCS Validation of HYDROELECTRIC PROJECT EL EDÉN, Colombia
- Verification of Biogas energy plant from palm oil mill effluent, Guatemala
- Verification of Agua Fresca Multipurpose and environmental services project, Colombia
- GS Validation of PARAMONGA BAGASSE BOILER PROJECT, Brazil

**Francy Ramirez**  
**CDM Reviewer**

**Education:**

Electrical Engineer. Universidad Los Andes, 2001

Postgraduate: Assessment of Social Projects. Universidad Los Andes, 2005  
University of Oxford. Course: Applying Knowledge Management, Principle and Practices (December 1 de 2009).

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

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

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

Climate Change, Trade and Standardization - in a development perspective". Stockholm, Sweden (23 and 25 November 2009)

ISO global workshop on Greenhouse Gas Schemes Addressing Climate Change – How ISO Standards Help, Stockholm, Sweden. (20 and 21 November 2009)

Conference on Climate Change – Deforestation and Standardization. Bali, Indonesia (31 May and 1st June 2010)

**Professional Background:**

ICONTEC (2005 - Actually)

Professional of Standardization

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

CODENSA (2002 - 2005)

Inspections and electrical works coordinator

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

**CDM Experience:****Lead Auditor:**

- Validation of Guanaquitas 9.74 MW hydroelectric project, Colombia
- Validation of Fuel Switching through change of furnaces at Imusa S.A., Colombia
- Validation of Installation of a high-pressure/high-efficiency bagasse boiler to cogenerate heat and power, Argentina
- Validation of Cueva Maria Hydroelectric Expansion Project, Guatemala
- Validation of Paysandú Clean Energy, Uruguay
- Validation of La Vegona Hydroelectric project, Honduras
- Validation of Chamelecón 280 Hydroelectric project, Honduras
- Validation of Pardos SHPs and LOGICarbon CDM Project, Brazil
- Validation of Pequi and Sucupira SHPs and LOGICarbon CDM Project, Brazil
- Validation of Cambará and Embaúba SHPs and LOGICarbon CDM Project, Brazil
- Validation of Bonyic hydroelectric project, Panamá
- Validation of METALDOM Fossil fuel switch from reheat furnace, Dominican Republic
- Validation of Toachi – Pilaton Hydroelectric Project, Ecuador
- Validation of EMGEA Small Hydropower (SHP) Run-of-the-River CDM Project Bundle, Colombia
- Validation of Energy efficiency at Malvinas Gas Plant, Peru
- Validation of Marañon Hydroelectric Project, Peru
- Validation of Santa Rita Hydroelectric Plant, Guatemala
- Validation of Ventana, Suba and Usaquén Hydroelectric CDM Bundled, Colombia
- Verification of Los Algarrobos hydroelectric project, Panama

- Verification of Bio energy in General Deheza –Electric power generation from peanut hull and sunflower husk, Argentina
- Validation of Taurichuco Hydropower Project, Peru
- Validation of Aguafresca Multipurpose and Environmental Service Project, Colombia
- Verification of Agua Fresca Multipurpose and Environmental Service Project, Colombia
- Verification of La Joya Hydroelectric project, Costa Rica
- Verification of Amaime Minor Hydroelectric Power Plant, Colombia

**Specialist:**

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

**CDM Technical Reviewer:**

- Validation of Improving energy efficiency in a new Gas Plant in Gibraltar - Colombia
- Validation of Tres Valles Cogeneration Project, Honduras
- Validation of Tunjita Diversion Hydroelectric Project, Colombia
- Validation of Ferreira Gomes Hydro Power Plant CDM Project, Brazil
- Verification of two crediting periods of La Venta II, Mexico
- Verification of two crediting periods of La Joya Hydroelectric Project, Costa Rica
- Verification of Bio energy in General Deheza –Electric power generation from peanut hull and sunflower husk, Argentina
- Verification of Tres Valles Cogeneration Project, Honduras
- Verification of Agua Fresca Multipurpose and Environmental Services, Colombia
- Verification of La Venta II, Mexico
- Verification of two crediting periods of Fertinal Nitrous Oxide Abatement Project, Mexico
- Verification of Co-composting of EFB and POME project, Guatemala



- Verification of Biogas Project, Olmeca III, Tecun Uman, Guatemala
- Verification of Jepirachi Wind Power Project, Colombia
- Verification of Biogas energy plant from palm oil mill effluent, Guatemala
- Verification of Santa Ana Hydroelectric Project, Colombia
- Validation of SHP Morro Azul CDM Project (JUN1164), Colombia
- Verification of Biogas Project, Olmeca III, Tecun Uman, Guatemala

### **Specialist Technical Reviewer:**

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

## 11. REFERENCES

/1/	Monitoring Report for the 1 <sup>st</sup> Verification of Combined Cycle at Loma de la Lata Thermo Unit Project, issued by Central Térmica Loma de la Lata S.A. <ul style="list-style-type: none"> <li>Version 01, dated on 21/07/2014</li> <li>Version 02, dated on 06/10/2014</li> <li>Version 03, dated on 20/02/2015</li> </ul>
/2/	Registered PDD for Combined Cycle at Loma de la Lata Thermo Unit Project, issued by Central Térmica Loma de la Lata S.A. Version 06, dated on 25/02/2013
/3/	Revised PDD for Combined Cycle at Loma de la Lata Thermo Unit Project, issued by Central Térmica Loma de la Lata S.A. Version 07, dated on 06/10/2014.
/4/	Emission Reductions Calculation File for Combined Cycle at Loma de la Lata Thermo Unit Project, issued by Central Térmica Loma de la Lata S.A, dated on 26/02/2015.
/5/	Raw Data File of measures of generated/consumed energy, natural gas consumption, diesel consumption, during the crediting period, issued by Central Térmica Loma de la Lata S.A, dated on 12/09/2014.
/6/	Operating Margin Calculation File for Combined Cycle at Loma de la Lata Thermo Unit Project, issued by Central Térmica Loma de la Lata S.A, dated on 18/09/2014. The calculation as well was included as a tag (OM day by day 2013) in the ER's File.
/7/	Validation Report for Combined Cycle at Loma de la Lata Thermo Unit Project, issued by SGS, dated on 01/03/2013.
/8/	Methodology ACM0007 " <i>Conversion from single cycle to combined cycle power generation</i> ", version 06.1.0.
/9/	Tool to calculate the emission factor for an electricity system, version 02.2.1.
/10/	Tool to calculate project or leakage CO <sub>2</sub> emissions from fossil fuel combustion, version 02.
/11/	CDM Validation and Verification Standard, version 07.0
/12/	CDM Project Cycle Procedure, version 07.0
/13/	CDM Project Standard, version 07.0
/14/	Guideline on the application of materiality in verifications, version 01.0

## VALIDATION REPORT



/15/	<p>Monthly Agreement About Natural Gas Delivery and Purchase between CTLLL (buyer) and YPF S.A (Gas Supplier) for each one of the months of the monitoring period.</p> <ul style="list-style-type: none"> <li>· 201312.pdf</li> <li>· 201311.pdf</li> <li>· 201310.pdf</li> <li>· 201309.pdf</li> <li>· 201308.pdf</li> <li>· 201307.pdf</li> <li>· 201306.pdf</li> <li>· 201305.pdf</li> <li>· 201304.pdf</li> <li>· 201303.pdf</li> </ul>																				
/16/	<p>NCV and EF for the Natural Gas Consumption in Combined Cycle at Loma de la Lata Thermo Unit Project (through Chromatography), issued by the fuel supplier REPSOL YPF S.A, dated on 28/07/2014.</p>																				
/17/	<p>Natural Gas Measuring Protocol PM 81 for Combined Cycle at Loma de la Lata Thermo Unit Project, signed between REPSOL YPF S.A and Central Térmica Loma de la Lata S.A, dated on May 2014.</p>																				
/18/	<p>Fuel Oil Consumption and Operation Hours of the Backup Generator for Combined Cycle at Loma de la Lata Thermo Unit Project, issued by Central Térmica Loma de la Lata S.A, between March 2013 to December 2013.</p>																				
/19/	<p>Energy Raw Data for the Calculation of the Operating Margin Emission Factor, and generated power by CTLLL, downloaded from the data base of the official power system administrator CAMMESSA, from March 2013 to December 2013.</p> <table style="margin-left: auto; margin-right: auto;"> <tr><td>· 201303.PRN</td><td>· PO1303.MDB</td></tr> <tr><td>· 201304.PRN</td><td>· PO1304.MDB</td></tr> <tr><td>· 201305.PRN</td><td>· PO1305.MDB</td></tr> <tr><td>· 201306.PRN</td><td>· PO1306.MDB</td></tr> <tr><td>· 201307.PRN</td><td>· PO1307.MDB</td></tr> <tr><td>· 201308.PRN</td><td>· PO1308.MDB</td></tr> <tr><td>· 201309.PRN</td><td>· PO1309.MDB</td></tr> <tr><td>· 201310.PRN</td><td>· PO1310.MDB</td></tr> <tr><td>· 201311.PRN</td><td>· PO1311.MDB</td></tr> <tr><td>· 201312.PRN</td><td>· PO1312.MDB</td></tr> </table>	· 201303.PRN	· PO1303.MDB	· 201304.PRN	· PO1304.MDB	· 201305.PRN	· PO1305.MDB	· 201306.PRN	· PO1306.MDB	· 201307.PRN	· PO1307.MDB	· 201308.PRN	· PO1308.MDB	· 201309.PRN	· PO1309.MDB	· 201310.PRN	· PO1310.MDB	· 201311.PRN	· PO1311.MDB	· 201312.PRN	· PO1312.MDB
· 201303.PRN	· PO1303.MDB																				
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· 201311.PRN	· PO1311.MDB																				
· 201312.PRN	· PO1312.MDB																				

## VALIDATION REPORT



/20/	<p>Measured Energy by the MEGA's Electricity Meter, downloaded from the data base of the official power system administrator CAMMESSA, from March 2013 to December 2013.</p> <ul style="list-style-type: none"> <li>· 201303.xls</li> <li>· 201304.xls</li> <li>· 201305.xls</li> <li>· 201306.xls</li> <li>· 201307.xls</li> <li>· 201308.xls</li> <li>· 201309.xls</li> <li>· 201310.xls</li> <li>· 201311.xls</li> <li>· 201312.xls</li> </ul>
/21/	<p>CDM-MR-FORM - Monitoring Report Form, version 04.0.  <a href="https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20140625145437175/lss_form07.pdf">https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20140625145437175/lss_form07.pdf</a></p>
/22/	<p>Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. See:  <a href="https://www.ipcc.ch/meetings/session25/doc4a4b/vol2.pdf">https://www.ipcc.ch/meetings/session25/doc4a4b/vol2.pdf</a>, page 1.19.</p>
/23/	<p><a href="http://www.ipcc.ch/meetings/session25/doc4a4b/vol1.pdf">http://www.ipcc.ch/meetings/session25/doc4a4b/vol1.pdf</a></p>
/24/	<p><a href="http://www.energia.gov.ar/contenidos/verpagina.php?idpagina=2311">http://www.energia.gov.ar/contenidos/verpagina.php?idpagina=2311</a>. File "Cálculo Factor de Emisión CO2 2013 (27/10/2014)", tag "metodo de despacho2013", column "V". The reported value is the average of this column.</p>
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/26/	<p>Argentinean Procedures for the Energy Sector, issued by CAMMESSA, dated on 2014.  <a href="http://portalweb.cammesa.com/Pages/BackupBotoneraAneriorIzquierda/Normativa/procedimientos.aspx">http://portalweb.cammesa.com/Pages/BackupBotoneraAneriorIzquierda/Normativa/procedimientos.aspx</a></p>