CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

CONTENTS

Annexes

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 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>.
03	22 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.

SECTION A. General description of small-scale project activity

A.1 Title of the small-scale project activity:

Santana I SHP CDM Project (JUN 1118)
Version: 3
Date: 11/03/2009

A.2. Description of the small-scale project activity:

The present project activity consist in the generation of electricity by a renewable source (hydroelectric source), through the construction of a Small Hydro Power (SHP) plant called Santana I.

This project has been developed by Firenze Energética S/A, a private entity which is an arm of the Interalli Group. Interalli Group is based on Curitiba city, Paraná State in Brazil. This company has a diversified actuation, enterprises that deals with technological development of seeds and planting; port terminal facilities, logistic system, commodities export and import, and hydroelectric energy generation plant. The Company is investing in renewable energy, in this case with the main focus being on Small Hydro Power plant .

Santana The installed capacity of the SHP is 14.758 MW of power and its location is given in the Santana river in the city of Nortelândia, state of Mato Grosso in west-central region of Brazil.

This enterprise has as main goal the generation of electricity which will be delivered in the National Interconnected System (SIN) compensating the thermal generation from fossil fuels in this system with the generation of renewable electricity. The construction of Santana I SHP also helps meet the growing demand for energy in Brazil.

This Small Hydro Power plant is going to have a reservoir of 1.17 km^2 characterized as a small reservoir, which does not present a significant impact compared to the large hydroelectric facilities.

Moreover, help with regard to improvement in the supply of electricity contributing to environmental sustainability by increasing the share of renewable energy in relation to total consumption of electricity in Brazil. Thus, the project activity support the construction of new renewable energy project as environmentally sustainable alternative to generate electric energy.

Considering that the project activity consists in a SHP with a small reservoir, it represents a virtually zero environmental impact when compared to large hydroelectric facilities. This fact is important because the construction of Small Hydro Power plants can really contributes to the efficient use of natural resources and environment, thus avoiding the growth of environmental and social liabilities caused by new large hydroelectric plants. In this way, as a factor of relevance to be emphasized, the investment in modern technology for small hydropowers contributes for a efficient use of the water resources, moreover add value to the natural resources.

In regard to the contribution of the project in mitigation of Greenhouse Gas emissions (GHG), the project activity reduces emissions of these gases avoiding thermoelectric plants operation that use fossil fuels as energy source. In the absence of the project activity, fossil fuels would be burned in thermoelectric plants grid interconnected. The project activity initiative helps Brazil to meet its goals of promoting sustainable development.

On the project activity it is also aligned with the specific requirements of the CDM (Clean Development Mechanism) of the host country, because:

- It contributes to environmental sustainability as reduce the use of fossil energy (non-renewable sources). Thus the project contributes to the best use of natural resources and makes use of clean and efficient technologies;
- It contributes to better working conditions and increases the opportunity for employment in areas where the projects are located;
- It contributes to better conditions of the local economy, because the use renewable energy reduces our dependence on fossil fuels, reduce the amount of pollution and the associated social costs related to it.

Moreover, the project diversify the sources of generation of electricity and decentralized energy generation from bringing specific benefits such as:

- Increased reliability, with shorter and less extensive interruptions;
- Fewer demands related to reserve margin;
- Energy of better quality for the region;
- Minor losses in transmission and distribution lines;
- Control energy reactive;
- Mitigation of congestion in transmission and distribution.

A.3. Project participants:

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) Project Participants (*) (as applicable)	Kindly indicate if the party involved wishes to be considered as project participant (Yes/No)
Brazil (Host Country)	Firenze Energética S/A (private entity)	No
	Carbotrader Assessoria e Consultoria em Energia Ltda. (private entity)	
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM- PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		

A.4. Technical description of the small-scale project activity:

A.4.1. Location of the small-scale project activity:

A.4.1.1. Host Party(ies):

Brazil

A.4.1.2. Region/State/Province etc.:

Mato Grosso State

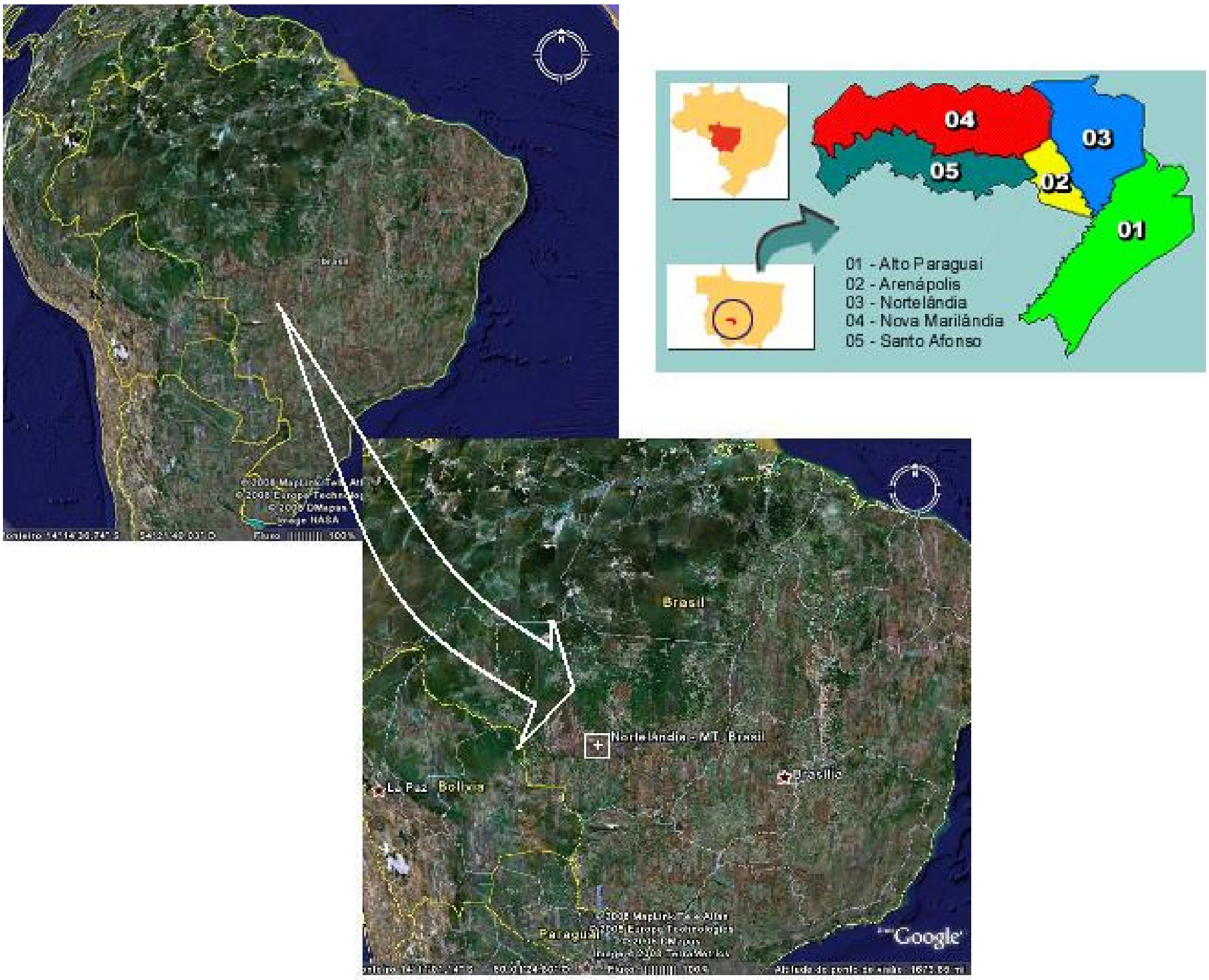
A.4.1.3. City/Town/Community etc:

Nortelândia City

A.4.1.4. Details of physical location, including information allowing the unique identification of this small-scale project activity :

The project activity is located in the river Santana in the Central West of Brazil, State of Mato Grosso in the municipality of Nortelândia. The geographical coordinates of the location of the dam are: 56º 49’ 44” West and 14º 23’ 28’’ South. Below the Figure 1 illustrates the location of the enterprise:

Figure 1: Geographical location of Nortelândia city.



Source: Google Earth (www.google.com) and City Brazil (www.citybrazil.com.br).

A.4.2. Type and category(ies) and technology/measure of the small-scale project activity:

Small-scale project activity
Type 1: Renewable energy project
Category: Electricity generation for a system

The project activity consists in the use of water, come directly from the river to generate electricity. The gravitational energy of water is used to move the turbines and by doing this, trigger generators that enable the generation of electricity. This is a source of clean energy and renewable that presents minimal impact on the environment.

The Santana I SHP use the potential of renewable water of Santana river, where will be constructed a little reservoir of 1.17 km^2 which allows the storage of water to generate energy efficiently, since this is considered a small reservoir.

The Santana I SHP is a venture classified as Small Hydro Power plant. According to Resolution 652, of 9/12/2003, the National Electric Energy Agency (ANEEL) to be considered a small hydroelectric, the area of the reservoir must be less than 3 km^2 (300 ha) and generation capacity must be between 1 MW and 30 MW. This type of enterprise is also called "run of river" plant which does not include significant water stocks.

Thus, this type of plant has almost no environmental impacts due to installed capacity remains relatively low, between 1 and 30 MW of power, and their areas of flooding are relatively small.

The Santana I SHP will be interconnected to the national electric grid (National Interconnected System - SIN) and shall supply electricity to the Brazilian electrical system which is unique and interconnected. Its installed capacity is 14.758 MW with two generators groups, where these groups are composed of two generating turbines of the type Simple Spiral Francis and two generators, each one coupled to its turbine.

As we can see, the installed capacity of the plant is below the limit of 15 MW established for small-scale CDM projects.

The start of commercial operation of Santana I SHP is scheduled for November 2010.

The technology and equipment used in the project activity are developed and manufactured in Brazil and are not expected transfer of know-how or technology to the host country.

The technical characteristics of equipment that will be implemented in SHP can be seen in Table 1 below:

Table 1: Main data from Santana I SHP

Main Datas from Santana I SHP			
General			
Item	**Value**	**Source**	
Installed Power (MW)	14.758	ANEEL	
Assured energy (MW)	8.72	Firenze Energética	
Planned Capacity Factor (n/a unit)	0.59	Calculated = 8.72 / 14.758	
Medium Flow rate (m^3/s)	19.22	Firenze Energética	
Planned net electricity to be dispatched (MWh)	76,391	Firenze Energética	
Generator Set			
Item	**Set 1**	**Set 2**	**Source**
Turbine Type	Simple Spiral Francis	Simple Spiral Francis	Project
Quantity	1	1	Project
Manufacturer	to be definned	to be definned	Project
Power (kW)	7,653	7,653	Project
Flow rate (m3/s)	11.09	11.09	Project
Rotation (rpm)	514	514	Project
Generator	3-Phase Synchronous	3-Phase Synchronous	Project
Quantity	1	1	Project
Manufacturer	to be defined	to be defined	Project
Nominal Power (kVA)	to be defined	to be defined	Project
Effective Power (kW) *	to be defined	to be defined	Project
Nominal Voltage (kV)	to be defined	to be defined	Project
Power factor	to be defined	to be defined	Project
Frequency (Hz)	to be defined	to be defined	Project

* The Installed Power of the plant will not exceed 15 MW.

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

Year	**Annual Estimation of Emission Reductions in tonnes of CO_2e**
2010 (November)	2,344
2011	14,069
2012	14,069
2013	14,069
2014	14,069
2015	14,069
2016	14,069
2017 (October)	11,725
Total estimated reductions (tonnes of CO_2e)	**98,483**
Total number of crediting years	**7**
Annual average over the crediting period of estimated reductions tonnes of CO_2e)	**14,069**

A.4.4. Public funding of the small-scale project activity:

There is no public funding provided by international organizations for the performance of the project works so the carbon credits revenue are the option choosen.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity:

Based on the information provided in Appendix C of the simplified modalities and procedures for small scale CDM activities, this small-scale renewable energy project is not part of a larger emission-reduction project, i.e., is not a debundled component of a larger project or program, given that this is a unique CDM project proposed by the project developer at this moment The project participants have not registered or operated (are not therefore engaged in any way) in any other small-scale CDM project activities in hydropower or by using any other technologies within the project boundary, and surrounding the project boundary.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the small-scale project activity:

Approved baseline and monitoring methodology:

AMS-I.D. - Grid connected renewable electricity generation -Version 13 , 14 December 2007.

and the Tool:

"Tool to calculate the emission the emission factor for an electricity system" – version 1.1, EB 35, 15-19 October 2007.

B.2 Justification of the choice of the project category:

In accordance to the list of sector scopes available on site of UNFCCC, the category in which the project is classified belongs to is:

Sector Scope I - Energy Industries (renewable/non-renewable sources).

The project activity is applicable to type I of small-scale projects (renewable energy), methodology I.D. – Generation of renewable electric energy connected to grid – since it is classified in applicability requirements necessary for this category. This category encompasses renewable sources, as hydric, which supply electricity to an electricity distribution system that is fed by at least one fossil fuel fired generation unit.

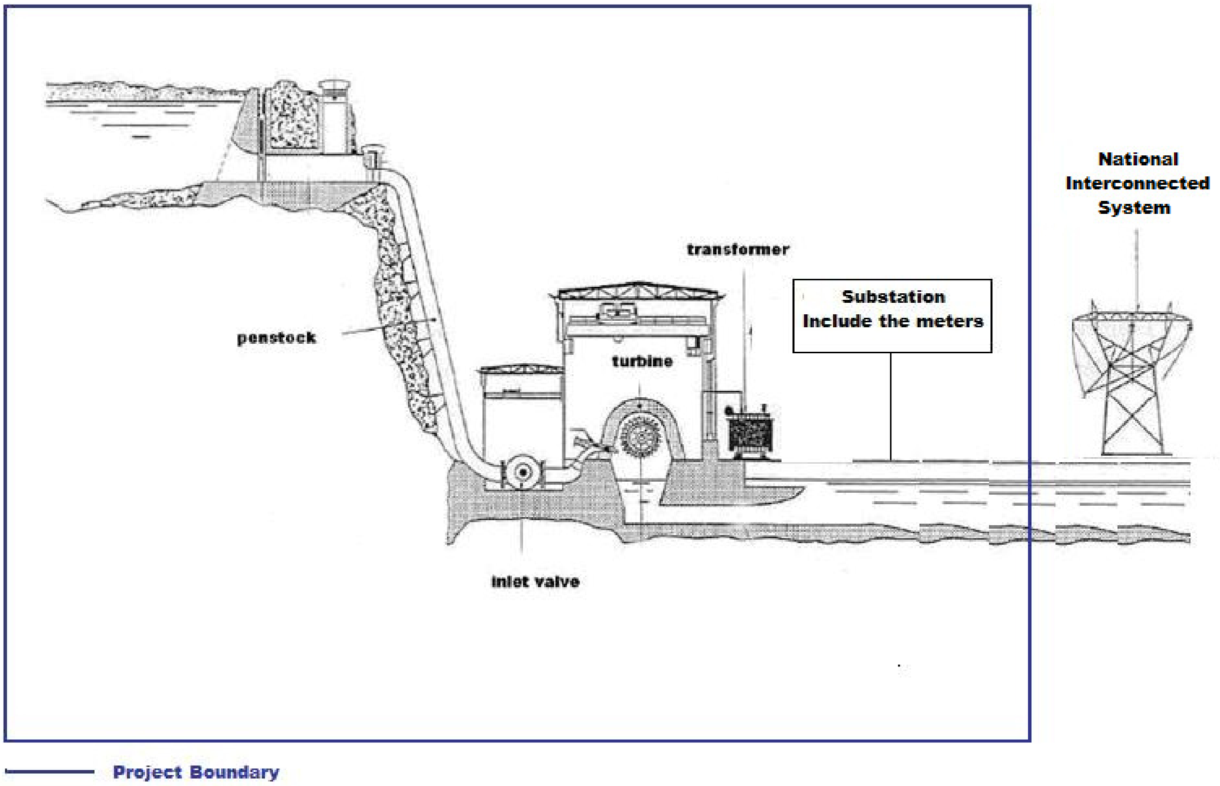
The installed capacity of Santana I SHP that will be implemented by this project activity is 14.758 MW of power. The maximum limit established for Small Scale CDM Projects is 15 MW. So, the capacity of this project is below the limit established by the methodology.

B.3. Description of the project boundary:

According to the methodology AMS-I.D the project boundary encompasses the physical and geographical locality of source of renewable generation.

In this way the project boundary is the area where the project is located, which contains the area of the reservoir, dam, the powerhouse which includes the main equipments as turbines and generators, the SHP substation and the measurement system in the CEMAT substation (local energy distributor to the interconnected system).

The diagram below shows the project boundary:



Regarding the location of the project activity connection to the grid, the electricity will be dispatched to the CEMAT sub-station – it will be the connection point. In the CEMAT Sub-station is located the energy meters. The energy generated by the project activity will be dispatched in CEMAT substation along the following route: 4,212 km double circuit until SE Cemat Nortelândia and simple circuit to 45,677 km SE Cemat Diamantino.

In accordance to guidelines and rules for small-scale project activities, the emissions related to production, transport and distribution of fuel used in baseline electric units are not included in project boundary, since they do not occur at the physical and geographical locality of project.

For the same reason, the emissions related to transport and distribution of electricity are also excluded from the project boundary.

B.4. Description of baseline and its development:

The current Brazilian scenario shows a supplied energy grid in large part by large hydro power plants, however with an important participation of mineral coal, fuel oil and natural gas fired thermal power plants, which jointly represent 15.9%[1] of national production. In the South-Southeast region of the country, where the main consumption centers are concentrated, the potential of hydro power production through large-scale plants is found to be practically exhausted. The absence of a system that guarantees energy reserves capable of supplying basic and emergency needs and the increasing demand for energy verified in the country, mainly in the regions mentioned above, makes it necessary to add energy production plants which, for different reasons, are frequently based on fossil fuels.

Kartha et al. (2002) state that "the central matter of the challenge of a baseline for electricity projects clearly lies in calculation the "avoided generation", which is, what occurs without CDM or another GHG mitigation project. The fundamental point is if avoided generation is in the "**build margin**" (which is, to substitute an installation that *would have,* in another way, been constructed) and/or in the **operating margin"** (thus, that affects the *operation* of current or future plants)".

The emission factor of the baseline is calculated with a **combined margin**, consisting of operating margin and build margin. For purposes of determining the emission factors "build margin" and "operating margin", an electric system project is defined as the spatial extension of plants that can be dispatched without significant restrictions in transmission. In a similar way, an **interconnected electric system** is defined as any electric system that is connected by transmission lines to project, in which plants can dispatch without significant restrictions in transmission.

The methodology approved for small-scale AMS - ID - "Grid connected renewable electricity generation", applies the increases in electricity capacity of small hydro power plants, which is the proposed project activity.

The baseline scenario considers electricity that has been in a different manner generated by operation of plants connected to the grid and by addition of new generation sources.

Thus, the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient calculated according to the "Tool to calculate the emission factor for an electricity system" as given in AMS I.D.

The reduction in CO_2 emission by the project activity of SHP is the result of dislocation of fossil fuel fired thermal generation plants that would have been placed in the interconnected electric system in another way. Environmentally speaking, the addition of small hydro power plants has appeared to be a very interesting option, since in addition to not producing Greenhouse Gases emissions it is a renewable type, even presenting reduced local environmental impact.

[1] Information Bank of Generation (BIG) from National Electric Energy Board. March 25 2008 http://www.aneel.gov.br/aplicacoes/capacidadebrasil/OperacaoCapacidadeBrasil.asp

The region where the project activity is located and its neighbouring municipalities is supplied by the National Interconnected Electric Grid. Part of the electricity produced by the project activity would have to be generated, in the case of its absence, by thermal plants connected to the electrical grid and fed by fossil fuels, increasing anthropogenic emissions. The addition of 14.758 MW by Santana I SHP shall comply all requirements of a small scale project activity under Clean Development Mechanism.

From this exposed, the project activity uses as a data source for the calculation of the Emission Factor of the National Interconnected System (SIN), data of the operating margin and the margin of construction provided by the Designated National Authority (DNA) of the host country.

The Emission Factor of CO_2 resulting from the generation of electric energy in the system checked in the National Interconnected System (SIN) in Brazil is calculated based on generating records from plants centrally operated by the **National Electric System Operator (ONS)**, which includes thermoelectric plants that use fossil fuels as energy.

The method used to make this calculation is the method of dispatch analysis, which is the most appropriate in determining the emission factor of the electrical grid.

This information is needed for renewable energy projects connected to the electric grid and implanted in Brazil under the **Clean Development Mechanism (CDM)** of the Kyoto Protocol.

The data result from the work of the Electrical System Operator (ONS) of the Ministry of Mines and Energy (MME) and the Ministry of Science and Technology, which are available to proponents of CDM projects. Thus, they can be applied in calculating ex-ante emissions avoided by the project activity, where the emission reduction will be calculated ex-post.

Further details of the development of the project baseline can be viewed through the link: http://www.mct.gov.br/index.php/content/view/73318.html.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

According to Annex A of Appendix B of the Simplified Modalities and Procedures for Small-Scale CDM Project Activities, one should make an analysis of barriers in order to demonstrate the additionality of the project, as described below (edition of 30 September 2005):

"Participants in the project shall provide an explanation to show that the activity of the project would not have occurred anyway due to at least one of the following barriers":

(a) **Investment barrier**: This barrier evaluates a financially more viable alternative to the project activity would have led to higher emissions;

(b) **Technological barrier:** This barrier evaluates a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions;

(c) **Barrier due to prevailing practice:** This barrier evaluates prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions;

(d) **Other barriers:** This barrier evaluates without the project activity, for another specific reason identified by the project participant, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher.

(a) Investment barrier

General Aspects

In Brazil, interest rates of financing agencies in local currency are significantly higher than the same rates in the American currency. The credit market is dominated by shorter maturities (from 90 days to 1 year) and the long-term credit lines are available only for stronger corporative borrowers and for special government initiatives.

The domestic financial markets with maturity of one year or more practically do not exist. Experience has shown that in times of financial stress, the duration of the savings instruments falls to levels close to one day, with a large concentration in overnight-type bank deposits. Savers do not hold long-term financial contracts because it is not possible to determine the price of the uncertainty involved in the preservation of the value of the purchasing power.

The lack of long-term local financings result from the reluctance of financial institutions to increase the maturity of their investments. Thus, investors choose for more liquid investments and put their money into short-term government securities instead of investing in long-term opportunities that could fund infrastructure projects.

The National Bank for Economic and Social Development, BNDES, is the sole supplier of long-term loans [2]. The financing of the BNDES debt is held mainly through commercial banks. But the high level of guarantee required, the high fees charged due to the risk associated with renewable projects and requirement of the contract for the purchase and sale of energy (CCVE), hamper the access of investors to these resources.

Project Basic Features

In order to analyze investment barriers, one indicator were set up as benchmark: (i) the basic discount rate set up by the brazilian government (SELIC rate), which is the main reference for Public Debt instruments traded in the market.

The indicator mentioned above will be compared with the undertaking's Internal Rate of Return (IRR) as the project's financial indicator.

SELIC Rate

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[2] According *Jennifer Hermann* in his article "Sistematização do debate sobre "Desenvolvimento e Estabilidade" no Brasil".

The SELIC rate is set up by the Special System for Settlement and Custody ("Sistema Especial de Liquidação e Custódia"). It is obtained by the calculation of the overnight average weighted rate for financing operations, secured by federal public debt instruments and traded in the said system and in clearing houses as committed operations[3]. The institution responsible for setting this rate is the Monetary Policy Committee (COPOM), whose main objective is to set up monetary policy and the underlying interest rate. The COPOM has been following adequate procedures mirroring the examples of the US Federal Reserve Board's by Federal Open Market Committee (FOMC) and by Germany's Central Bank Council.

The interest rate set when the COPOM meets is the goal for the SELIC rate (average rate for overnight financing secured by federal public debt securities), in force in the period between regular Committee meetings. Another COPOM function is to release the "Inflation Report" analyzing the country's economic and financial outlook as well as inflation projections.

The Internal Rate of Return is one of the main indices to analyze investment projects. The IRR in a project is the rate equaling the investment's value with the future returns or cash flows.

Federal public debt securities main purpose is to collect resources for the financing of the public debts, as well as finance the Federal Government's activities, such as education, health and infra-structure. These fixed income assets are a conservative and safe option for investment and are mostly indexed by the SELIC.

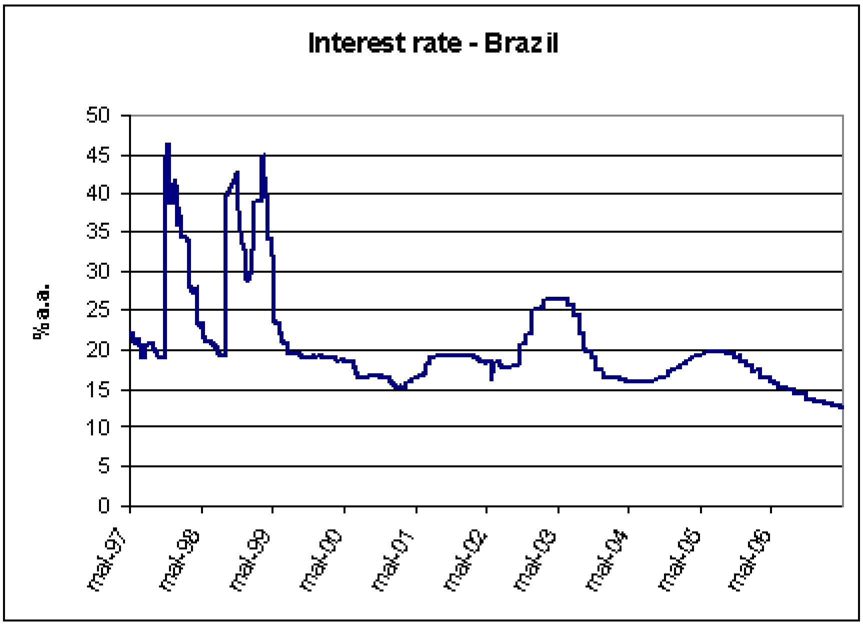
The brazilian economy has withstood several phases of instability oftentimes caused by the international scenario. International economic uncertainties created severe fluctuations in brazilian monetary policy, mainly in the setting of the brazilian basic interest rate. The fluctuations at the end of the 1990´s and between 2000 and 2002 were caused by external factors (Asian crisis in 1999 and the presidential election in Brazil in 2002).

As an emerging country, Brazil has always had high interest rates, which from an investment point of view makes public debt securities quite attractive when compared with developed countries. At the present time the brazilian economy has enjoyed economic growth, relative expansion, high level of international reserves, which has facilitated capturing foreign resources, resulting in smoothing SELIC rate fluctuations as shown in Graph 1.

In the same graph we can see that in the last 6 years, the SELIC rate has been "stable" considering that the fluctuations have occurred at a high level.

[3] http://www.bcb.gov.br/?COPOM

Graph 1: Selic rate – historic.



Data source: Central Bank of Brazil.

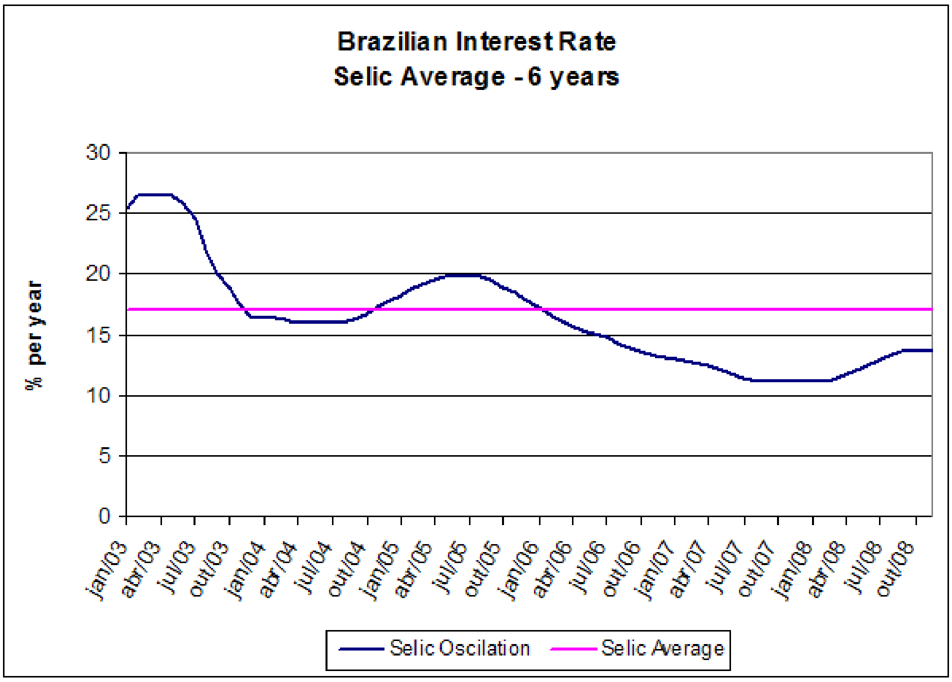
The brazilian basic interest rate is used as a base for market financing as well as an index for public investment by government public debt securities.

In this scenario the SELIC rate makes brazilian government public debt securities attractive as a relatively conservative or risk-free investment.

The use of the SELIC rate as a comparison benchmark against the internal rate of return for investments, must as conservative measure, be performed by its average within a certain time period. The main reason for using the average of the six previous years prior to the project's start are the fluctuations shown in the previous graph, and moreover, the average is a good proxy for the returns expected by investors in brazilian public debt securities.

We show below the average SELIC rate for 6 years (2003 to 2008):

Graph 2: Selic average (period 2003 to 2008).



Data source: Central Bank of Brazil.

With the previous discussion in mind, the Small Hydropower Plant Internal Rate of Return is lower than the SELIC average rate of 16.99% at the time of decision-making on whether to proceed with the project.

The IRR for the Santana I SHP (Small Hydropower Plant) is 11.9% per year, without the funds obtained by the sale of CERs (Certified Emission Reduction). If we take the sale of CERs the IRR of the Santana I SHP in account the rate becomes 12.8% per year.

This demonstrates that the undertaking's IRR making up this project activity is lower than the average SELIC rate.

By summarizing the analysis of the project's financial gauge with the benchmark, we have:

Table 3: Comparison of the project IRR with the benchmarks.

Project IRR	Project IRR with CERs	SELIC rate average
11.9%	12.8%	16.99%

The project's IRR has stayed below the average SELIC rate. The analysis shows that the project faces investment barriers when compared with other more attractive alternatives, such as public titles referenced in SELIC.

The CERs (Certified Emission Reduction) are highly significant instruments for entrepreneurs in overcoming barriers, improving investment quality and hence stimulating future investments in clean energy generation.

Conclusions

The barriers facing the project are due to its return being lower than other investment options with lower risk and higher liquidity. But, in addition to this reality, one should note that an energy project faces great uncertainties, and therefore is an investment of higher risk than government securities. This means that a rate of return higher than the SELIC reference rate is necessary so that associated risks can be overcome (as detailed in the “Prevailing Business Practices”, the energy market really has a high degree of uncertainty in its returns).

Although the SELIC rate makes brazilian public debt securities an attractive investment, at the same time it encumbers capturing resources for infra-structure development projects which includes energy generation projects.

As we have seen, due to access difficulties, short grace periods and high guarantees required by credit institutions, the country has shown low investment levels in this types of projects, as the market has shown a preference by private capital for government papers of high yield and relative low risk.

Thus we have demonstrated that investment in the project faces investment barriers.

(b) Technological barrier

Not used.

(c) Prevailing business practice

History of the Brazilian Electric Sector

In recent decades, the Brazilian Electric Sector has undergone several changes until the current model. The energy sector was composed almost exclusively of government-owned companies, but since 1995, due to an increase in international interest rates and the incapacity of investment, the government was forced to seek for alternatives. The recommended solution was to begin a privatisation process and deregulation of the market.

The table below shows a summary of the main changes between the pre-existing models and the current model, which ultimately result in changes in the activities of some agents of the sector.

Table 4: Table summary of the changes in the Brazilian electric sector

Former Model (until 1995)	Free Market Model (1995 to 2003)	New Model (2004)
Financing using public funds	Financing using public and private funds	Financing using private and public funds

Former Model (until 1995)	**Free Market Model (1995 to 2003)**	**New Model (2004)**
Verticalized Companies	Companies classified by activity: generation, transmission, distribution and commercialization	Companies classified by activity: generation, transmission, distribution, commercialization, imports and exports.
Predominantly State-controlled companies	Opening up of the market and emphasis on the privatization of the Companies.	Coexistence between State-controlled and Private Companies.
Monopolies – No competition	Competition in generation and commercialization.	Competition in generation and commercialization.
Captive Consumers	Both Free and Captive Consumers	Both Free and Captive Consumers
Tariffs regulated throughout all sectors	Prices are freely negotiated for the generation and commercialization.	In a free environment: Prices are freely negotiated for the generation and commercialization. In a regulated environment: auctions and bids for the least tariffs.
Regulated Market	Free Market	Coexistence between Free and Regulated Markets.
Determinative Planning – Coordinator Group for the Planning of Eclectic Systems (GCPS)	Indicative Planning accomplished by the National Council for Energy Policy (CNPE)	Planning accomplished by the Energy Research Company (EPE)
Hiring: Market 100%	Hiring : Market 85% (until August/2003) and Market 95% (until December/2004)	Hiring: Market 100% + reserve
Energy Surplus/Deficit shared between the buyers.	Energy Surplus/Deficit sold in the Wholesaler Energy Market (MAE)	Energy Surplus/Deficit sold in the CCEE. Distributors Energy Surplus/Deficit compensation mechanism (MCSD).

Source: Electric Power Commercialization Chamber - CCEE[4]

The Brazilian electric sector underwent several moments of instability and imbalance between generated energy and demanded energy, where the growth rate of the demand was greater than the installation capacity. As a result, the levels of "stored energy" in the reservoirs decreased between the years of 1997 and 2000 showing the intensive use of water resources to meet the increasing demand without increasing the installed capacity. Thus, rationing of energy and interruptions in power supply occurred in Brazil, harming the economic growth.

Facing the threat of disruption and reduction of energy consumption that the dependence of electrical energy mostly supplied by large hydroelectric centrals, the Priority Thermoelectricity Program (PPT) was

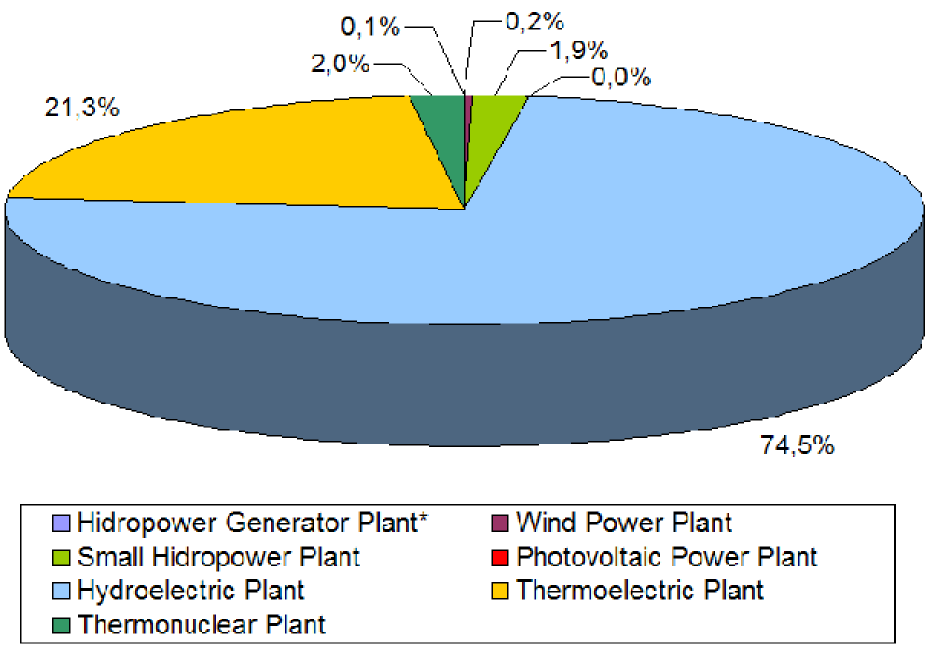
[4] Electric Power Commercialization Chamber – CCEE. Changes Made to the Brazilian Electric Power System: http://www.ccee.org.br/cceeinterdsm/v/index.jsp?vgnextoid=3df6a5c1de88a010VgnVCM100000aa01a8c0RCRD

launched by the Brazilian government aiming to reduce the dependence of large hydroelectric power by diversifying their sources. The PPT was set up through the Federal Decree 3371 of 24 February 2000 and Order 43 of the Ministry of Mines and Energy of 25 February 2000, which originally planned the construction of 47 thermoelectric plants using Bolivian gas, totalling 17,500 MW of new installed capacity until December 2003. However, these initial plans were changed and so that in December 2004 there were 20 plants in operation, totalling approximately 9,700 MW.

National Scenario

The Brazilian electrical system is currently about 100,690 MW of installed capacity, a total of 1,698 electricity generation companies[5].
Of these, about 74,980 MW are Large Hydroelectric Centrals, about 21,464 MW are Thermoelectric Plants, Nuclear Plants are 2,007 MW and 1,877 MW are only Small Hydropower Plants. There are also 8.17 GW of installed capacity in neighbouring countries (Argentina, Uruguay, Paraguay and Venezuela) that can sell electricity for the Brazilian grid[6].

Graph 3: Installed capacity in Brazil.



Source: BIG - Information Bank of Generation - National Electric Energy Board - 25 March 2008. * Hydropower plants with installed capacity below 1MW.

From the data presented above, we can see that the power of Hydroelectric and Thermoelectric Plants altogether, the generation capacity in Brazil by these sources exceeds 95%, and only 1.86% of the

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[5] Information Bank of Generation (BIG) from National Electric Energy Board. 25 March 2008 http://www.aneel.gov.br/aplicacoes/capacidadebrasil/capacidadebrasil.asp

[6] http://www.aneel.gov.br/aplicacoes/capacidadebrasil/OperacaoCapacidadeBrasil.asp

installed capacity in Brazil comes from small hydroelectric plants and generating centrals (1,877 MW from a total of 100,690 MW).

Based on the Brazilian electricity generation macro-environment illustrated in the preceding paragraphs, we can observe that the project activity is inserted in a scenario that has dominated the business of generating energy on a large scale, thus, an unusual business in the common practice in the country.

Additional to the facts described above, we enforce that the renewable energy in Brazil needs incentives to increase investments in renewable projects. To encourage the growth of investment in renewable projects, the Brazilian government created in April 2002 the Program of Incentive for Alternative Sources of Electricity - Proinfa. It is an important tool for the diversification of the national energy matrix. The program coordinated by the Ministry of Mines and Energy (MME) and establishes the purchase of energy in the National Interconnected System (SIN), produced by wind sources, biomass and Small Hydropower Plants. But once again, the level of guarantees required is high and many projects not fit to receive the benefits.

Conclusions

Observing the Brazilian energy scenario, it can be shown that the generation of energy by small hydroelectric plants is unusual. Brazil is a country of continental proportions that is the basis of its production of energy in large power hydroelectric plants and currently in thermoelectricity plants. There have been some government policies in an attempt to diversify the Brazilian energy matrix, this fact shows that for some sectors the government intervention is needed through sectoral policies or other forms of incentives (for example the Proinfa and PPT, the purchase of energy subsidies, reduction or exemption of taxes), so that enterprises are not attractive place for private initiative.

In the case of SHPs it is mentioned that the fact there government programs that encourage their implementation clearly demonstrates that this type of enterprise is not common.

Regarding the Free Market of Energy, although it be conducive to the emergence of small producers and auto producers of energy, that is not the reality. The volatility of the market is very large and the investor is afraid before size risk. And it becomes a major barrier to the deployment of renewable projects.

Therefore, is demonstrated that the project activity is not a common practice.

(d) Other barriers

There are limited infra-structure barrier. The Human Development Index of the municipality is below of the national average (HDI – 0.718 in a scale of 0 to 1. The national average is 0.8. Source: PNUD), with a small population (6,237 habitants – source: www.ibge.gov.br). This fact affect in the way to availability of qualified workers, qualification of new professionals, physical infra-structure, etc.

Anyway, its necessary infra-structure investments in communication to attend the necessities to the enterprise implementation, like the extension services in telephony, internet and implementation of mobile phones, also access roads, supply of electricity, among other factors.

Conclusion of the barriers analysis

The barriers analysis above clearly showed that the project activity faces investment barriers, barriers on the prevailing business practice and other barriers that have prevented its development. The developers of the project expect that these barriers are overcome, or at least minimized, through the benefits/resources of the CDM. In addition, the developers of the project consider the financial resources arising from CDM part of the capital investment activity in this project. These resources are vital to the implementation of the Small Hydro Power Santana I.

These facts demonstrate that the project activity doesn't have an environment with suitable conditions to its implementation without the resources of CDM.

Therefore, we can conclude that the project activity is environmentally and economically additional and consequently is eligible to receive CERs (Certified Emission Reduction) from CDM.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

The baseline is the kWh produced by renewable generation unit multiplied by an emission coefficient (measured in tCO_2e/MWh) calculated in a transparent and conservative manner, called combined margin (CM), which consists of a combination between the operation margin (OM) and the build margin (BM) according to procedures prescribed in the methodological tool "Tool to calculate the emission factor for an electricity system".

For the calculation of the baseline, the six steps below should be followed:

STEP 1. Identify the relevant electric power system.
STEP 2. Select an operating margin (OM) method.
STEP 3. Calculate the operating margin emission factor according to the selected method.
STEP 4. Identify the cohort of power units to be included in the build margin (BM).
STEP 5. Calculate the build margin emission factor.
STEP 6. Calculate the combined margin (CM) emissions factor.

As mentioned in the section B.4, the operating margin and the build margin are publicly available by the brazilian DNA.

The calculation of the Operation Margin is calculated using the dispatch data analysis, option (C) of the Tool to calculate the emission factor for an electricity system. Hence, according to the same tool, in the monitoring period the emission factor will be up-dated anually.

The Designated National Authority uses the legal definition used by the ONS (National System Operator) for the SIN that defines a single electricity system in Brazil, used only for purpose of calculation of CDM project.

Furthermore the geographic and system boundaries for the relevant electricity grid can be clearly identified and information on characteristics of the grid are available. All information about the grid is available in ONS, Operador Nacional do Sistema (National System Operator), (www.ons.org.br), and in ANEEL, Agência Nacional de Energia Elétrica (National Agency of Electric Energy), (www.aneel.gov.br). More details about the Brazilian Interministerial Commission on Global Climate Change – CIMGC single system decision is available in http://www.mct.gov.br/upd_blob/0024/24834.pdf .

The CDM projects have two options for the use of the BM factor. It can be calculated *ex-ante* when the project is submitted, or *ex-post* for each year in which the generation of the project occurs. In this case was chosen the ex-post option, were the datas are calculated by the Brazilian DNA and *Operador Nacional do Sistema* - ONS (National Grid Operator) and regularly available in the DNA website.

Baseline emissions

Baseline emissions (BE_y in tCO_2) are then, the product of the baseline emissions factor ($EF_{grid,CM,y}$ in tCO_2/MWh) times the electricity supplied by the project activity to the grid (EG_y in MWh), as follows:

$$BE_y = EF_{grid,CM,y} \cdot EG_y$$

Where:
BE_y are the baseline emissions in tCO_2e/year;
EG_y are the generated electricity in year y in MWh.

This project activity don't involve the addition of renewable energy units. Santana I SHP is a new project.

Calculate the project GHG emissions

According to the AMS-I.D, no project emission is required to be accounted.

$\mathbf{PE_y = 0}$

Calculate the project leakage GHG emissions

The present project activity is a new project to be implemented, therefore, there is no energy generating equipment transferred from another activity, so according to the methodology the leakage is considered zero.

$\mathbf{L_y = 0}$

Calculate the emission reductions

The emission reduction (ER_y) is calculated as follows:

$$ER_y = BE_y - PE_y - L_y$$

As $\mathbf{PE_y = 0}$ and $\mathbf{L_y = 0}$, $\mathbf{ER_y}$ is:

$\mathbf{ER_y = BE_y}$

B.6.2. Data and parameters that are available at validation:

All the data and parameters used in the estimation of the baseline emission will be monitored and is described in the item B.7.1.

B.6.3 Ex-ante calculation of emission reductions:

The baseline methodology considers the determination of the emissions factor to the grid which the project activity is connected as the core data to be determined in the baseline scenario. In Brazil, the grid is interconnected by the National Interconnected System (SIN) in a single system.

"Operating Margin *OM* Emission Factor" calculation ($EF_{grid,OM-DD,y}$)

The Emission Factor (OM) calculated by the Dispatch Data Analysis is summarized as follows:

$$EF_{grid,OM-DD,y} = \frac{\sum_h EG_{PJ,h} \cdot EF_{EL,DD,h}}{EG_{PJ,y}}$$

Where:

$EF_{grid,OM-DD,y}$	Dispatch data analysis operating margin CO_2 emission factor in year y (tCO_2/MWh));
$EG_{PJ,h}$	Electricity displaced by the project activity in hour h of year y (MWh);
$EF_{EL,DD,h}$	CO_2 emission factor for power units in the top of the dispatch order in hour h in year y (tCO_2/MWh);
$EG_{PJ,y}$	Total electricity displaced by the project activity in year y (MWh);
h	Hours in year y in which the project activity is displacing grid electricity;
y	Year in which the project activity is displacing grid electricity.

The hourly emissions factor is calculated based on the energy efficiency of the power unit and the fuel type used, as follows:

$$EF_{EL,DD,h} = \frac{\sum_n EG_{n,h} \cdot EF_{EL,ny}}{\sum_n EG_{n,h}}$$

Where:

$EF_{EL,n,y}$ CO_2 emission factor of power unit n in year y (tCO_2/MWh);

$EG_{n,h}$ Net quantity of electricity generated and delivered to the grid by power unit n in hour h (MWh);

n Power units in the top of the dispatch.

For effect of *ex-ante* calculation of the Operation Margin (OM) Emission Factor will be used, as a good estimation to $EF_{grid,OM-DD,y}$ value, the arithmetic average of the OM Emission Factor published by the DNA for the period of one year (available data of the last 12 months). (http://www.mct.gov.br/index.php/content/view/72901.html)

Average Monthly Factor (tCO_2/MWh)												
year	2007											
month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
EF	0.2292	0.1954	0.1948	0.1965	0.1606	0.2559	0.3096	0.3240	0.3550	0.3774	0.4059	0.4865

This way, we have the OM Emission Factor:

$EF_{grid,OM-DD,y} = 0.2909$

"Build Margin Emission Factor BM" calculation ($EF_{grid,BM,y}$)

According to the used methodology, the Build Margin (BM) Emission Factor, also needs to be calculated, as follow the formula below:

$$EF_{grid,BM,y} = \frac{\sum_{i,m} EG_{m,y} . EF_{EL,m,y}}{\sum_{m} EG_{m,y}}$$

Where:

$EF_{grid,BM,y}$ Build margin CO_2 emission factor in year y (tCO_2/MWh);

$EG_{m,y}$ Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh);

$EF_{EL,m,y}$ CO_2 emission factor of power unit m in year y (tCO_2/MWh);

m Power units included in the build margin.

Like for the *OM* Emission Factor, the build margin emission factor $EF_{grid,BM,y}$ will be adopted the 2007 year value published by the DNA (ultimate data available). It can be viewed in the link: (http://www.mct.gov.br/index.php/content/view/72901.html).

So, the Build Margin (*BM*) Emission factor is:

$EF_{grid,BM,y} = 0.0775$

"Baseline Emission Factor" calculation ($EF_{grid,CM,y}$)

Finally the baseline Emission Factor ($EF_{grid,CM,y}$) of the Combined Margin, is calculated through a weighted-average formula, considering both the $EF_{grid,OM\text{-}DD,y}$ and the $EF_{grid,BM,y}$ and the weights w_{OM} and w_{BM} (are default 0.5), that gives:

$$EF_{grid,CM,y} = 0.2909 \cdot 0.5 + 0.0775 \cdot 0.5 = 0.18418 \quad (tCO_2/MWh)$$

The emissions reduction (**ER**) of this project activity is:

$$ER = BE_y - (L_y + PE_y)$$

The baseline emissions would be then proportional to the electricity delivered to the grid throughout the project's lifetime. Baseline emissions due to displacement of electricity are calculated by multiplying the electricity baseline emissions factor ($EF_{grid,CM,y}$) with the electricity generation of the project activity.

$$BE_y = EF_{grid,CM,y} \cdot EG_y$$

For this reason, the electricity generated by the project activity is the electricity produced (conservative estimative) by the Santana I SHP in the *y* year. The electricity generation is estimated on basis of assured energy (free translation):

$EG_{Santana\ I,h}$ = **76,391 MWh**

Therefore, the baseline emissions will be calculated as follows:

$$BE_y = 0.18418 \cdot 76{,}391 = \mathbf{14{,}069}\ tCO_2e/\ year$$

To this project leakages is not considered, thus:

$\boldsymbol{L_y = 0}$

As said previously the project emission is zero:

***PEy* =0**

So, the emission reduction (**ER**) of the project activity is:

$$ER = \mathbf{14{,}069} - (0 + 0) = \mathbf{14{,}069\ tCO_2e/year}$$

B.6.4 Summary of the ex-ante estimation of emission reductions:

Year	Estimation of project activity emissions (tCO_2e)	Estimation of Baseline emissions (tCO_2e)	Estimation of leakage (tCO_2e)	Estimation of Overall emission reductions (tCO_2e)
2010 (November)	0	2,344	0	2,344
2011	0	14,069	0	14,069
2012	0	14,069	0	14,069
2013	0	14,069	0	14,069
2014	0	14,069	0	14,069
2015	0	14,069	0	14,069
2016	0	14,069	0	14,069
2017 (October)	0	11,725	0	11,725
Total (tonnes CO_2e)	0	**98,483**	0	**98,483**

B.7 Application of a monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

Data / Parameter:	$EG_{Santana\ I,h}$
Data unit:	MWh
Description:	Net electricity of the Santana I SHP delivered to grid in hour *h*
Source of data to be used:	Energy Meters, periodic energy reports generated and dispatched to the grid.
Value of data	76,391
Description of measurement methods and procedures to be applied:	The net electricity delivered to the grid will be checked through the energy metering. The meter must comply with national standards and industrial regulations to ensure the accuracy. The meters will must be sealed for safety after calibration.
QA/QC procedures to be applied:	These data will be used for calculate the emission reductions. Energy generation invoices and metering protocol will be used to check plausibility. The data will be archived monthly (electronic) and will be archived during the credit period and two years after. The data from the energy meters will be cross checked with the CCEE data bank (Electric Power Commercialization Chamber in Brazil) or with invoice of energy sales in the way to verify the coherency of the data.
Any comment:	The electricity supplied to the grid will be monitored by the seller.

Data / Parameter:	$EF_{grid,CM,y}$
Data unit:	tCO_2e/MWh
Description:	Brazilian grid emission factor.
Source of data to be used:	Calculated through the data provided by DNA (Designated National Authority). The brazilian DNA provides the Operating Margin Emission Factor and the Build Margin Emission Factor.
Value of data	0.18418
Description of	The Emission Factor will be monitored through ex-post calculation, which

measurement methods and procedures to be applied:	data are available by the DNA (Designated National Authority). The Combined Margin is calculated through a weighted-average formula, considering both the $EF_{grid,OM-DD,y}$ and the $EF_{grid,BM,y}$ and the weights w_{OM} and w_{BM} (are default 0.5).
QA/QC procedures to be applied:	This data will be applied in the project emission reductions calculation. The data will be annually filed (electronic archive) and it will be kept for two years after the end of project activity.
Any comment:	

Data / Parameter:	$EF_{grid,OM-DD,y}$
Data unit:	tCO_2/MWh
Description:	CO_2 Operating Margin emission factor of the grid, in a year *y*
Source of data to be used:	Data provided by DNA to the year *y*.
Value of data	0.2909
Description of measurement methods and procedures to be applied:	The Operating Margin Emission Factor will be collect in the DNA website, which is responsible for this calculation.
QA/QC procedures to be applied:	This data will be applied in *ex-post* calculation of the Emission Factor. The data will be annually filed (electronic archive) and it will be kept for two years after the end of project activity.
Any comment:	

Data / Parameter:	$EF_{grid,BM,y}$
Data unit:	tCO_2/MWh
Description:	CO_2 Build Margin emission factor of the grid, in a year *y*
Source of data to be used:	Data provided by DNA (Designated National Authority) to the year *y*.
Value of data	0.0775
Description of measurement methods and procedures to be applied:	The Build Margin Emission Factor will be collect in the DNA website, which is responsible for this calculation.
QA/QC procedures to be applied:	This data will be applied in *ex-post* for the calculation of the Emission Factor. The data will be annually filed (electronic archive) and it will be kept for two years after the end of project activity.
Any comment:	

B.7.2 Description of the monitoring plan:

The monitoring plan for the project activity is based on the methodology AMS ID.

1) **<u>Power generation and measurement system:</u>**

General characteristics of the measurement system:

The procedures design for monitoring electricity generation by the project activity follow the parameters and regulations of the Brazilian energy sector. The National Grid Operator (ONS) and the of Electric Power Commercialization Chamber (CCEE) are the organs responsible for specification of the technical requirements of energy measurement system for billing, that is, those bodies monitor and approve projects for accurate accounting of energy.

The agent responsible for the measurement system for billing (SMF) develop the project in accordance with the technical specifications of the measurements for billing, which should include the location of measurement points, panels of measurement, meters and systems for local and remote measurement.

The measurement system make the measure and records the energy. This is installed in the panels of measurement, which are located in the control room or cabins of measurement. For this system is guaranteed the inviolability of data, which must be sealed for safety after calibration or seals with electronic passwords.

There will have two panels of measurement, containing each one two meters (principal and the back-up). The panels of measurement will be located in the CEMAT substation (Centrais elétricas Matogrossenses – The local energy distributor).

The measurement system contain also a communication system that have the function to send the electricity dispatched for the grid data to the CCEE.

Data monitoring:

The readings of meters are used for calculating the emission reductions when the Meter is in normal operation state. The monitoring steps are as follows:

(1) The data will be measured hourly and recorded monthly;
(2) The power output settlement sheet and sales receipts will be used to cross check the monitored data.
(3) The project owner provides DOE with readings record of meters, acess to the CCEE data measured and copies of sales invoices.

<u>Quality control:</u>

(1) Calibration of meters
The calibration of meters conducted by qualified organization must comply with national standards and industrial regulations to ensure the accuracy. The meters must be sealed for safety after calibration. The calibration records must be archived together with other monitoring records.
The class of accuracy in the equipment that will be used in the project activity is under the national standards (NBR 14519 from Associação Brasileira de Normas Técnicas – Brazilian Association of Technical Standards). It can be viewed in the Grid Procedures from the National Grid Operator: Module 12, Sub-module12.2 Installation of the Measurement System for Billing in the link: http://www.ons.org.br/download/procedimentos/Submodulo%2012.2_v10.0.pdf.

(2) Emergency treatment

In case of unavailability of measures from any point of measurement, due to maintenance, commissioning or for any other reason, will be used the methodology to estimate data as the item 14.3 of the Procedure of Energy Commercialization PdC ME.01[8]

Data Mangement:

All the project activity issues regarding the SHP will be treated by the Firenze Energética Executive Management Sector responsible (to be defined during the plant construction). By now all the SHP construction issue has been conducted by the Firenze Energética Board.

A operational structure for the SHP will be assigned and trained before the SHP commercial operation start.

The monitoring data will be stored during the project's duration. In this case this means 7 years (one period duration) plus 2 years after its close according to the methodology. If the project is renewed for another two periods, the data will be stored for 21 years plus 2 years, making up a total of 23 years of monitoring.

All data gathered in the monitoring range will be electronically filed and kept for at least 2 years after the last crediting period.

Training Procedures:

All the training necessary for the plant operational team, , will be provided during the plant construction and during the plant commercial operation Also a plant operation manual will be created in order to provide assured instructions.

Furthermore, operation, maintenance and calibration procedures will follow the national guidelines set by the National Grid Operator.

2) **Emission Factors:**

The Emission Factor related to this project activity ($EF_{grid,CM,y,}EF_{gris,OM-DD,y}$ e $EF_{grid,BM,y}$) as mentioned previously, are available by the brazilian DNA and it can be viewed at its website (www.mct.gov.br/clima). Thus, the monitoring of such data will be ex-post through periodic access to data provided by DNA.

B.8 Date of completion of the application of the baseline and monitoring methodology and the name of the responsible person(s)/entity(ies)	

The application of the baseline and monitoring methodology was completed in 15/07/2008. The entity responsible for its development is. Carbotrader. The data contact below, as well as in Annex I of the PDD.

Company:	CARBOTRADER ASSESSORIA E

[8] http://www.ccee.org.br/cceeinterdsm/v/index.jsp?vgnextoid=67778d3ef9a3c010VgnVCM1000005e01010aRCRD

	CONSULTORIA EM ENERGIA LTDA.
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Represented by:	
First Name:	Arthur
Last Name:	Moraes
Job title:	Director

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

01/03/2009 (date on which the project participant is going to commit to major expenditures)

C.1.2. Expected operational lifetime of the project activity:

28 years and 0 months.

C.2 Choice of the crediting period and related information:

C.2.1. Renewable crediting period

C.2.1.1. Starting date of the first crediting period:

01/11/2010 (or the date of registration, whichever occurs later)

C.2.1.2. Length of the first crediting period:

7 years – 0 month

C.2.2. Fixed crediting period:

Not applicable.

C.2.2.1. Starting date:

Not applicable.

C.2.2.2. Length:

Not applicable.

SECTION D. Environmental impacts

D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

With respect to regulatory permits, Santana I SHP has authorizations emitted by ANEEL:

- Dispatch Nº 3301 of 04/09/2008 issued on 05/09/2008 by ANEEL. Approving the basic project of Santana I SHP. Current dispatch.
- Ordinance ANEEL Nº 126 of 28/03/2008 issued on 31/03/2008 by MME. Approving Santana I SHP at the Infra-structure Special Regime Incentives – REIDI.
- Resolution Nº 542 of 14/10/2003 issued on 15/10/2003 by ANEEL. Authorizing Firenze Energética to establish as a Independent Energy Producer.
- Dispatch Nº 407 of 09/07/2003 issued on 10/07/2003 by SPH/ANEEL. Approving the Simple Inventory Studies of the Santana river in the Mato Grosso State.

With respect to environmental permits legislation requires issuing of following licenses:

- **Preliminary License (LP):** preliminary phase of planning activity in which concept and location of enterprise are evaluated. In this phase Environmental Impact Study (EIA) and Environmental Impact Report (RIMA) are analysed, or, depending on the case, the Environmental Control Report (RCA).

- **Installation License (LI):** authorizes implementation of enterprise. In this phase, the Environmental Control Plan (PCA) is analysed, it contains projects for systems of treatment and/or disposing of liquid and atmospheric effluents and solid residue etc.

- **Operation License (LO):** authorizes operation of enterprise after verification of compliance with measures determined in phases of LP and LI.

The project activity comprises one SHP, therefore, it is necessary environmental permits for its development.

The Santana I SHP has the following licences to be implemented:

- **LAI 55954/2008** – Environmental Installation License from Environment Secretary of Mato Grosso State – SEMA (Secretaria de Estado do Meio Ambiente – SEMA). Issued on 16 October 2008.
- **LAI 299/2008** – Environmental Installation License from SEMA. Issued on 02 April 2008.
- **LAI 962/2007** – Environmental Installation License from SEMA, issued on 17 January 2007.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

The environmental impact caused by the project's activities are considered not significant. The Small Hydropower Plants have as their main feature the construction of small reservoirs, which is one of the main feature of the Santana I SHP.

The Santana I SHP meets the environmental requirements for its implementation, as can be seen by the fact that it has an Installation Permit and meeting ANEEL's (Brazilian National Regulatory Agency) norms concerning the display of the simplified hydroelectric inventory studies.

To have the Installation Permit issued, the DAP (Preliminary Environmental Diagnosis) for the Santana I SHP, was done in order to diagnose the undertaking´s implementation area, verifying resulting possible impacts and lastly, to verify measures to be taken to reduce negative impacts and mitigate or compensate other impacts. Some identified positive impacts, did not deserve optimizing measures due to the fact that they are native to the project's conception whose benefits will be felt as a result of the project´s implementation, i.e. Santana I SHP operation.

A site inspection was performed in addition to the collection of secondary data with the several entities affected by the project in question. This inspection was intended to identify and describe in more depth the environmental aspects in the area where the Santana I SHP is going to be inserted.

The main environmental impacts identified in the Environmental Diagnosis is: degradation by erosion processes in the areas of loan use, for disposal of rubble, the generation of particulate matter, and the risk of fire in vegetation, pollution from burning of waste and release of effluent, increase consumption of electricity, increasing the flow of heavy vehicles, impacts from the point of view of real estate value on other farms, as well as those are considered low-grade of impact. All the measures to mitigate the impacts is covered by the Environmental Diagnosis Report developed.

Positive impacts will be caused by the project, such as the increase in direct and indirect jobs, improvement of public service to the user, improving the safety of the electrical system, energy of higher quality, among others.

Based on the performed surveys and analyses, it was possible to define the array of measures to be implemented to adopt measures for the mitigation of adverse environmental impacts and maximize the benefits resulting from the project's electric energy generation, in order to enable its effective compatibility with environment protection and its integration in the development process.

As far as the environmental impacts to be caused by the project's implementation, as these are of little significance, some points will be taken in consideration in running the project to make it conform with the Preliminary Environmental Diagnosis (DAP) and which have been recommended in it.

The measures considered for the project's implementation are: clearing the forest and cleaning the flooded area; minimal possible removal of the site area vegetation and civil engineering construction separating the organic soil to be utilized in environmental regeneration projects; with reference to the alteration of river dynamics, due to the fact that the river has been dammed, it was recommended that the fauna be repopulated, even though the river has no ictiofauna diversity; with reference to job creation, the project will prioritise the hiring of a workforce based in the Nortelândia region; with reference to the Change of the Local Scenery, this should be prompty reverted with the adoption of works to control erosion, recuperation or rehabilitation of degraded areas, embankment protection, and recuperation of the dam's surroundings, and lastly by another program dealing with domestic effluents caused by activities related to the SHP's implementation, produced by workers in the worksite, to be collected and adequately treated. Adoption of a septic tank and drainage to be installed in soil with good permeability, is recommended.

The above-mentioned measures will be undertaken starting with the SHP's construction.

SECTION E. Stakeholders' comments:

E.1. Brief description how comments by local stakeholders have been invited and compiled:

In accordance to Resolution nº.1, dated 11 September 2003 and Resolution nº7 dated 7 March 2008, of the Inter-Ministry Commission on Global Climate Change (CIMGC), any CDM projects shall send a letter describing the project and request commentaries by local interested parties.

The project activity applies to only one state of the federation, thus, the invitations of comments should be addressed to the following actors involved and affected by the project activities:

- City Hall and City Councils;
- State environmental body and Municipal environmental body;
- Brazilian Forum of NGOs and Environmental and Development Social Movements - http://www.fboms.org.br;
- Community associations;
- State Public Attorney;
- National Public Attorney.

In order to satisfy and comply with this ruling the project proponents sent invitation letters describing the project, and requested commentaries by the following interested parties:

- City Hall of Municipality Nortelândia (Prefeitura Municipal de Nortelândia);
- Public Construction and Transport Secretary of Municipality Nortelândia;
- Agriculture Secretary of Municipality Nortelândia;
- City Council of Municipality Nortelândia (Câmara Municipal de Nortelândia);

- Environment Secretary of Mato Grosso State–SEMA (Secretaria de Estado do Meio Ambiente);
- State Public Attorney of Mato Grosso (Ministério Público do Estado do Mato Grosso);
- Federal Public Attorney (Ministério Público Federal);
- Brazilian Forum of NGOs and Environmental and Development Social Movements – FBOMS (Fórum Brasileiro de ONGs);
- Retail Trade Union of Nortelândia (Sindicato do Comércio Varejista de Nortelândia).

The interested parties above were invited to present their concerns and provide comments on project activity during a period of 30 days after receipt of the invitation letter. The letters were sent to local stakeholders prior to beginning the process of validation and remains open for comments from stakeholders.

In the letter forwarded to the stakeholders, they were informed that the Project Design Document, and Annex III to Resolution No. 1 of the Inter-Ministry Commission on the Global Climate Change (CIMGC) are available for viewing on the site of Carbotrader, the participating company in the project activity: www.carbotrader.com in the following links: http://www.carbotrader.com/jun1118a3.pdf and http://www.carbotrader.com/jun1118dcp.pdf. These documents are available for consultation on the website and updated according to the latest or current version.

E.2. Summary of the comments received:

So far no comments were received from interested parties.

E.3. Report on how due account was taken of any comments received:

Not applicable due to the item E.2

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public financing for this project activity.

Annex 3

BASELINE INFORMATION

The CO_2 emission factors resulting from the generation of electricity verified in Brazil's National Interconnected System (SIN) are calculated from the plants power generation records issued centrally by the National Grid Operator, especially in thermoelectric plants. This information is necessary to renewable energy projects connected to the national grid and implemented in Brazil under the Kyoto Protocol's Clean Development Mechanism (CDM).

The baseline emissions are calculated according to the "Tool to calculate the emission factor for an electricity system" version 01 approved in meeting number 35 of the UNFCCC's Executive Board. With this methodology the National Grid Operator (ONS) is tasked with explaining the SIN´s (National Interconnected System) operational practices regulated by the ANEEL (Brazilian Electricity Regulatory Agency) to the work group made up by the Ministry of Science and Technology (MCT) and Ministry of Mines and Energy (MME). According to this system, the CO2 Emission Factors applicable to the project activity, will be calculated by the National Grid Operator (ONS) for the single system since May 27, 2008.

More details about baseline development of this project can be found through this links:
http://www.mct.gov.br/index.php/content/view/73318.html and
http://www.mct.gov.br/index.php/content/view/13986.html.

Annex 4

MONITORING INFORMATION

The monitoring of the project's activity is based on the baseline methodology and monitoring applicable to this project and, as described in items B 7.1 and B 7.2, measuring equipment of generated energy is used for verification of renewable energy generated by the project's activity.

After energy generation data has been collected, there will be a reconciliation of this data with the reports/data issued by the CCEE or with the sold energy numbers in energy sales invoices. We emphasize that the energy data from CCEE is a passes by auditing and must not contain errors. This procedure will be adopted in order to give consistency to the data.

It should be noted that all collected data in the monitoring scope will be electronically filed and kept for at least 2 years after the last credit period.

This monitoring plan is based on the Small Scale Methodology AMS I.D version 13 – December 14 2007, as well as on the "Tool to calculate the emission factor for an electricity system" version 1.1 approved in meeting number 35 of the UNFCCC´s Executive Board.

Here is a summary of the data to be monitored:

Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Propotion of data to be monitored	How will the data be archived? (eletronic/paper)	Comments
EG_y	Project Activity	MWh	m	monthly	100%	electronic	The electricity delivered to the grid will be checked through the energy metering, data acquisition software and cross checked with CCEE data or through sales receipt.
$EF_{grid,CM,y}$	DNA	tCO_2e/MWh	c	annually	100%	electronic	These data will be monitored through *ex-post* calculation. The datas will be available by the DNA (Designated National Authority) werbsite.
$EF_{gris,OM-DD,y}$	DNA	tCO_2e/MWh	m	annually	100%	electronic	The Operating Margin Emission Factor, will be monitored in the DNA website, which is responsible for this calculation.

$EF_{grid,BM,y}$	DNA	tCO_2e/MWh	m	annually	100%	electronic	The Build Margin Emission Factor, will be annually monitored in the DNA website, which is responsible for this calculation.

Annex 5

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