MONITORING REPORT FORM (CDM-MR)

Version 01 - in effect as of: 28/09/2010

AGUA FRESCA MULTIPURPOSE AND ENVIRONMENTAL SERVICES PROJECT

Project 0122

4th Monitoring Period (01/01/2011 – 31/12/2011)

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MONITORING REPORT
Version 02 – March 24th 2011

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Project 0122
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SECTION A. General description of the project activity

A.1. Brief description of the project activity: >>

Agua Fresca Project in its first stage, it is a hydroelectric run-of river power generation project, with a design flow of 2.9 m^3/s, an installed capacity of 7.49 MW and an annual production of 63.3 GWh. The connection of the Project to the National Electrical Grid is done in the Municipality of Fredonia, in the Fredonia Substation of Empresas Públicas de Medellín. For this, a 44 kV transmission line with a length of 15 km was built. It is estimated that the project will displace yearly 27.510 metric tons of CO_2, by displacing the power generation of the thermal plants in the Colombian Electric Sector .

The project reuses the water from the discharge of Rio Piedras Hydroelectric Plant. In case this plant is not operating, or operating with a flow less that 2.9 m^3/s, Agua Fresca Power Plant counts with a secondary intake structure that takes water directly from the river. This way, Agua Fresca project is independent and has an increased reliance in its operation.

It is important to clarify the fact that in the PDD the design flow is 2.7 m^3/s. The change in the design flow obeys to design adjustments made in the final stage in the project. This change does not result in a conflict for additional water resource usage because CORANTIOQUIA, the environmental authority, originally granted the project a water concession for 3.2 m^3/s,

The Commissioning, Operation and Maintenance of the Plant are done by Empresas Públicas de Medellín. This company has a broad experience in hydropower project in Colombia, and it is one of the top utility companies of the country.

The second stage of the project comprehends the construction of a regional aqueduct to provide water for human consumption as for irrigation to the lands and settlements located in the Cauca River canyon between La Pintada and Bolombolo, harnessing the hydrological resource contributed by the Piedras River. This is still in financial evaluation.

A.2. Project Participants

Aguas de la Cabaña S.A. E.S.P. Private entity - official contact for the CDM project activity

The Republic of Austria. Federal Minister of Agriculture, Forestry, Environment and Water Management, represented by Kommunalkredit Public Consulting GmbH (KPC).

A.3. Location of the project activity:

Agua Fresca Multipurpose and Environmental Services Project is located in the Republic of Colombia at the municipality of Jericó (Department of Antioquia) within the area of influence of the Piedras River basin.

Jericó is at the south west of the department of Antioquia, in the Colombian Andes, with an altitude ranging from 600 m to 3000 m. The project is located in the lower part of Piedras River's Basin, near the Cauca River and the sector of Puente Iglesias.

A.4. Technical description of the project

Essential technical aspects:

- Run-of-the river facility. The project does not imply the construction of dam of reservoir.
- Installed Capacity: 7.49 MW
- Design Flow: 2.9 m3/s
- Total Head: 327 m
- Power generation: 63.3 GWh / year
- Basin: Río Piedras. The project reuses the waters of Rio Piedras Hydroelectric Plant.
- Secondary intake structure
- Water inlet to back.
- Power house at surface.
- For electricity generation, technologies are employed: One Pelton turbine with vertical axis of 7.49 MW, 720 rpm, and five jets, with 327 m of total head. One synchronic generator of 8.08 MVA and 4.16 kV of nominal tension.
- Connection to the grid: transmission line (44 kV) 15 km length.
- Emission reduction: 27.510 Ton CO2e per year.
- Commissioning, Operation and Maintenance of the Plant by Empresas Públicas de Medellín.

A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:

The methodology applied to the project activity is the AMS-I.D.: Grid connected renewable electricity generation version 6.
Category I.D. comprises renewable energy generation units, such as photovoltaics, hydro, tidal/wave, wind, geothermal, and biomass, that supply electricity to an electricity distribution system that is or would have been supplied by at least one fossil fuel or non-renewable biomass fired generating unit.
Agua Fresca Project is a hydroelectric renewable energy generation project with an installed capacity lower than 15 MW (7.49 MW), thus the methodology is applicable.

A.6. Registration date of the project activity:

The project was registered in January 7th, 2006

A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

The crediting period of the project is from 01 Jan 07 to 31 Dec 12

A.8. Name of responsible person(s)/entity(ies):

The monitoring report form was completed by Generadora Unión S.A. E.S.P.

Address: Carrera 35 No 7 – 99 Piso 2, Medellin, Colombia
Telephone: +574 312 4084
Fax: +574 312 1711
www.gunion.com

SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

The project entered in commercial operation on April 2008, and since then it has been generating hydropower and delivering electricity to the Colombian National Grid. It is currently operated and maintained by Empresas Públicas de Medellín

On November 19th 2009, the UNFCCC issued 20.015 CERs corresponding to the emission reduced by Agua Fresca Project in its first crediting period (01/01/2007 – 31/12/2008).

On June 8th 2011, the UNFCCC issued 25.584 CERs corresponding to the emission reduced by Agua Fresca Project in its second crediting period (01/01/2009 – 31/12/2009).

On September 16th 2011, the UNFCCC issued 24.571 CERs corresponding to the emission reduced by Agua Fresca Project in its third crediting period (01/01/2010 – 31/12/2010).

B.2. Revision of the monitoring plan

There has been no revision of the monitoring plan

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

There has been no deviation applied to this monitoring period

B.4. Notification or request of approval of changes

There has been no Notification or request of approval of changes applied to this monitoring period

SECTION C. Description of the monitoring system

Accordingly with the AMS I.D. methodology, the monitoring for category I.D projects -Renewable electricity generation for a grid - shall consist of metering the electricity generated by the renewable technology.

All the power generation plants in Colombia have records of their hourly generation and these records are public because of the market condition. All this information is gathered by XM Expertos en Mercados, a Colombian company that provides the integral services of operation, administration and development for the Colombian wholesale power market. More information on this company is available in the webpage http://www.xm.com.co . The hourly generation of Agua Fresca project is available at all times at http://sv04.xm.com.co/neonweb/. The report of the daily generation for the period January 1st 2011 to December 31st, 2011 available in the XM webpage is attached (Annex I).

The hourly generation for the period January 1st, 2011 to December 31st, 2011 is attached in the spreadsheet "Power Generation Agua Fresca Plant 2010.xls. (Annex II). This information was checked comparing the data delivered by Empresas Publicas de Medellín with the information available in the XM webpage (Annex III)

There are power gauges that measure the power delivered to the national grid. These gauges are maintained and calibrated by Empresas Públicas de Medellín, and they are checked annually. The calibration certificates are contained in the Annex IV

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	
(Copy this table for each data and parameter. To report multiple values, a table may be used)	
Data / Parameter:	**Emission Factor**
Data unit:	**kg CO_2/ kWh**
Description:	Colombian Grid Emission Factor For Small Scale Project
Source of data used:	Resolution 181401 of October 20th, 2004 of the Ministry of Energy and Mines of the Colombian Republic
Value(s) :	0.477
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emission reduction calculation
Additional comment:	The emission factor of **0.477 kg CO2/ kWh** complies with the attachment 7 of the PDD, and it was confirmed by the CDM Executive Board in the section 71-c of on its 50th meeting, held in October 13th to 16th of 2009.

D.2. Data and parameters monitored	
(Copy this table for each data and parameter. To report multiple values, a table may be used)	
Data / Parameter:	**Power Produced by Agua Fresca Hydropower Plant**
Data unit:	kWh
Description:	Power dispatched each year by Agua Fresca Hydropower Plant Project to the National Grid
Measured /Calculated /Default:	

Source of data:	EE.PP.M (project operator) XM Expertos en Mercados (Colombia's Power Wholesale Market Administrator)
Value(s) of monitored parameter:	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emission Reduction calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Electricity gauges installed complying with country regulations; records double checked with receipt of sales.
Measuring/ Reading/ Recording frequency:	hourly
Calculation method (if applicable):	
QA/QC procedures applied:	

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

The Colombian Energy Sector

The Colombian Energy and Mining Planning Unit (UPME) is in charge of designing the National Electricity Sector Expansion Plan which is a reference or indicative plan based on the criteria established in both the PND and the PEN. The national strategic elements related to the electricity sector are summarized below:

- Attend the electricity demand with reliability higher than 95% in the long term
- Enhance the availability of firm capacity through the addition of thermal based capacity
- Improve system's efficiency through the installation of clean efficient technology
- Diversify the sources of electricity generation in the system, in the context of the availability of domestic energy resources.

The sector presents increased reliance on thermal-based generation capacity. After severe droughts, registered during the 1990s (i.e. 1992, 1997), that caused power shortages with associated forced rationing, the system has encouraged the development of more thermal generation capacity, specifically with the intention of increasing the share of firm capacity and enhancing the system's reliability of supply. The increase in thermal share of the SIN has also been the indirect result of the withdrawal of the public sector in large investments and the reluctance of private generators to enter the hydro electric generation an associated environmental and social requirements. Therefore, future additions to the power mix to attend the projected growth in demand are anticipated to be thermal-based. While this responds to the need for flexibility and robustness of the system, the increase in thermal share contributes to the gradual increase of GHG emissions by the sector and the release of local criteria pollutants (such as NOx and, SOx particulates and volatile hydrocarbons, which have been linked to health of exposed populations).

The project activity reduces CO2 emissions in electricity generation through the use of renewable energy sources. The project activity serves to displace fossil fuel-fired plants (a combination of coal and

gas based power plants in the Colombian Interconnected National System) with clean energy provided by hydroelectricity. The inclusion of the project into the interconnected grid redistributes the dispatch of all the power plants giving rise to a most efficient electricity generation of the whole system. In the absence of the CDM project activity, no other project would have been implemented indeed, so that emission reductions would not occur.

Calculation of the Baseline

The baseline for small is calculated in the document: *METODOLOGÍA SIMPLIFICADA PARA EL CÁLCULO DE LA LÍNEA BASE PARA PROYECTOS DE PEQUEÑA ESCALA: Generación de energía eléctrica con fuentes renovables interconectada a la red. Versión 1,* (SIMPLIED METHODOLOGY FOR BASELINE CALULATION OF SMALL SCALE PROJECTS: Grid Power generation with renewable sources. Version 1). This document is annexed to Resolution 181401 of October 29th, 2004 of the Ministry of Energy and Mines of the Colombian Republic

This document was prepared by the UPME (Energy and Mining Planning Unit) of the Colombian Ministry of Mines and Energy. It presents the baseline calculation for small scale power generation Project activities. In this report, in the respective operating and build margin values, are **0.660** and **0.294** kg CO2/ kWh, the arithmetic average was calculated to obtain **0.477kg CO2/ kWh** as baseline value for the year 2004.

The emission factor of **0.477kg CO2/ kWh** complies with the attachment 7 of the PDD, and it was confirmed by the CDM Executive Board in the section 71-c of on its 50th meeting, held in October 13th to 16th of 2009.

E.2. Project emissions calculation

The project does not have any emissions associated to its operation

E.3. Leakage calculation

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There is no leakage of emission in the project

E.4. Emission reductions calculation / table

Month	Generation (KWh - month)	Baseline emissions (TonCO2eq) Fe: 0,4770	Project emissions (TonCO2eq)	Leakage emissions (TonCO2eq)	Emission Reduction (TonCO2eq)
January	5.352.779,86	2.553	0	0	2.553
February	4.324.411,20	2.063	0	0	2.063
March	5.272.581,82	2.515	0	0	2.515
April	5.234.590,80	2.497	0	0	2.497
May	5.394.900,00	2.573	0	0	2.573
June	5.219.390,40	2.490	0	0	2.490
July	5.399.121,80	2.575	0	0	2.575
August	4.939.752,00	2.356	0	0	2.356
September	4.753.537,20	2.267	0	0	2.267
October	5.363.468,40	2.558	0	0	2.558
November	5.133.344,40	2.449	0	0	2.449
December	5.361.120,00	2.557	0	0	2.557
Total	**61.748.998**	**29.454**	**0**	**0**	**29.454**

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

Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions (tCO_2e)	**27.510**	**29.454**

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

Agua Fresca Power Plant reduced a total of 29.454 TonCO2eq from the Colombian electric Grid in the year 2011. This figure is equivalent to 107,1% of the projected emissions (27.510 TonCO2eq) for the year 2011. This increase of 7.1% was due to the intense period of rainfall that occurs during the year caused mainly by the influence of La Niña - Southern Oscillation (ENSO).

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History of the document

Version	Date	Nature of revision
01	EB 54, Annex 34 28 May 2010	Initial adoption.
Decision Class: Regulatory **Document Type**: Guideline, Form **Business Function**: Issuance		