



Monitoring report form
(Version 04.0)

Complete this form in accordance with the Attachment "Instructions for filling out the monitoring report form" at the end of this form.

MONITORING REPORT

Title of the project activity	El Canadá Hydroelectric Project
Reference number of the project activity	0606
Version number of the monitoring report	01
Completion date of the monitoring report	23/07/2014
Registration date of the project activity	02/12/2006
Monitoring period number and duration of this monitoring period	05, 23/11/2010 – 30/04/2014, first and last days included
Project participant(s)	<p>Guatemala: Generadora de Occidente Ltda.</p> <p>Finland: Government of Finland - Ministry of Foreign Affairs of Finland; Fortum Corporation.</p> <p>Japan: Chubu Electric Power Co., Inc; The Chugoku Electric Power Co., Inc.; Kyushu Electric Power Co., Inc.; Mitsubishi Corporation; Shikoku Electric Power Co., Inc.; Tohoku Electric Power Co., Inc.; The Tokyo Electric Power Co., Inc.; Japan International Cooperation Agency (JICA); Mitsui & Co., Ltd.</p> <p>Netherlands: Netherlands' Ministry of Infrastructure and the Environment (IenM); Electrabel N.V.; Netherlands' Ministry of Economic Affairs, Agriculture and Innovation (EL&I).</p> <p>Norway: Government of Norway – Ministry of Foreign Affairs; Norsk Hydro ASA; Statoil ASA.</p> <p>Sweden: Government of Sweden - Swedish Energy Agency.</p> <p>France: GDF SUEZ</p> <p>Germany: RWE Power AG; Deutsche Bank AG; BP Alternative Energy International Ltd. Bilateral and Multilateral Funds - Prototype Carbon Fund (PCF): Managing company – International Bank for Reconstruction and Development (IBRD) as Trustee of the Prototype Carbon Fund (PCF)</p>
Host Party(ies)	Guatemala: Generadora de Occidente Ltda. (GdO)
Sectoral scope and selected methodology(ies), and where	<p>Sectoral Scope 1: Energy industries (renewable/non-renewable sources)</p> <p>ACM0002: "Consolidated Baseline Methodology for Grid-</p>

applicable, applied standardized baseline(s)	connected Electricity Generation from Renewable Sources", version 13.0.0, EB 67.
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	331,850 tCO ₂
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	340,050 t CO ₂
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period up to 31 December 2012(if applicable)	218,777 tCO ₂
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period from 1 January 2013 onwards (if applicable).	121,273 tCO ₂

SECTION A. Description of project activity

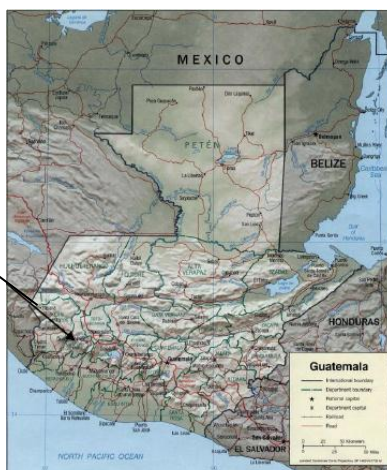
A.1. Purpose and general description of project activity

El Canadá Hydroelectric Project consists of a 43 MW peaking run-of-river hydroelectric plant located on the Samalá River on the west coast of Guatemala, near the town of Santa María de Jesus. The western Guatemala region has 350 MW of demand and 31 MW of installed capacity. Construction began in February 2002 and was completed in December 2003. The Project started commercial operation per the Wholesale Market Norms on November 23rd, 2003. Since its commissioning, it has been producing an average of 175 GWh/year of electricity, which is sold to Guatemala's largest commercial distributor, COMEGSA, under a 10-year Power Purchase Agreement (PPA). The Project contributes to the sustainable development of Guatemala in various ways. First, it has increased the supply of power to the local grid, improving stability and helping reduce losses in the distribution system. Second, it is reducing greenhouse gas emissions as well as emissions of local pollutants from power generation by using a cleaner energy source than what typically would have been used in the country. Third, it is one of the first renewable energy projects to be developed after the approval of Guatemala's new General Electricity Law. Its development has provided important knowledge and experience for other project developers that are striving to participate in the competitive national and regional market. Fourth, through the agreements the Project Company has entered into with the neighboring municipalities, the Project is conserving sub-surface water, it has re-forested parts of the land where it was constructed, and it is making annual payments to improve the conditions of the local communities. Finally, it has created 250 jobs, injecting at least US\$ 30 million into the Guatemalan economy over the course of the construction period. The actual emissions reductions achieved during the actual monitoring period (23/11/2010 – 30/04/2014) are **340,050 t CO₂**

A.2. Location of project activity

The Project is located on the Samalá River, 12 kilometers south of the Quetzaltenango Municipality and 198 kilometers due west from Guatemala City. Quetzaltenango is Guatemala's second largest city and is responsible for a large portion of the 350 MW maximum demand of the western region. The Samalá River is nearly 130 kilometers in length, and has relatively high flows, due to intense rainstorms over the western slopes of the volcanic mountain ranges that act as the river's basin. The slopes around the Project are very steep, with small plateaus. The Project is located immediately downstream from the existing Santa María hydro powerhouse owned by the national utility, Instituto Nacional de Electrificación (INDE), and utilizes some of the existing infrastructure. The geographic coordinates for the El Canadá Power House are Latitude: 14.6857, Longitude: -91.5315.

El Canadá
Hydroelectric
Project



A.3. Parties and project participant(s)

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
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Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Guatemala (host)	Generadora de Occidente, Ltda. ("GdO")	No
Finland	Government of Finland – Ministry of Foreign Affairs of Finland; Fortum Corporation	Yes
Japan	Chubu Electric Power Co., Inc.; The Chugoku Electric Power Co., Inc.; Kyushu Electric Power Co., Inc.; Mitsubishi Corporation; Shikoku Electric Power Co., Inc.; Tohoku Electric Power Co., Inc.; The Tokyo Electric Power Co., Inc.; Japan International Cooperation Agency (JICA); Mitsui & Co., Ltd.	Yes
Canadá	International Bank for Reconstruction and Development (IBRD) as the Trustee of the Prototype Carbon Fund (PCF)	Yes
Netherlands	Netherlands' Ministry of Infrastructure and the Environment (IenM); Electrabel N.V.; Netherlands' Ministry of Economic Affairs, Agriculture and Innovation (EL&I)	Yes

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Norway	Government of Norway - Ministry of Foreign Affairs; Norsk Hydro ASA; Statoil ASA	Yes
Sweden	Government of Sweden - Swedish Energy Agency	Yes
France	GDF Suez	No
Germany	RWE Power AG; Deutsche Bank AG; BP Alternative Energy International Ltd.	No

Party involved (host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Bilateral and Multilateral Funds – Prototype Carbon Fund (PCF)	Managing company: International Bank for Reconstruction and Development (IBRD) as Trustee of the Prototype Carbon Fund (PCF)	Yes

A.4. Reference of applied methodology and standardized baseline

Consolidated methodology for grid-connected electricity generation from renewable sources”
(ACM0002), version 13.

http://cdm.unfccc.int/filestorage/D/Y/P/DYPFI935XBG274NWH6O8CM1KEZR0VU/EB67_repan13_ACM0002_ver13.0.0.pdf?t=S2l8bjg3YzVkfDAAjQhP_alZur303oL2lpx8

“Tool to calculate the emission factor for an electricity system”, Version 3.0.0.

http://cdm.unfccc.int/filestorage/z/a/6WYDEP2G30AT5NQOMJCK8XIRL7VUF1.pdf/eb70_repan22.pdf?t=ODN8bjg3bDBkfDDG9ut7Spbn0XxCkeERwZWS

“Tool to calculate project or leakage CO2 emissions from fossil fuel combustion”, Version 02.

<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf>

A.5. Crediting period of project activity

The project is on second crediting period, which is renewable and it has 7 years length from 23/11/2010 to 22/11/2017.

A.6. Contact information of responsible persons/ entities

Mr. Hector Bracamontes Hinojosa
Enel Green Power Mexico
Tel: +52 55 5083 0310
Email: hector.bracamontes@enel.com

Enel Green Power Mexico is not a project participant

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

El Canadá Hydroelectric Project consists of a 43 MW peaking run-of-river hydroelectric plant located on the Samalá River on the west coast of Guatemala, near the town of Santa María de Jesus. The western Guatemala region has 350 MW of demand and 31 MW of installed capacity. Construction began in February 2002 and was completed in December 2003. The Project started commercial operation per the Wholesale Market Norms on November 23rd, 2003.

The Project collects power flows from the tailrace of the existing Santa María power plant that is owned by INDE and also collects spillages from the Santa María dam and local inflow from the area between the Santa María dam and the Project diversion dam. All power flows flow through a desander, located immediately downstream of the diversion dam, and are subsequently diverted through a tunnel, three meters in diameter and approximately 1200 m long, to a regulating pond. The regulating pond is designed to collect water inflows for daily peaking operation, totalling 5 hours. The live storage volume is 184,000 m3, using an 8-meter pond fluctuation. The normal operating level of the reservoir is 1,416.90 meters above sea level (masl) and the minimum operating level is 1,409 masl. An intake structure on the regulating reservoir is

equipped with trash racks and a hydraulically operated gate. The gate is equipped to close during emergency conditions in the event of penstock rupture. The penstock is approximately 2,400 m long and conveys the power flows from the regulating reservoir to the powerhouse. The penstock is comprised of a low- and a high-pressure section 1590 and 800 m long, respectively. The penstock is bifurcated into two 1.45-m diameter penstock pipes, approximately 46 m from the powerhouse.

The penstock pipe is buried over its total length. The low-pressure penstock diameter is 2.10 m, and the high-pressure section diameter 1.85 m. El Canadá powerhouse contains two 21.5-MW units. Each generating unit has a Pelton turbine and synchronous generator. The powerhouse crane has a capacity at least equal to the heaviest lift during equipment installation of 65 tons. The control room is be air conditioned and separate from the equipment area of the powerhouse. The output from the El Canadá facility is stepped up from 13.8 kV to 69 kV, before it is transmitted to Santa María substation about 3.6 km away for delivery to the INDE utility grid. The transmission line poles are steel and the guard and the power cables are 636 MCM ACSR. Each pole of the transmission line is grounded to provide a resistance of not more than 10 ohms.

All equipment utilized in the El Canadá Project is proven technology that has been successfully applied worldwide. Each of the two 21.5-MW generating units has a Pelton turbine and a synchronous generator. The rubber dam used in the diversion dam is a new technology introduced to Guatemala.

Rubber dam technology was chosen in order to properly regulate the level at the diversion dam considering the operational restrictions due to being downstream from the Santa Maria powerhouse.

This technology also has an added advantage during high volume situations during the wet season, the rubber dam can be deflated in order to avoid diverting mud, rocks, tree trunks, and other garbage into the desander.

B.2. Post registration changes

B.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline

Not Applicable

B.2.2. Corrections

Not Applicable

B.2.3. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline

Not Applicable

B.2.4. Changes to project design of registered project activity

Not Applicable

B.2.5. Changes to start date of crediting period

Not Applicable

B.2.6. Types of changes specific to afforestation or reforestation project activity

Not Applicable

SECTION C. Description of monitoring system

The monitoring of the emissions reductions was done according to the operational structure shown in the below chart. The first step is measuring process, followed by verification of the measurement, calculation of

the emissions reductions, and finally, review and analysis of results. Generadora de Occidente, Ltda. General Manager will be the responsible for the monitoring process.

- The Plant Manager of El Canadá Hydroelectric Project is responsible of the electric energy measurement.
- The Marketing Analyst engineer of Generadora de Occidente, Ltda. is in charge of the monitoring process.
- The General Manager is responsible of the Monitoring Plan.

Personnel who carry out the monitoring function are trained in CDM procedures. New personnel have to follow up a training program and are formed in the specific skills required to carry out the Monitoring Plan.

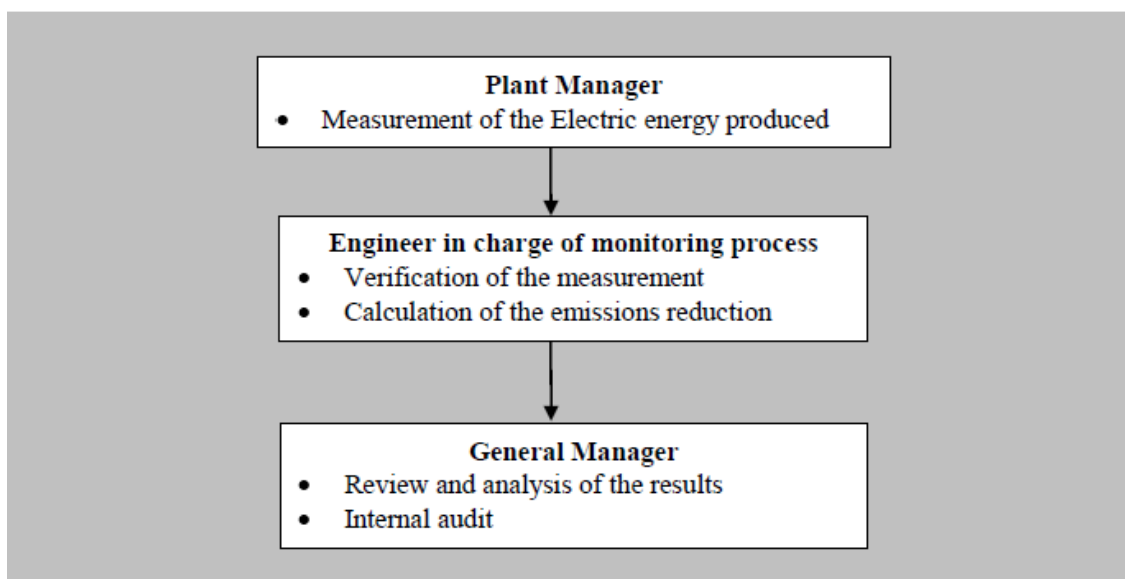


Figure 1. Information Flow Diagram

1. Measuring

The Plant Manager collects electronically and monthly the generation data from the commercial energy meter installed in the El Canadá Substation, which measures the energy produced by El Canadá Hydroelectric Project and Montecristo Hydroelectric Project. In the Montecristo Substation in the 69 KV bus is installed the energy meter of Montecristo Hydroelectric Project, therefore El Canadá Hydroelectric Project could be calculated by difference. The generation data is reported in a spreadsheet for measuring control and register. The commercial meter data collection of the monitored month takes place during the first week of the following month.

The Plant Manager collects electronically and monthly the generation data from the commercial energy meter installed in the Montecristo Substation, which measures the energy produced by Montecristo Hydroelectric Project. The generation data is reported in a spreadsheet for measuring control and register. The commercial meter data collection of the monitored month takes place during the first week of the following month.

Therefore El Canadá Hydroelectric Project could be calculated by difference. Calculated the difference the generation data is reported in a spreadsheet for measuring control and register. The commercial meter data collection of the monitored month takes place during the first week of the following month.

2. Calculation energy produced and verification

The person in charge of the monitoring process verifies the accuracy of the recorded energy data. For this purpose, is necessary to compare the data recorded against the information of the commercial measurement published by the Administrador del Mercado Mayorista (AMM) in Certificates emitted by them.

3. Calculation of emissions reductions

The person responsible of perform the Monitoring Process calculated the emissions reductions for the observation period using the ex ante emission factor according to the Table A.4.7 on the PDD

Location of monitoring points

The metering point is located at El Canadá substation, therefore the power output for El Canadá and Montecristo are monitored at El Canadá Substation as stated in the registered PDD.

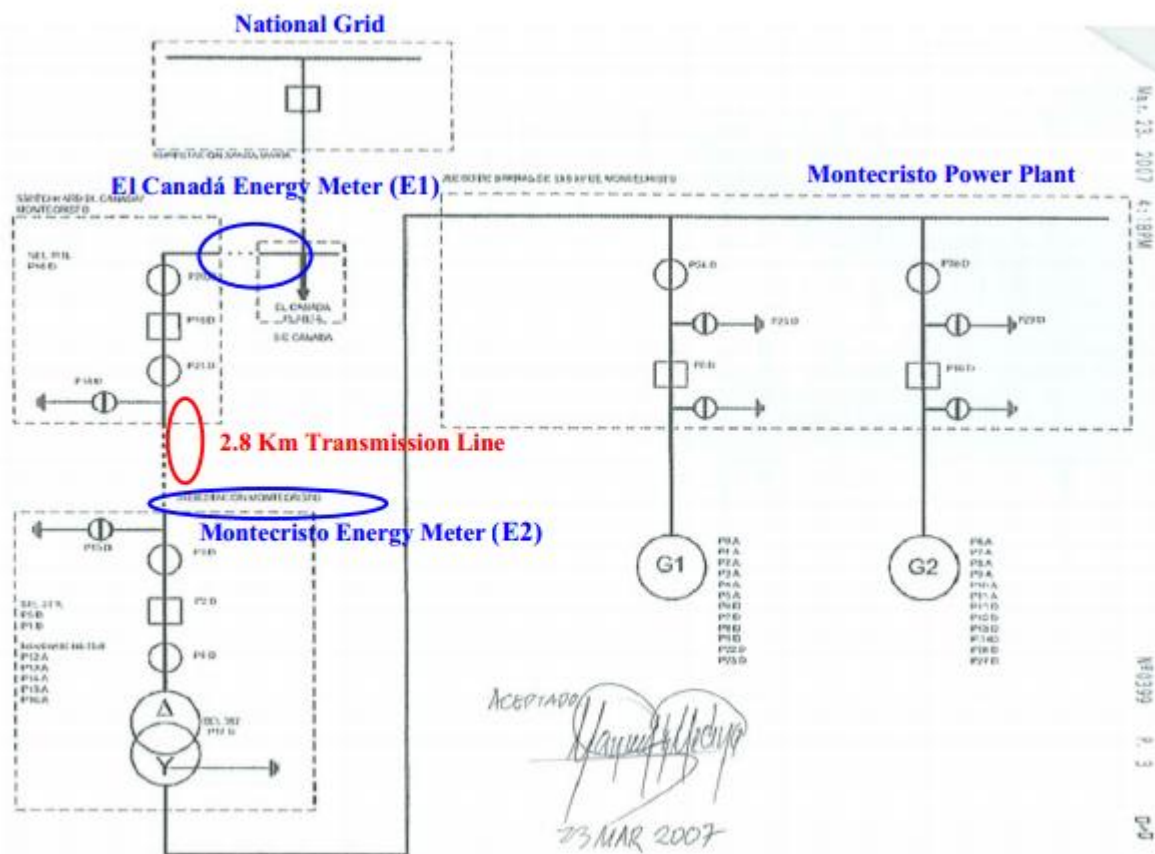


Figure 2. Monitoring System Diagram

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

Data / Parameter:	NCV _{i, y} - Net Calorific Values
Unit:	TJ/10 ³ tonnes
Description:	Annual energy produced by the plants connected to the grid during 2006, 2007 and 2008
Source of data:	Administrador del Mercado Mayorista, AMM
Value(s) applied:	By means of the net calorific values is calculated the apparent fuel consumed during each year by the generating units.
Purpose of data:	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	EF_{grid,CM,y}
Unit:	tCO2/MWh
Description:	Combined margin CO2 emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system”.
Source of data:	Calculated. Official statistics from AMM for electricity generation clustered by technology 2006, 2007, and 2008
Value(s) applied:	0.495 tCO2/MWh
Purpose of data:	This value was calculated according to “Tool to calculate the emission factor for an electricity system” (version 3.0.0). Applied value was calculated by referring to Official AMM Statistics for electricity generation (2006, 2007, and 2008).
Additional comment:	

Data / Parameter:	EF_{OM, y}
Unit:	tCO2/MWh
Description:	Operating Margin emission factor for year y
Source of data:	Calculated according to “Tool to calculate the emission factor for an electricity system” (version 3.0.0).. Applied value was calculated by referring Official AMM Statistics for electricity generation (2006, 2007, 2008).
Value(s) applied:	0.841 tCO2/MWh
Purpose of data:	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	EF_{BM, y}
Unit:	tCO2/MWh
Description:	Build Margin emission factor for year y
Source of data:	Calculated according to “Tool to calculate the emission factor for an electricity system” (version 3.0.0). Applied value was calculated by referring Official AMM Statistics for electricity generation (2006, 2007, 2008).
Value(s) applied:	0.380 tCO2/MWh
Purpose of data:	Calculation of baseline emissions
Additional comment:	This data will be calculated ex-ante at the time of PDD submission and will not be changed during the second crediting period.

D.2. Data and parameters monitored

Data / Parameter:	EG_{PJ,y} (=EG_{facility, y}) = E1 – E2
Unit:	MWh
Description:	Net electricity supplied to the grid by the project
Measured/ Calculated / Default:	Measured – Hourly measurement and monthly recording
Source of data:	Calculated based on measured readings of E1 and E2

Value(s) of monitored parameter:			23/11/2010-30/04/2014
	Generation Measurement	MWh	703,900.86
Monitoring equipment:	Electricity meters		
Measuring/ Reading/ Recording frequency:	Monthly		
Calculation method (if applicable):	Not applicable		
QA/QC procedures:	<p>Uncertainty of data is low as this value is calculated based on the meter readings at El Canadá and Montecristo substations.</p> <p>Electricity supplied by the project activity to the grid. Double check by receipt of sales.</p> <p>As established in the NCC14, the measurement equipment has to comply with Norms: IEC 687 or ANSI/IEEE 12.2. Its exactitude must be of 0.2%. Data Registry: The measurement equipment must register the information in periods of 15 to 60 minutes. This equipment must have a non-volatile memory that allows the storage of information for at least the least 37 days and it has to have a battery capable of keeping these data during a period of at least 7 days, in case of failure of the auxiliary power feeding. The generated energy is monitored by AMM as well as by the generator, and there is the secondary measurement equipment in case there is any divergence in the information.</p>		
Purpose of data:	Calculation of baseline emissions		
Additional comment:			

Data / Parameter:	E1		
Unit:	MWh		
Description:	Net electricity supplied to the grid by El Canadá and Montecristo Plants measured at El Canadá substation		
Measured/ Calculated / Default:	Measured – Hourly measurement and monthly recording		
Source of data:	Measured; Official metering data sent monthly to the AMM. Invoices to the final COMEGSA, a third part or the Economical Transaction Report submitted by AMM will be compared with the official data to AMM.		
Value(s) of monitored parameter:			23/11/2010-30/04/2014
	Generation Measurement	MWh	893,716

Monitoring equipment:	<p>From 2010 to 2012 Type: Principal Meter – ION 8600 Power Measurement Accuracy Class: +/- 0.20% Serial: PT-0511A048-00 Calibration frequency: Yearly Last calibration: 07/07/2011 Validity: 18 months</p> <p>Type: Back up Meter – Maxsys 2510 Siemens Accuracy Class: +/- 0.20% Serial: 85 762 983 Calibration frequency: Yearly Last calibration: 07/07/2011 Validity: 18 months</p> <p>From 2012 onwards Type: Principal Meter – ION 8600 Power Measurement Accuracy Class: +/- 0.20% Serial: MT-1206A252-01 Calibration frequency: Yearly Last calibration: 18/07/2013 Validity: 18 months</p> <p>Type: Back up Meter – ION 8600 Power Measurement Accuracy Class: +/- 0.20% Serial: PT- 0511A2048-00 Calibration frequency: Yearly Last calibration: 19/07/2013 Validity: 18 months</p>
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	Not applicable
QA/QC procedures:	<p>Electricity supplied by the project activity to the grid. Double check by receipt of sales.</p> <p>As established in the NCC14, the measurement equipment has to comply with Norms: IEC 687 or ANSI/IEEE 12.2. Its exactitude must be of 0.2%. Data Registry: The measurement equipment must register the information in periods of 15 to 60 minutes. This equipment must have a non-volatile memory that allows the storage of information for at least the least 37 days and it has to have a battery capable of keeping these data during a period of at least 7 days, in case of failure of the auxiliary power feeding. The generated energy is monitored by AMM as well as by the Generator, and there is the secondary measurement equipment in case there is any divergence in the information.</p>
Purpose of data:	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	E2
Unit:	MWh
Description:	Net electricity supplied to the grid by Montecristo Plant measured at Montecristo substation
Measured/ Calculated / Default:	Measured – Hourly measurement and monthly recording

Source of data:	Measured; Official metering data sent monthly to the AMM. Invoices to the final COMEGSA, a third part or the Economical Transaction Report submitted by AMM will be compared with the official data to AMM.						
Value(s) of monitored parameter:	<table border="1"> <tr> <td></td><td></td><td>23/11/2010-30/04/2014</td></tr> <tr> <td>Generation Measurement</td><td>MWh</td><td>189,817</td></tr> </table>			23/11/2010-30/04/2014	Generation Measurement	MWh	189,817
		23/11/2010-30/04/2014					
Generation Measurement	MWh	189,817					
Monitoring equipment:	<p>From 2010 to 2012 Type: Principal Meter – ION 8600 Power Measurement Accuracy Class: +/- 0.20% Serial: PT-0511A045-00 Calibration frequency: Yearly Last calibration: 07/07/2011 Validity: 18 months</p> <p>Type: Back up Meter – Maxsys 2510 Siemens Accuracy Class: +/- 0.20% Serial: 85 762 982 Calibration frequency: Yearly Last calibration: 07/07/2013 Validity: 18 months</p> <p>From 2012 onwards Type: Principal Meter – ION 8600 Power Measurement Accuracy Class: +/- 0.20% Serial: MT-1206A250-01 Calibration frequency: Yearly Last calibration: 19/07/2013 Validity: 18 months</p> <p>Type: Back up Meter – Schneider Electric Accuracy Class: +/- 0.20% Serial: MT-1206A251-01 Calibration frequency: Yearly Last calibration: 19/07/2013 Validity: 18 months</p>						
Measuring/ Reading/ Recording frequency:	Monthly						
Calculation method (if applicable):	Not applicable						
QA/QC procedures:	<p>Electricity supplied by the project activity to the grid. Double check by receipt of sales.</p> <p>As established in the NCC14, the measurement equipment has to comply with Norms: IEC 687 or ANSI/IEEE 12.2. Its exactitude must be of 0.2%. Data Registry: The measurement equipment must register the information in periods of 15 to 60 minutes. This equipment must have a non-volatile memory that allows the storage of information for at least the least 37 days and it has to have a battery capable of keeping these data during a period of at least 7 days, in case of failure of the auxiliary power feeding. The generated energy is monitored by AMM as well as by the Generator, and there is the secondary measurement equipment in case there is any divergence in the information</p>						
Purpose of data:	Calculation of baseline emissions						
Additional comment:							

Calibration of energy meters

According to the NCC-14 clause 14.12 "Periodic Verifications" the participant will verify his meters to fulfill the requirement of the Administrador del Mercado Mayorista, AMM (Wholesale Market Administrator) or of the manufacturer". Because of this, Generadora de Occidente, Ltda. proceeds to the calibration of their energy meters, the principal meter and the support meter; giving as result that both meters fulfill with the requirements of the norm ANSI C12.20 and they were certified by the company AMELEC.

The results of the calibration of the energy meters of Generadora de Occidente, Ltda., performed by the company AMELEC, among others are the following ones:

CALIBRATION CERTIFICATE	
Meter Model:	ION 8600
Meter Mark:	Power Measurement
Meter Serial No.:	PT-0511A048-00
Description:	Main meter
Meter Location	El Canada Hydroelectric Plant
Company Name:	Generadora de Occidente, Ltda.
Calibration Date	17/09/2010
Calibration Company Name	AMELEC
Calibration by:	Mario Raúl Túchez
Approved by:	Homero Arias
Accuracy Tests:	Meets the accuracy requirements

CALIBRATION CERTIFICATE	
Meter Model:	ION 8600
Meter Mark:	Power Measurement
Meter Serial No.:	PT-0511A048-00
Description:	Main meter
Meter Location	El Canada Hydroelectric Plant
Company Name:	Generadora de Occidente, Ltda.
Calibration Date	07/07/2011
Calibration Company Name	Applus
Calibration by:	Erick Rolando López Porix
Approved by:	Antonio Lopez Romero
Accuracy Tests:	Meets the accuracy requirements

CALIBRATION CERTIFICATE	
Meter Model:	ION 8600
Meter Mark:	Power Measurement
Meter Serial No.:	MT-1206A252-01
Description:	Main meter
Meter Location	El Canada Hydroelectric Plant
Company Name:	Generadora de Occidente, Ltda.
Calibration Date	23/07/2012
Calibration Company Name	AMELEC
Calibration by:	Mario Raúl Túchez
Approved by:	Homero Arias
Accuracy Tests:	Meets the accuracy requirements

CALIBRATION CERTIFICATE

Meter Model:	ION 8600
Meter Mark:	Power Measurement
Meter Serial No.:	MT-1206A252-01
Description:	Main meter
Meter Location	El Canada Hydroelectric Plant
Company Name:	Generadora de Occidente, Ltda.
Calibration Date	18/07/2013
Calibration Company Name	electrotek
Calibration by:	Mario Raúl Túchez
Approved by:	Mario de León
Accuracy Tests:	Meets the accuracy requirements

CALIBRATION CERTIFICATE	
Meter Model:	Maxsys 2510
Meter Mark:	Siemens
Meter Serial No.:	85 762 983
Description:	Back-up meter
Meter Location	El Canada Hydroelectric Plant
Company Name:	Generadora de Occidente, Ltda.
Calibration Date	17/09/2010
Calibration Company Name	AMELEC
Calibration by:	Mario Raúl Túchez
Approved by:	Mario de León
Accuracy Tests:	Meets the accuracy requirements

CALIBRATION CERTIFICATE	
Meter Model:	Maxsys 2510
Meter Mark:	Siemens
Meter Serial No.:	85 762 983
Description:	Back-up meter
Meter Location	El Canada Hydroelectric Plant
Company Name:	Generadora de Occidente, Ltda.
Calibration Date	17/09/2010
Calibration Company Name	AMELEC
Calibration by:	Mario Raúl Túchez
Approved by:	Mario de León
Accuracy Tests:	Meets the accuracy requirements

CALIBRATION CERTIFICATE	
Meter Model:	Maxsys 2510
Meter Mark:	Siemens
Meter Serial No.:	85 762 983
Description:	Back-up meter
Meter Location	El Canada Hydroelectric Plant
Company Name:	Generadora de Occidente, Ltda.
Calibration Date	17/09/2010
Calibration Company Name	AMELEC
Calibration by:	Antonio López Romero
Approved by:	Mario de León
Accuracy Tests:	Meets the accuracy requirements

CALIBRATION CERTIFICATE	
Meter Model:	Maxsys 2510
Meter Mark:	Siemens
Meter Serial No.:	85 762 983

Description:	Back-up meter
Meter Location	El Canada Hydroelectric Plant
Company Name:	Generadora de Occidente, Ltda.
Calibration Date	07/07/2011
Calibration Company Name	Applus
Calibration by:	Mario Raúl Túchez
Approved by:	Erick Rolando López Porix
Accuracy Tests:	Meets the accuracy requirements

CALIBRATION CERTIFICATE	
Meter Model:	ION 8600
Meter Mark:	Power Measurement
Meter Serial No.:	PT-0511A048-00
Description:	Back-up meter
Meter Location	El Canada Hydroelectric Plant
Company Name:	Generadora de Occidente, Ltda.
Calibration Date	23/07/2012
Calibration Company Name	AMELEC
Calibration by:	Mario Raúl Túchez
Approved by:	Homero Arias
Accuracy Tests:	Meets the accuracy requirements

CALIBRATION CERTIFICATE	
Meter Model:	ION 8600
Meter Mark:	Power Measurement
Meter Serial No.:	PT-0511A048-00
Description:	Back-up meter
Meter Location	El Canada Hydroelectric Plant
Company Name:	Generadora de Occidente, Ltda.
Calibration Date	18/07/2013
Calibration Company Name	electrotek
Calibration by:	Mario Raúl Túchez
Approved by:	Mario de León
Accuracy Tests:	Meets the accuracy requirements

The results of the calibration of the meters of energy of Generadora Montecristo, S.A., performed by the company AMELEC are the following ones:

CALIBRATION CERTIFICATE	
Meter Model:	ION 8600
Meter Mark:	Power Measurement
Meter Serial No.:	PT-0511A045-00
Description:	Main meter
Meter Location	Montecristo Hydroelectric Plant
Company Name:	Generadora de Occidente, Ltda.
Calibration Date	17/09/2010
Calibration Company Name	AMELEC
Calibration by:	Mario Raúl Túchez
Approved by:	Mario de León
Accuracy Tests:	Meets the accuracy requirements

CALIBRATION CERTIFICATE	
Meter Model:	MAX SYS
Meter Mark:	SIEMENS
Meter Serial No.:	PT-0511A045-00
Description:	Main meter
Meter Location	Montecristo Hydroelectric Plant

Company Name:	Generadora de Occidente, Ltda.
Calibration Date	07/07/2011
Calibration Company Name	Applus
Calibration by:	Erick Rolando Lopez Porix
Approved by:	Antonio López Romero
Accuracy Tests:	Meets the accuracy requirements

CALIBRATION CERTIFICATE	
Meter Model:	MAX SYS
Meter Mark:	SIEMENS
Meter Serial No.:	MT-1206A250-01
Description:	Main meter
Meter Location	Montecristo Hydroelectric Plant
Company Name:	Generadora de Occidente, Ltda.
Calibration Date	23/07/2012
Calibration Company Name	AMELEC
Calibration by:	Mario Raul Tuche
Approved by:	Homero Arias
Accuracy Tests:	Meets the accuracy requirements

CALIBRATION CERTIFICATE	
Meter Model:	ION 8600
Meter Mark:	Schneider Electric
Meter Serial No.:	MT-1206A250-01
Description:	Main meter
Meter Location	Montecristo Hydroelectric Plant
Company Name:	Generadora de Occidente, Ltda.
Calibration Date	19/07/2013
Calibration Company Name	electrotek
Calibration by:	Mario Raul Tuche
Approved by:	Homero Arias
Accuracy Tests:	Meets the accuracy requirements

CALIBRATION CERTIFICATE	
Meter Model:	Maxsys 2510
Meter Mark:	Siemens
Meter Serial No.:	85 762 982
Description:	Back-up meter
Meter Location	Montecristo Hydroelectric Plant
Company Name:	Generadora de Occidente, Ltda.
Calibration Date	17/09/2010
Calibration Company Name	AMELEC
Calibration by:	Mario Raul Tuche
Approved by:	Homero Arias
Accuracy Tests:	Meets the accuracy requirements

CALIBRATION CERTIFICATE	
Meter Model:	Maxsys 2510
Meter Mark:	Siemens
Meter Serial No.:	85 762 982
Description:	Back-up meter
Meter Location	Montecristo Hydroelectric Plant
Company Name:	Generadora de Occidente, Ltda.
Calibration Date	17/09/2010
Calibration Company Name	AMELEC

Calibration by:	Mario Raul Tuche
Approved by:	Homero Arias
Accuracy Tests:	Meets the accuracy requirements

CALIBRATION CERTIFICATE	
Meter Model:	Maxsys 2510
Meter Mark:	Siemens
Meter Serial No.:	85 762 982
Description:	Back-up meter
Meter Location	Montecristo Hydroelectric Plant
Company Name:	Generadora de Occidente, Ltda.
Calibration Date	07/07/2011
Calibration Company Name	Applus
Calibration by:	Erick Rolando López
Approved by:	Antonio López Romero
Accuracy Tests:	Meets the accuracy requirements

CALIBRATION CERTIFICATE	
Meter Model:	Maxsys 2510
Meter Mark:	Siemens
Meter Serial No.:	85 762 982
Description:	Back-up meter
Meter Location	Montecristo Hydroelectric Plant
Company Name:	Generadora de Occidente, Ltda.
Calibration Date	07/07/2011
Calibration Company Name	Applus
Calibration by:	Erick Rolando López
Approved by:	Antonio López Romero
Accuracy Tests:	Meets the accuracy requirements

CALIBRATION CERTIFICATE	
Meter Model:	Maxsys 2510
Meter Mark:	Siemens
Meter Serial No.:	85 762 982
Description:	Back-up meter
Meter Location	Montecristo Hydroelectric Plant
Company Name:	Generadora de Occidente, Ltda.
Calibration Date	07/07/2011
Calibration Company Name	Applus
Calibration by:	Erick Rolando López
Approved by:	Antonio López Romero
Accuracy Tests:	Meets the accuracy requirements

CALIBRATION CERTIFICATE	
Meter Model:	Maxsys 2510
Meter Mark:	Siemens
Meter Serial No.:	85 762 982
Description:	Back-up meter
Meter Location	Montecristo Hydroelectric Plant
Company Name:	Generadora de Occidente, Ltda.
Calibration Date	07/07/2011
Calibration Company Name	Applus
Calibration by:	Erick Rolando López
Approved by:	Antonio López Romero
Accuracy Tests:	Meets the accuracy requirements

CALIBRATION CERTIFICATE	
Meter Model:	ION 8600
Meter Mark:	Power Measurement
Meter Serial No.:	MT-1206A251-01
Description:	Back-up meter
Meter Location	Montecristo Hydroelectric Plant
Company Name:	Generadora de Occidente, Ltda.
Calibration Date	23/07/2012
Calibration Company Name	AMELEC
Calibration by:	Mario Raúl Túchez
Approved by:	Homero Arias
Accuracy Tests:	Meets the accuracy requirements

CALIBRATION CERTIFICATE	
Meter Model:	ION 8600
Meter Mark:	Power Measurement
Meter Serial No.:	MT-1206A251-01
Description:	Back-up meter
Meter Location	Montecristo Hydroelectric Plant
Company Name:	Generadora de Occidente, Ltda.
Calibration Date	23/07/2012
Calibration Company Name	AMELEC
Calibration by:	Mario Raúl Túchez
Approved by:	Homero Arias
Accuracy Tests:	Meets the accuracy requirements

The Hydroelectrics Projects El Canadá and Montecristo have a meter of principal energy that is used to obtain the readings of commercial measurement of the plant and a meter of support which is used to obtain the readings of commercial measurement in case that the principal meter is malfunctioning, according to the stipulated in the regulation NCC-14 of the Administrador del Mercado Mayorista, AMM (Wholesale Market Administrator) in the clauses 14.6.1, 14.10 bis and 14.10 tris.

D.3. Implementation of sampling plan

Not applicable

SECTION E. Calculation of emission reductions or GHG removals by sinks

E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

The Plant Manager collects electronically and monthly the generation data from the commercial energy meter installed in the El Canadá Substation, which measures the energy produced by El Canadá Hydroelectric Project and Montecristo Hydroelectric Project.

Year	Generation (MWh) from El Canadá and Montecristo plants at El Canadá Substation				
	2010	2011	2012	2013	2014
Generation	23,337.00	283,843.1	275,048.06	254,721.70	56,766.30

The Plant Manager collects electronically and monthly the generation data from the commercial energy meter installed in the Montecristo Substation, which measures the energy produced by Montecristo Hydroelectric Project. The generation data is reported in a spreadsheet for measuring control and register. The commercial meter data collection of the monitored month takes place during the first week of the

following month. From the period 23/11/2010 to 30/04/2014 the commercial energy meter installed in the Montecristo Substation registered the following information:

Generation (MWh) from Montecristo plant at Montecristo Substation					
Year	2010	2011	2012	2013	2014
Generation	1,995.70	61,542.1	59,792.1	54,237.3	12,249.3

Therefore El Canadá Hydroelectric Project could be calculated by difference. The generation data is reported in a spreadsheet for measuring control and register. The commercial meter data collection of the monitored month takes place during the first week of the following month. From the period 23/10/2010 – 30/04/2014, the energy produced by El Canadá Hydroelectric Project registered the following information:

Generation (MWh) from El Canadá Hydroelectric Project					
Year	2010	2011	2012	2013	2014
Generation	21,341	222,301.00	215,255.96	200,484.40	44,517.00

Calculation energy produced and verification

The person in charge of the monitoring process verifies the accuracy of the recorded energy data. For this purpose, is necessary to compare the data recorded against the information of the commercial measurement published by the *Administrador del Mercado Mayorista* (AMM) in Certificates emitted by them.

The measuring verification is carried out as below shown:

El Canadá Hydroelectric Project Measurement Control				
Year 2010				
Month	El Canadá Generation (MWh)	AMM Comercial Measurement (MWh)	El Canadá validated generation	
January	-	-		
February	-	-		
March	-	-		
April	-	-		
May	-	-		
June	-	-		
July	-	-		
August	-	-		
September	-	-		
October	-	-		
November	2,787	2,787	Validated	
December	18,555	18,555	Validated	
Annual Total	21,342	21,342		

El Canadá Hydroelectric Project Measurement Control				
Year 2011				
Month	El Canadá Generation (MWh)	AMM Comercial Measurement (MWh)	El Canadá validated generation	
January	16,915	16,915	Validated	
February	14,088	14,088	Validated	
March	13,912	13,912	Validated	
April	14,495	14,495	Validated	
May	15,075	15,075	Validated	
June	19,266	19,266	Validated	

July	24,667	24,667	Validated
August	25,094	25,094	Validated
September	26,443	26,443	Validated
October	18,043	18,043	Validated
November	18,773	18,773	Validated
December	15,525	15,525	Validated
Annual Total	205,381	205,381	

El Canadá Hydroelectric Project Measurement Control			
Year 2012			
Month	El Canadá Generation (MWh)	AMM Comercial Measurement (MWh)	El Canadá validated generation
January	16,329	16,329	Validated
February	14,265	14,265	Validated
March	12,494	12,494	Validated
April	9,231	9,231	Validated
May	15,538	15,538	Validated
June	22,540	22,540	Validated
July	20,272 ¹	20,293	Validated
August	22,460	22,460	Validated
September	23,831	23,831	Validated
October	24,194	24,194	Validated
November	18,103	18,103	Validated
December	15,995	15,995	Validated
Annual Total	215,252	215,273	

El Canadá Hydroelectric Project Measurement Control			
Year 2013			
Month	El Canadá Generation (MWh)	AMM Comercial Measurement (MWh)	El Canadá validated generation
January	15,078	15,084	Validated
February	12,726	12,726	Validated
March	13,311	13,311	Validated
April	11,849	11,849	Validated
May	14,894	14,894	Validated
June	17,049	17,049	Validated
July	18,073	18,073	Validated
August	17,073	17,073	Validated
September	21,646	21,646	Validated
October	23,035	23,035	Validated
November	19,806	19,806	Validated
December	15,940	15,940	Validated
Annual Total	200,485	200,485	

El Canadá Hydroelectric Project Measurement Control			
Year 2014			
Month	El Canadá Generation (MWh)	AMM Comercial Measurement (MWh)	El Canadá validated generation
January	15,039	15,040	Validated
February	12,426	12,426	Validated
March	5,774	5,774	Validated
April	11,276	11,276	Validated
May	-	-	
June	-	-	
July	-	-	
August	-	-	

¹ A deduction of 0.2% for lack of calibration was applied from 07 - 23/07/2012.

September	-	-	
October	-	-	
November	-	-	
December	-	-	
Annual Total	44,515	44,515	

The person responsible of performing the Monitoring Process calculated the emissions reductions from 23/11/2010 to 30/04/2014 using the ex ante emission factor according to the Table A.4.7 on the PDD. The chart prepared for the calculation is:

EI Canadá Hydroelectric Project. Second Crediting Period			
Year	Annual validated generation (MWh)	Emission factor (t CO ₂ /MWh)	Baseline Emissions reductions (ton CO ₂)
2010	21,342	0.495	10,564
2011	205,381	0.495	101,663
2012	215,252	0.495	106,549
2013	200,485	0.495	99,237
2014	44,515	0.495	22,034
Total	703,900	0.495	340,050

E.2. Calculation of project emissions or actual net GHG removals by sinks

Since the EI Canadá Project is a run-of-river hydropower plant, it does not generate direct GHG emissions.

E.3. Calculation of leakage

Not Applicable.

E.4. Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks

Item	Baseline emissions or baseline net GHG removals by sinks (t CO ₂ e)	Project emissions or actual net GHG removals by sinks (t CO ₂ e)	Leakage (t CO ₂ e)	Emission reductions or net anthropogenic GHG removals by sinks (t CO ₂ e)
Total	340,050	0	0	340,050

E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO ₂ e)	331,850 t CO ₂ e	340,050t CO ₂ e

E.6. Remarks on difference from estimated value in registered PDD

Hydrological conditions were not as expected, resulting in more generation than it was originally estimated.

E.7. Actual emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Item	Actual values achieved up to 31 December 2012	Actual values achieved from 1 January 2013 onwards
Emission reductions or GHG removals by sinks (t CO ₂ e)	218,777 t CO ₂ e	121,273 t CO ₂ e

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Appendix 1. Contact information of project participants and responsible persons/ entities

Project participant and/or responsible person/ entity	<input checked="" type="checkbox"/> Project participant <input checked="" type="checkbox"/> Responsible person/ entity for completing the CDM-MR-FORM
Organization name	Generadora de Occidente, Ltda
Street/P.O. Box	6 10-65 Zona 10, Centro Gerencial Las Margaritas
Building	Torre 1, Nivel 8, Oficina 801
City	Guatemala City
State/Region	
Postcode	01010
Country	Guatemala
Telephone	502-2327 7018
Fax	
E-mail	oswaldo.smith@enel.com
Website	
Contact person	Oswaldo
Title	Country Manager, Guatemala
Salutation	
Last name	Smith Gonzalez
Middle name	
First name	Rene Oswaldo
Department	
Mobile	
Direct fax	
Direct tel.	
Personal e-mail	

Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
04.0	25 June 2014	Revisions to: <ul style="list-style-type: none"> • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from <i>F-CDM-MR</i> to <i>CDM-MR-FORM</i>; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net anthropogenic GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: monitoring report		