



**PROJECT DESIGN DOCUMENT FORM  
FOR SMALL-SCALE CDM PROJECT ACTIVITIES (F-CDM-SSC-PDD)  
Version 04.1**

**PROJECT DESIGN DOCUMENT (PDD)**

<b>Title of the project activity</b>	Agua Fresca Multipurpose and environmental services project
<b>Version number of the PDD</b>	Version 3.1
<b>Completion date of the PDD</b>	02/07/2013
<b>Project participant(s)</b>	Aguas de la Cabaña S.A. E.S.P.
<b>Host Party(ies)</b>	Colombia
<b>Sectoral scope(s) and selected methodology(ies)</b>	01: Energy industries - Renewable sources / AMS-I.D. Grid connected renewable electricity generation, version 17.
<b>Estimated amount of annual average GHG emission reductions</b>	10,808 tCO <sub>2</sub> e

**SECTION A. Description of project activity****A.1. Purpose and general description of project activity**

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Agua Fresca Project is located in the Republic of Colombia, department of Antioquia, in the jurisdiction of Jericó and Fredonia Municipalities. In its first stage, it is a hydroelectric run-of river power generation project, with an installed capacity of 7.49 MW and an annual production of 63.3 GWh. Its second stage consists in 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, and thus promoting tourism and the agro-industrial development of the region.

The construction of the regional aqueduct is expected to develop according to the area real demand warrants. To date the current conditions in the area have prevented this second stage is implemented.

The current state of the second stage of Agua Fresca Multipurpose Project has no impact on it as Project Clean Development Mechanism.

Currently the project has:

- Letter of No Objection approved, May 27<sup>th</sup>, 2004.
- National Approval granted by the Ministry of Environment to, who is the Designated National Authority in Colombia, of 26<sup>th</sup> November, 2004
- The project is validated and registered with the UNFCCC since January 7<sup>th</sup>, 2006.
- The project entered in commercial operation on April, 2008
- The emission reductions resulting from the power generation have been verified by the DOE designated ICONTEC for these periods as follows:

**Table N° 1** Verifications Agua Fresca Multipurpose and environmental services project

<b>Period (Year)</b>	<b>Generation (kW)</b>	<b>Emissions Reduction CO<sub>2</sub> (Ton CO<sub>2</sub> e)</b>
2007 – 2008	41,960,530	20,015
2009	53,634,464	25,584
2010	51,512,351	24,571
2011	61,748,998	29,454
<b>Total</b>	<b>208,856,343</b>	<b>99,624</b>

- The CER's produced by Agua Fresca Power Plant have been sold to the Kommunalkredit Public Consulting GmbH (KPC), who acts as a CER purchaser for the Austrian Government.

The factor applied during the first crediting period was 0.477 kg CO<sub>2</sub>/kWh, which was approved by Resolution No. 181401 29<sup>th</sup> October, 2004 of the Ministry of Mines and Energy of the Republic of Colombia.

The project has environmental license granted by the Environmental Authority – Corantioquia The project is also in line with the national policies and programs by promoting the use of renewable energy sources - Law 697, 2001.



The Agua Fresca Project is considered not only as a project of electric power generation and aqueduct, but also as an "Environmental Services Project", since it contributes to decrease the global emissions of carbon through the substitution of polluting fuels as a source of electric power generation; and with its multiple benefits and capacity to yield and consolidate economic resources, it will contribute to the conservation and protection of the Piedras River's basin.

It is estimated that the project will displace yearly from the beginning of the second crediting period 10,808 tCO<sub>2</sub>e, based on an emission factor of 0.1707 kg CO<sub>2</sub>e/kWh, calculated by the consulting firm ET&B (Environmental Technologies and Business), who was contracting for Aguas de la Cabaña, company owns the power plant.

To calculate the emission factor was applied la Methodological tool: "Tool to calculate the emission factor for an electricity system", version 03.0.0.

From a Sustainable Development scope, it is important to highlight the reuse and optimization of the harnessing of the hydrological resource provided by the Piedras River, which is first harnessed by the Piedras River Power Plant which belongs to the Society Generar S.A. E.S.P and generates 135 GWh per year, then it is used by Aguas de la Cabaña S.A. E.S.P. to generate 63.3 GWh per year in the Agua Fresca Power Plant, and finally reused in a regional pump aqueduct to provide water for human consumption and agro industrial usage for a region with great water scarcity.

About the environmental effects, Agua Fresca Project, thanks to its characteristics of being a run-of-river-intake project with no dam, and the simplicity involving the civil works, has a minimum environmental impact, since it involves no settlement relocation or displacement whatsoever, it has a low effect on the ecosystems in the area of influence and its land requirements are minimal.

Additionally, the reduction of 2.7 m<sup>3</sup>/s of the Piedras River's flow in the section of the river located between the discharge of the Río Piedras Power Plant and its mouth to the Cauca River will help to control the erosion of the shores in this section, which have been qualified by experts as geologically unstable.

Agua Fresca Multipurpose and Environmental Services Project contributes to local sustainable development with the investment of 20% of the revenue generated by the sale of carbon certificate de, which is destined the administration and maintenance of Jerico's Botanical Garden and its articulation with Las Nubes Natural Reserve.

The power plant is delivering around 63.3 GWh/year in the dispatching scheme of the Colombian National Interconnected System (SIN). According to the official indicative expansion plan, options to meet increasing energy demand in Colombia are mostly thermal. Due to the small size of the Agua Fresca Run-of-River Power Plant(7.49 MW) relative to the net installed capacity (14.4 GW), the plant has no discernible effect on the planned expansion of the SIN (Sistema Interconectado Nacional), but it will displace energy that is dispatched at the margin (largely thermal energy).

Agua Fresca Multipurpose and Environmental Services Project contribute to sustainable development in different ways:

- Shows the potential of run-of-river power plants as alternative to conventional hydropower or thermo power plants, encouraging the construction of run-of-river plants in the Country. These



plants produce sustainable development mechanisms using small resources in different places in the Country.

- Plants of this type contribute to the reduction of polluting particles in the Country, which can also be discharged by thermo power plants.
- Developed great knowledge and nationwide experience in the construction of run-of river power plants; also strengthen the national institutional capacities focused to the consolidation of competitive advantages to participate in the international carbon market.
- Demonstrates the potential value of the environmental services in the region, through the recognition of the role of the natural forest ecosystems in the generation of electric power and in the production and acquisition of the resources destined to their conservation and protection.
- The local community has obtained benefits with short term social programs, becoming a key element to assure the approval, backup and participation of the community in the project and its complementary activities.

## **A.2. Location of project activity**

### **A.2.1. Host Party(ies)**

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Colombia<sup>1</sup>

### **A.2.2. Region/State/Provinceetc.**

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Antioquia Department

### **A.2.3. City/Town/Community etc.**

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Municipality of Jericó

### **A.2.4. Physical/ Geographical location**

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The 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. Jericó has a population of 12,466<sup>2</sup> inhabitants. In the rural zones the main activities are agriculture, and the most important crops are coffee, banana, corn, cardamom and stockbreeding.

Agua Fresca Power Plant in its first stage, it is a hydroelectric run-of river power generation project, with an installed capacity of 7.49 MW and an annual production of 63.3 GWh. The connection of

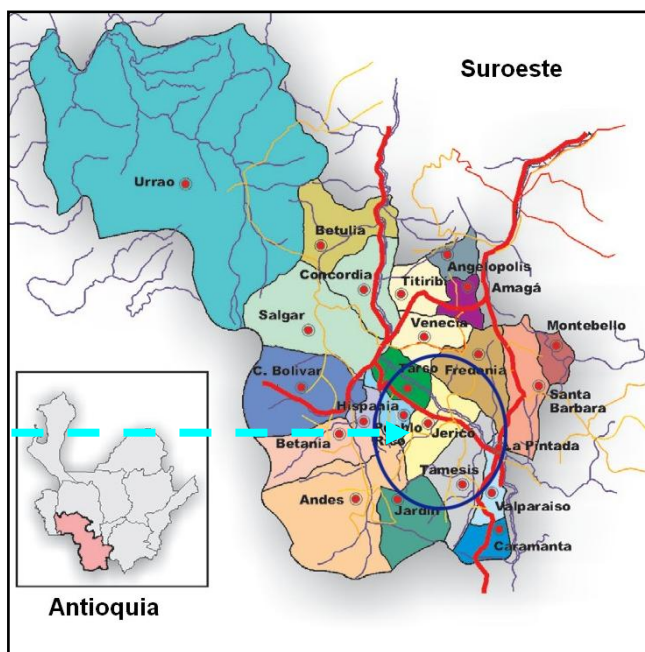
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<sup>1</sup> The Colombian Government ratified "United Nations Framework Convention on Climate Change" by the Law 164, 1994, and signed the Kyoto Protocol on March 22, 1998 ratified it by the Law 629, 2000.

<sup>2</sup> DANE (National Administrative Department of Statistics)–Boletín – Censo General 2005 – Perfil Jericó – Antioquia.

the Project to the National Electrical Grid is in the Municipality of Fredonia. Was constructed a 44 kV transmission line with a length of 15 km.

The second stage, the construction of the regional aqueduct is expected to develop according to the area real demand warrants. To date the current conditions in the area have prevented this second stage is implemented.



#### Essential technical aspects:

- Run-of-the river facility. The project does not involved the construction of dam of reservoir.
- Installed Capacity: 7.49 MW
- Design Flow: 2.7 m<sup>3</sup>/s
- Total Head: 327 m
- Power generation: 63.3 GWh / year
- Basin: Piedras River. The project will reuse the waters of Piedras River Hydroelectric Plant.
- Water inlet to back.
- Power house at surface.
- For electricity generation, and profiting the steep slope between the Piedras River plant and the project that is located at the final stretch, the following technologies is employed:

A Pelton turbine with vertical axis and a rated capacity of 7.49 MW is used to generate power making use of the kinetic energy carried by the fast flowing stream and the potential energy between the entry and exit points of the project. This prevents the need for water storage and the use of reservoirs, therefore avoiding potential environmental and social impacts in the area. Pelton turbines have been extensively utilized in hydroelectric projects around the world and in Colombia



because of.

Because of this, and because the technology of the project is the last state of the art for this kind of projects, the project technology is unlikely to be superseded by other more efficient technologies.

Since the start of operations Agua Fresca Power Plant operates continuously every day of the year, 24 hours a day, optimally and efficiently, except on days that are performed maintenance.

These maintenance are classified into three groups:

1. Minor preventive and corrective: are in charge of the plant operators;
2. Preventive, predictive and corrective elderly: are made by the maintenance team and are scheduled repeatedly according to the traceability of equipment;
3. The major corrective Emergency: become immediately due to no time for any type of programming and will be attended by staff of the maintenance team.

It has an annual program of preventive and predictive maintenance for Agua Fresca Power Plant, where maintenance is performed every six months for a day and a two-day annual maintenance.

#### A.4. Parties and project participants

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

#### A.5. Public funding of project activity

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Aguas de la Cabaña S.A. E.S.P. is a Private Society. There is not public funding in the Agua Fresca Multipurpose and Environmental Services Project. For this reason Appendix 2 is not applicable.

#### A.6. Debundling for project activity

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Agua Fresca Power Plant is a product of an initiative from Aguas de la Cabaña, who saw the opportunity for the optimal utilization of water resource of the Piedras River. This resource was seized by constructing an independent power plant. In turn, this plant not only takes advantage of the Piedras River, but also uses the water discharged by the Río Piedras Power Plant, located upstream of the Agua Fresca Power Plant.

Agua Fresca Environmental Services Project is an independent project and is not tied to any large



scale project. It was validated and registered by Aguas de la Cabaña in January 7<sup>th</sup>, 2006 as small-scale project and is in commercial operation since April 2008.

Project participants report that there is not another project with the characteristics specified in Annex C to the modalities and procedures for small-scale project under the CDM:

- a. With the same project participants;
- b. In the same project category and technology/measure; and
- c. Registered within the previous 2 years; and
- d. Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

## SECTION B. Application of selected approved baseline and monitoring methodology

### B.1. Reference of methodology

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- Methodology:
  - *Category*: Small Scale.
  - *Name*: AMS-I.D.- Grid connected renewable electricity generation.
  - *Version*: 17 - EB 61, Annex 17, 3 June, 2011.
- Tool:
  - *Name*: “Tool to calculate the emission factor for an electricity system”.
  - *Version*: 03.0.0 Tool 07.

This tool was applied both to calculate the CO<sub>2</sub> emission factor as for the weighting factor according stipulated in the tool for the renewal of the crediting period of the project, “*Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period Validity*”, Version 03.0.1, EB 66 Annex 47.

### B.2. Project activity eligibility

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Category I.D. this methodologies comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal, and renewable biomass, that supply electricity to a national or a regional grid.

Item	AMS-I.D v17 - Applicability Criteria	Project Activity
1	<p>This methodology comprises renewable energy generation units, such as photovoltaic, <b>hydro</b>, tidal/wave, wind, geothermal and renewable biomass:</p> <p><b>a. Supplying electricity to a national or a regional grid; or</b></p> <p>b. Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.</p>	<p>Agua Fresca Project is a hydroelectric renewable energy generation project with an installed capacity lower than 15 MW (7.49 MW) that will be connected to the national grid by a 44 kV transmission line, 15 km length.</p>
2	Illustration of respective situations under	Project supplies electricity to the Colombian



Item	AMS-I.D v17 - Applicability Criteria	Project Activity
	which each of the methodology (i.e. AMS-I.D, AMSI. F and AMS-I.A2) applies is included in Table 2 of the methodology.	National grid.
3	<p>This methodology is applicable to project activities that:</p> <p><b>a. Install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant);</b></p> <p>b. Involve a capacity addition;</p> <p>c. Involve a retrofit of (an) existing plant(s); or</p> <p>d. Involve a replacement of (an) existing plant(s).</p>	<p>The project activity applied to:</p> <p>a. Install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant);</p>
4	<p>Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology:</p> <ul style="list-style-type: none"> <li>– The project activity is implemented in an existing reservoir with no change in the volume of reservoir;</li> <li>– The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m<sup>2</sup>;</li> <li>– The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4W/m<sup>2</sup>.</li> </ul>	<p>Agua Fresca hydroelectric project, has no reservoir, and therefore according to the methodology applicable to the project, “<i>Indicative simplified baseline and monitoring Methodologies for selected small-scale CDM project activity categories</i>”, Version 17, EB 61, Item 4, and the definition expressed in footer 6, this condition does not applicable to the project activity.</p>
5	<p>If the new unit has both renewable and nonrenewable components (e.g., a wind/diesel unit), the eligibility limit of 15MW for a small scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.</p>	Not applicable to the project activity.
6	<p>Combined heat and power (co-generation) systems are not eligible under this category.</p>	Not applicable to the project activity.
7	<p>In the case of project activities that involve the addition of renewable energy</p>	Not applicable to the project activity.



Item	AMS-I.D v17 - Applicability Criteria	Project Activity
	generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.	
8	In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.	Not applicable to the project activity.

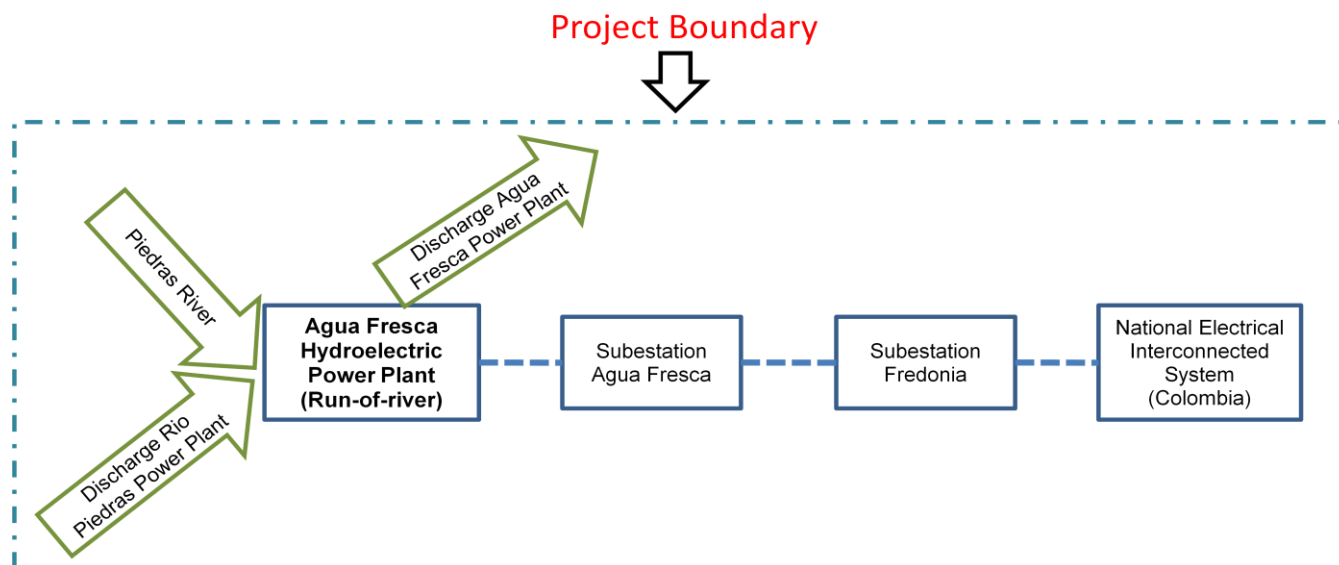
### B.3. Project boundary

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According to the methodology AMS-ID: Grid connected renewable electricity generation, Version 17.0, EB 61, Annex 17, 3 June, 2011. The spatial extent of the project boundary includes the project power plant connected physically to the electricity system. Thus, the project boundary is the spatial extent of the project includes the power plant and all power plants connected physically to the National electric grid.

This is shown in the following scheme:

**Scheme N° 1-Project Boundary**



### B.4. Establishment and description of baseline scenario

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The methodological tool: *Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period Validity, Version 03.0.1*, (EB 66 Annex 47) is develops the following steps for establishing the baseline scenario of the project activity:

***Step 1: Assess the validity of the current baseline for the next crediting period***

For develops the validity of the current baseline for the second crediting period of the project following steps are followed:

***Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies***

For the second crediting period of the project, the baseline complies with existing rules and policies established from the Colombian Ministry of Environment and Sustainable Development, the Ministry of Mines and Energy, and UPME (Mining and Energy Planning Unit).

The Ministry of Mines and Energy and Energy Mining Planning Unit (UPME) is in charge of development 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)<sup>3</sup> and the PEN (National Energy Plan)<sup>4</sup>.

The national strategic elements related to the electricity sector are summarized below:

- Attend the electricity demand with a 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.

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 (National Interconnected System) 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 hydroelectric generation and 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 NO<sub>x</sub> and, SO<sub>x</sub> particulates and volatile hydrocarbons, which have been linked to health of exposed populations).

The fuel conversion (from coal, oil to gas) as a source of energy is harmful to the environment and clearly increases local air pollution and GHG emission releases. Actually, natural gas based power plants are being rapidly built in Latin America to the detriment of non-GHG emitting technologies.

<sup>3</sup> National Development Plan – 2010-2014 – Prosperity for all. National Planning Department. Bogotá D.C., 2011.

<sup>4</sup> National Energy Plan – 2006 – 2025 – Context and Strategies. Mining and Energy Planning Unit – UPME -. Bogotá D.C. April de 2007.



Indeed, there is a general tendency to an increase in the regional thermal generation share and a decrease in non-fossil fuel based generation such as hydropower.

Run-of-the river power plants provide a good example of non-GHG emitting power generation projects that address both local environment needs and global environmental problems such as climate changes. In these terms, the project fulfils national and environmental priorities:

- It is consistent with national ratification of the Kyoto Protocol and associated voluntary commitments regarding global climate change mitigation.
- It is consistent with regional and local needs in terms of supplying sustainable electricity.
- It is consistent with the power sector development plans since a run-of the-river power plant uses a renewable source of energy for electricity generation that produces minimum local impacts.
- From the social viewpoint the project generates employment during the administration, operation and maintenance of power plant. The company also supports the creation of community organizations for the development of the region and promotion of sustainable human development.
- Additionally, the project contributes not only to the growth of the national economy through private investment but also boosts the energy sector in the country through the development of this type of renewable power generation projects.

According to the above, the project activity is consistent with the Colombian National legislation and policies established in the Energy Sector of the country, therefore complies with the step 1.1.

### ***Step 1.2: Assess the impact of circumstances***

The conditions for the calculation of the emissions reduction of Power Plant have changed since the emission factor applied for the start of the project is different than it is now in effect for this type of power generation projects. The Mining and Energy Planning Unit is the agency under the Ministry of Mines and Energy, is one who performs the calculation of this factor and the Ministry of Mines and Energy is who takes that factor through a resolution.

The baseline factor during the first crediting period up to 0.477 kg CO<sub>2</sub>/kWh, which was approved by Resolution No. 18 1401 29<sup>th</sup> October, 2004, the Ministry of Mines.

For the second crediting period of the project was calculated a new emission factor, where if  $W_{OM} = 0.50$  and  $W_{BM} = 0.50$ , the emission factor is 0.3024 tCO<sub>2</sub>/MWh. Bearing in mind that Agua Fresca Multipurpose Project enters second crediting period,  $W_{OM} = 0.25$  and  $W_{BM} = 0.75$ , the baseline scenario for the new period is 0.1707 tCO<sub>2</sub>/MWh.

This factor was calculated by EBT (Environmental Business & Technologies Ltda.), consulting firm hired by Aguas de la Cabaña S.A. E.S.P.

According to the above, the project activity complies with the step 1.2.

***Step 1.3: Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested.***

Not Applicable.

***Step 1.4: Assessment of the validity of the data and parameters***

As mentioned in step 1.2, the new emission factor is a fixed datum unmonitored, according to Colombian legislation in this area. Consequently to the growth of the Colombian electric grid, the baseline factor has been recalculated and it has changed from the factor initially taken to the start of the project. The emission factor applied for renewal of the second period of accreditation is the result of recalculating the emission factor, according to the tool “Tool to calculate the emission factor for an electricity system, Version 0.3.0.0, Tool 07”.

Therefore, the data and parameters are as follows:

- The CO<sub>2</sub> emission is fixed and is a datum unmonitored
- Energy generated and delivered to the grid is a datum monitored.

According to the above, the project activity complies with the step 1.4.

Taking into account that complied with the steps 1.1, 1.2, 1.3 and 1.4, then was fulfilled with Step 1, ie “Assess the validity of the current baseline for the next crediting period”, and continues with Step 2.

***Step 2: Update the current baseline and the data and parameters***

***Step 2.1: Update the current baseline***

According Procedure for Renewal of the Crediting Period of a Registered CDM Project Activity, Annex 29, Version 06.0, EB 63, 29<sup>th</sup> September, 2011; Chapter II, Item 2 (a) and 3; taking into account the above, remains the same baseline of the project and is updated only the calculation of the reduction of CO<sub>2</sub> emissions with current emission factor and methodology of monitoring.

Also for calculating the emission factor applies the “Tool to calculate the emission factor for an electricity system”, Version 03.0.0, TOOL07; according Chapter II. BASELINE METHODOLOGY PROCEDURE, Step 6: *Calculate the combined margin emissions factor, (a) Weighted average CM....*” The following default values should be used for  $w_{OM}$  and  $w_{BM}$ :

- For all other projects:  $w_{OM} = 0.5$  and  $w_{BM} = 0.5$  for the first crediting period, **and  $w_{OM} = 0.25$  and  $w_{BM} = 0.75$  for the second and third crediting period**, unless otherwise specified in the approved methodology which refers to this tool.”

Considering the above, the new emission factor is recalculated based on the current factor, see Appendix 3, document “Report of Emission Factor calculation the National Grid according to the method and option selected by Energía del río Piedras S.A. E.S.P.”. This document was prepared by consulting firm hired by Aguas de la Cabaña S.A. E.S.P., where:

Table N° 2 - Current

Variables	New Emission Factor <sup>5</sup>	% Weighting Variables-Renewal	Factor for second period
Emission Factor (tCO <sub>2</sub> e/MWh)	0.3024		0.1707
Operating Margin (tO <sub>2</sub> /MWh)	0.5657	25%	0.1414
Build Margin (tCO <sub>2</sub> /MWh)	0.0390	75%	0.0293

The baseline emissions are:

$$BE_y = EG_{BL,y} * EF_{CO_2,grid,y}$$

$BE_y$  = Baseline Emissions in year  $y$  (tCO<sub>2</sub>)

$EG_{BL,y}$  = Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year  $y$  (MWh).

$EF_{CO_2,grid,y}$  = CO<sub>2</sub> emission factor of the grid in year  $y$  (tCO<sub>2</sub>/MWh)

Where:

$EG_{BL,y} = 63,300$ (MWh).

$EF_{CO_2,grid,y} = 0.1708$ (tCO<sub>2</sub>/MWh)

$$BE_y = 63,300 * 0.1707$$

$$BE_y = 10,808 \text{ tCO}_2 \text{ e yearly}$$

#### Emission Reductions

- The project reduced in the first crediting period between January 1th, 2007 and December 31th, 2011: 99,624 tCO<sub>2</sub>e.
- The project will reduce for the second crediting period 10.808 tCO<sub>2</sub>e per year and for the all crediting period (seven (7) years) 75,656 tCO<sub>2</sub>e.

#### Total Emission Reductions:

- **First Period** its reduced (January 1th, 2007 and December 31th, 2011): 99,624 tCO<sub>2</sub>e.
- **Second Period** (January 2013 – December 2019): 75,656 tCO<sub>2</sub>e

<sup>5</sup> This factor corresponds to a  $W_{OM} = 0.50$  and  $W_{BM} = 0.50$

- **Total (July 2007 – December 2019): 175,280 tCO<sub>2</sub>e**

According to the above, the project activity complies with the step 2.1.

***Step 2.2: Update the data and parameters***

The data and parameters not monitored have been updated for the second renewal of the crediting period as detailed in step 2.1.

According to the above, the project activity complies with the step 2.1.

Taking into account that complied with the steps 2.1 and 2.2, then was fulfilled with Step 2, ie “Update the current baseline and the data and parameters”.

**B.5. Demonstration of additionality**

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Not Applicable.

**B.6. Emission reductions**

**B.6.1. Explanation of methodological choices**

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According Procedure for Renewal of the Crediting Period of a Registered CDM Project Activity, Annex 29, Version 06.0, EB 63, 29<sup>th</sup> September, 2011; Chapter II, Item 2 (a) and 3; taking into account the above, remains the same baseline of the project and is updated only the calculation of the reduction of CO<sub>2</sub> emissions with current emission factor and methodology of monitoring.

In accordance with this, the Agua Fresca Power Plant, is governed by the following existing methodology and tools:

- Methodology:
  - *Category*: AMS-I.D.- Grid connected renewable electricity generation.
  - *Name*: Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories.
  - *Version*: 17 - EB 61, Annex 17, 3<sup>th</sup> June 2011.
- Tool:
  - *Name*: Tool to calculate the emission factor for an electricity system,
  - *Version*: 03.0.0, TOOL07.

The data for calculation of the Operating Margin and Build Margin Emissions Factors are collected from official sources such as the Energy and Mines Planning Unit (UPME), XM Expertos en Mercados and the National Dispatch Center (CND). **CND** is in charge of planning, supervision and control of generation and transmission of the national electricity system. CND also supervises the Regional Dispatch Centers (CRDs) to ensure system's coordination and reliability and registers and stores generation data by the hour in a state of the art database that can be fully accessible through the Internet.

**B.6.2. Data and parameters fixed ex ante***(Copy this table for each piece of data and parameter.)*

<b>Data / Parameter</b>	Emission Factor
<b>Unit</b>	tCO <sub>2</sub> e/MWh
<b>Description</b>	Colombian Grid Emission Factor For Small Scale Project
<b>Source of data</b>	"Report of Emission Factor calculation the National Grid according to the method and option selected by Energía del río Piedras S.A. E.S.P.".
<b>Value(s) applied</b>	0.1707
<b>Choice of data or Measurement methods and procedures</b>	<p>The calculation of the CO<sub>2</sub> emission factor was calculated by Environmental Business &amp; Technologies - EB&amp;T – a consulting company contracted by the project owner for the development of this factor.</p> <p>This calculation was performed under the Methodology ACM0002, version 13.0.0, EB67, using the methodological tool to calculate the emission factor: "Tool to emission factor for an electricity system", version 03.0.0.</p> <p>For the calculation of the emission factor of the Colombian national power grid, has considered the following criteria:</p> <ul style="list-style-type: none"> <li>• Solely use information from official sources available to the public at large;</li> <li>• Apply the "Simple Adjusted Operating Margin" to calculate the OM emission factor;</li> <li>• Apply the "<i>Ex-ante</i>" approach on the data employed to calculate the emission factor.</li> </ul> <p>Annex No. 3 includes the "Report of Emission Factor calculation the National Grid according to the method and option selected by Energía del río Piedras S.A. E.S.P.".</p> <p>According Procedure for Renewal of the Crediting Period of a Registered CDM Project Activity, Annex 29, Version 06.0, EB 63, 29<sup>th</sup> September, 2011; Chapter II, Item 2 (a) and 3; taking into account the above, remains the same baseline of the project and is updated only the calculation of the reduction of CO<sub>2</sub> emissions with current emission factor and methodology of monitoring.</p> <p>Also for calculating the emission factor applies the Tool to calculate the emission factor for an electricity system, Version 02.2.1, EB63 - Annex 19, 29<sup>th</sup> September, 2011; according Chapter II. BASELINE METHODOLOGY PROCEDURE, Steep 6: <i>Calculate the combined margin emissions factor, (a) Weighted average CM....</i>"The following default values should be used for W<sub>OM</sub> and W<sub>BM</sub>:</p> <p style="text-align: center;"><b>Recalculation de Emission Factor</b></p> <p><b>Emission Factor (tCO<sub>2</sub>e/MWh)</b>  <b>for second period crediting= 0.1707</b>  Operating Margin (tO<sub>2</sub>/MWh) (W<sub>OM</sub>= 0.25) = 0.1414  Build Margin (tCO<sub>2</sub>/MWh) (W<sub>BM</sub>= 0.75) = 0.0293</p>
<b>Purpose of data</b>	Calculating emission reductions generated by the Power Plant
<b>Additional comment</b>	

**B.6.3. Ex-ante calculation of emission reductions**

&gt;&gt;

The methodology for calculating the baseline scenario was explained in the step 2 for the B.4 Establishment and description of baseline scenario. It was estimated that the yearly emission reduction will be 0.1707 tCO<sub>2</sub> e/year. This adds up to 75,656 tCO<sub>2</sub> e for the length of the second crediting period.

**B.6.4. Summary of ex-ante estimates of emission reductions**

Year	Baseline emissions (tCO <sub>2</sub> e)	Project emissions (tCO <sub>2</sub> e)	Leakage (tCO <sub>2</sub> e)	Emission reductions (tCO <sub>2</sub> e)
2013	10,808	0	0	10,808
2014	10,808	0	0	10,808
2015	10,808	0	0	10,808
2016	10,808	0	0	10,808
2017	10,808	0	0	10,808
2018	10,808	0	0	10,808
2019	10,808	0	0	10,808
<b>Total</b>	75,656	0	0	75,656
<b>Total number of crediting years</b>	7			
<b>Annual average over the crediting period</b>	10,808			10,808
<b>Energy generated annually (MW)</b>	63,300			



**B.7. Monitoring plan****B.7.1. Data and parameters to be monitored***(Copy this table for each data and parameter.)*

<b>Data/ Parameter</b>	Electricity generated and delivered to the grid by the project activity
<b>Unit</b>	kWh
<b>Description</b>	Power dispatched each year by Agua Fresca Hydropower Plant Project to the National Grid
<b>Source of data</b>	EPM (Empresas Públicas de Medellín) XM Expertos en Mercados (Colombia's Power Whole sale Market Administrator)
<b>Value(s) applied</b>	
<b>Measurement methods and procedures</b>	Electricity gauges installed complying with country regulations; records double checked with receipt of sales.
<b>Monitoring frequency</b>	Hourly
<b>QA/QC procedures</b>	<p>The energy meters of the plant, located in Fredonia substation are latest generation equipment, are calibrated annually for Empresas Públicas de Medellín – EPM -, who is in charge to operate and maintain the substation. Also EPM is the one who reads and transmits data from the energy meters to the National Dispatch Center through XM Expertos en Mercado.</p> <p>The registration information of the energy generated by the central is performed through two (2) energy gauges; one is the main gauge and the other is the back gauges, which are located at the Fredonia Substation. The energy gauges are bidirectional.</p> <p>Colombia has no regulations governing the frequency of calibrating measuring equipment. However, with reference to the provisions of the UNFCCC, according to the "Guidelines for Assessing Compliance With The calibration frequency requirements", Annex 60, Version 01, EB52. Number 8, if you do not specify the frequency of calibration of the equipment is taken as reference established by the technical specifications of the equipment or international standards.</p> <p>In accordance with the above international standards and where the periodicity consulted varies between 4 and 20 years, decision was taken to perform the calibration of the measuring equipment every five (5) years.</p>
<b>Purpose of data</b>	Emission Reduction calculation
<b>Additional comment</b>	

**B.7.2. Sampling plan**

&gt;&gt;



Not Applicable.

**B.7.3. Other elements of monitoring plan**

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Not Applicable.

**SECTION C. Duration and crediting period****C.1. Duration of project activity****C.1.1. Start date of project activity**

>>

July, 2006

**C.1.2. Expected operational lifetime of project activity**

>>

50 years

**C.2. Crediting period of project activity****C.2.1. Type of crediting period**

>>

Renewal crediting period, so:

- First Crediting period: January 2007 – December 2012
- Second Crediting period: January 2013 – December 2019
- And Third Crediting period: January 2020 – December 2026

**C.2.2. Start date of crediting period**

>>

January 1<sup>th</sup>, 2013

**C.2.3. Length of crediting period**

>>

Sever years.

**SECTION D. Environmental impacts****D.1. Analysis of environmental impacts**

>>

Not Applicable.

**SECTION E. Local stakeholder consultation****E.1. Solicitation of comments from local stakeholders**

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Not Applicable.

**E.2. Summary of comments received**

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Not Applicable.

**E.3. Report on consideration of comments received**

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Not applicable

## **SECTION F. Approval and authorization**

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The National Approval granted by the Ministry of Environment to, who is the Designated National Authority in Colombia, of 26<sup>th</sup> November, 2004, and according to Colombian legislation in this area, does not require to be renewed, since it is given once for the entire duration of the project.

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**Appendix 1: Contact information of project participants**

<b>Organization</b>	Aguas de la Cabaña S.A. E.S.P.
<b>Street/P.O. Box</b>	Carrera 35 N° 7 – 99, Second floor
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<b>Contact person</b>	-----
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<b>Salutation</b>	Mr.
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<b>First name</b>	Sergio
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<b>Mobile</b>	-----
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<b>Contact person</b>	-----
<b>Title</b>	-----
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<b>Middle name</b>	-----
<b>First name</b>	Martin
<b>Department</b>	Department Climate and Energy
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<b>Direct fax</b>	-----
<b>Direct tel.</b>	-----
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## **Appendix 2: Affirmation regarding public funding**

Not applicable.



### **Appendix 3: Further background information on ex ante calculation of emission reductions**

- “Report of Emission Factor calculation the National Grid according to the method and option selected by Energía del río Piedras S.A. E.S.P.”. January, 2012. Medellín.
- Spreadsheet CO<sub>2</sub> Emission Factor developed by EB&T. January, 2012. Medellín.



#### **Appendix 4: Further background information on monitoring plan**

Not Applicable.





### Appendix 5: Summary of post registration changes

Version	Date	Nature of revision
02	May 25 <sup>th</sup> , 2012	<ul style="list-style-type: none"> <li>It implemented the current format of the PDD for project activities (F-CDM-PDD) Version 04.1.</li> <li>It implemented Methodological Tool: "Validity of the original/current Baseline and the update the baseline at the Renewal of a crediting period". Version 03.0.1, EB 66, Annex 47, 2<sup>th</sup> March 2012.</li> <li>It implemented "Procedure for renewal of the crediting period of a registered CDM Project Activity", Version 06.0, EB63, Annex 29. 29<sup>th</sup> September 2011.</li> <li>Updated the monitoring methodology, based on the methodology for small scale projects effect on the date (Grid connected renewable electricity generation --- Version 17.0)</li> <li>Updated the "Tool to calculate the emission factor for an electricity system". Version 03.0.0., TOOL07.</li> </ul>
01	January 7 <sup>th</sup> , 2006	Initial adoption.

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### History of the document

Version	Date	Nature of revision
04.1	11 April 2012	Editorial revision to change history box by adding EB meeting and annex numbers in the Date column.
04.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the project design document form for small-scale CDM project activities" (EB 66, Annex 9).
03	EB 28, Appendix 34 15 December 2006	<ul style="list-style-type: none"> <li>The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.</li> </ul>
02	EB 20, Annex 14 08 July 2005	<ul style="list-style-type: none"> <li>The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document.</li> <li>As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <a href="http://cdm.unfccc.int/Reference/Documents">http://cdm.unfccc.int/Reference/Documents</a>.</li> </ul>
01	EB 07, Annex 05 21 January 2003	Initial adoption.
<b>Decision Class:</b> Regulatory <b>Document Type:</b> Form <b>Business Function:</b> Registration		