



CER's

CDM Monitoring Report

CLEAN DEVELOPMENT MECHANISM  
MONITORING REPORT

Candelaria Hydroelectric  
Small Scale Project  
(CDM Registration Reference Number 0604)

Monitoring Period:  
01 January 2007 to 31 January 2008

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## Section A. General description of the project activity

### *A.1. Title of the Project:*

Candelaria Hydroelectric Project

Monitoring Report based on the PDD Version Number 02, Section D from 07/09/2006

### *A.2. Description of the small scale project activity:*

The objective of the project activity is to generate renewable electricity using hydroelectric resources and to sell the generated output to the national grid. The project has the capacity to reduce CO<sub>2</sub> emissions by avoiding electricity generation by the fossil fuel-fired power plants connected to the grid.

The project activity involves the installation of a run-of-river hydropower plant with an installed capacity of 4.3 MW that will utilize the water of the Trece Aguas River. Currently, this watercourse is used for electricity generation in an existing 16 MW hydropower plant (Secacao) located upstream of Candelaria. The Secacao plant was developed in 1998 and is owned and operated by Candelaria's sponsors.

Total differential altitude (head) between the head pond and the turbine/generator of Candelaria is approximately 130 meters. The project consists of a 4.3 MW Francis type turbine, a 430 meter long tunnel a 770 meter long penstock. The water used, once having gone through both plants, is returned to the original river basin downstream.

The plant delivers electricity to the Guatemalan National Electric Grid and is connected to it through a 69 kilovolt transmission line (that was built to connect the existing 16 MW plant). The plant also delivers part of its output locally through an existing 13.8 kilovolt distribution line owned by a Utility serving this rural area, thus giving access to electricity to several local communities.

Project participants consider that sustainable development can be achieved due to important benefits generated by the project activity.

Hydroelectric plants and other renewable technologies would allow Guatemala, in the medium to long-term, to achieve the following benefits: (a) a higher standard of living for its population; (b) sufficient clean energy supply to balance out the negative environmental impact caused by fossil fuel consumption, (c) reduction in the current dependence on imported fossil fuels (and the corresponding dependence on foreign currency required to purchase it); (d) transfer of appropriate technology and associated benefits such as job creation and training.

Candelaria will direct 10% of the funds generated through the sale of CERs to an organization, called "Fundación Trece Aguas," established by the Candelaria developers aimed at investing in the local communities to support and strengthen mainly school

education, health services and infrastructure needs. The long-term aim is to establish this organization in a manner to allow for fund raising and/or international or local aid assistance management, among others, in order to carry on its mission and extend its local impact.

Moreover, Candelaria has increased employment opportunities in the area.

#### *A.3. Candelaria Hydroelectric Monitoring Report*

The GHG emissions reduction during the period from January 1<sup>st</sup>, 2007 to January 31<sup>st</sup>, 2008 were achieved through the delivered electricity generated by the Candelaria Hydroelectric Plant, that was dispatched in the Guatemalan National interconnected Grid.

The Monitoring Report is based on the electricity delivered to the grid by the Candelaria Hydroelectric Plant. The amount of energy delivered is monitored by the energy producer, through its PLC program and the energy meters installed at the substation, as well as by AMM – Administrador del Mercado Mayorista, the wholesale electricity market administrator, which controls and measures all electricity delivered to the grid and assures, for the producer and buyer, that the electricity generated has been delivered properly to the grid.

Calculation of the emissions reductions are based on validated and registered parameters fixed in the PDD and justified during the validation. The baseline combined margin emission factor for Candelaria hydroelectric plant is 0.824 tCO<sub>2</sub>/MWh.

#### *A.4. Period of the monitoring report and amount of monitored emissions Reductions*

Period of the monitoring report: 01/Jan/2007 – 31/Jan/2008

Amount of monitored emissions reductions: **22,259.50** tCO<sub>2</sub>

#### *A.5. Date of completing the monitoring report*

The date of completion of this monitoring report was 15/February/2008.

#### *A.6. Personnel Responsible*

Executive Director	- Rudolf W. Jacobs (Candelaria)
General Manager	- Rodrigo J. Tormo A. (Candelaria)
Project Monitoring	- Mario Gutierrez (Candelaria and Secacao Operations Manager) - Rene Figueroa (Candelaria and Secacao IT department).
Monitoring Report	- Rodrigo J. Tormo A.

## Section B. Monitoring methodology and plan

### *B.1. Name and reference of approved monitoring methodology applied to the project activity*

The selected methodology is AMS-I.D. Grid Connected renewable electricity generation (version 8).

### *B.2. Justification of the choice of the methodology and why it is applicable to the small scale project activity*

Monitoring has been chosen as it is suggested in the last proposal on “Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories”.

Data collection is compatible with the baseline methodology described in the PDD, Section B.2.

### *B.3. Data to be monitored*

ID Number	Data Type	Data Variable	Data Unit	Measured (m) calculated (c) or estimated (e)	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	For how long is archived data to be kept?	Comment
1	Electricity generation of the Candelaria hydropower plant	CG	MWh	m	Daily	All	electronic	10 years	Data source: Hidroeléctrica Candelaria, S.A.

## Section C. Monitored Data

According to option (a) of Type I, Category D of CDM small-scale project activity categories contained in Appendix B of the simplified M&P for CDM small-scale project activity, monitoring shall consist of metering the electricity generated by the renewable technology.

### *C.1. Data collected in order to monitor project emissions*

GHG emissions by the project activity are zero.

### *C.2. Data collected in order to monitor baseline emissions*

#### Hidroeléctrica Candelaria, S.A.

Month	2007 (MWh)	2008 (MWh)
January	2,141	1,600
February	1,514	
March	1,560	
April	1,451	
May	1,199	
June	1,609	
July	2,432	
August	2,852	
September	3,031	
October	3,122	
November	2,451	
December	2,052	
<b>Total</b>	<b>25,414</b>	<b>1,600</b>

Table 1 – Electricity generation delivered to grid by Candelaria Small Hydro Plant  
(Source: energy meters data and invoices issued to the buyers)

## Section D. Calculation of GHG emission by source

### *D.1. Describe the formula used to calculate emissions reductions*

The build margin (BM) emission factor of 0.88 tCO<sub>2</sub>/MWh and the operating margin (OM) emission factor of 0.767 tCO<sub>2</sub>/MWh result in a combined margin emissions factor of **0.824 tCO<sub>2</sub>/MWh**. This emissions factor will be multiplied with the verified electricity generation delivered to the grid to determine the emissions reductions (CERs).

$$ER = EF \times EG$$

ER = Emission Reductions  
 EF = Emission Factor (combined)  
 G = Electricity Generation

D.2. Tables providing values obtained when applying formula above

Year	Electricity Generation (MWh)	Emission Factor (tCO <sub>2</sub> /MWh)	Emissions Reductions (tCO <sub>2</sub> )
2007 (1/Jan/2007 to 31/dec/2007)	25,414	0.824	20,941.10
2008 (1/Jan/2008 to 31/Jan/2008)	1,600	0.824	1,318.40
<b>TOTAL (tCO<sub>2</sub>)</b>			<b>22,259.50</b>

## Annexes

### *Annex 1- Contact information on participants in the project activity*

Organization: Hidroeléctrica Candelaria, S.A.  
Street: 16 calle 0-26 zona 14  
City: Guatemala City  
State/Region: Central America (Latin America/Caribbean Region)  
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