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

PROJECT DESIGN DOCUMENT (PDD)

Title of the project activity	Santa Ana Hydroelectric Plant
Version number of the PDD	3~~2~~.0
Completion date of the PDD	29~~10~~/11~~01~~/2013~~06~~
Project participant(s)	Empresa de Acueducto y Alcantarillado de Bogota-EAAB
Host Party(ies)	Colombia
Sectoral scope(s) and selected methodology(ies)	Sectoral scope: 1 : Energy industries (renewable - / non-renewable sources) Methodology applied: AMS-I.D - Renewable electricity generation for a grid. Version 7
Estimated amount of annual average GHG emission reductions	20,642.4 tCO2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The Santa Ana Hydroelectric Plant is a small run–of-river type hydroelectric plant, introduced into the municipal potable water supply system of Bogotá Colombia, located on the outskirts of the city. It is scheduled to begin operations in the second semester of 2005.

The city of Bogotá relies on three principal sources of drinking water: Tibitoc, La Regadera, and Chingaza, the most recent source. These supplies are interconnected into an optimized water supply and distribution network, operated by Empresa del Acueducto y Alcantarillado de Bogotá (EAAB). Vulnerability analyses conducted by EAAB of the water supply system of Bogotá, considering both Water Supply Network Operation & Maintenance Scenarios as well as potential vulnerabilities of the water conducting infrastructure, concluded that an additional reservoir (San Rafael) needed to be built under the Chingaza system in order to ensure adequate supply of drinking water to the city. In order to comply with reliability requirements, an additional, steeply sloped, water-conducting tunnel with a length of 2.5 km, was constructed that interconnected to the city water distribution system. The Santa Ana Hydroelectric Project is installing at the base of the tunnel a power house with hydroelectric energy conversion equipment, that will turbine the water passing from the Wiesner water treatment plant into the distribution/storage system of the city, producing clean electricity to be placed into the Colombia National Interconnected Grid System, following local existing electricity market regulations and required environmental and operational permits. A key objective of the project is to reduce Greenhouse Gas Emissions that would have otherwise have been generated by the National Interconnected System of Colombia.

The project is expected to reduce an annual average of 20,642.4 tCO2e per year and total GHG emission reductions for the chosen crediting period of 206,424 tCO2e.

The Santa Ana Hydroelectric Plant is consistent with the Sustainable Development Criteria[1] established by the Colombian NDACDM, Oficina Colombiana para la Mitigación al Cambio Climático (OCMCC) of the Ministerio de Ambiente, Vivienda y Desarrollo Territorial. Local host country sustainable development criteria include:

Compliance with local law and relevant norms:

The project has all the required environmental licenses, permits, concessions and authorizations, granted by the regional environmental authority *Corporación Autonoma Regional de Cundinamarca (CAR)*. The environmental license includes the approved Environmental Management Plan for the project. The project recently obtained the final permit needed to proceed: the Concession for Use of Water necessary for the plant to generate electricity and to provide potable water to the city of Bogotá. This concession was granted by the Special Administrative Unit of the National System of Parks (UESPNN), part of the Ministry of the Environment, Territorial Development and Housing, which is the designated authority for water usage.

Coherence and contribution to government policies:

[1] Criterios y Procedimientos para la Aprobación Nacional de Proyectos de Reducción de Emisiones de Gases de Efecto Invernadero Elegibles al Mecanismo de Desarrollo Limpio. OCMCC, Bogotá, Colombia, Julio 2003.

The Santa Ana Hydroelectric Plant, being a small scale hydroelectric facility, complies with the framework of the *energy sector policies*[2] of Colombia in aspects related to renewable energy electricity generation and technological innovation, being one of the first hydro power projects in the country using treated water from a city aqueduct, and by increasing the efficiency of the use of water from a watershed by using the supply in an optimized manner for dual purposes (drinking water supply and electricity generation). The project is also consistent with the objectives established by the national government for participation in the Clean Development Mechanism, as a small scale energy generation project based on renewable energy.

Contribution to the economic and social welfare of communities in the long run:

The Santa Ana Hydroelectric Plant has provided job opportunities for skilled and non-skilled labor during the construction phase. During the construction phase of the project spanning over three years, an average of 100 construction labor posts were maintained (peaking at more than 200 during high construction periods). Most of the labor has been sourced from near by communities. The operation of the project creates long-term employment for 1 chief engineer, 5 operating technicians, supporting office and clerical personnel.

Investment resulting from the construction and operation of the project will increase the efficiency of the use of water from reservoirs supplying Bogotá, and will contribute to the environmental conservation and restoration of the watershed area of influence of the project, helping to preserve and secure long term water supplies to the local population. Specifically, EAAB has signed an agreement with the National Park System in Colombia (UESPNN), that commits part of the proceeds from the sale of certified emissions reductions generated by the Santa Ana project to strategic investments in the restoration and conservation of the Chingaza Paramo[3]. This agreement was necessary to secure the water concession to supply the plant.

A.2. Location of project activity
A.2.1. Host Party(ies)

The Republic of Colombia, South America

A.2.2. Region/State/Province etc.

Bogotá, Distrito Capital

A.2.3. City/Town/Community etc.

Bogotá, Distrito Capital, in the suburb of USAQUEN.

A.2.4. Physical/ Geographical location

The Santa Ana Hydroelectric plant is located at the following geographical coordinates: *Latitude 110 360 North, Longitude 105 800 East, specified as Cartesian Coordinates, Altitude 2,750 m above sea level*, located on the north east outskirts of Bogotá in the Republic of Colombia, South America.

[2] Plan Energético Nacional. Estrategia Energética Integral. Visión 2003-2020. Unidad de Planificación Minero Energética (UPME), Ministerio de Minas y Energía, República de Colombia.

[3] Convenio No. 003 de 1998 celebrado entre la Unidad Administrativa Especial del Sistema de Parques Nacionales Naturales y la EAAB.

Figures 1, 2 and 3 present maps showing a relative position of the project in the context of Colombia.

Figure 1. Location of the Project in the context of Colombia

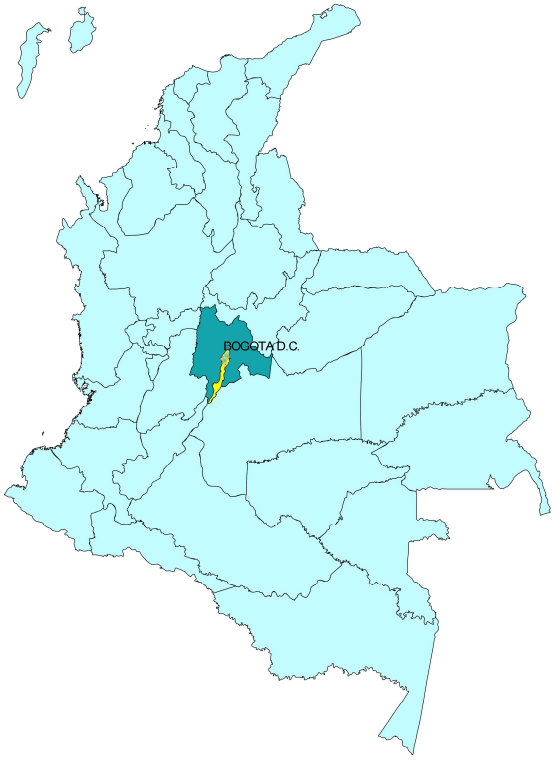


Figure 2. Location of the Project in the context of the city of Bogotá.

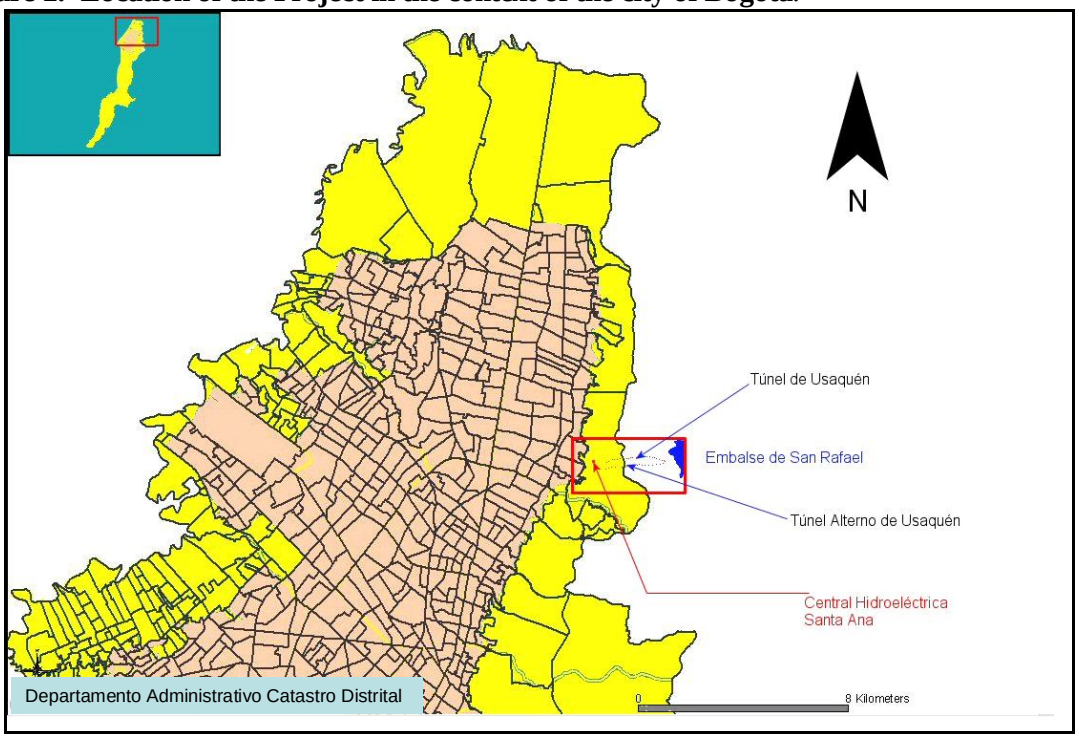


Figure 3. Altitude Curve Levels of the Project in the context of the city of Bogotá

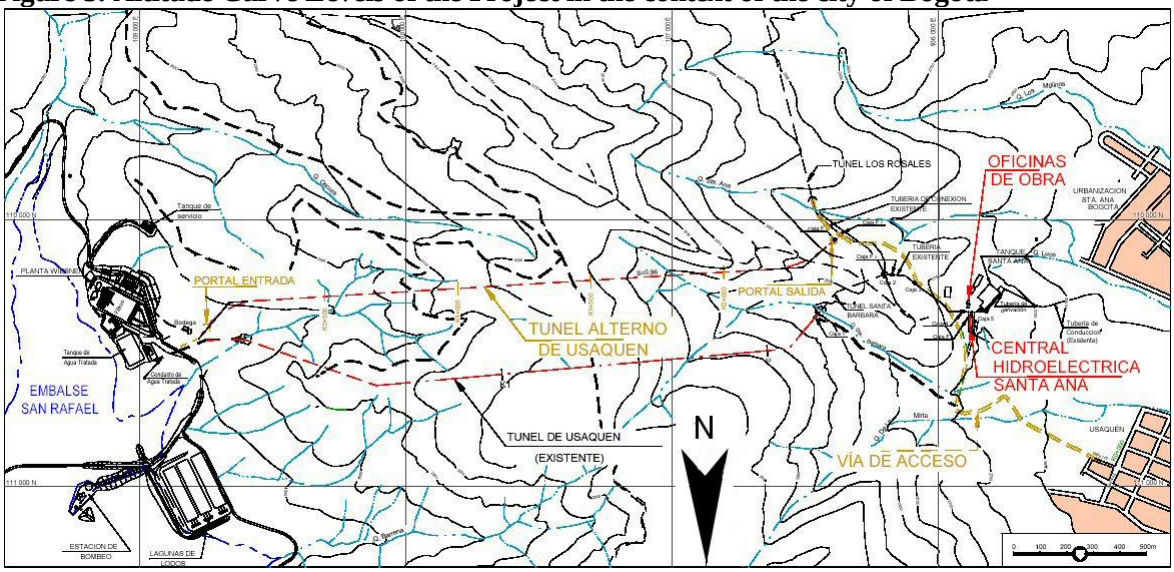
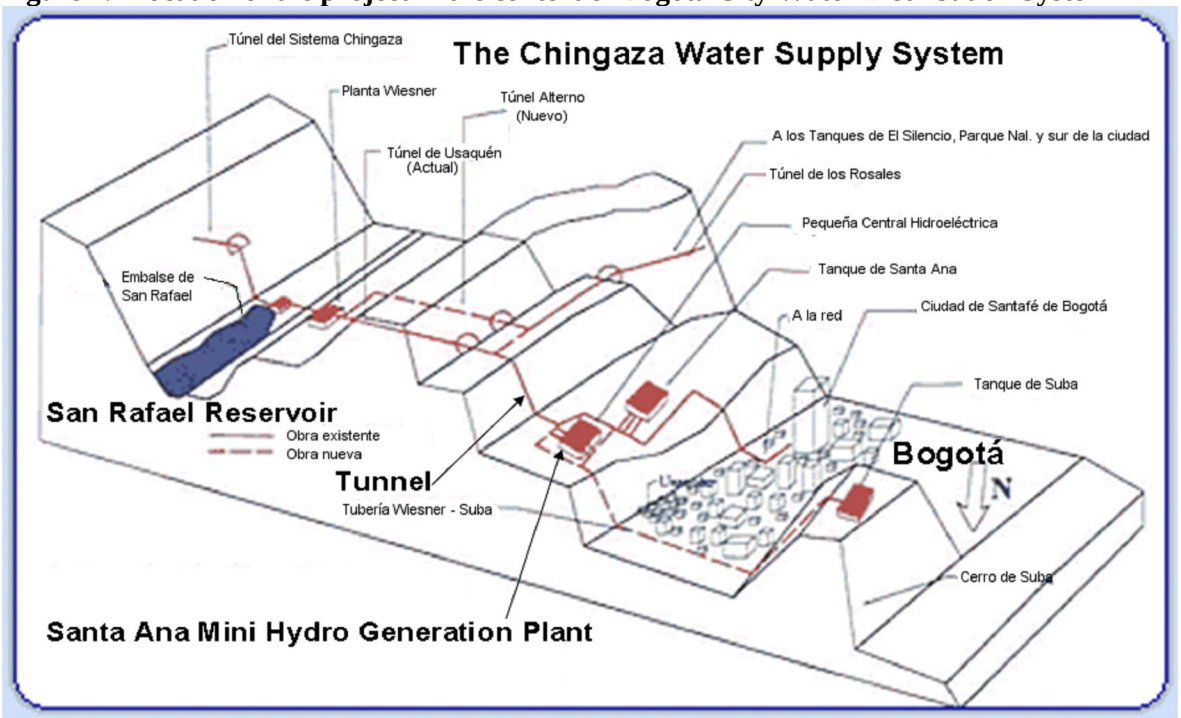


Figure 4, depicts the relative location of the project in the context of the water distribution system of the City of Bogotá, Colombia.

Figure 4. Location of the project in the context of Bogotá City Water Distribution System



A.3. Technologies and/or measures

The proposed project activity is classified under Appendix B of the Simplified M&P for Small Scale CDM Project Activities:

Type I: Renewable Energy Projects

Category I.D: Renewable Electricity Generation for a Grid

The Santa Ana Hydroelectric Plant qualifies under this project category since:

1. The project activity is a small scale, run of the river, hydroelectric power plant.

2. It has a plate power capacity of 13.43 MW, which is under the 15 MW requirement to qualify as a Small Scale CDM Project Activity.

3. The project activity supplies electricity to a grid distribution system that is supplied by various fossil fuel and non-renewable biomass fired generating units; the Colombian National Interconnected Grid System includes electricity supplies from several types of fossil fuel plants.

The Santa Ana Hydroelectric Plant relies on commercial, environmentally safe and sound technological packages as well as the required know-how for implementation, transferred to the host party through the appropriate commercial guarantees and support service packages established for the implementation of the project activity, and which are standard in hydro power development.

The proposed project activity will serve to displace fossil emissions from the Colombian National Interconnected Grid System, replacing them with clean energy produced by hydroelectricity.

The project includes the following specifications:

Power Plant Characteristics	
Installed Plate Capacity of the Turbine	13.43 MW
Plant Design Flow	13.5 m3/s
Net Design Head	105.90 m
Hydraulic Turbine	Francis NEIRPIC, manufactured by ALSTON Hydro Barcelona Turbine, No. 2012 in 2001.
Expected Electricity Generation	47 GWh/year

A.4. Parties and project participants

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	Empresa de Acueducto y Alcantarillado de Bogota-EAAB (Public entity)	NO

A.5. Public funding of project activity

No public funding from Parties included in Annex I, including Official Development Assistance, has been involved in financing this project activity.

A.6. Debundling for project activity

In accordance with Appendix C to the Simplified M&P for the Small-Scale CDM Project Activities, the Santa Ana Hydroelectric Plant is not a debundled component of a larger CDM project activity. It is unrelated to any other CDM project activity in the region, existing or planned. It is not part of another registered small scale CDM project activity, or an application to register another small scale CDM project activity:

- By the same project participant;
- In the same project category;
- Registered within the previous 2 years; or
- 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

Type I: Renewable Energy Projects.

Category I.D: Renewable Electricity Generation for a Grid.

Methodology: AMS-I.D - Renewable electricity generation for a grid. Version 7

The methodology applied does not refer any tool or other methodology.

B.2. Project activity eligibility

Type I. Renewable Energy Projects.

Category I.D. Renewable Electricity Generation for a Grid.

(Justify the choice of the applicable baseline calculation for the project category as provided for in appendix B of the simplified M&P for small-scale CDM project activities.)

Appendix B of the Simplified M&P for Small Scale CDM Project Activities contains two options that can be applied in the selected project category (taking into account the decisions/amendments to Appendix B as of EB 12):

"The baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO2 equ/kWh) calculated in a transparent and conservative manner as:

a) The average of the "approximate operating margin" and the "build margin", where:

(i) The "approximate operating margin" is the weighted average emissions (in kg CO2 equ/kWh) of all generating units serving the system, excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation;

(ii) The "approximate operating margin" is the weighted average emissions (in kg CO2 equ/kWh) of all generating units serving the system, excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation;

(iii) The "build margin" is the weighted average emissions (in kg CO2 equ/kWh) of recent capacity additions to the system, which capacity additions are defined as the greater (in MWh) of most recent[4] 20 per cent[5] of existing plants, or the 5 most recent plants.

OR

b) The weighted average emissions (in kg CO2 equ/kWh) of the current generation mix."

Option a) is selected for the proposed project activity due to the following reasons:

1. In a complex hydro-thermal electricity supply system such as the one of Colombia, representative electricity generation, and therefore emission factors for power plants, should not necessarily be measured by only looking at a balance of plants for any single year or current year generation mix, due to the complex interactions of hydrological conditions and representative meteorological cycles (such as the denominated El Nino/La Nina).

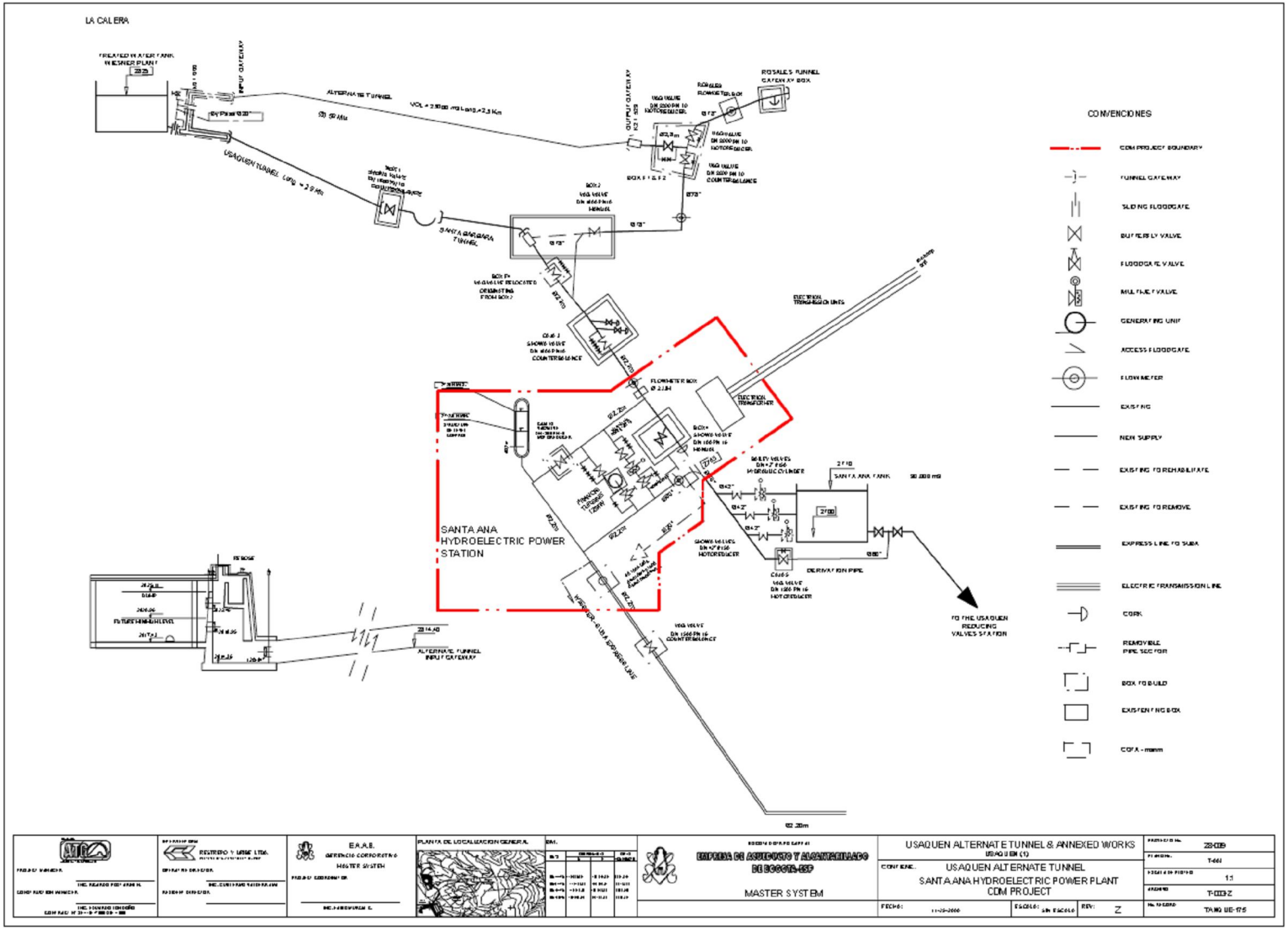
The consideration of both an operating margin and a build margin is more representative of the trends of market/regulatory behaviour in Colombia (that affect dispatch over time), as well as investment signals, that result in the installation of capacity additions in highly dynamic operations of wholesale electricity markets.

B.3. Project boundary

The project boundary encompasses the physical, geographical site of the hydro power generation source.
The following GRAPHIC delineates the project boundaries:

[4] Unidad de Planificación Minero Energética. Ministerio de Minas y Energía, Republica de Colombia www.upme.gov.co: Generation data available for the most recent year.

[5] If the calculation of the most recent 20 % of existing plants falls on part of the capacity of a plant, that plant is included in the calculation.


LA CALERA
SANTA ANA HYDROELECTRIC POWER STATION
CONVENCIONES
CDM PROJECT BOUNDARY
TUNNEL GATEWAY
SLIDING FLOODGATE
BUTTERFLY VALVE
FLOODGATE VALVE
MULTIPLE VALVE
GENERATING UNIT
ACCESS FLOODGATE
FLOW METER
EXISTING
NEW SUPPLY
EXISTING TO REHABILITATE
EXISTING TO REMOVE
EXPRESS LINE TO SUBA
ELECTRIC TRANSMISSION LINE
CORK
REMOVABLE PIPE SECTION
BOX TO BUILD
EXISTING BOX
COTA - mamm
USAQUEN ALTERNATE TUNNEL & ANNEXED WORKS
USAQUEN (1)
USAQUEN ALTERNATE TUNNEL
SANTA ANA HYDROELECTRIC POWER PLANT
CDM PROJECT
MASTER SYSTEM

B.4. Establishment and description of baseline scenario

"The baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO2 equ/kWh) calculated in a transparent and conservative manner as: The average of the "approximate operating margin" and the "build margin", where:

> *(i)The "approximate operating margin" is the weighted average emissions (in kg CO2 equ/kWh) of all generating units serving the system, excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation;*
>
> *(ii)The "build margin" is the weighted average emissions (in kg CO2 equ/kWh) of recent capacity additions to the system, which capacity additions are defined as the greater (in MWh) of most recent[6] 20 per cent[7] of existing plants, or the 5 most recent plants."*

Specifications of this baseline include the following aspects, in the context of Colombia:

The baseline in the Santa Ana PDD uses the Ministry of Mines and Energy of the Republic of Colombia, Resolution 181421 of November 2005, which establishes the Colombian official emissions factor for small scale CDM projects of 0.4392 kg CO_2e/kWh. The Unidad de Planeación Minera–Energética (UPME) of the Ministry of Mines and Energy, the maximum authority on electricity generation and distribution in the national grid, followed the UNFCCC guidelines for the calculations of small scale emissions factors, using the most complete information and models of the Colombian electrical energy generation and distribution available.

1. For calculating the operating margin, Resolution 181421 of the Ministry of Mines and Energy establishes a representative average of all generating units serving the system (for estimation of approximate operating margin), excluding hydro, geothermal, wind, low cost-biomass, nuclear and solar generation taking into account official information (generation, plant information, plant heat rate) for the period of years 2002-2004, establishing that this period is representative of the predominant hydrological/meteorological cycles that govern hydroelectric capacity in Colombia, for the purpose of energy planning in Colombia. This is in accordance with the Unidad de Planificación Minero Energética, UPME of the Colombian Ministry of Mines and Energy[8].

2. Build margin estimations are based on generation and detailed power plant information for the year 2004, being this year the one with most recent complete information.

3. Recent plants are defined by their date of entry into commercial operation, as declared in official documentation by the Comisión Reguladora de la Electricidad y Gas de Colombia (CREG).

Information regarding carbon emission factors for fuels used in electricity generation in Colombia are official data provided by UPME of the National Ministry of Mines and Energy, presented in the National Decree establishing the small scale project emissions factor.

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[6] Generation data available for the most recent year.

[7] If 20 % falls on part capacity of a plant, that plant is included in the calculation.

[8] Metodología Simplificada para el Cálculo de la Línea Base para proyectos de pequeña escala. Generación de Energía Eléctrica con Fuentes Renovables Interconectadas a la Red, categoría I.D para el año 2004. República de Colombia, Ministerio de Minas y Energía, Unidad de Planificación Minero Energética (UPME), Bogotá, Colombia. Octubre 2005.

B.5. Demonstration of additionality

In accordance the Simplified Modalities & Procedures for Small Scale CDM Project Activities, the following *barrier analysis* is presented that demonstrates additionality.

The Santa Ana Hydroelectric Project has a nominal capacity under 15 MW, and is to provide hydroelectricity to a country-wide electricity grid which is supplied in part by a series of fossil fuel plants; therefore, it qualifies for the usage of simplified methodologies as presented in Appendix B of the Simplified M&P for Small Scale CDM Project Activities.

In Latin America, renewable energy projects, especially hydro projects, normally face long lead times and multiple uncertainties and barriers from the inception of pre-feasibility studies through the development of technical final specifications, securing of permits (both operational and environmental), often extending the length of time required for the project developer to reach financial closure, before construction and implementation can take place. During the multi-year periods of pre-investment activity, different types of initial assumptions used in assessing a project (electricity market price trends, demand and supply behaviour, regulatory context, etc), are prone to suffer changes. Therefore project developers have to continuously adjust their project evaluation models for the purpose of determining the economic/financial viability of their projects as initial assumptions undergo changes.

As a result, most projects that initiate this cycle do not survive and are not implemented. The reality of hydro project development indicates that from initial concept to financial execution cycles, many hydro developers are not able to sustain their activity, therefore resulting in a low percentage of completion of investment cycles associated to hydro development due to rapidly changing electricity sector conditions in most of the Latin American countries. The Santa Ana Hydroelectric Plant has not been exempted from such a dynamic framework of occurrences during its project development cycle, which has been typical of renewable energy projects in developing countries. This was a particularly difficult process for EAAB, because electricity generation is not part of its core business, supplying drinking water and waste water piping, and has been its first and only experience in the area of electricity generation.

Investment Barrier: "a financially more viable alternative to the project activity would have led to higher emissions".

As is widely known, small-scale hydros are not least-cost options for grid electricity production, especially in reformed wholesale markets such as the one established in Colombia in the late 1990s.

Taking into account the characteristics of the reformed electricity market in Colombia which drives dispatch towards least-cost producers and the relative composition of current electricity generation (characterized by the mix in operation, investment trends, and overall utilization factor of the available and predicted plants to come in line), a more competitive and financially viable alternative to generating the energy from the Santa Ana project activity would have been an increase of electricity generation with the existing installed capacity of the Colombia National Interconnected System, that would have led to an increase of GHG emissions in Colombia, as represented by appropriate consideration of the official grid emission factor in the country. This would have been the most probable option.

This project is not and has never been part of the national electricity expansion plan; therefore it has not been part of the baseline scenario of energy sector planning in Colombia.

Initial pre-feasibility analyses for the Santa Ana Hydroelectric Project started in October 1995, when initial considerations were given to both technical characteristics and economic analysis of a potential project to generate electricity, something EAAB has never done before due to the fact that it is a traditional municipal water utility company whose mission is to supply drinking water and extract waste waters. At the time of the initial estimations, several technical design and economic scenarios were considered by EAAB in order to assess the feasibility of the possible hydroelectric project. Initial estimates indicated to decision makers that the project would provide an Internal Rate of Return in the range from 12% to 18%, depending on the financing alternatives (public, private or mixed) and how the prevailing tax regime affected each alternative.

Primary factors influencing the project's financial viability were the expected sale price of electricity and availability of hydraulic flows to the new plant turbine. These estimates were based on the assumptions related to the expected electricity price used to incorporate the revenue from electricity sales into the financial analysis. They were based on the expected behaviour of electricity market prices in the Colombian Electricity Market, before major electricity sector reforms took place. In addition, the Internal Rate of Return (IRR) evaluation was linked to the projected electricity generation from the proposed project, which in turn was directly related to the expected water flow rate to the turbine and the amount of electricity generation which this water flow would produce. Based on the above considerations, the project proposal was originally designed for a nominal capacity of 12 MW and an electricity generation amount in the order of around 90 MWh per year.

The initial evaluations of the proposed project indicated that it would have required a minimum price for the electricity generated and sold of US$ 0.040/kWh[9]. In 1995, prices for the electricity were determined on the basis of private contracts, not on an open market, and the expected prices used in the feasibility study were minimum US$ 0.04/kWh[10]. At this price, the studies indicated that the project would be a feasible investment for EAAB, despite the fact that the core business of EAAB is water utility services and not electricity generation. Additional feasibility studies in 1997, shortly before the national electricity market reforms took effect, assumed a sale price of US$0.05 per kWh[11].

In the period from 1995-2000, through several stages of considerations for the development of the project which included financial evaluations and the consolidation of required permits, concessions and construction licenses, EAAB as the project developer was subjected to a rapidly changing regulatory framework and wholesale electricity market behaviour in Colombia. Market reforms were fully manifested in 1998. The reforms brought about a trend of major electricity price reductions due to adjustments of individual market players, attainment of economies of scale for power plant investment (especially for larger size gas fired units), and overall increased efficiency due to the interplay of competitive market forces as dispatch was focused on least cost energy production. Prices fell down to US $0.02 per kwh, and have remained at similar levels[12]. The falling electricity prices in 1998 and 1999, effectively caused a reduction of 50% in expected energy sales revenues, from US$ 0.04 per kwh to US$ 0.02 per kwh, which represented a major barrier to implementation of the Santa Ana project, a higher cost small-scale renewable energy project.

[9] As documented in the "Estudio de Prefactibilidad de la Construcción del Túnel Alterno de Usaquén y la Central Hidroeléctrica de Santa Ana, Volumen II. Alternativas de Gestión. EAAB, Octubre de 1995".

[10] According to data provided in Plan de Expansion de Referencia de Generacion y Transmision 2002-2011, page 29, graph 2.13 on evolution of prices of electricity in the Colombian market, UPME, Bogotá, Colombia.

[11] INGETEC SA, Estudio de Optimización de la Central Hidroelectrica Santa Ana, Julio 1997.

[12] Due to a 28% revaluation of the Colombian Peso to the US Dollar in 2005, prices for the sale of electricity to the grid today range around US $ 0.027 / kwh.

During that period, EAAB continued to evaluate the possibility of executing the project[13], based on company policies related to public image, environmental policy for sustainable development, technological innovation and entrepreneurship. Santa Ana was a first-of-a-kind project in Colombia to utilize treated water from a city aqueduct for the combined purpose of provision of drinking water and electricity generation for the grid. However, the 50% reduction of electricity sales prices made the project much harder to justify economically and financially, without additional sources of income. This is why the EAAB became interested in CDM, during events held by the National Strategy Studies program to implement the CDM in Colombia.

Prevailing Practice Barrier: EAAB drinking water supply programs and strategies diminished hydraulic flows to the Santa Ana plant which reduced potential generation capacity.

During the latter part of the 1990's, EAAB introduced a series of programs aimed at increasing the efficiency of water use in the city. Water tariffs were increased significantly; new technologies for controlling water pressure and a massive general public education program were undertaken involving different water users, resulting in a reduction in the trend of water consumption in the city. At the same time this reduction happened, the company had reduced leakages and increased service coverage, quality and reliability of service to users in the city. This pattern of improvements, which represent the *prevailing practices* of EAAB, clearly stated in their company mission[14], contributed to a long term reduction of the availability of water flowing to the proposed Santa Ana generation facility, reducing the expected annual electricity generation of the project by approximately 45%. This reduction in hydraulic capacity further diminished the economic viability of the project, and constitutes a second type of barrier confronted by the project.

During the period 1999-2000, as project cycle analyses and activities continued, taking into account the fall in electricity prices and the large reduction in hydraulic flows to the plant, EAAB participated in several activities carried out by the Ministry of Environment related to the potential implementation of the Clean Development Mechanism in Colombia[15], becoming interested in the potential use of CDM in order to assist in its contributions to sustainable development in coherence with its environmental objectives; and in the possibility that CDM revenues could assist in reducing the financial implementation and operation hurdles faced by the Santa Ana Hydroelectric Project in the light of sharply reduced electricity prices and hydraulic flows. The Vice Minister of Environment and the Director of the National Strategy Study to Implement CDM in Colombia actively promoted the CDM as a solution for the project in meetings with EAAB directors.

In 1999-2000, after the reduction in the water flows available for the project, implementation of the project on a financial basis alone would have required an equilibrium price for its electricity generated in the range of US$ 0.066/kWh, a much higher price than the real trend of market prices of electricity, which had fallen into the range of US$ 0.020-0.025/kWh, in Colombia[16]. Under the combined conditions of reduced water flow and low electricity sale prices, the Internal Rate of Return (IRR) of the project fell to – 8.09 % in the absence of CER revenues. Assuming the electricity price constant at US$ 0.020 per kWh, the inclusion of CER sales under various market and price scenarios for CERs[17] indicated that the project would undoubtedly benefit from CER sales by improving its operating incomes and IRR significantly. The amount of IRR improvement would

[13] As reflected by the company's effort to obtain financing from Multilateral Banks, as well as local sources of capital

[14] See www.eaab.com.co

[15] National Strategy Study for Implementation of CDM in Colombia, seminars, meetings and presentations by the Vice Minister of Environment to decision makers of the Santa Ana Project. 1998-2000.

[16] Plan Energético Nacional: Estrategia Energética Integral, Visión 2003. "Indicadores de la Evaluación del Sector Eléctrico". pg. 62.

[17] Financial simulations on the effect of CERs on the Santa Ana Hydro Project, March 2004.

be directly related to the eventual level of the CER prices, which were at that time were estimated by the National Strategy Study for Implementation of CDM in Colombia to be within the range of US$3 to $20.

INCREASES IN PROJECT IRR WITH CDM, Various Possible CER Prices, kWh = US$.02					
	No CDM	WITH CDM			
CER PRICE SCENARIOS	0	$ 4	$ 8	$ 12	$ 16
INTERNAL RATE OF RETURN	**-8.09%**	-6.97%	-6.17%	-5,38%	-4,59%

If electricity prices were to rise to US$.032/kWh (Col 70,84) and CER were to be sold at US$6, the project's IRR would become positive. This scenario could occur through possible increases in economic growth and electricity demand during the life of the project. The project's financial success would depend, then, on the combination of improved electricity prices and higher CER prices. Scenarios with electricity prices at US$0.035 per KWh combined with improving CER prices would make the project more viable, as the following table indicates.

INCREASES IN PROJECT IRR WITH CDM, Various Possible CER Prices, kWh = US$.035					
	No CDM	WITH CDM			
CER PRICE SCENARIOS	0	$ 4	$ 8	$ 12	$ 16
INTERNAL RATE OF RETURN	**-0.86%**	0.15%	0.72%	1.28%	1.84%

In addition to reducing the financial gaps created by the sharp reductions in electricity prices and water flow availability, the improvement from CERs to operating cash flows over time was seen as helpful to EAAB to better manage the costs and risks involved in the financial operation of the project during the first ten years of operation.

In coherence with its strong environmental program, EAAB also took into account the local and global environmental benefits of the clean energy project, and the learning-by-doing in the areas of energy generation and in the application of the CDM. The possibility of applying CDM was promoted by the Ministry of the Environment as an alternative to address the financial barriers to implementation, and to assist in the addressing the plants annual operating costs.

Taking into account national circumstances of the prices and dispatch of electricity in Colombia, in the absence of the Santa Ana Hydroelectric Plant, the associated electricity generation that would not be generated through a renewable project such as the proposed project activity, would indeed be generated by an increased usage factor of the existing plants in the Colombian grid. The Santa Ana Hydroelectric Plant is now expected to generate around 47 GWh per year, which represents around 0.1% of total current electricity generation in Colombia. In the absence of this proposed small scale renewable energy project, the viable alternative would be for the Colombian Grid to generate the equivalent of the electricity generated by Santa Ana, which would generate more greenhouse gas emissions, based on the official small scale emissions factor methodology applied below.

B.6. Emission reductions
B.6.1. Explanation of methodological choices

E.1.2.1 Describe the formulae used to estimate anthropogenic emissions by sources of GHGs due to the project activity within the project boundary:

Emissions by sources of GHG's due to the project activity can be identified from the following Table:

Sources	On-Site/Relevance of the emission	Off-Site / Relevance
Direct	CO_2 emissions during project construction (e.g. fuel use by trucks and machinery) are negligible and therefore not to be considered.	CO_2 emissions related to transport of materials and equipment to the project site are very small. CO_2 emissions related to grid losses on T&D of energy generated by the project are outside the control of the project. CO_2 emissions related to the electricity required for the operation of the project is not to be considered, since the energy for operation will be derived from the electricity generated by the project and is considered as non significant.

In accordance to the appropriate approved baseline methodology used in this CDM project activity, emissions by sources of GHG due to the project activity are considered to be zero.

E.1.2.2 Describe the formulae used to estimate leakage due to the project activity, where required, for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities

Leakage is to be considered only when transferring existing renewable energy technology from another activity.

The Santa Ana Hydroelectric Plant is not transferring existing renewable energy technology from another activity. The energy conversion equipment for the project was manufactured new for specific site conditions. All of the equipment to be installed in the facility can be clearly tracked by the appropriate manufacturing plates located in the plant, specifying year of manufacture, sourcing and supported by the appropriate existing record related to manufacturing contracts and placement orders with technology suppliers.

Therefore there is no leakage associated to the Santa Ana hydroelectric project.

The sum of E.1.2.1 and E.1.2.2 represents the small-scale project activity emissions

Project activity emissions are zero.

E.1.2.4 Describe the formulae used to estimate the anthropogenic emissions by sources of GHGs in the baseline using the baseline methodology for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities:

The emissions calculation in the Santa Ana PDD uses the Colombian Ministry of Mines and Energy National Decree 181421 of November 2005, which establishes the Colombian official emissions factor for small scale CDM projects of 0.4392 kg CO_2e/kWh. The Unidad de Planeación Minera – Energética of the Ministry of Mines and Energy, the maximum authority on electricity generation and distribution in the national grid, developed that calculation following the UNFCCC guidelines for the calculations of SSC emissions factors,

using the most complete information and models of the Colombian electrical energy generation and distribution available.

Taking into account that the formulae selected for baseline determination from Appendix B is to include the relevant clarifications extended by the CDM Executive Board meeting EB 12, the procedures employed for this calculation are as follows, based on the existing supporting documentation provided by UPME used to develop Resolution 181421 from November 2005, describing procedures used for the determination of the emission factor for small scale renewable energy projects interconnected to the national grid in Colombia:

The approximate operating margin in the system is calculated taking into account the weighted average of all the thermal generating plants operating in the Colombian grid in the period 2002-2004, using official data published by UPME.

The representative period of years 2002-2004 has been selected as being representative of the climatological / meteorological cycles that influence the hydrological conditions encountered in the country (represented by the cyclic appearance of the El Nino/La Nina weather patterns), that are of vital importance for appropriately representing conditions for electricity generation in the hydro/thermal grid system of Colombia.

In the case of Colombia, Resolution 181421 from the Ministry of Mines and Energy, uses the most recent year (2004) for the purpose of determination of the build margin, therefore complying with the text of the methodology.

The selection of the period is of critical importance, because of the strong impact of the regularly recurring El Niño phenomenon on annual rainfall, which regulates the amount of hydro energy that can be produced. The El Niño cycle in the 1990s dried the country's hydro facilities, forcing the economy almost completely to fossil fuels for electrical energy generation. It was a national energy crisis. The country's energy policy is now based precisely on mitigating the effects of El Niño, and so is the period to be used in calculating the emissions factor.

The implications for CDM small scale emissions factors are critical. For example, if a Niño cycle begins next year (2006), and that single year is used to calculate the small scale emissions factor from the national interconnected grid for a new small scale CDM project in 2007, then the emissions factor to be applied during the 10 year accreditation period will be much too large. It will not represent reality during the accreditation period. Following the El Niño cycle, the tropical rains will again fill the reservoirs, basins and rivers, returning the interconnected grid to its balance of hydro and fossil.

B.6.2. Data and parameters fixed ex ante

Data / Parameter	$EF_{grid,y}$
Unit	kg CO_2e/kWh
Description	CO2 emission factor for electricity displaced from the grid
Source of data	Colombian Ministry of Mines and Energy National Decree 181421 of November 2005, which establishes the Colombian official emissions factor for small scale CDM projects.
Value(s) applied	0.4392
Choice of data or Measurement methods and procedures	The Unidad de Planeación Minera – Energética of the Ministry of Mines and Energy, the maximum authority on electricity generation and distribution in the national grid, developed that calculation following the UNFCCC guidelines for the calculations of SSC emissions factors, using the most complete information and models of the Colombian electrical energy generation and distribution available.
Purpose of data	Used to determine baseline emissions.
Additional comment	No comments.

B.6.3. Ex-ante calculation of emission reductions

Calculation procedures are established as follows:

The *approximate operating margin* is calculated based on a weighted average of the operation of thermal generating plants in the period 2002-2004.

The *approximate operating margin* is:

$$AOM = \sum EFTH_{ij} * GWh_{ij} / \sum Gwh_{ij}$$

Where:

AOM = approximate operating margin
$EFTH_{ij}$ = emission factor for a thermal plant i in year j, through the selected period 2002-2004.
GWh_{ij} = electricity generation for each thermal plant i in year j, through the selected period 2002-2004.

The emission factor for each thermal plant i in year j ($EFTH_{ij}$), through the selected period 2002-2004, is calculated as:

$$EFTH_{ij} = HR_{ij} * EC_{ik} * UCF$$

Where:

HR_{ij} = Heat rate for each thermal plant i in year j, expressed in BTU/kWh.
EC_{ik} = CO2 emissions coefficient for fuel k in plant i, through the selected period 2002-2004. CO2 emissions coefficients in Colombia are determined by considering national calorific values as well as specific chemical characteristics as specified by UPME.
UCF = appropriate unit factors.

Based on that approach and using official country data, the *approximate operating margin* for the selected period 2002-2004 is calculated as 0.5728 kg CO2/kWh.

The *build margin* (BM) is calculated by following the selection process specified in Appendix B of the M&P for Small Scale Project Activities in the CDM:

a) Calculation of the MWh of most recent 20% of existing plants, using official electricity generation data for the most recent year available (2004).

b) Calculation of the MWh of the 5 most recent plants selected as per their date of entry into commercial operation, registered by the Comisión Reguladora de Energía (CREG) in Colombia.

c) Comparison of the MWh for each alternative, and selection of the larger, as an indication of which set of data for plants to use for determination of the build margin.

Calculation of the MWh of most recent 20% of existing plants includes:

a) Total electricity generated in Colombia in 2004 was 48,572,000 MWh, therefore 20% was 9,714,000 MWh.
b) Plants were organized from the most recent up until the total electricity generation was equal to the estimated 9,714,000 MWh.

Calculation of the MWh of the 20% of the electricity generated from most recent plants, selected as per their date of entry into commercial is depicted in the following table:

Estimation of 20% of most recent generation of the electricity generation in Colombia in GWh (2004)					
Comercial entry in operation	**Name of plant**	**Capacity (MW)**	**Ton C02**	**Generation (GWh)**	**Emission factor of plant (Ton CO2/GWh)**
18-Dic-2004	La Vuelta	11.8	0	6	0
8-Oct-2004	La Herradura	19.8	0	21	0
4-Ago-2004	Termoyopal 1 (11)	19.0	11.342	15	760
29-Jul-2004	Termoyopal 2 (12)	30.0	44.168	60	742
27-Abr-2004	Jepírachi (3)	19.8	0	52	0
15-Ago-2003	Cogenerador Ingenio Risaralda (1)	5.5	10.479	15	688
1-Dic-2002	Miel I	396	0	1.022	0
29-Jun-2001	Porce ii	405	0	1.662	0
27-Ene-2001	Termosierrab	460	162.716	440	370
30-Nov-2000	Termocentro 1 cc	285	82.300	201	410
13-Jul-2000	Termocandelaria 2	150	29.688	53	565
16-Jun-2000	Urrá	331	0	1.045	0
3-Jun-2000	Termocandelaria 1	150	5.719	10	557
13-Mar-2000	Rio Piedras	19.4	0	131	0
1-Ene-2000	Cogenerador Incauca 1 (1)	9	46.796	85	553
16-Jul-1999	Termoemcali 1	231	12.590	32	396

7-Ene-1999	Paipa 4	150	652.140	662	985
17-Dic-1998	Termovalle 1	203	1.200	3	395
20-Oct-1998	TebsaB	750	1.517.218	3.542	428
18-Abr-1998	Flores 2	99	151.576	254	598
1-Abr-1998	Flores 3	150	258.000	461	560
	Total		**2.985.931**	**9.771**	
Generation of system in 2004			**100%**	**48,572**	**GWh**
			20%	**9,714**	**GWh**

Calculation of the MWh of the 5 most recent plants, selected as per their date of entry into commercial operation is 154,000 MWh as depicted in the following table:

Electricity generation from the 5 most recent plants in Colombia in GWh (2004)

Comercial entry into operation	Name of plant	Capacity (MW)	Ton $C0_2$	Generation (Gwh)	Emission factor (Ton CO_2/GWh)
Dic-04	La Vuelta	11.8	0	5.84	0
Oct-04	La Herradura	19.8	0	21.42	0
Ago-04	Termoyopal 1 (11)	19.0	11.342	14.92	760
Jul-04	Termoyopal 2 (12)	30.0	44.168	59.54	742
Abr-04	Jepírachi (3)	19.8	0	51.99	0
	Total generation of 5 most recent plants		**55.510**	**154**	

The comparison of MWH generated for year 2004, indicates that the build margin is to be calculated by using the criteria of most recent 20% of existing plants.

The relevant data set for build margin estimation in Colombia is that of power plants considered under *the most recent 20 per cent of existing plants*:

The build margin (BM) is:

$$BM = \sum EFP_{2004} * GWh_{2004} / \sum GWh_{2004}$$

Where:

EFP_{2004} = Emission factor for plants under the 20 % criteria, for 2004. Emission factor for hydro or renewable plants is zero and the emission factor for thermal plants under such list is estimated as:

$$EFTH_{2004} = HR_{i,2004} * EC_{ik} * UCF$$

Where:

$HR_{i,2004}$ = Heat rate for each thermal plant i in 2004, expressed in BTU/kWh.

EC_{ik} = CO2 emissions coefficient for fuel k in plant i, for 2004. CO2 emissions coefficients in Colombia are determined by considering national calorific values as well as specific chemical characteristics as specified by UPME.

UCF = appropriate unit factors.

Based on that approach and using official country data, the ***build margin*** is:

BM = 0.3056 kg CO_{2e}/kWh.

The average emission factor (AEF) is the average of the "approximate operating margin" and the "build margin" expressed as:

AEF = (AOM + BM) /2

In the case of Colombia, AEF is:

$AEF_{Colombia}$ = (0.5728 kg CO_{2e}/kWh + 0.3056 kg CO_{2e}/kWh) /2

$AEF_{Colombia}$ = 0.4392 kg CO_{2e}/kWh

Emissions in the baseline using the baseline methodology are estimated as:

$E_{baseline} = AEF_{Colombia} * EGSA_j$

where:

$AEF_{Colombia}$ = is the Emission Factor for Colombia,

$EGSA_j$ = expected electricity generation for the Santa Ana Hydroelectric Plant for each year of operation in the 10 year fixed period for crediting that has been selected.

E.1.2.5 Difference between E.1.2.4 and E.1.2.3 represents the emission reductions due to the project activity during a given period:

Since project emissions are zero and leakage is not to be considered, accordingly with the baseline methodology specified by Appendix B for the type and category of this project activity, emissions reductions due to the project activity are those calculated in the preceding section.

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

Year	Baseline emissions (tCO_2 e)	Project emissions (tCO_2 e)	Leakage (tCO_2 e)	Emission reductions (tCO_2 e)
2005	10,321.2	0	0	10,321.2
2006	20,642.4	0	0	20,642.4
2007	20,642.4	0	0	20,642.4
2008	20,642.4	0	0	20,642.4
2009	20,642.4	0	0	20,642.4
2010	20,642.4	0	0	20,642.4
2011	20,642.4	0	0	20,642.4
2012	20,642.4	0	0	20,642.4
2013	20,642.4	0	0	20,642.4
2014	20,642.4	0	0	20,642.4
2015	10,321.2	0	0	10,321.2
Total	**206,424**	**0**	**0**	**206,424**
Total number of crediting years	**10**			
Annual average over the crediting period	**20,642.4**	**0**	**0**	**20,642.4**

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

According to the Monitoring Methodology as specified under the relevant M&P for Small Scale CDM project activities related to renewable electricity connected to a grid, monitoring shall consist of metering the electricity generated by the renewable technology, that is the Santa Ana hydro power plant.

According to the monitoring methodology there is no need to perform monitoring functions for:

- Estimation or measurement of emissions occurring within the project boundary;
- Determination of the baseline;
- Estimation of leakage.

Data / Parameter	EGSA
Unit	MWh
Description	Electricity generated, provided to the Colombia National Interconnected System at the Busbar of commercial transaction
Source of data	Measured
Value(s) applied	
Measurement methods and procedures	Records from the Operation of the Santa Ana Hydroelectric Plant, audited and stored by Empresa del Acueducto de Aguas y Alcantarillado de Bogota (EAAB). Proportion of data to be monitored: All How will the data be archived? (electronic/ paper): electronic For how long is archived data to be kept?: 10 years
Monitoring frequency	Daily
QA/QC procedures	EAAB has implemented a quality control program with one (1) specific procedure related to power generation (MA0407P) and several technical instructive (MA0407I01, MA0407I02, MA0407I03 and MA0407I04) which are applicable to the activity, ~~21 procedures~~ designed to monitor electricity generation at multiple levels and other matters, its delivery to the grid, and cross checking with electricity purchaser, regional distributor and UPME. This quality control program was recommended by the DOE and is being carried out specifically for the purpose of supporting the CDM project activity.
Purpose of data	Is used to determine baseline emissions.
Additional comment	The plant manager and engineers have received training in CDM and formed part of the team which designed the monitoring system and the quality control standards and procedures for monitoring electricity generation and transfers to the grid. In addition, the EAAB has an independent unit for quality control which will act as an external control to the quality management of the electricity generation and interlinkage to the grid. Emissions reductions will be a function of the amount of electricity delivered to the grid which in turn will reduce fossil generation on the margin.

B.7.2. Sampling plan

No parameter has been determined by means of a sampling plan.

B.7.3. Other elements of monitoring plan

Name and reference of approved monitoring methodology applied to the small-scale project activity: According to Appendix B of the Simplified M&P for Small-Scale CDM Project Activities, monitoring shall consist of metering the electricity generated by the renewable technology and applying the grid emissions factor for small scale projects of this category.

Justification of the choice of the methodology and why it is applicable to the small-scale project activity: Monitoring methods have been chosen as suggested in accordance to Appendix B of the Simplified M&P for

Small-Scale CDM Project Activities for category I.D small scale CDM project activities, comprising renewable energy plants connecting to an existing electricity grid.

EAAB has assigned the following channels of authority and responsibility for the different aspects associated to the monitoring of the project:

Activity		*Authority*	*Responsibility*
Measurement	*Internal*	*Electromechanical Services Office Director*	*Plant Operator / Energy negotiator*
	External	*EMGESA*	*CAM*
Registration	*Internal*	*Electromechanical Services Office Director*	*Plant Operator / Energy negotiator*
	External	*EMGESA*	*CAM*
Verification	*Internal*	*Electromechanical Services Office Director*	*Control Center Chief/ Energy negotiator*
	External	*XM EMGESA CODENSA*	*CAM CODENSA EMGESA*
Report	*Internal*	*Electromechanical Services Office Director*	*Control Center Chief/ Energy negotiator*
	External	*EMGESA*	*CAM*
Calibration and maintenance	*Internal*	*Electromechanical Services Office Director*	*Control Center Chief/ Energy negotiator*
	External	*EMGESA CODENSA*	*CAM*

-	~~Data registry~~	~~Internal monitoring~~	~~External monitoring~~	~~Measurement~~	~~Reporting to archives~~	~~External reporting~~	~~Verification on electricity generation from the plant~~	~~Calibration and maintenance of equipments~~
~~Authority~~	~~*Plant Engineer at the power plant site*~~	~~*Director of Master Network Unit at EAAB*~~	~~*CODENSA, ISA, EMGESA, CREG*~~	~~*Plant Engineer at the power plant site*~~	~~*Plant Engineer at the power plant site*~~	~~*CREG*~~	~~*Director of Master Network Unit at EAAB*~~	~~*Plant Engineer at the power plant site*~~
~~Responsa-bility~~	~~*Operating Technician for the project*~~	~~*Plant Engineer at the power plant site*~~	~~*Director of Master Network Unit at EAAB*~~	~~*Operating Technician for the project*~~	~~*Plant Engineer at the power plant site*~~	~~*CODENSA*~~	~~*Director of Master Network Unit at EAAB Plant Engineer at the power plant site*~~	~~*Specialists sub contracted for maintenance responsibility of power plant generation and exchanges with the grid at the busbar of commercial transaction*~~

~~Acronyms:~~

~~EAAB: Empresa de Acueducto de Bogota is the municipal water utility company of the city of Bogotá;~~

~~CODENSA: the regional vendor of electrical energy;~~

~~ISA: Interconexión Eléctrica S.A E.S.P is a public services company that operates in the fields of administration, operación and transport of energy in the Colombian energy markets.~~

~~EMGESA: Producer and seller of energy in the region that provides technical support.~~

~~CREG: National Commission for the Regulation of Energy and Gas production, distribution and sales.~~

EAAB is implementing the necessary procedures related to quality control of the operation and performance of the monitoring functions associated with the Santa Ana hydro power plant. EAAB is in the process of developing the ISO 9000 certification, and the Master Network Unit in charge of the operation of the power plant is one of the EAAB units involved in this certification process. As part of this effort, it is expected that the operation and monitoring of the facility will comply with criteria for: calibration and maintenance of the monitoring equipment, management of non predicted episodes, verification of data and decision making tools and processes for corrective actions.

EAAB is currently in the process of developing the necessary quality control manuals for the operation of the power plant, and it is expected to comply with the appropriate criteria for the implementation of such procedures. The Environmental Department of EAAB has the overall responsibility on the issue of monitoring of the CDM components of the project, and the Master Unit Department is responsible for the operation of the project and verification of monitoring data in this CDM project activity.

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

Starting date for the Santa Ana Hydroelectric Plant has been defined as the starting date of construction for the project activity, which is 20 November of 2000[18].

C.1.2. Expected operational lifetime of project activity

25 years.

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

The crediting period chosen for the Santa Ana project activity is one fixed crediting period of 10 years.

C.2.2. Start date of crediting period

Starting date for operation of the plant: *(DD/MM/YYYY)*: 01/08/2005. The Santa Ana power plant began operations after the DOE validation field visit

C.2.3. Length of crediting period

The crediting period chosen for the Santa Ana project activity is a fixed crediting period of 10 years.

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

[18] For construction contract No. 1-02-7100-069-2000, which was let by EAAB to build the Santa Ana Hydro plant, clear and complete history of construction is provided by the construction auditing report by RESTREPO Y URIBE LTDA, entitled INTERVENTORIA DURANTE LA CONSTRUCCION DEL TUNEL ALTERNO DE USAQUEN, MICROCENTRAL HIDROELECTRICA SANTA ANA, Y OBRAS ANEXAS.

EAAB has fulfilled local Colombian requirements with respect to Environmental Impact Assessment of the Santa Ana Hydroelectric Plant. It holds a duly processed environmental licence from the Regional Environmental Authority CAR.

The Santa Ana Hydroelectric Plant completed an Environmental Management Plan[19], that is inclusive of:

1. Description and characteristics of the project,
2. Criteria for/and definition of Areas of Influence,
3. Identification and Evaluation of Impacts,
4. Environmental Management Plan
5. Follow-up and Environmental Monitoring Plan
6. Contingency Plan, including Risk Analysis and Management Plan.

The Environmental Management Plan was presented to the Corporación Autónoma Regional de Cundinamarca[20] (CAR, the regional environmental authority) in the year 2000. Under Resolution 1913 of 23 November 2000, CAR as the regional environmental authority with jurisdiction on the project's locality:

1. Approved the Environmental Management Plan submitted by EAAB

2. Granted the required environmental permits needed for the execution of the project.

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

The stakeholder consultation process for the Santa Ana Hydro project was comprehensive. The consultation process was established in the Environmental Management Plan which was previously approved by the regional environmental authority CAR; it was communicated and consulted beforehand to the community through written communications, meetings and house to house visits by EAAB representatives. A community information and consultation office was created before the project began construction and operated during the entire construction process, which communicated each upcoming step in the construction process to the community; received questions and complaints; and resolved each complaint consecutively.

This project has a very small environmental footprint and created no environmental or community problems. It created employment, will generate clean energy for the national grid, displaces greenhouse gases, and uses already treated water to generate electricity, thereby increasing the efficiency of water use. The project complies with all national and local environmental requirements. The community stakeholders were rigorously informed and consulted before the construction began, and stakeholders were constantly informed of each incremental step in the construction process. The project enjoyed stakeholder acceptance from its inception. All stakeholder complaints during the construction process were recorded and resolved. The NDACDM at the Ministry of Environment confirms that the project complies with the nation's criteria for sustainable development.

[19] EAAB. Plan de Manejo Ambiental. Documento No. UHSA-5/1-028. Diseños para Construcción del Túnel Alterno de Usaquen y Central Hidroeléctrica de Santa Ana. Implemented by INGETECS.A. Ingenieros Consultores under Contract No SF-1-02-4000-0122-96. Bogota, Colombia, Febrero 1998.

[20] Under Colombia Law 99 from 1993, in article31, numeral 9, CAR is given the function to grant concessions, permits, authorizations and environmental licenses required by law for the use of natural resources, or for the development of activities that affect or may affect the environment.

EAAB, ATG [21] and the CAR (Regional Environmental Authority) conducted a series of stakeholder consultation and information activities regarding the construction of the proposed power plant in the direct area of influence of the project (comprised by surrounding neighbourhoods) as well as the indirect area of influence of the project activity (characterized by the local municipality). Stakeholders included local chambers of commerce in the project area, health clinics, social clubs, community social action committees, local mayors, school principals, businesses, religious institutions, households, and universities.

In addition, a complete record of community consultation activities and responses carried out by the Regional Environmental Authority CAR in accordance with their procedures regarding community consultation in the context of the environmental licensing process is available for review[22].

E.2. Summary of comments received

Considering the following classification of potential impacts to stakeholders, an assessment was performed in order to define potential local stakeholders, for which relevant consultation processes should/should not need to be undertaken.

[21] Asociacion Techint-Geominas (ATG) was the building contractor that constructed the plant.

[22] Proyecto Minicentral Hidroeléctrica de Santa Ana: Resumen de proceso de licenciamiento y participación de las partes interesadas. CAEMA, CAR, EAAB, 2004.

Area of Concern for Stakeholders	Relevance	Requirement for Stakeholder Consultation
Natural Habitat	The area of influence of the project lies within the geographical scope of the Forestry Reserve of Eastern Bogotá. EAAB's mission as a company involved in water supply for the capital city of Colombia, includes a strong conservation program for the catchment area. In accomplishing such conservation goals, EAAB has standing collaboration agreements with local and international Conservation NGO's such as Conservation International, with the purpose of implementing programs for habitat conservation, restoration and management.	No
Indigenous Populations	There are no indigenous populations in the area of concern of the project.	No
Resettlement of Populations	The proposed project activity does not anticipate any resettlement of local populations as a result of the installation of the project activity, being project works typical of a water conduction project and a small scale run-of river project.	No
International and Trans-Boundary Waters	All of the water to be used as well as the geographical area of influence of the project lies within internal watersheds in Colombia.	No
Pesticide Usage	The proposed project activity uses water from the City of Bogotá drinking water supply system, therefore great care is taken in aspects related to water quality compliance.	No
Environmental Impact Assessment	The project has to comply with Colombian Environmental Impact Assessment requirements, that include specific requirements with respect to the social impacts of the project during the phases of construction and operation. For that matter, and through the approval process for the granting of the required Environmental Permits in Colombia, appropriate consideration has been given to such related social stakeholders consultation, through the implementation of a series of activities in order to take into consideration stakeholders in the project.	Yes, in accordance to the provisions established in the Environmental Management Plan submitted by EAAB on behalf of the Santa Ana Hydroelectric Plant
Cultural Heritage	The project site is not a cultural heritage sensitive area in Colombia.	No

Comments received from local stakeholders as well as the national authorities included (as established in the environmental license):

1. Need to provide specific information on the management and storage of any dangerous solids, fuels, during construction period.
2. Need to provide information on areas from which construction materials would be purchased.
3. Need to know on architectural details of the Power House, as to maintain landscape beauty in the area.
4. Need to establish an awareness program for the community on the transportation issues related to delivery of materials to the construction site, with considerations for public safety.
5. Need to include an inventory of fauna for the direct as indirect area of influence of the project, as well as on forestry species.
6. Need to include drawings and provisions for drainage systems.

E.3. Report on consideration of comments received

The Environmental Management Plan submitted to and approved by the regional environmental authority CAR, included relevant consideration of the comments received. EAAB's office of community relations, operated by ATG, responded to all queries and complaints during the course of the project.

All comments were duly attended. DOE reviewed the extensive program of community response that EAAB maintained through its community relations program. All queries, complaints and criticisms are on file, and each has a record of how it was attended by EAAB.

SECTION F. Approval and authorization

The letter of approval issued by the local Designated Authority is available for validation.

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Appendix 1: Contact information of project participants

Organization	**Empresa de Acueducto y Alcantarillado de Bogota (EAAB)**
Street/P.O. Box	Calle 22 c. # 4099
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E-mail	c1mpcruz@yahoo.com
Website	www.acueductodebogota.com.co; www.eaab.com
Contact person	Dr. Oscar Garcia
Title	Gerente Corporativo del Sistema Maestro
Salutation	Dr.
Last name	Garcia
Middle name	-
First name	Oscar
Department	Gerencia del Sistema Maestro
Mobile	
Direct fax	(571) 344- 7441
Direct tel.	(571) 344 –7111 (office)
Personal e-mail	ogarcia@acueducto.com.co

Appendix 2: Affirmation regarding public funding

No public funding from Parties included in Annex I, including Official Development Assistance, has been involved in financing this project activity.

Appendix 3: Applicability of selected methodology

No comments.

Appendix 4: Further background information on ex ante calculation of emission reductions

All data used in the calculations are presented in the spreadsheet calculation accompanying the PDD.

Appendix 5: Further background information on monitoring plan

No comments.

Appendix 6: Summary of post registration changes

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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, Annex 34 15 December 2006	• 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.
02	EB 20, Annex 14 08 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
01	EB 07, Annex 05 21 January 2003	Initial adoption.
Decision Class: Regulatory **Document Type:** Form **Business Function:** Registration		