



**MONITORING REPORT**  
**Version 2 – August 17<sup>th</sup>, 2010**

**EL CANADÁ HYDROELECTRIC PROJECT**  
**UNFCCC Reference No. 0606**  
**Monitoring Report from January 1<sup>st</sup>, 2009 to May 31<sup>st</sup>, 2010**

**SECTION A. General description of the project activity**

**A.1. Brief description of the 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 23<sup>rd</sup>, 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 neighbouring 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.

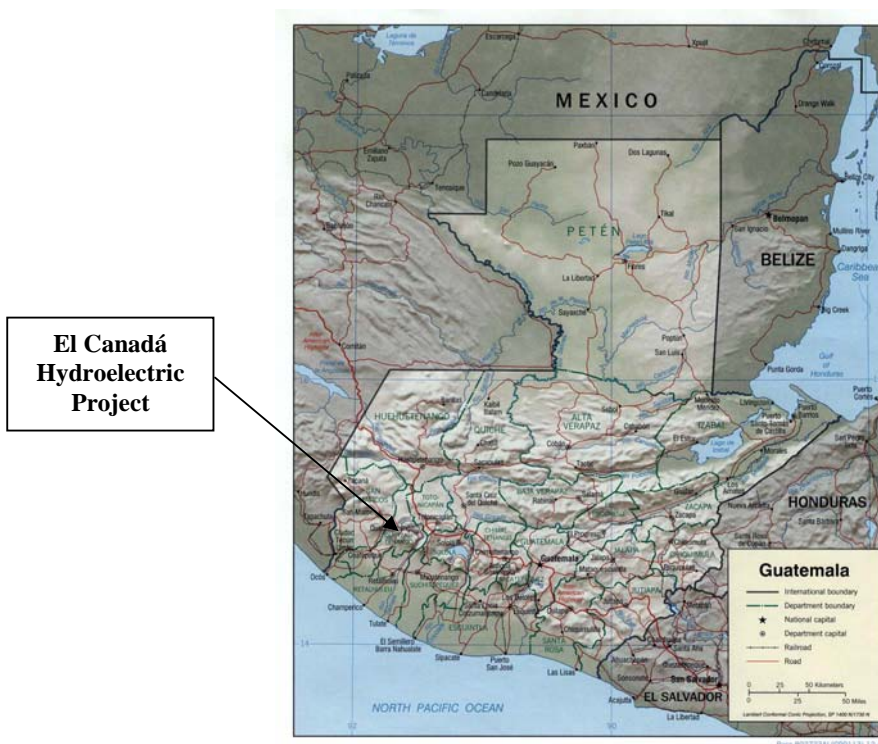
**A.2. Project Participants**

<b>Name of Party involved (*) (host) indicates a host Party)</b>	<b>Private and/or public entity(ies) project participants (*) (as applicable)</b>	<b>Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)</b>
Guatemala (host)	Generadora de Occidente, Ltda. ("GdO")	No
Canada	International Bank for Reconstruction and Development (IBRD) as the Trustee of the Prototype Carbon Fund (PCF)	Yes
The Netherlands	International Bank for Reconstruction and Development (IBRD) as the Trustee of the Prototype Carbon Fund (PCF)	Yes

(\*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Parties involved is required.

### A.3. Location of the 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.



### A.4. Technical description of the project

#### Main Project Characteristics

Nominal Installed Capacity: 43.9 MW  
 Number of Units: 2 x 21.95 MW  
 Real Installed Capacity: 43 MW  
 Number of Units: 2 x 21.5 MW  
 Generation: 175 GWh/year  
 Head: 365 m  
 Maximum Hydraulic Capacity: 13.4 m<sup>3</sup>/sec.  
 Powerline: 69 kV

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

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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 m<sup>3</sup>, 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 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 down stream 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>A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:</b>
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<b>Category of the project activity</b>	Grid-connected electricity generation from renewable energy sources.
<b>Methodology Used</b>	ACM0002 ver. 6 – Consolidated methodology for grid-connected electricity generation from renewable sources
<b>Choice of the crediting period</b>	Renewable crediting period

<b>A.6. Registration date of the project activity:</b>
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December 2<sup>nd</sup>, 2006

<b>A.7. Crediting period of the project activity and related information (start date and choice of crediting period):</b>
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November 23<sup>rd</sup>, 2003 to November 22<sup>nd</sup>, 2010 (Renewable)

**CDM – Executive Board****A.8. Name of responsible person(s)/entity(ies):**

Organization:	Generadora de Occidente, Ltda.
Street/P.O.Box:	Diagonal 6, 10-65 Zona 10
Building:	Centro Gerencial Las Margaritas, Torre I, Nivel 8, Oficina 801
City:	Guatemala
State/Region:	Guatemala
Postfix/ZIP:	01010
Country:	Guatemala
Telephone:	+502 2327-7000
FAX:	+502 2339-3176
E-Mail:	
URL:	<a href="http://www.enel-latinamerica.com">www.enel-latinamerica.com</a> - <a href="http://www.enelgreenpower.com">www.enelgreenpower.com</a>
Represented by:	
Title:	CDM Coordinator for Latin America
Salutation:	Mr.
Last Name:	Ríos Villatoro
Middle Name:	Rafael
First Name:	Fernando
Department:	
Mobile:	+502 5918-7980
Direct FAX:	+502 2339-3176
Direct tel:	+502 2327-7000 Ext. 7015
Personal E-Mail:	<a href="mailto:fernando.rios@latinamerica.enel.it">fernando.rios@latinamerica.enel.it</a>

**SECTION B. Implementation of the project activity****B.1. Implementation status of the 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 23<sup>rd</sup>, 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 m<sup>3</sup>, 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.

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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 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 down stream 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. Revision of the monitoring plan**

Not Applicable.

**B.3. Request for deviation applied to this monitoring period**

Not Applicable.

**B.4. Notification or request of approval of changes**

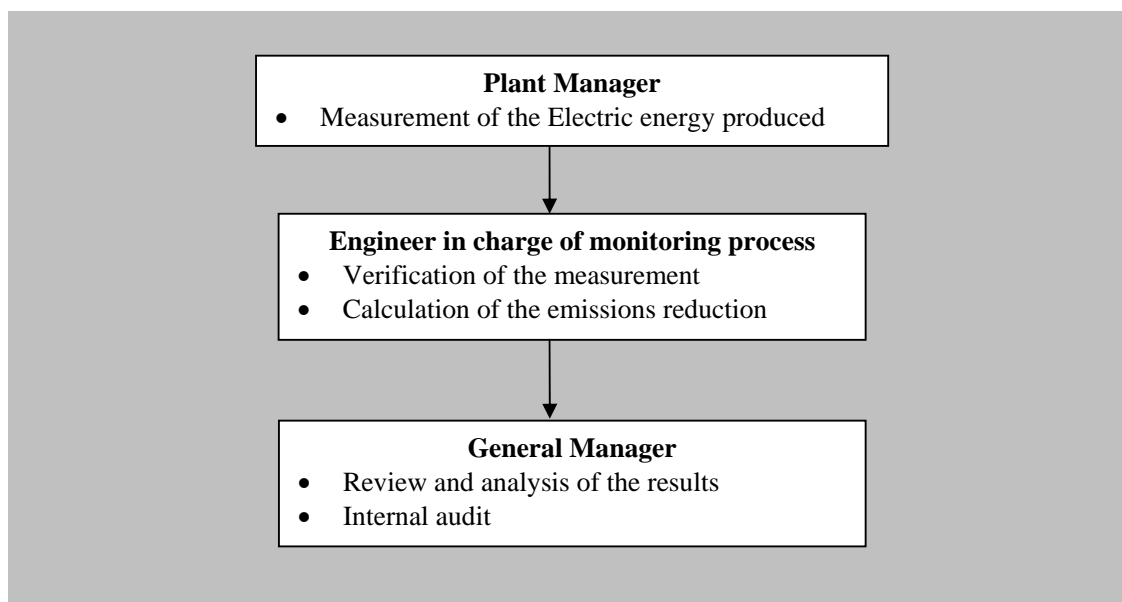
Not Applicable.

**SECTION C. Description of the 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.



### Measuring and calculation procedure

#### 1. Measuring

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

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. 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.

**CDM – Executive Board****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.3.5 on the PDD.

**SECTION D. Data and parameters****D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors**

<b>Data / Parameter:</b>	<b>EF<sub>OM,v</sub></b>
Data unit:	t CO <sub>2</sub> /MWh
Description:	Operating Margin Emission Factor
Source of data used:	Calculated
Value(s) :	The value applied for the first crediting period was 0.83
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	
Additional comment:	

<b>Data / Parameter:</b>	<b>EF<sub>BM,v</sub></b>
Data unit:	t CO <sub>2</sub> /MWh
Description:	Build Margin Emission Factor
Source of data used:	Calculated
Value(s) :	The value applied for the first crediting period was 0.59
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	
Additional comment:	

<b>Data / Parameter:</b>	<b>EF<sub>y</sub></b>
Data unit:	t CO <sub>2</sub> /MWh
Description:	Emission Factor
Source of data used:	Calculated
Value(s) :	The value applied for the first crediting period was 0.71
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	
Additional comment:	

<b>Data / Parameter:</b>	<b>NCV<sub>i,v</sub></b>
Data unit:	TJ/10 <sup>3</sup> tonnes
Description:	Net Calorific Value
Source of data used:	IPCC Guidelines 2006
Value(s) :	The value applied for the first crediting period was based on the 1996 IPCC Guidelines.
Indicate what the data are used for (Baseline/ Project/ Leakage emission)	



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calculations)	
Additional comment:	

**D.2. Data and parameters monitored**

<b>Data / Parameter:</b>	<b><math>EG_{PJ,y} (=EG_{\text{facility},y}) = E1 - E2</math></b>
Data 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:	As per the actual measured readings of meters at El Canada and Montecristo plant substations
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculate the emission reductions of the project
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Electricity meters
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	Not Applicable
QA/QC procedures applied:	Uncertainty of data is low as this value is calculated based on the meter readings at El Canada and Montecristo substations

<b>Data / Parameter:</b>	<b>E1</b>
Data unit:	MWh
Description:	Electricity supplied to the grid by of El Canada and Montecristo Plants measured at El Canada 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:	As per the meter readings
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculate the emission reductions of the project
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type: Principal Meter – ION 8600 Power Measurement Accuracy Class: +/- 0.20% Serial: PT-0511A048-00 Calibration frequency: Yearly Last calibration: October 23 <sup>rd</sup> , 2009 Validity: 18 months





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	Type: Back up Meter – Maxsys 2510 Siemens Accuracy Class: +/- 0.20% Serial: 85 762 983 Calibration frequency: Yearly Last calibration: October 23 <sup>rd</sup> , 2009 Validity: 18 months
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	Not Applicable
QA/QC procedures applied:	Uncertainty of data is low  There is one principal and backup meter. The meters are calibrated yearly to fulfill the requirements of the norm ANSI C12.20. Official metering data will be sent monthly to the AMM. Invoices to the final buyer COMEGSA will have to match the official metering data to AMM.

Data / Parameter:	<b>E2</b>
Data unit:	MWh
Description:	Electricity supplied to the grid by Montecristo Plant 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:	As per the meter readings
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculate the emission reductions of the project
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type: Principal Meter – ION 8600 Power Measurement Accuracy Class: +/- 0.20% Serial: PT-0511A045-00 Calibration frequency: Yearly Last calibration: October 23 <sup>rd</sup> , 2009 Validity: 18 months  Type: Back up Meter – Maxsys 2510 Siemens Accuracy Class: +/- 0.20% Serial: 85 762 982 Calibration frequency: Yearly Last calibration: October 23 <sup>rd</sup> , 2009 Validity: 18 months
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	Not Applicable
QA/QC procedures applied:	Uncertainty of data is low



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	There is one principal and backup meter. The meters are calibrated yearly to fulfill the requirements of the norm ANSI C12.20. Official metering data will be sent monthly to the AMM. Invoices to the final buyer COMEGSA will have to match the official metering data to AMM.
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**Calibration of the meters of energy**

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. last October 23<sup>rd</sup>, 2009, proceeded to the calibration of his meters of energy, 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 meters of energy of Generadora de Occidente, Ltda., delivered by the company AMELEC are the following ones:

CALIBRATION CERTIFICATE	
Meter Model:	ION 8600
Meter Mark:	Power Measurement
Meter Serial No.:	PT-0511A048-00
Description:	Meter of principal energy
Meter Location:	El Canadá Hydroelectric Plant
Company Name:	Generadora de Occidente, Ltda.
Calibration Date:	October 23 <sup>rd</sup> , 2009
Calibration Company Name:	AMELEC
Calibration by:	Mario Raúl Túchez
Approved by:	Homero Arias
Accuracy Tests:	Meets the accuracy requirements

CALIBRATION CERTIFICATE	
Meter Model:	Maxys 2510
Meter Mark:	Siemens
Meter Serial No.:	85 762 983
Description:	Meter of support
Meter Location:	El Canadá Hydroelectric Plant
Company Name:	Generadora de Occidente, Ltda.
Calibration Date:	October 23 <sup>rd</sup> , 2009
Calibration Company Name:	AMELEC
Calibration by:	Mario Raúl Túchez
Approved by:	Homero Arias
Accuracy Tests:	Meets the accuracy requirements

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 Montecristo, S.A. last October 23<sup>rd</sup>, 2009, proceeded to the calibration of his meters of energy, 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.

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

<b>CALIBRATION CERTIFICATE</b>	
Meter Model:	ION 8600
Meter Mark:	Power Measurement
Meter Serial No.:	PT-0511A045-00
Description:	Meter of principal energy
Meter Location:	Montecristo Hydroelectric Plant
Company Name:	Generadora Montecristo, S.A.
Calibration Date:	October 23 <sup>rd</sup> , 2009
Calibration Company Name:	AMELEC
Calibration by:	Mario Raúl Túchez
Approved by:	Homero Arias
Accuracy Tests:	Meets the accuracy requirements

<b>CALIBRATION CERTIFICATE</b>	
Meter Model:	Maxys 2510
Meter Mark:	Siemens
Meter Serial No.:	85 762 982
Description:	Meter of support
Meter Location:	Montecristo Hydroelectric Plant
Company Name:	Generadora Montecristo, S.A.
Calibration Date:	October 23 <sup>rd</sup> , 2009
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 trumps or is damaged, 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.

<b>SECTION E. Emission reductions calculation</b>
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<b>E.1. Baseline emissions calculation</b>
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**Measuring**

The Plant Manager collects electronically and monthly the generation data from the commercial energy meter installed in the El Canada Substation, which measures the energy produced by El Canada 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. From the period January 1<sup>st</sup>, 2009 to May 31<sup>st</sup>, 2010, the energy produced by El Canadá Hydroelectric Project registered the following information:



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El Canadá and Montecristo Hydroelectric Projects	
Year: 2009	
Month	Generation (MWh)
January	15,180
February	13,481
March	12,344
April	13,838
May	21,768
June	27,223
July	23,791
August	21,485
September	20,590
October	18,561
November	21,643
December	15,529
<b>Total</b>	<b>225,434</b>

El Canadá and Montecristo Hydroelectric Projects	
Year: 2010	
Month	Generation (MWh)
January	14,953
February	12,852
March	10,725
April	15,088
May	16,405
June	-
July	-
August	-
September	-
October	-
November	-
December	-
<b>Total</b>	<b>70,022</b>

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 January 1<sup>st</sup>, 2009 to May 31<sup>st</sup>, 2010, the commercial energy meter installed in the Montecristo Substation registered the following information:

Montecristo Hydroelectric Project	
Year: 2009	
Month	Generation (MWh)
January	3,220
February	2,835
March	2,611
April	2,909
May	4,617
June	5,768
July	5,078
August	4,523
September	4,162
October	3,906
November	4,546
December	3,256
<b>Total</b>	<b>47,432</b>

Montecristo Hydroelectric Project	
Year: 2010	
Month	Generation (MWh)
January	3,102
February	2,608
March	2,187
April	3,128
May	3,442
June	-
July	-
August	-
September	-
October	-
November	-
December	-
<b>Total</b>	<b>14,466</b>

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. 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. From the period January 1<sup>st</sup>, 2009 to May 31<sup>st</sup>, 2010, the energy produced by El Canadá Hydroelectric Project registered the following information:



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El Canadá Hydroelectric Project	
Year: 2009	
Month	Generation (MWh)
January	11,960
February	10,646
March	9,734
April	10,929
May	17,151
June	21,455
July	18,712
August	16,962
September	16,428
October	14,654
November	17,097
December	12,274
<b>Total</b>	<b>178,002</b>

El Canadá Hydroelectric Project	
Year: 2010	
Month	Generation (MWh)
January	11,851
February	10,244
March	8,538
April	11,960
May	12,963
June	-
July	-
August	-
September	-
October	-
November	-
December	-
<b>Total</b>	<b>55,556</b>

In January 22<sup>nd</sup>, 2010 the Administrador del Mercado Mayorista, AMM (Wholesale Market Administrator) delivered the certification of records of measurement from January 1<sup>st</sup> to December 31<sup>st</sup>, 2009 of Generadora de Occidente, Ltda. The certificate delivered by the Wholesale Market Administrator of this measurement contains the following information:

WHOLESALE MARKET ADMINISTRATOR	
DEPARTMENT OF MEASUREMENT	
CERTIFICATION OF RECORDS OF MEASUREMENT	
<b>GENERATOR:</b>	Generadora de Occidente, Ltda.
<b>LOCATION:</b>	Km.197 carretera a Zunil, Quetzaltenango
<b>MONTH / YEAR</b>	<b>ENERGY GENERATED (KWh)</b>
Jan-09	11,960,151
Feb-09	10,646,170
Mar-09	9,733,638
Apr-09	10,929,126
May-09	17,151,326
Jun-09	21,454,641
Jul-09	18,712,180
Aug-09	16,961,888
Sep-09	16,427,982
Oct-09	14,654,418
Nov-09	17,097,160
Dec-09	12,273,681
These data are monthly kwh energies	
<b>Issue Date:</b>	January 22 <sup>nd</sup> , 2010

In June 29<sup>th</sup>, 2010 the Administrador del Mercado Mayorista, AMM (Wholesale Market Administrator) delivered the certification of records of measurement from January 1<sup>st</sup> to May 31<sup>st</sup>, 2010 of Generadora



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de Occidente, Ltda. The certificate delivered by the Wholesale Market Administrator of this measurement contains the following information:

WHOLESALE MARKET ADMINISTRATOR	
DEPARTMENT OF MEASUREMENT	
CERTIFICATION OF RECORDS OF MEASUREMENT	
<b>GENERATOR:</b>	Generadora de Occidente, Ltda.
<b>LOCATION:</b>	Km.197 carretera a Zunil, Quetzaltenango
<b>MONTH / YEAR</b>	<b>ENERGY GENERATED (KWh)</b>
Jan-10	11,850,919
Feb-10	10,243,644
Mar-10	8,538,246
Apr-10	11,960,042
May-10	12,963,125
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These data are monthly kwh energies	
<b>Issue Date:</b>	June 29 <sup>th</sup> , 2010

In June 29<sup>th</sup>, 2010 the Administrador del Mercado Mayorista, AMM (Wholesale Market Administrator) delivered the certification of records of measurement from January 1<sup>st</sup>, 2009 to May 31<sup>st</sup>, 2010 of Generadora Montecristo, S.A. The certificate delivered by the Wholesale Market Administrator of this measurement contains the following information:

WHOLESALE MARKET ADMINISTRATOR	
DEPARTMENT OF MEASUREMENT	
CERTIFICATION OF RECORDS OF MEASUREMENT	
<b>GENERATOR:</b>	Generadora Montecristo, S.A.
<b>LOCATION:</b>	Km.197 carretera a Zunil, Quetzaltenango
<b>MONTH / YEAR</b>	<b>ENERGY GENERATED (KWh)</b>
Jan-09	3,219,605
Feb-09	2,834,678
Mar-09	2,610,826
Apr-09	2,909,222
May-09	4,616,625
Jun-09	5,768,260
Jul-09	5,078,461
Aug-09	4,523,492
Sep-09	4,162,335



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Oct-09	3,906,265
Nov-09	4,546,271
Dec-09	3,255,657
These data are monthly kwh energies	
<b>Issue Date:</b>	June 29 <sup>th</sup> , 2010

WHOLESALE MARKET ADMINISTRATOR	
DEPARTMENT OF MEASUREMENT	
CERTIFICATION OF RECORDS OF MEASUREMENT	
<b>GENERATOR:</b>	Generadora de Occidente, Ltda.
<b>LOCATION:</b>	Km.197 carretera a Zunil, Quetzaltenango
<b>MONTH / YEAR</b>	<b>ENERGY GENERATED (KWh)</b>
Jan-10	3,101,650
Feb-10	2,607,987
Mar-10	2,187,016
Apr-10	3,128,095
May-10	3,441,592
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These data are monthly kwh energies	
<b>Issue Date:</b>	June 29 <sup>th</sup> , 2010

**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:



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EI Canadá Hydroelectric Project Measurement Control			
Year: 2009			
Month	EI Canada Generation (MWh)	AMM Comercial Measurement (MWh)	EI Canada validated generation
January	11,960	11,960	Validated
February	10,646	10,646	Validated
March	9,734	9,734	Validated
April	10,929	10,929	Validated
May	17,151	17,151	Validated
June	21,455	21,455	Validated
July	18,712	18,712	Validated
August	16,962	16,962	Validated
September	16,428	16,428	Validated
October	14,654	14,654	Validated
November	17,097	17,097	Validated
December	12,274	12,274	Validated
<b>Annual Total</b>	<b>178,002</b>	<b>178,002</b>	

EI Canadá Hydroelectric Project Measurement Control			
Year: 2010			
Month	EI Canada Generation (MWh)	AMM Comercial Measurement (MWh)	EI Canada validated generation
January	11,851	11,851	Validated
February	10,244	10,244	Validated
March	8,538	8,538	Validated
April	11,960	11,960	Validated
May	12,963	12,963	Validated
June	-	-	Validated
July	-	-	Validated
August	-	-	Validated
September	-	-	Validated
October	-	-	Validated
November	-	-	Validated
December	-	-	Validated
<b>Annual Total</b>	<b>55,556</b>	<b>55,556</b>	

## E.2. Project emissions calculation

The person responsible of perform the Monitoring Process calculated the emissions reductions from January 1<sup>st</sup>, 2009 to May 31<sup>st</sup>, 2010 using the *ex ante* emission factor according to the Table A.3.5 on the PDD. The chart prepared for the calculation is:

EI Canadá Hydroelectric Project. First Crediting Period.			
Year	Annual validated generation (MWh)	Emission factor (ton CO <sub>2</sub> /MWh)	Emissions reductions (ton CO <sub>2</sub> )
2003	12,663	0.71	8,991
2004	142,918	0.71	101,472
2005	174,432	0.71	123,847
2006	162,889	0.71	115,651
2007	174,737	0.71	124,063
2008	214,677	0.71	152,420
2009	178,002	0.71	126,382
2010 - a	55,556	0.71	39,445
<b>Total</b>	<b>1,115,874</b>	<b>0.71</b>	<b>792,270</b>



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From January 1<sup>st</sup>, 2009 to May 31<sup>st</sup>, 2010 the El Canadá Hydroelectric Project has reduced 165,827 tonnes of CO<sub>2</sub> by using renewable resources for the generation of electrical energy.

**E.3. Leakage calculation**

Not Applicable.

**E.4. Emission reductions calculation / table**

El Canadá Hydroelectric Project. First Crediting Period.				
Year	Baseline Emissions (tCO <sub>2</sub> e/yr)	Project Emissions (tCO <sub>2</sub> e/yr)	Leakage (tCO <sub>2</sub> e/yr)	Emissions Reductions (tCO <sub>2</sub> e/yr)
Nov-03	9,250	8,991	-	8,991
2004	101,473	101,472	-	101,472
2005	108,072	123,847	-	123,847
2006	124,250	115,651	-	115,651
2007	124,250	124,063	-	124,063
2008	124,250	152,420	-	152,420
2009	124,250	126,382	-	126,382
May-10	35,898	39,445	-	39,445
<b>Total</b>	<b>751,693</b>	<b>792,270</b>	<b>-</b>	<b>792,270</b>

**E.5. Comparison of actual emission reductions with estimates in the CDM-PDD**

This section shall include a comparison of actual values of the emission reductions achieved during the monitoring period with the estimations in the registered CDM-PDD.

Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
<b>Emission reductions (tCO<sub>2</sub>e)</b>	<b>160,148</b>	<b>165,827</b>

The emission reduction achieved during the monitoring period is 3.42% below of the estimations in the registered CDM-PDD.

**E.6. Remarks on difference from estimated value in the PDD**

Not Applicable.

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