



**Monitoring report form
(Version 03.1)**

Monitoring report

Title of the project activity	Agua Fresca Multipurpose and environmental services project
Reference number of the project activity	0122
Version number of the monitoring report	1.1
Completion date of the monitoring report	28/02/2013
Registration date of the project activity	07/01/2006
Monitoring period number and duration of this monitoring period	5 th Monitoring Period 01/01/2012 – 31/12/2012
Project participant(s)	Aguas de la Cabaña S.A. E.S.P.
Host Party(ies)	Colombia
Sectoral scope(s) and applied methodology(ies)	01: Energy industries (renewable-/ non renewable sources) / Grid connected renewable electricity generation version 6.
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	27.510 t CO ₂ e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	28.913 t CO ₂ e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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Agua Fresca Project in its first stage, it is a hydroelectric run-of river power generation project, with a design flow of 2.9 m³/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 t CO₂e, 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 than 2.9 m³/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 m³/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 m³/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.

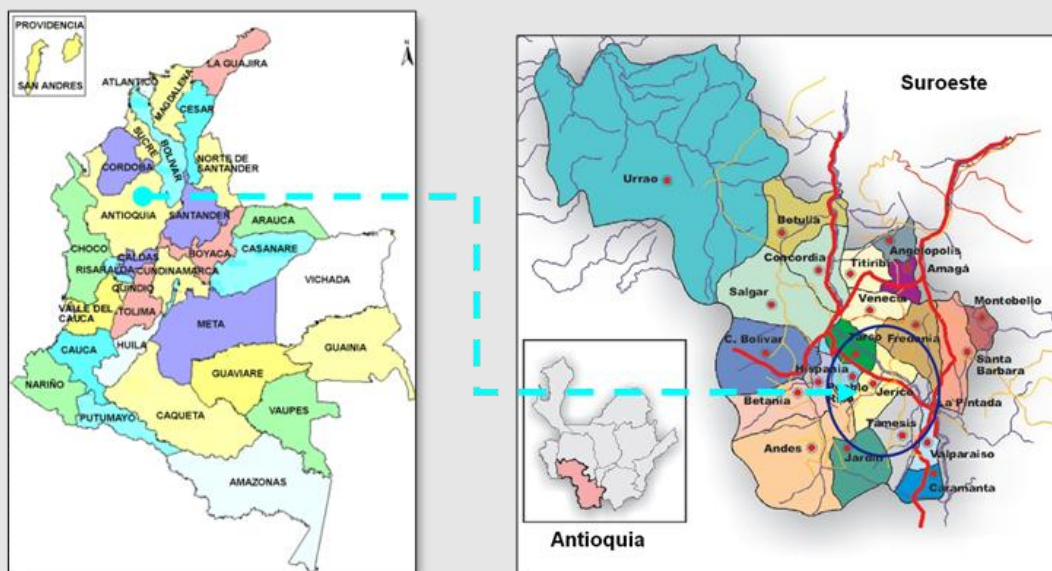
The second stage of the project comprehends the construction of a regional aqueduct to provide water for human consumption as for irrigation to the lands and settlements located in the Cauca River canyon between La Pintada and Bolombolo, harnessing the hydrological resource contributed by the Piedras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

A.2. Location of project activity

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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 3.000 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.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)
Colombia	<ul style="list-style-type: none"> – Aguas de la Cabaña S.A. E.S.P. – Kommunalkredit Public Consulting GmbH (KPC). 	No

A.4. Reference of applied methodology

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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.5. Crediting period of project activity

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Crediting period 01/01/2007 – 31/12/2012

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

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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 CER's 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 CER's 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 CER's corresponding to the emission reduced by Agua Fresca Project in its third crediting period (01/01/2010 – 31/12/2010).

On September 7th 2012, the UNFCCC issued 29.454 CER's corresponding to the emission reduced by Agua Fresca Project in its third crediting period (01/01/2011 – 31/12/2011).

Essential technical aspects:

- Run-of-the river facility. The project does not imply the construction of dam or 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 Río 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 t CO₂e per year.
- Commissioning, Operation and Maintenance of the Plant by Empresas Públicas de Medellín.

B.2. Post registration changes

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

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N.A.

B.2.2. Corrections

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N.A.

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

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N.A.

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

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N.A.

B.2.5. Changes to start date of crediting period

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N.A.

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

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N.A.

SECTION C. Description of monitoring system

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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 2012 to December 31st, 2012 available in the XM webpage is attached (Annex I).

The hourly generation for the period January 1st, 2012 to December 31st, 2012 is attached in the spreadsheet "Generation Agua Fresca Project 2012.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 fixed ex ante or at renewal of crediting period**

(Copy this table for each piece of data and parameter.)

Data / Parameter:	Emission Factor
Unit:	Kg CO ₂ / kWh
Description:	Colombian Grid Emission Factor For Small Scale Project
Source of data:	Resolution 181401 of October 20 th , 2004 of the Ministry of Energy and Mines of the Colombian Republic
Value(s) applied:	0.477
Purpose of data:	Emission reduction calculation
Additional comment:	The emission factor of 0.477 kg CO ₂ / 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 13 th to 16 th of 2009.

D.2. Data and parameters monitored

(Copy this table for each piece of data and parameter.)

Data / Parameter:	Power Produced by Agua Fresca Hydropower Plant
Unit:	kWh
Description:	Power dispatched each year by Agua Fresca Hydropower Plant Project to the National Grid
Measured/ Calculated / Default:	N.A.
Source of data:	EPM – Empresas Públicas de Medellín (project operator) XM Expertos en Mercados (Colombia's Power Wholesale Market Administrator)
Value(s) of monitored parameter:	N.A.
Monitoring equipment:	N.A.
Measuring/ Reading/ Recording frequency:	Hourly
Calculation method (if applicable):	N.A.
QA/QC procedures:	The energy meters of the plant, located in Fredonia substation are latest generation equipment, are calibrated annually for Empresas Publicas de Medellin – EPM -, who in turn is the one who makes them operate and maintain. Also EPM is the one who reads and transmits data from the energy meters to the National Dispatch Center through XM Expertos en Mercado.
Purpose of data:	N.A.
Additional comment:	N.A.

D.3. Implementation of sampling plan

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N.A

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

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

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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 - National Development Plan -, and the PEN - National Energy Plan -.

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*, (SIMPLIFIED METHODOLOGY FOR BASELINE CALCULATION 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 **0.477 kg 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. Calculation of project emissions or actual net GHG removals by sinks

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The project does not have any emissions associated to its operation.

E.3. Calculation of leakage

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There is no leakage of emission in the project.

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	27.510	0	0	28.913

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)	27.510	28.913

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

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Agua Fresca Power Plant reduced a total of 28.913 t CO₂e from the Colombian electric Grid in the year 2012. This figure is equivalent to 105.1% of the projected emissions (27.510 t CO₂e) for the year 2012. This increase of 5.1% was due to the intense period of rainfall that occurs during the year caused mainly by the influence of La Niña - Southern Oscillation (ENSO).

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)	128.537	N.A.

Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
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.
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