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:

Title: Rodeio Bonito Small Hydro Power Project
Version No: 02
Dated: 21th September 2009

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

The Rodeio Bonito Small Hydro Power Project (Rodeio Bonito SHP) owned by Rodeio Bonito Hidrelétrica S/A is a small hydroelectric project with installed capacity of 14.637 MW located on the Irani River, Santa Catarina State, Brazil.

The Rodeio Bonito Hidrelétrica S/A, is a subsidiary of VELCAN Desenvolvimento Energético do Brasil Ltda, Brazilian Independent Power Producer part of the multinational VELCAN Energy group. The main objective of the project developer is to increase the power generating capacity in Brazil by developing, constructing and operating renewable energy units with the support of carbon credits.

Purpose of the project

The purpose of the project activity is to help meet Brazil's rising demand for energy due to economic growth and to improve the supply of electricity. At the same time, the project will contribute to the environmental, social and economic sustainability by increasing the share of renewable energy in the total Brazilian (and the Latin America and the Caribbean region's) electricity production.

The Latin America and the Caribbean region countries have expressed their commitment towards achieving a target of 10% renewable energy of the total energy use in the region. Through an initiative of the Ministers of the Environment in 2002 (UNEP-LAC, 2002[1]), a preliminary meeting of the World Summit for Sustainable Development (WSSD) was held in Johannesburg in 2002. In the WSSD final Plan of Implementation no specific targets or timeframes were stated, however, the importance of renewable energy production projects was recognized for achieving sustainability in accordance with the Millennium Development Goals[2].

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[1] UNEP-LAC (2002). Final Report of the 7th Meeting of the Inter-Sessional Committee of the Forum of Ministers of Environment of Latin America and the Caribbean. United Nations Environment Programme, Regional Office for Latin America and the Caribbean. 15 to 17 May, 2002, São Paulo (Brazil).

[2] WSSD Plan of Implementation, Paragraph 19 (e): "*Diversify energy supply by developing advanced, cleaner, more efficient, affordable and cost-effective energy technologies, including fossil fuel technologies and renewable energy technologies, hydro included, and their transfer to developing countries on concessional terms as mutually agreed. With a sense of urgency, substantially increase the global share of renewable energy sources with the objective of increasing its contribution to total energy supply, recognizing the role of national and voluntary regional targets as well as initiatives, where they exist, and ensuring that energy policies are supportive to developing countries' efforts to eradicate poverty, and regularly evaluate available data to review progress to this end.*"

Reduction of GHG emissions

The implementation of the project activity will have an important contribution to environmental sustainability by reducing carbon dioxide emissions that would have occurred otherwise. The project activity reduces emissions of greenhouse gas (GhG) by avoiding electricity generation by fossil fuel fired power plants which would be generating and emitting CO_2 in the absence of the project.

Contribution to sustainable development

Since it is a Run of River hydropower plant, the project presents very limited environmental impacts. The participant of the project recognizes that the project activity will help Brazil fulfill its goals of promoting sustainable development. Specifically, the project is in line with host-country specific CDM requirements because of its contribution towards:

- Diversification and improvement of the supply of electricity with clean, renewable hydroelectric power while contributing to the regional/local economic development. Small-scale hydropower run-of-river plants provide local distributed generation, in contrast with the business as usual large hydropower and natural gas fired plants built in the last 5 years especially in the South subsystem. Moreover, these small-scale projects provide site-specific technological benefits including:
    - increased reliability and shorter and less extensive outages;
    - improved power quality;
    - reduced lines losses;
    - mitigation of transmission and distribution congestion; and
    - increased system capacity with reduced transmission & distribution investment.

- Technological and capacity development since all technology, hand labour and technical maintenance activities will be provided inside Brazil;

- Regional integration and connection with other sectors – the project facilitates the increase in hydroelectricity as a generating source in the region. Also, it creates an alternative market for this kind of energy generation, indirectly joining the Brazilian energy and environmental sectors;

- Better revenue distribution is achieved through job creation and an increase in people's wages. Better income distribution in the region where the Rodeio Bonito SHP is located is also obtained through less expenditures and more income in the local municipalities. The surplus of capital that these municipalities will have, could be translated into investments in education and health, which will directly benefit the local population and indirectly impact a more equitable income distribution. This money would stay in the region and be used for providing the population better services, which would improve the availability of basic needs, and avoid emigration.

- Better working conditions and increase of employment opportunities in the area where the project is located. The project activity will require a whole team for operation, management and repair services. It has created direct jobs for 200 persons and indirect jobs to 400 persons in the state of Santa Catarina;

A strong indication that Rodeio Bonito SHP contributes to the country's sustainable development goals is that the project is in accordance with the April 2002 law nº 10.438 of PROINFA (*Programa de Incentivo as Fontes Alternativas de Energia Elétrica*). PROINFA is a Brazilian federal program that gives incentive to alternative sources of electricity (wind, biomass, and a small scale hydropower plant). Among other factors, this initiative goal is to increase the renewable energy source share in the Brazilian electricity profile in order to contribute to a greater environmental sustainability through giving these renewable energy sources better economic advantages.

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 a project participant (Yes/No)
Brazil (host)	Rodeio Bonito Hidrelétrica S/A	No
(*) 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:

The Rodeio Bonito SHP is a run-of-river, small hydro electric project. It uses water from the Irani River to generate electricity with an installed capacity of 14.637 MW and a reservoir of 0.838 km^2.

By legal definition of the Brazilian Power Regulatory Agency (ANEEL- *Agência Nacional de Energia Elétrica*), Resolution no. 652, December 9th, 2003, small hydro in Brazil must have installed capacity greater than 1 MW but not more than 30 MW and with reservoir area less than 3 km^2. The project characteristics are in accordance with this definition.

Small hydro electric power projects with reservoirs are considered to effectively generate distributed power and supply small urban areas, rural regions and remote areas in the host country. Generally, it consists of a hydroelectric power project with reservoir which has minimal environmental impacts.

According to Eletrobrás (1999[3]), run-of-river projects are defined as "the projects where the river's dry season flow rate is the same or higher than the minimum required for the turbines," as it is the case of the Rodeio Bonito SHP.

[3] **Eletrobrás**. Diretrizes para estudos e projetos de pequenas centrais hidrelétricas. Centrais Elétricas Brasileiras S.A. 1999.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
35.58	43.11	28.95	38.55	54.03	62.00	62.03	56.10	59.65	72.97	54.27	40.26

Table 1: Rodeio Bonito's river monthly average flow at the project location

The dry season in the region is from January to March. With the numbers in the Table 1, the average dry season flow rate is 35.88 m^3/s. Thus the project can be considered a run-of-river power plant according to all the presented criteria.

The technology and equipment used in the project are developed and manufactured locally and has been successfully applied to similar projects in Brazil and around the world. The main characteristics of the project are as shown in Table 2.

Installed Power Capacity	14.637 MW
Plant Load Factor	0.6
Total Generation	77,059 MWh/year
Gross Head	27.05 m and 25 m
Reservoir	0.838 km^2
Plant Design flow	62.68 m^3/s

Table 2: Main Project Characteristics

Further technical details of the project can be found at http://www.rodeiobonito.com/technical_features_a4.html.

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.:

State of Santa Catarina, Southern Brazil

A.4.1.3. City/Town/Community etc:

Chapeco

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

The Rodeio Bonito SHP is located on the Irani River, in the state of Santa Catarina in the South of Brazil. The geographical coordinates for the project activity's powerhouse are 27° 06' 42.72" S and 52° 29' 1.31" W. The dam is located at 27° 06' 35.14" S and 52° 28' 50.35" W.

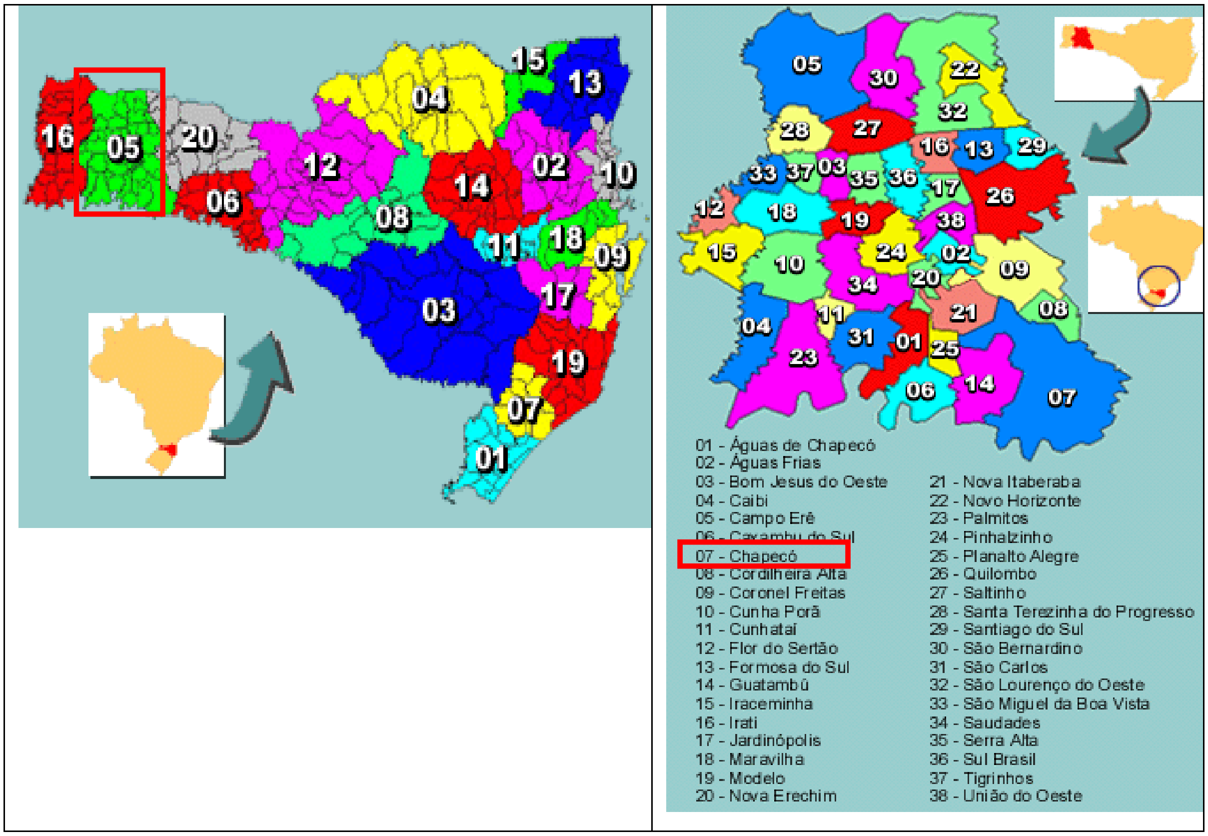

Figure 1 – Political division of Brazil showing the state of Santa Catarina and the city involved in the project activity (Source: City Brazil, 2008[4]).

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

Small Scale Project Activity
Type: Type I – Renewable Energy Projects
Category: I.D. Grid Connected Renewable Electricity Generation[5]
Version: 14, EB 48

The technology employed is well established. The electromechanical equipments that will be employed are shown in Table 3. The three large turbines will operate under a gross head of 27.05 m, whereas the two small ones will operate under a gross head of 25 m.

The hydroelectric power project with reservoir is constituted of:

- a low-level diversion dam which raises the water level in the river
- a head race channel which brings the water at the vertical of a power house
- an intake structure which consists of a trash screen and a submerged opening with an intake gate.

[4] Source: http://www.citybrazil.com.br/

[5] http://cdm.unfccc.int

- pressurized pipe (called a penstock) to conduct water from intake to power house
- a power station constructed downstream of the intake and at as low a level as possible to gain the maximum head on the turbine.

The technology to be employed at Rodeio Bonito SHP is standard in the hydroelectricity sector. The Francis Dupla and Kaplan turbine is among the most widely used water turbines. In this project, the turbines are manufactured in Brazil.

The Francis turbine is a type of hydraulic reactor turbine in which the flow exits the turbine blades in the radial direction. Francis turbines are common in power generation and are used in applications where high flow rates are available at medium hydraulic head. Water enters the turbine through a volute casing and is directed onto the blades by wicket gates. The low momentum water then exits the turbine through a draft tube. In the model, water flow is supplied by a variable speed centrifugal pump. A load is applied to the turbine by means of a magnetic brake, and torque is measured by observing the deflection of calibrated springs. The performance is calculated by comparing the output energy to the energy supplied.

The Kaplan turbine is a propeller-type water turbine with adjustable blades. The Kaplan turbine is an evolution of the Francis turbine and allows efficient power production in low head applications that was not possible with Francis turbines. Kaplan turbines are widely used throughout the world in high-flow, low-head power production. The Kaplan turbine is an inward flow reaction turbine, which means that the working fluid changes pressure as it moves through the turbine and gives up its energy. The design combines radial and axial features. The inlet is a scroll-shaped tube that wraps around the turbine's wicket gate. Water is directed tangentially, through the wicket gate, and spirals on to a propeller shaped runner, causing it to spin. The outlet is a specially shaped draft tube that helps decelerate the water and recover kinetic energy.

Turbines	
Type	Francis Dupla / Kaplan
Quantity	03 / 02
Installed capacity (MW)	4,667 / 0,318
Gross head	27.05 m (3) / 25 m (2)
Design Flow	59.43 / 3.25 m^3/s
Manufacturer	HISA Hidráulica Industrial S/A / Rischbieter Engenharia Indútria e Comércio LTDA
Generators	
Type	Three Phase Synchronous Brushless / Submersible Hydroturbine
Quantity	03 / 02
Speed (rpm)	450 / 900
Nominal Power (MVA)	5.2 (3) / 0.4 (2)
Voltage (kV)	6.9 (3) / 0.38 (2)
Manufacturer	WEG Equipamentos Elétricos S/A / WEG

Table 3 – Specifications of the electromechanical equipment at Rodeio Bonito SHP

The construction of Rodeio Bonito SHP started on 20th August 2007 and the work progress can be viewed at http://www.rodeiobonito.com/image_gallery_a32.html

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

Please indicate the chosen crediting period and provide the estimation of total emission reductions as well as annual estimates for the chosen crediting period. Information of the emission reductions shall be indicated using the following tabular format.

Years	**Estimation of annual emission reductions in tonnes of CO_2e**
2010	**15,374**
2011	**15,374**
2012	**15,374**
2013	**15,374**
2014	**15,374**
2015	**15,374**
2016	**15,374**
Total estimated reductions (tonnes of CO_2e)	**107,618**
Total number of crediting years	**7**
Annual average of the estimated reductions over the crediting period	**15,374**

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

The project will not receive any public funding and is not a diversion of ODA

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

According to Appendix C of the Simplified Modalities and Procedures for Small-Scale CDM projects activities, debundling is defined as the fragmentation of a large project activity into smaller parts. A proposed small-scale project activity shall be deemed to be a debundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

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

Since Rodeio Bonito Small SHP does not correspond to any of the above mentioned points, it is not a debundled component of a larger project activity.

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:

AMS – I.D - Renewable Energy Projects; Grid connected renewable electricity generation. (Version 14, EB 48).

According to approved methodology AMS-I.D, a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) shall be calculated in a transparent and conservative manner according to the procedures prescribed in the "**tool to calculate the emission factor for an electricity system".**

Assessment and demonstration of the additionality of the project is performed according to "**Attachment A to Appendix B of the simplified modalties and procedures for CDM small-scale project activities – Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories" .**

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

The Rodeio Bonito SHP qualifies under this project category as:

- the project activity is a hydroelectric power plant
- the project activity will supply electricity to the Brazilian grid which is partly supplied with fossil fuel fired generating units.

The project has an installed capacity of 14.637 MW, which is lower than 15 MW and thus the project activity qualifies as a small-scale project activity and will remain under the limits of small-scale project activity type during every year of the crediting period.

B.3. Description of the project boundary:

The project boundary encompasses the physical, geographical site of the hydropower generation source which is represented by the power plant facility and the grid to which the electricity is supplied.

The "tool to calculate the emission factor for an electricity system" recommends that given country specific variations in grid management policies, the DNA delineates the boundaries of the electricity systems in the country. According to Ministry of Science and Technology (MCT) and the Ministry of Mines and Energy (MME) of Brazil, the definition used by National Operator of the Electric System (ONS) for the Brazilian National Interconnected System (SIN) is thus applied, which defines a unique national grid The Brazilian grid is then considered a boundary as the Rodeio Bonito SHP.

B.4. Description of baseline and its development:

According to the project category and the corresponding methodology, the baseline is the energy produced by the renewable generating unit (MWh) multiplied by an emission coefficient (tCO_2e /MWh) calculated in a transparent and conservative manner as:

a) A combined margin (CM) emission factor, consisting of the combination of operating margin (OM) and build margin (BM) emission factors according to the procedures prescribed in the "Tool to calculate the emission factor for an electricity system" or,

b) The weighted average emissions (in tCO_2e/MWh) of the current generation mix. The data of the year in which project generation occurs must be used.

The Option (a), a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures 'Tool to calculate the emission factor for an electricity system' has been chosen to calculate the emission coefficient.

For the **Brazilian National Interconnected System (SIN),** the procedures to calculate CO_2 emission factors have been developed in cooperation between the **Ministry of Science and Technology (MCT)** and the **Ministry of Mines and Energy (MME)**, based on the guidelines provided by the "tool to calculate the emission factor for an electricity system", approved by the CDM Executive Board in Bonn, Germany. The CO_2 emission factors are calculated based on generation records of plants centrally dispatched by the **National Operator of the Electric System (ONS)** and, in particular, thermoelectric power plants. The ONS was responsible for explaining to the group the operation practices of the SIN, according to regulations by ANEEL (National Electrical Energy Agency). In keeping with such procedures, CO_2 emission factors have been calculated by **ONS** since January 2006, being available for the general public and investors.

For the project activity, the emission factor developed for the National grid has been adopted. The details of the baseline and the key data are available at http://www.mct.gov.br.

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:

The project fulfills all the "additionality" prerequisites (see application of "Attachment A to Appendix B of the simplified modalties and procedures for CDM small-scale project activities – Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories " hereafter referred to simply as "additionality tool," below) demonstrating that it would not occur in the absence of CDM.

The "additionality tool" is applied in order to describe how the anthropogenic emissions of GHG are reduced below those that would have occurred in the absence of the Rodeio Bonito SHP.

According to Attachment A to Appendix B of the simplified modalties and procedures for CDM small-scale project activities, evidence to why the proposed project is additionnal is offered under the following categories of barriers: (a) investment, (b) technological, (c) prevailing practice and (d) other barrier.

The result is a matrix that summarizes the analyses, providing an indication of the barriers faced by each scenario. The most plausible scenario will be the one with the fewest barriers. The first step in the process of assessing and demonstrating the additionality of the project is to list the likely future scenarios. The identified and credible alternative scenarios to the project activity are:

- **Alternative 1**: The continuation of current activities.

This scenario represents the continuation of current practices, which is electricity generation with significant participation of fossil fuel fired power plants and non implementation of the project activity.

- **Alternative 2**: The construction of the new renewable energy plant

This scenario represents the use of a new renewable source, small hydro generation plant, considered neutral in terms of GHG emissions. It will displace the higher carbon intensity electricity generated in the baseline scenario.

The barriers considered are as follows:

- Financial/economical – This barrier evaluates the viability, attractiveness and financial and economic risks associated with each scenario, considering the overall economics of the project and/or economic conditions in the country.

- Technical/technological – This barrier evaluates whether the technology is currently available, if there are indigenous skills to operate it, if the application of the technology is of regional, national or global standard, and generally if there are technological risks associated with the particular project outcome being evaluated.

- Prevailing business practice – This evaluates whether the project activity represents prevailing business practice in the industry. In other words, it assesses whether in the absence of regulations it is a standard practice in the industry, if there is experience to apply the technology and if there tends to be high-level management priority for such activities.

- Other barriers - This barrier evaluates whether without the project activity emissions would have been higher, for any other reason identified, such as institutional barriers or limited information, ,managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies.

Context

To introduce the presentation of barriers faced by investors, we will describe the regulatory instability in Brazil since 1995. Many laws and regulations were created to organize and to provide incentives for new investments in the energy sector. The timeline of the Brazilian electricity reforms were as follows[6]:

Year	Event
1988	New constitution
1995	Concession Law passed (n. 8987)
1995	IPP Law passed (n. 9074)
1995	First privatization of distribution company
1997	ANEEL established First privatization of distribution company
1998	ONS and MAE created
1999	Currency crisis Priority thermal power program announced
2001-02	Rationing period
2001-02	ANEEL's authority suspended
2003	Announcement of "new model"
2004	First old energy auction
2005	Second old energy auction

Table 4: Brazilian reforms

Although the new model reduces market risk, it ability to encourage private investment in the electricity sector will depend on how the regulatory framework is implemented. There are several perceived uncertainties and risks such as:

- Risks of regulatory failure as the government has a considerable role in long-term planning
- Rules need to be designed for the transition from the current to the new model to allow current investments to be rewarded adequately
- Price volatility may increase in the short-term electricity market in turn bringing about higher investment risk
- The high share of hydropower in Brazil's energy mix and uncertainty over rainfall also contribute to higher volatility of the short-term electricity market.

Some of the inherent insitutional barriers for private investors as summarized by Claudio J.D. Sales, Presidente, Instituto Acende Brazil are shown in Fig 2. According to him, the barriers are lack of transparency of regulatory organizations, energy auction with unstable rules and delays in environmental clearances.

[6] Source: Oliveira *et al*, 2005. The IPP Experience in the Brazilian Electricity Market. Working Paper 53. Program on Energy and Sustainable Development.

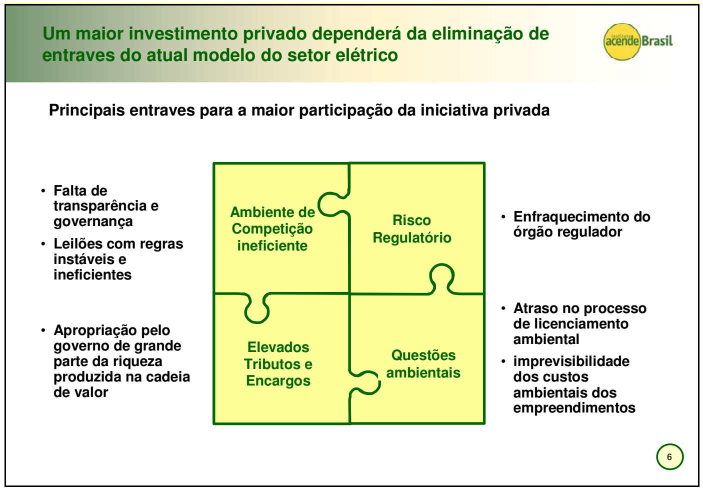

Figure 2: Barriers to private section participation in energy sector. Source: Instituto Acende Brazil[7]

With regards to **financial/economical** barriers faced at the time the decision of implementing the project was taken:

- The continuation of current practices (Alternative 1) does not pose any financial/economical barrier to the project developer, and requires no further financing;

- The construction of a renewable energy plant (Alternative 2) faces specific financial/economical barriers: especially lack of funds and lack of long-term debt financing that make the project activity not attractive enough for a private investor. Hence, in this alternative the project activity would not have been commissioned and the corresponding power would have been produced from significant participation of existing and new fossil fuel units of the Brazilian grid (case of alternative 1).

To be more specific about barriers faced by Alternative 2, we have to underline that Brazil is suffering from a considerable **lack of funds** in order to finance its infrastructures. According to the financial community (World Bank[8]), investment in infrastructure in Brazil is running at about 1 per cent of gross domestic product, far from the 3.2 per cent required to prevent further deterioration of structures and services, assuming annual GDP growth of only 2 per cent. This lack of investment in the infrastructural sector is partly due to the fact that long-term debt market in Brazil is not developed for small and middle private developers. Domestic credit offered to the private sector is quite low compared to other countries. It is about 30% of GDP, around one-third of which consists of loans extended by public-sector banks[9]. Domestic credit is scarce, expensive and concentrated on short term maturities.

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[7] http://www.acendebrasil.com.br/archives/files/20070418_Fecomercio_v2.pdf

[8] World Bank, 2007. Brazil How to Revitalize Infrastructure Investments in Brazil; Public Policies for Better Private Participation (In Two Volumes) Volume I: Main Report

[9] Deutsche Bank Research Brazil: O país do futuro? Economic scenarios for the next 15 years. World http://www.dbresearch.com/PROD/DBR_INTERNET_EN-PROD/PROD0000000000199361.pdf

There is lack **of long-term debt financing** from commercial banks to small and medium investors. The National Development Bank – BNDES is the only supplier of long-term loans and other private debt providers such as pension funds, insurance companies and mutual funds are investing mostly in public bonds[10]. The lack of local long-term financing results from the reluctance of creditors and savers to lengthen the term of their investments. There are several reasons explaining the difficulties faced by the long-term debt market in Brazil. First of all, the volatility of the interest rates in Brazil has been very high over the last decades. The SELIC Rate, main interest rate index in Brazil, has varied from a minimum of 15.07% p.a. in December 2007 to a maximum of 45% p.a. in March 1999[11]. As a consequence, the credit market is dominated by shorter maturities (90-days to 1-year). Savers generally opt for the most liquid investments and place their money in short-term government bonds instead of investing in long-term opportunities such as infrastructural projects. The most liquid government bond is the LFT (floating rate bonds based on the daily Central Bank reference rate). As of January of 2006, 37% of the domestic federal debt was in LFTs. Thus credit is restricted to the short-term in Brazil or the long-term in dollars offshore (Arida *et al*., 2004[12]). The high share of debt maturing within one year (36% of the total amount of securities held by the public), the relatively short average maturity of fixed rate bonds and the significant share of floating rate debt indicate the exposure to higher short-term interest rates and/or refinancing risk in the country (Amante *et al* 2007)[13]. Long-term credit lines are available only to the strongest corporate borrowers and for special government initiatives which can provide sufficient guarantees.

Private developers with limited financial resources are not able to set-up debt-leveraged structure for financing their projects. **High levels of guarantees** are required to obtain finance for energy projects in Brazil, which is a barrier for developing new projects. Insurance, financial guarantees, financial advisories are requirements that increase the cost of the project and are barriers to the projects' economics. The other guarantees required are maintenance of a minimum capitalization index, maintenance of a minimum working capital index, maintenance of minimum debt coverage index, restriction regarding shareholders dividend payment, restriction regarding taking new debts, acquiring term debt bonds with minimum fixed interests assured by developer equivalent to inflation indexer of energy trade contract plus 10% annual earning margin over invested values[14]. Also, the project is generally not financed on a project finance basis, and the developer is exposed to an extra financing risk.

To emphasize the difficulty to finance such projects, one can mention the Governement created the PROINFA Federal Government Program to try to respond to that diffculty. The program provides long-term PPAs and special financing conditions. Rodeio Bonito SHP did not participate to this program

[10] Brazil 2015: A reform agenda, Armando Castelar Pinheiro Seminar at the Inter American Development Bank, Washington, October 4, 2005

[11] http://www.bcb.gov.br/?SELICMES

[12] Arida, P., Bacha, E.L., Resende, A.l. 2004. Credit, Interest, and Jurisdictional Uncertainty: Conjectures on the Case of Brazil. In F. Giavazzi, I. Goldfajn e S. Herrera (orgs.), Inflation Targeting, Debt, and the Brazilian Experience, 1999 to 2003. Cambridge, MA: MIT Press.

[13] André Amante, Márcio Araujo and Serge Jeanneau (2007). The search for liquidity in the Brazilian domestic government bond market. BIS Quarterly Review, June 2007.

[14] Alencar, C.T. and Filho, F.L. (2006). Risk mitigation for the private power projects investors in Brazil – The Guarantees Structure. CIB W107 Construction in Developing Countries International Symposium.

because the developer considered BNDES guarantees requirement for project financing rather excessive. Although this might be the Bank procedure to mitigate risk as a financing institution, it is understood as a financial barrier. Moreover, the Brazilian Government enacted a decree in 2006 establishing that all "PROINFA CERs" would not belong to the project developer. As the developer had already considered the incentive of carbon credits, Rodeio Bonito SHP did not participate to the program.

In Brazil, PROINFA was initiated to give incentive to alternative sources of electricity to increase the renewable energy source share in the Brazilian electricity profile. The Brazilian government has committed a large monetary fund in order to develop this plan. As a matter of comparison, in the PROINFA supporting program, most of the selected projects have not yet been commissioned. Only half of the projects are now running or are under construction. This shows again that even with a solid support from the federal state, private promoters faces financial difficulties while developing their projects.

Applied SHP projects		**Selected SHP projects**		**Contracted SHP projects**		**SHP Projects under construction**		**SHP Projects under operation**	
Nbr	MW	Nbr	MW	Nbr	MW	Nbr	MW	Nbr	MW
104	1,924	81	1,410	65	1,189	26	799	9	154

Table 5: Situation of the PROINFA program on Dec 2006[15].

Of the 81 SHP which were initially selected by the PROINFA program, less than half of them came through. The decision of the federal government to postpone to December 2008 the deadline of operation of the selected projects under PROINFA and also to increase the finance leverage from 70% to 80% enlightens the difficulties project developers are currently facing[16].

Regardless of the risks and barriers mentioned above, the main reason for the reduced number of similar project activities is **the economic cost**. Project feasibility requires a PPA contract with a utility company, but such utilities do not have the incentives or motivation to buy electricity generated by small hydro projects. Most of the developers that funded their projects outside of PROINFA have taken CDM as decisive factor for completing their projects. Therefore, as far as we know, the vast majority of similar projects being developed in the country are participating either in PROINFA Program, or CDM. To illustrate this point, we compiled data of small hydro PROINFA projects and CDM projects, on the beginning of year 2008. By that time, 542.5 MW of SHP has applied for CDM[17], while, 816.5 MW of SHP projects are being constructed with PROINFA.

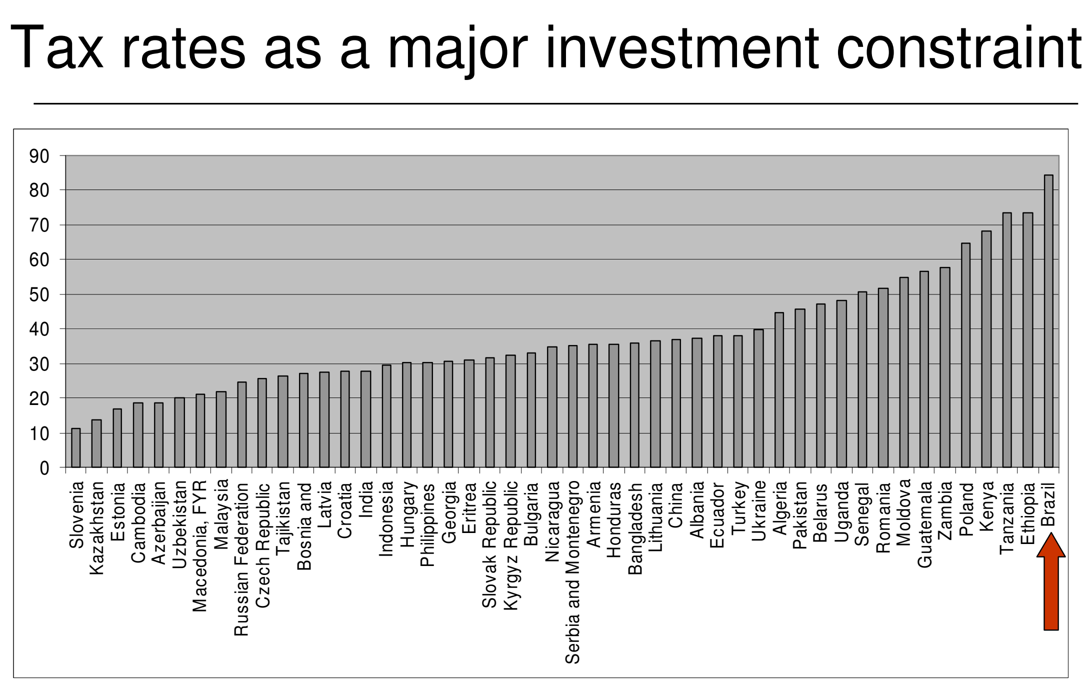
By the time the project developer decided to implement the project activity, **inflation uncertainty** was very high in Brazil. Inflation uncertainty leads to uncertainty of costs, interest rates, taxes, depreciation,

[15] http://www.fundacionbariloche.org.ar/idee/taller%20renovables/panel%205/Bermann.pdf

[16] Berman 2007. *As novas energias no Brasil* – inclusão social e programas de governo. Rio de Janeiro: Fase, 2007

[17] Current status of the project activities under the CDM in Brazil and the world. Last compilation from the UNFCCC webpage: February 19, 2008. http://www.mct.gov.br/upd_blob/0023/23251.pdf

monetary policy, etc[18]. The interest rate spread and tax rates are very high compared to other countries (Fig 3)[19]. This is evidenced by the fact that the country's tax burden has risen steadily in recent years to reach about 37 per cent of gross domestic product. Brazil's complicated tax system is a huge impediment to doing business in the country. A recent World Bank report found that it took a typical company in Brazil 2,600 hours a year to pay its taxes - putting the country in last place among 177 countries surveyed[20].



Source: World Bank, WDI 2005.

Note: Measures the share of senior managers interviewed in World Bank–sponsored Investment Climate Surveys who ranked tax rates as a major or very severe investment constraint.

Figure 3: Taxes rates in Brazil compared to other countries (World Bank, 2005)

There are other issues in the financial market that contributes to make interest rate spreads one of the highest in the world. Market volatility, jurisdictional uncertainty, insufficient competition among the financial institutions and high taxes are some of the issues that prevent the growth of investment in private sector. Under inflation uncertainty, risk averse agents require a risk premium to buy nominal bonds, which rises the cost of capital and depresses investment. Thus inflation uncertainty ranks very high on private developer’s concerns.

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[18] Banco Central Do Brazil Working Paper Series 157. Is the investment-uncertainty link really elusive? The harmful effects of inflation uncertainty in Brazil, 2007.http://www.bcb.gov.br/pec/wps/ingl/wps157.pdf

[19] World Bank, WDI, 2005

[20] Financial Times, http://www.ft.com/cms/s/0/813132d8-e40c-11dc-8799-0000779fd2ac.html

Moreover, although Rodeio Bonito has been authorized by ANEEL in 2004, the previous promoter had kept the licence inactive for 3 years. During this latency time the prices of construction and equipments have been increasing considerably, degrading the financials of the project further[21] (Fig 4).

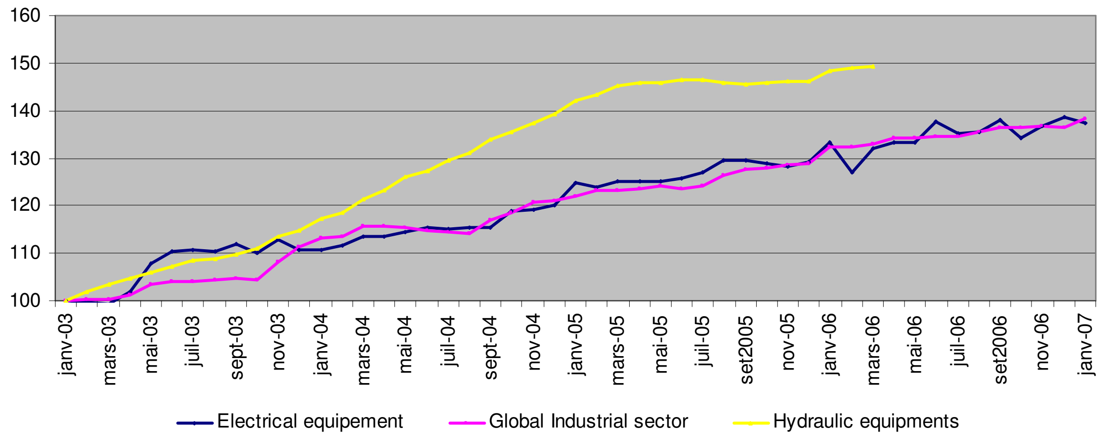


Figure 4: Indices 100 (base Jan. 2003) of the construction and equipment costs (www.abimaq.org.br)

To further demonstrate this investment barrier, the project participant provided an investment analysis of Rodeio Bonito project. The IRR is the annualized effective compounded return rate which can be earned on the invested capital, i.e., the yield on the investment. A project is a good investment proposition if its IRR is greater than the rate of return that could be earned by alternate investments, in this case represented by the benchmark value. Shareholders IRR will be used as project financial indicator and as reference to represent the standard returns in the market the Brazilian interest rate will be used, known as *SELIC* (Special System of Clearance sale and of Custody).

SELIC is a great computerized system, under the responsibility of the Central Bank of Brazil and of the National Association of the Institutions of the Open Markets, since 1980, when it was created. The Committee of National Monetary Politics (COPOM) stipulates SELIC Target that can be defined as the average rate of the daily financings, with ballast in federal titles, select in the Selic System, which is in force for the whole period among ordinary meetings of the Committee.

The SELIC rate is cleaned in the SELIC System and obtained by the calculation of the considered and adjusted medium tax of the financing operations by one day, ballasted in federal public titles and studied in referred him system or in clearing house and clearance sale of assets. The operators of the institutions transfer SELIC, on line, the relative businesses to public titles involving banks that buy and that you/they sell those titles. Therefore, the Selic rate is the rate that remunerates the investors in the purchase business and sale of public titles. The qualified financial institutions, such as banks, savings banks, society's brokers of titles and values furniture, distributing societies of titles are capable to make this kind of operation. The most liquid government bond is the LFT (floating rate bonds based on the daily reference rate of the Central Bank of Brazil).

[21] www.abimaq.org.br

As of January 2006, 37% of the domestic federal debt was in LFTs and had duration of one day (Source: Tesouro Nacional; www.tesouro.fazenda.gov.br). This bond rate almost follows the CDI rate, which is influenced by the SELIC rate, defined by COPOM.

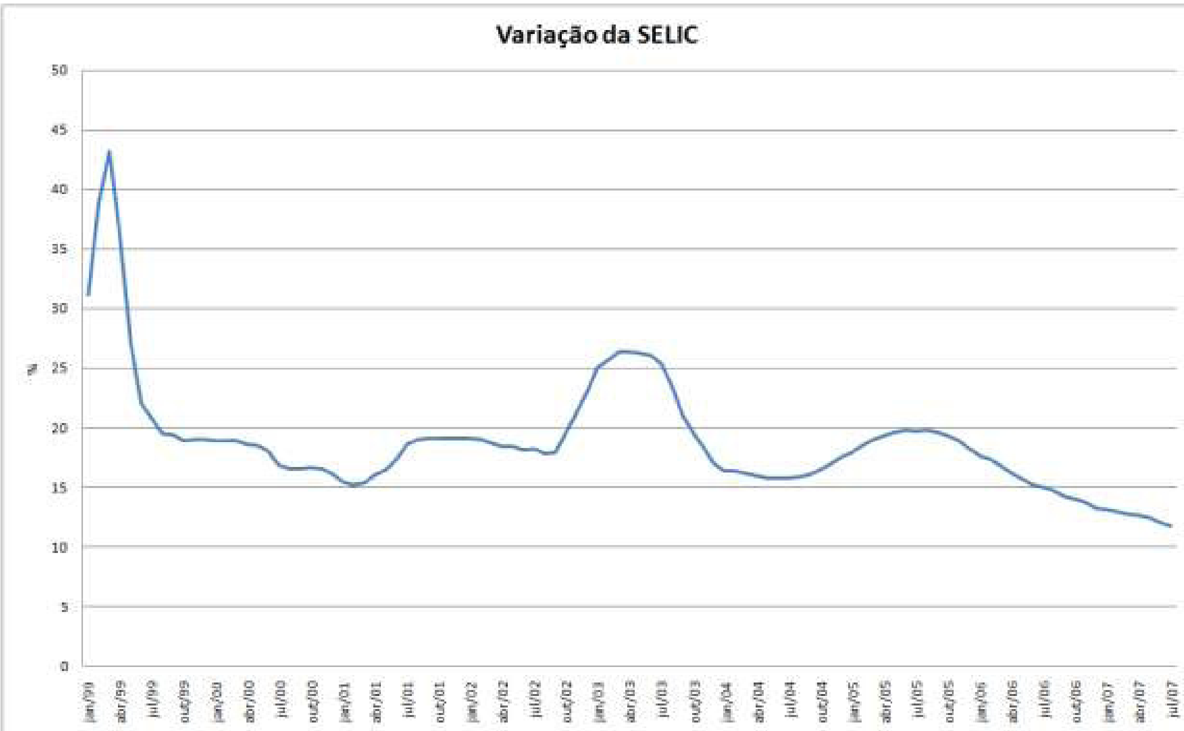


Figure 5: Variation of SELIC rate
(Source: Banco Central do Brasil)

In order to be conservative, the average value of 2 years before the investment decision will be considered. The investment decision date considered is the one of the "Board of directors", 18th of June of 2007. At this date were available updated values of the most important investment costs, as mentioned in the document, and the project investment analysis was finalised. From July 2005 to June 2007, the average value for the SELIC was 15,5 % (see Figure 5). This value is conservative considering the decreasing trend of SELIC initiated in April 2005 and that has continued until March 2008, and the average values of SELIC in 2006 (14,9%).

The cash flow provided by the project participant was verified by external auditors and present an IRR value of 13,3 % without carbon credits revenues. This value is 2,2 % inferior to the benchmark value.

To quantify the impacts of carbon credits on the IRR, the value of 15 Euros per carbon credit was considered, which is conservative in comparison with the auction of carbon credits done by the city of São Paulo (16,2 Euros per CER in 2007, 19,2 Euros in 2008[22]). Furthermore, the average value of exchange rate on the July 2005-June 2007 period (2,74 BRL/EUR) was taken into account. The value of

[22] http://noticias.ambientebrasil.com.br/noticia/?id=40914

emission factor considered was the one of the south subsystem of the Brazilian Grid in 2006.Considering these hypotheses, the value of IRR of the project with carbon credits revenues is 15,9%, which is 2,6% superior to the value of IRR of the project without carbon credits revenues (13,3%). This value is also 0,4 % superior to the benchmark considered as well. These 2 facts underline clearly the relevance and the importance of the incentive of carbon credits.The input values of the financial analysis presented in the PDD are supported either by third-partydocuments or official documents issued by governmental bodies, such as the National Electricity Agency - ANEEL. The parameters taken from the third-party documents reflect the actual economic situation of the project at the time of decision making; these documents were made available to the validator.

To turn the benchmark analysis more consistent a sensitivity analysis was conducted by altering the following parameters:

- Electricity generation increase;
- Electricity tariff increase;
- O&M costs reduction;
- Investment reduction.
- These parameters were selected as they are the most likely to fluctuate over time. Highest possible variation values are supported by studies, article or even by technical conditions.

If the highest potential variation value for any parameter is higher than the alteration necessary to make the project feasible, then there is theoretically a possible scenario that makes the project feasible. Table 5 presents the results of the sensitivity analysis.

Parameter	Variation necessary to feasibility	Highest potential variation	IRR considering the highest potential variation
Tariff price	15%	10%	14,8%
Investment costs	-16%	-5%	14,0%
Electricity generated	18%	10%	14,6%
O&M costs	-85%	-50%	14,6%

Table 5: Sensitivity analysis

The highest potential variation value consideredfor the electricity generation is represented by an increase of 10 % of thet annual output of the Project. This would imply values of flows of the Irani river 10 % higher thanthe average of the historical values of flows ans this over a period of 25 years, which is highly unlikely.

The highest possible variation value for the electricity tariff is based on a study which evaluates the electricity tariff in 2006 and 2007 in the Host Country. The variation value was set to 10%, given that all prices observed were inferior to the value retained in the financial model, which demonstrates conservativeness of the model.

Specific for this project, O&M cost is not a critical parameter. Even considering O&M costs with a reduction of 50%, the IRR of the Scenario 2 is lower than the benchmark.

The highest possible variation value for investments is based on an external documents that present average data for invested value of a Small Hydropower Plant per MW. All available data present values superior to the value retained in the model. As a result, the highest possible variation was set to -5%.

After conducing the investment and sensitivity analysis, it can be concluded that the Alternative 2 faces significant investment barriers that would prevent its implementation, and that the project activity *cannot be considered as financially attractive*.

In this context of financial/economical barrier, the incentive of carbon credits provided the project participant not only with the required level of confidence on the viability of our project but also with a visibility which allows us to raise the required funds on the market. Along with the direct financial support of CDM for project implementation, which is part of all projects developed by Velcan Energy group, the project promoter considers CDM also as a support in funds rising.

Since 2005, private investors worldwide have invested in the company partly because of the carbon component of our company profile. It is clearly shown that since 2005 investors focus on carbon commodity market. Without CDM potential of our projects, attractiveness of our company for private placements would not be as high as it is today and funds for project implementation would not be sufficient. For small and medium size IPP over the world, CDM has become a clear advantage for visibility and also, an important bonus for private funding by shareholders.

With respect to **technical/technological** barriers:

- In the case of Alternative 1 (continuation of current practices), there are no technical/technological barriers as this simply represents a continuation of current electricity generation practices which have been shown to work, and does not involve implementation of any new technology or innovation.

- Alternative 2 faces no **technical/technological** barrier.

With respect to **the analysis of prevailing business practice**:

- The continuation of current practices (Alternative 1) presents no particular obstacles. This is by definition prevailing practice in the region.

- In the case of Alternative 2, there are barriers that would have to be overcome. The common practice in Brazil in the power sector has been the **construction of large-scale hydroelectric plants and, more recently, of thermal fossil fuel plants**, with natural gas, which also receive incentives from the government.

It is clear that large scale hydroelectricity is and will continue as the main source for the electricity base load in Brazil. With discoveries of vast reserves of natural gas in the Santos Basin in 2003 the policy of using natural gas to generate electricity remains a possibility and it will continue to generate interest from private-sector investors in the Brazilian energy sector.

The Figure 6 clearly demonstrates that added generation capacity in Brazil is composed by thermal power plants and large hydropower plants and not by small hydropower plants that represent a non significant part of these new units (in average, SHP represent 3,7% of new generation capacity over the period 2002-2005).

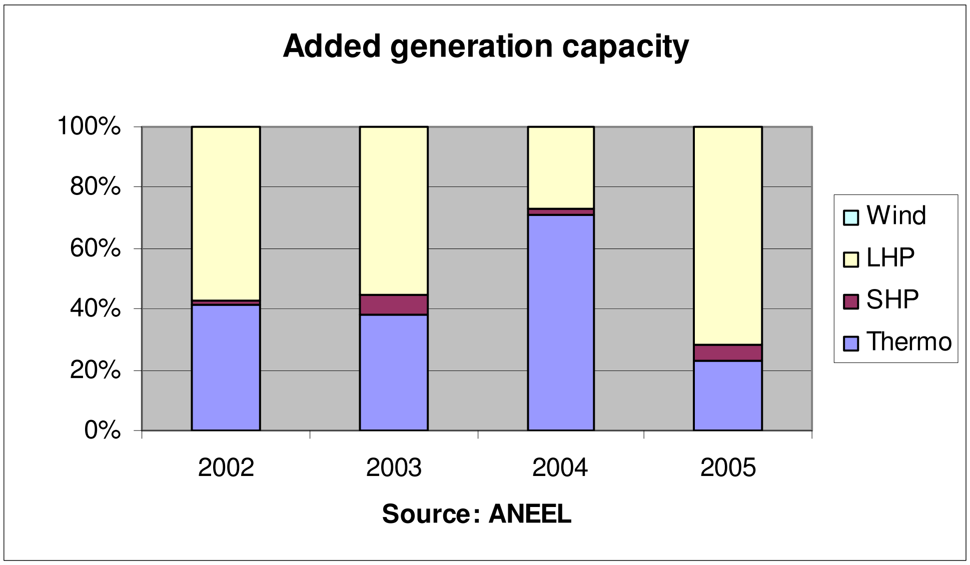


Fig 6: Added generation capacity (GW)

Brazil has a total of 1,688 plants in operation generating 100,473,260 kW of power, of which 74.58% is from large-scale hydroelectric plants. There are 292 small hydro-electric power plants (SHP) generating 1,819,247 kW thus accounting for only 1.81% of the generation[23]. Already 21.25% of the power generated in the country comes from thermal power plants, and this number will tend to increase in the following years, since 51.7% of the generation capacity approved between 1998 and 2008 are thermal power plants (compared to only 12.64% of SHPs).

At the south subsystem, where the project is located, the generation system has an installed capacity of 33,329 MW. Large hydro and thermal power constitutes 87% and 11.6% respectively, showing that SHP constitutes a very small fraction[24]. In the state of Santa Catarina, the electricity generation from SHP is 3.2% of total generation. Large hydro projects and thermoelectric power accounts for 78% and 18% of total generation respectively[25]. These figures show that interests for the construction of thermal power plants have been more important than those for SHPs and that the trend in terms of energy generation is not in SHP construction.

To further demonstrate the project activity is not a common, practice, the project participant analyzed other activities similar to the proposed project activity and that have occurred by the time of the project decision phase in the South region of Brazil, where is implemented the project activity. Then, it can be

[23] http://www.aneel.gov.br/aplicacoes/capacidadebrasil/GeracaoTipoFase.asp?tipo=5&fase=3

[24] Plano decenal de expansão de energia elétrica 2006 – 2015 (MME/EPE)

[25] http://www.aneel.gov.br/aplicacoes/ResumoEstadual/CapacidadeEstado.asp?cmbEstados=SC:SANTA%20CATARINA

identified the small hydros that have incentives (Proinfa and/or CDM) or not, in order to further substantiate the need of incentives.

In the Table 6, Project participant present operations start of SHPs from 2005 to 2007 (source ANEEL 2007, UNFCCC 2007).

Started operations in 2005 / South Region (PR, SC, RS)															
Name	**State**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**CDM**	**Proinfa**
Cristalino	PR								4					X	
Furnas do Segredo	RS										9,8			X	
Santa Clara I	PR								3,6					X	
Santo Antônio	RS										4,5				
Partial total (MW)		0	0	0	0	0	0	0	7,6	0	14,3	0	0		
Total (MW)		21,9													

Started operations in 2006 / South Region (PR, SC, RS)															
Name	**State**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**CDM**	**Proinfa**
Carlos Gonzatto	RS				9,0										X
Esmeralda	RS												22,2		X
Fundao I	PR												2,5	X	
Rio Palmeiras I	SC							1,5							
Rio Palmeiras II	SC											1,4			
Sao Bernardo	RS								15,0						X
Partial total (MW)		0,0	0,0	0,0	9,0	0,0	0,0	1,5	15,0	0,0	0,0	1,4	24,7		
Total (MW)		51,6													

Started operations in 2007 / South Region (PR, SC, RS)															
Name	**State**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**CDM**	**Proinfa**
Caju	SC						3,2								
Contestado	SC												5,6		
Coronel Araujo	SC												5,6		
Faxinal dos Guedes	SC		4,0											X	
Flor do Sertao	SC							16,5							X
Ludesa	SC								30,0						X
Mafras	SC											2,2			
Santa Laura	SC										15,0				X
Salto Santo Antônio	SC									1,7				X	
Partial total (MW)		0,0	4,0	0,0	0,0	0,0	3,2	16,5	30,0	1,7	15,0	2,2	11,1		
Total (MW)		83,7													

Table 6: Operations starting of SHPs from 2005 to 2007 in Southern region of Brasil

In terms of numbers of SHPs, there were 19 SHPs that started operations from 2005 to 2007 in the Southern region of Brasil, where 12 received some kind of incentives. In terms of installed power, it represents 85% of the total 157.2 MW. All he 7 SHPs that started operations in this period in the South region and that are not receiving benefits neither from Proinfa nor from the CDM have a much smaller capacity than the project activity. Therefore they are definitely not comparable.

For the specific year of 2007, when Rodeio Bonito started construction, among the 9 SHPs that started operations, 5 received incentives. In terms of installed capacity, it represents 80 % of the total 83.7 MW.

The other 4 SHPs that did not receive incentives have less than 5,6 MW of installed capacity. Then, due to technical characteristics very different, those SHPs cannot be compared with the proposed project activity with almost 15 MW of installed capacity. As an example, for the project Contestado of 5,6 MW, the height of the dam is 3m (source: www.eletrisa.com.br), which is definitely not comparable with the height of Rodeio Bonito dam which is around 27 m and the investment induced.

Considering information above, the majority situation of small hydro projects in Brazil is the implementation of this type of project with some kind of incentives considering that operating units that started operations in southern region of Brasil in 2007, 80% of their installed capacity came from plants implemented with incentives. Thus, it is clearly demonstrated that the project activity is not a common business practice.

With respect to **other** barriers:

- **Alternative 1** faces no other barrier.

- In the case of **Aternative 2**, the transmission line which will have to be built between the project activity and the substation of the grid goes through the city of Chapeco. This would create NIMBY ("Not in my backyard") effects, which represents a risk for the development of the project.

The electricity generated by the project activity will be conveyed by a 69 kV transmission line. The distance between the substation and the site of the project activity is approximately 15 kilometers. The specificity of this transmission line is that one third of the total length is in urban area, through the city of Chapeco, over a distance of approximately 5 kilometers. The transmission line will be composed on 86 pylons made of concrete, among which 26 will stand in the city of Chapeco.

The layout of a part of the transmission line in Chapeco could create NIMBY ("Not in my backyard") effects. NIMBY is the term given to local opposition to development proposals of goods of public interest that are perceived by the local population as a threat (such as landfill sites, incineration plants, electrical transmission lines). This potential local opposition could result in delays in the development of the project, in the need of financial compensation and was considered as a risk by the project developer.

Barriers Evaluated		Alternative 1 Continuation of current activities	Alternative 2 Construction of a new plant
1	Financial / Economical	No	**Yes**
2	Technical / Technological	No	No
3	Prevailing Business Practice	No	**Yes**
4	Other barriers	No	**Yes**

Table 7: Summary of barriers analysis

To conclude, the prevailing business practice in Brazil as well as obtaining financing and financial guarantees to project are barriers to investment in renewable energy projects in the country. The access of long-term funding for renewable energy projects is difficult, mainly because of the guarantees needed and the lack of a real project finance structure. The high cost of capital in Brazil is a barrier for projects to be developed. As an example, a quick analysis over the installation of small hydro power plants in Brazil since 2001, shows that the incentives for this source were not effective, indicating a market/financial barrier.

The barrier analysis shows that the most plausible scenario is the continuation of current practices i.e. continuation of the electricity generation from the increasing fuel fossil intensive grid. The project scenario will displace grid electricity from an increasing carbon-intensive source, resulting in significant GHG emission reductions. This project cannot be considered as a common practice and therefore is not a business as usual type scenario. And it is clear that, in the absence of the incentive created by the CDM; this project is not the most attractive scenario. Therefore, baseline and project scenarios are defined as follows:

- The **Baseline Scenario** is the continuation of current practices.

- The **Project Scenario** is the construction of a new hydroelectric power plant (14.637 MW). The new plant will displace grid electricity from a more carbon-intensive source, resulting in significant GhG emissions reductions. The Project Scenario is additionnal in comparison to the Baseline Scenario, and therefore eligible to receive Certified Emissions Reductions (CERs) under the CDM.

CDM approval and barrier analysis

Despite the barriers faced by the project, the project participant decided to make the investment as part of the company's global effort to increase its portfolio in Brazil and elsewhere. The company decided to approve the project based on criteria such as the type of energy source and CER revenues. It is worth mentioning that all the projects developed by the company are renewable energy generation projects, and that the incentive of CERs revenues is part of the business model of the company since its creation. As a result, the incentive of CERs revenues has been critical for Board approval of the industrial investment before the project's starting date (as included in the Board of director's meeting memo, dated 18/06/2007).

Additional real actions to continue the activity as CDM included the inclusion of this project activity in the pipeline of ongoing CDM initiatives being executed by the project participant in Brazil, the preparation of an adequate PDD; the hiring of DNV as the validator for the project activity, and, the account of carbon credits by Velcan's financial team for the valuation of the project. The timeline for these actions are included in the table below

Action	Start date
Inclusion of project in Velcan's development and carbon pipeline	11/2006
Initiation of the PDD development	04/2007
Velcan's board approval of the industrial investment	06/2007
Construction start	08/2007
Quotation of validator	12/2007
DNV validation	04/2008

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

According to the "tool to calculate the emission factor for an electricity system", the following procedures will be applied to calculate project emissions, baseline emissions, leakage emissions and emission reductions to the project activity.

Project emissions

For hydro power project activities that result in new reservoir, project emissions are estimated as follows:

(a) If the power density (PD) of power plant is greater than 4 W/m^2 and less than or equal to 10 W/m^2:

$$PE_y = \frac{EF_{Res}.TEG_y}{1000}$$

Where:

PEy = Emission from reservoir expressed as tCO_2e/year
$EFRes$ = is the default emission factor for emissions from reservoirs, and the default value as per EB 23 is 90 Kg CO_2e /MWh.
$TEGy$ = Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year y (MWh).

(b) If the power density (PD) of the power plant is greater than 10 W/m^2:

$$PE_y = 0$$

The power density of the project activity is calculated as follows:

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}}$$

Where:

PD = Power density of the project activity, in W/m^2.
Cap_{PJ} = Installed capacity of the hydro power plant after the implementation of the project activity (W).
Cap_{BL} = Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero.
A_{PJ} = Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m^2).
A_{BL} = Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2). For new reservoirs, this value is zero.

Baseline emissions

The procedures to calculate CO_2 emission factor for Brazilian grid has been developed in cooperation between MCT and MME, based on the guidelines provided by the "**tool to calculate the emission factor for an electricity system",**approved by the CDM Executive Board in Bonn, Germany.

The calculation of operating margin is calculated based on the dispatch data analysis OM and the build margin which is made available annually. It is available for the year 2006, 2007 and will be available ex-post for each year in which project occurs. The baseline emission factor is calculated as the weighted average of the operating margin emission factor and the build margin emission factor. The weights, by default, are 0.5 for OM and BM. The emission factor for the brazilian national system will be applied.

The details of calculation of operating margin emission factor, built margin, calculation of baseline emission factor, definition of subsystem, detailed description of the methodology and the parameters and data used in calculations of emission factor can be found at www.mct.gov.br

Leakage

The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction, fuel handling (extraction, processing, and transport), and land inundation. Project participants do not need to consider these emission sources as leakage in applying this methodology.

Emission reductions

Emission reductions are calculated as follows:

$$ERy = BE_y - PE_y - LE_y$$

Where:

ERy = Emission reductions in year y (t CO_2e/yr)
BEy = Baseline emissions in year y (t CO_2e/yr)
PEy = Project emissions in year y (t CO_2/yr)
LEy = Leakage emissions in year y (t CO_2/yr)

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

Data / Parameter:	**Area**
Data unit:	Km^2
Description:	Reservoir surface at maximum level
Source of data used:	ANEEL Resolution
Value applied:	0.838 Km^2
Justification of the choice of data or description of measurement methods and procedures	It will be used to calculate the power density of the reservoir. It has impact on the applicability of the methodology and on the calculation of the Certified Emission Reductions of the project activities.

actually applied :	
Any comment:	This data is measured once at the beginning of the project.

Data / Parameter:	**Installed Capacity**
Data unit:	MW
Description:	Project activity installed capacity
Source of data used:	ANEEL Resolution and the detailed project report
Value applied:	14.637
Justification of the choice of data or description of measurement methods and procedures actually applied :	It is used to calculate the power density of the reservoir. It is also used to calculate the Certified Emission Reductions of the project activity, as the calculation of assured electric energy depends on this data.
Any comment:	

Data / Parameter:	w_{OM}
Data unit:	%
Description:	Weighting of operating margin emissions factor
Source of data used:	"Tool to calculate the emission factor for an electricity system" (Version 1.1/EB35).
Value applied:	50
Justification of the choice of data or description of measurement methods and procedures actually applied :	This value was selected because the project activity does not consist on wind nor solar energy generation
Any comment:	---

Data / Parameter:	w_{BM}
Data unit:	%
Description:	Weighting of operating build emissions factor
Source of data used:	"Tool to calculate the emission factor for an electricity system" (Version 1.1/EB35).
Value applied:	50
Justification of the choice of data or description of measurement methods and procedures actually applied :	This value was selected because the project activity does not consist on wind nor solar energy generation.
Any comment:	---

B.6.3 Ex-ante calculation of emission reductions:

Project emissions

Even if AMS ID does not recommend any calculation for reservoir emissions, in order to have conservative assumptions, we applied project emissions calculations for reservoirs as recommended by ACM0002. According to ACM0002, new hydro electric power projects with reservoirs, shall account for project emissions. The power density (W/m^2) of the project activity is as follows:

PD = Power density of the project activity, in W/m^2.
Cap_{PJ} = 14.637 MW
Cap_{BL} = For new hydro power plants, this value is zero.
A_{PJ} = 0.838 km^2
A_{BL} = For new reservoirs, this value is zero.

$$PD = \frac{14.637}{0.838} = 17.5 \text{ MW/km}^2 = 17.5 \text{ W/m}^2$$

The power density is greater than 10 W/m^2 and hence, $PE_y = 0$

Baseline emissions

Baseline emissions BE_y are calculated which is the electricity supplied by Rodeio Bonito SHP to the grid times the CO_2 average emission rate of the estimated baseline.

(1) $$BE_y = EG_{PJ,y} \cdot EF_{grid,CM,y}$$

Where:

$EG_{PJ,y}$ Electricity supplied to the grid by the project activity in the year "y" (75,997 MWh/yr).

$EF_{grid,CM,y}$ Emission factor for Brazilian National Electric Grid (SIN) in year y (0.2023 tCO_2/MWh for year 2006, as can be seen here below in table 8). (based on values published by the Brazilian DNA, Inter-Ministerial Commission for Climate Change). $EF_{grid,CM,y}$ will be monitored *ex-post*

The Rodeio Bonito SHP is expected to generate around 77,059 MWh/year as shown below, implying a PLF of approximately 60%:

Month	Average Power Generation (MW)[26]	Total Generation (MWh)	Electricity supplied to the grid (MWh)[27]
Total	**8.79**	**77,059**	**75,997**

The dispatch data analysis OM and BM is used to calculate the emission factor for the project activity. For the dispatch data analysis, one needs to use the year in which the project activity displaces grid electricity and update the emission factor annually during monitoring. The Ministry of Science and Technology of Brazil http://www.mct.gov.br will provide the hourly and monthly average emission factor for OM and yearly emission factor for BM for the national grid. This combined margin emissions factor of dispatch data analysis OM and yearly BM will be calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times W_{OM} + EF_{grid,BM,y} \times W_{BM}$$

Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year y (tCO_2/MWh)
W_{OM} = Weighting of operating margin emission factor (50%)
W_{BM} = Weighting of build margin emissions factor (50%)

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
OM	0,3218	0,3462	0,3373	0,2752	0,3173	0,3058	0,3507	0,3360	0,3834	0,3598	0,2651	0,2802
BM	0,0814	0,0814	0,0814	0,0814	0,0814	0,0814	0,0814	0,0814	0,0814	0,0814	0,0814	0,0814
CM	0,2016	0,2138	0,2094	0,1783	0,1993	0,1936	0,2160	0,2087	0,2324	0,2206	0,1732	0,1808

Table 8: OM and BM published by MCT for 2006

The value calculated for 2006 is 0.2023 tCO_2/MWh.

Leakage

As mentioned in section B.6.1, leakage is zero.

Emission reductions

Emission reductions for the Rodeio Bonito SHP is

$$ER_y = 15,374 - 0 - 0 = 15,374\ tCO_2$$

[26] Average generation (MW) per month considering the technical availability and the environmental flow

[27] 0.5% line losses and 0.88% auto consumption

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

Year	Estimation of project activity emissions (tonnes of CO2e)	Estimation of baseline emissions (tonnes of CO2e)	Estimation of leakage (tonnes of CO2e)	Estimation of overall emission reductions (tonnes of CO2e)
Year 1 (2010)*	**0**	**15,374**	**0**	**15,374**
Year 2 (2011)	**0**	**15,374**	**0**	**15,374**
Year 3 (2012)	**0**	**15,374**	**0**	**15,374**
Year 4 (2013)	**0**	**15,374**	**0**	**15,374**
Year 5 (2014)	**0**	**15,374**	**0**	**15,374**
Year 6 (2015)	**0**	**15,374**	**0**	**15,374**
Year 7 (2016)	**0**	**15,374**	**0**	**15,374**
Total (tCO2e)	**0**	**107,618**	**0**	**107,618**
*Start date is 1st January 2010				

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

Data monitored and required for verification and issuance will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

B.7.1 Data and parameters monitored:

Data / Parameter:	**Electricity supplied by the project activity to the grid (EGy)**
Data unit:	MWh
Description:	Energy metering connected to the grid and the annual energy generation report
Source of data to be used:	Energy meter and receipt of electricity purchase
Value of data	75,997 MWh/year
Description of measurement methods and procedures to be applied:	Electricity delivered to the grid will be monitored by the project (seller) and by the electricity buyer through electricity meter connected to the grid and through sales receipt (crosschecking). This data will be recorded on an hour to hour basis for calculation of emission reductions (hourly measurement and monthly recording).
QA/QC procedures to be applied:	Energy metering QA/QC procedures are explained in Annex 4 (the equipments used, will by legal requirements have extremely low level of uncertainty).
Any comment:	This data will be used to calculate the emission reductions obtained through the project activity.

<table>
<tr><th>Data / Parameter:</th><th>Emission Factor Operating Margin (EF_{OM})</th></tr>
<tr><td>Data unit:</td><td>tCO_2/MWh</td></tr>
<tr><td>Description:</td><td>National Grid Emission Factor</td></tr>
<tr><td>Source of data to be used:</td><td>MCT</td></tr>
<tr><td>Value of data</td><td>For year 2006
<table>
<tr><th colspan="13">Average monthly factor (tCO_2/MWh)</th></tr>
<tr><td>2006</td><td colspan="12">Month</td></tr>
<tr><td></td><td>January</td><td>February</td><td>March</td><td>April</td><td>May</td><td>June</td><td>July</td><td>August</td><td>September</td><td>October</td><td>November</td><td>December</td></tr>
<tr><td></td><td>0,3218</td><td>0,3462</td><td>0,3373</td><td>0,2752</td><td>0,3173</td><td>0,3058</td><td>0,3507</td><td>0,3360</td><td>0,3834</td><td>0,3598</td><td>0,2651</td><td>0,2802</td></tr>
</table></td></tr>
<tr><td>Description of measurement methods and procedures to be applied:</td><td>Ex-post emission factor will be calculated by MCT with the ONS data. The EF_{OM} will be monitored and calculated by MCT and ONS.</td></tr>
<tr><td>QA/QC procedures to be applied:</td><td>Uncertainty level of data is low</td></tr>
<tr><td>Any comment:</td><td></td></tr>
</table>

<table>
<tr><th>Data / Parameter:</th><th>Emission Factor Build Margin (EF_{BM})</th></tr>
<tr><td>Data unit:</td><td>tCO_2/MWh</td></tr>
<tr><td>Description:</td><td>Nartional Grid Emission Factor</td></tr>
<tr><td>Source of data to be used:</td><td>MCT</td></tr>
<tr><td>Value of data</td><td>For year 2006
<table>
<tr><th>2006</th><th>Build margin (tCO_2/MWh)</th></tr>
<tr><td>National grid</td><td>0,0814</td></tr>
</table></td></tr>
<tr><td>Description of measurement methods and procedures to be applied:</td><td>Ex-post emission factor will be calculated by MCT with the ONS data. The EF_{BM}, will be monitored and calculated by MCT and ONS.</td></tr>
<tr><td>QA/QC procedures to be applied:</td><td>Uncertainty level of data is Low</td></tr>
<tr><td>Any comment:</td><td>The BM factor for the year in which the project activity supplied electricity to the grid will be applied.</td></tr>
</table>

<table>
<tr><td>Data / Parameter:</td><td>Emission Factor (EFy)</td></tr>
<tr><td>Data unit:</td><td>tCO_2/MWh</td></tr>
<tr><td>Description:</td><td>National Grid Emission Factor</td></tr>
<tr><td>Source of data to be used:</td><td>MCT</td></tr>
<tr><td>Value of data</td><td>
<table>
<tr><th></th><th>Jan</th><th>Feb</th><th>Mar</th><th>Apr</th><th>May</th><th>June</th><th>July</th><th>Aug</th><th>Sept</th><th>Oct</th><th>Nov</th><th>Dec</th></tr>
<tr><td>OM</td><td>0,3218</td><td>0,3462</td><td>0,3373</td><td>0,2752</td><td>0,3173</td><td>0,3058</td><td>0,3507</td><td>0,3360</td><td>0,3834</td><td>0,3598</td><td>0,2651</td><td>0,2802</td></tr>
<tr><td>BM</td><td>0,0814</td><td>0,0814</td><td>0,0814</td><td>0,0814</td><td>0,0814</td><td>0,0814</td><td>0,0814</td><td>0,0814</td><td>0,0814</td><td>0,0814</td><td>0,0814</td><td>0,0814</td></tr>
<tr><td>CM</td><td>0,2016</td><td>0,2138</td><td>0,2094</td><td>0,1783</td><td>0,1993</td><td>0,1936</td><td>0,2160</td><td>0,2087</td><td>0,2324</td><td>0,2206</td><td>0,1732</td><td>0,1808</td></tr>
</table>
</td></tr>
<tr><td>Description of measurement methods and procedures to be applied:</td><td>Ex-post emission factor will be calculated by MCT with the ONS data. The EFy formula items, EF_{OM} and EF_{BM}, will be also monitored and calculated by MCT and ONS. The emission factor as combined margin will be calculated based on OM and BM values as explained in B.6.3.</td></tr>
<tr><td>QA/QC procedures to be applied:</td><td>Uncertainty level of data is low</td></tr>
<tr><td>Any comment:</td><td></td></tr>
</table>

B.7.2 Description of the monitoring plan:

Generated Electric energy

The monitoring will be done according to AMS I.D.

Generation Data Collection Procedure

RESPONSIBILITIES

Maintenance area - responsible for the accomplishment of the data server backup and generation of the monthly spreadsheets of energy generation of the following meters:

- Generating Units Meters - gross energy;
- Main Metering and Rear guard Meter - net energy dispatched to the SIN.

Operation Area - responsible for the consolidation of the monthly spreadsheets of generation and supervision of the SCDE System, through the consistence analysis of the collected data and monitoring of system operation.

PROCESS DESCRIPTION

I – Generation Data Collection Procedure through SCDE (system of energy data collection):

As set forth by the Commercialization Convention, homologated by ANEEL's Resolution no. 109, dated October 26, 2004, the Electric Power Commercialization Center (CCEE) is responsible for providing the specifications, orientation and determination of aspects pertaining to the adaptation of the Billing Commensuration System (SMF), and for the implementation, operation and maintenance of the SCDE system (System for the Garnering of Electric Power Data), so as to render viable the garnering of data pertaining to electric power to be used in the Accounting Posting and Settlement System (SCL), purporting to insure the accuracy of the amounts measured, as well as the meeting of the required time frames.

The SCDE is responsible for the daily collection of the generation and consumption data of the SIN measurement points. The data collected by SCDE are transferred to the computation system SCL for Accountancy and Financial Clearance. The data collection is accomplished in a passive way, through Central Unit of Collection of Measurement (UCM). In this collection, the generation data are obtained directly from the meters and made available in files of format xml for each one of the meter. These files are generated through the UCM and transmitted automatically by the application Client SCDE. In case of reading unavailability of any measurement point, due to maintenances, commissioning or for any other reason, the methodology of data estimate will be used according to the item 14.3 of the Commercialization Procedure PdC ME.01. The meters of net energy (main and rearguard) present the passive collection through UCM and the logical inspection (auditing) of the data through VPN. The meters of gross energy (generating units) present the passive collection through UCM and the logical inspection (auditing) of the data through Dialed Line.

II - Data Consolidation Procedure:

The Maintenance Area, through a system technician will be responsible for consolidating the data on gross and net energy generated from the meters. The Operation Department, through the Engineer of Operation will make the consolidation of the generation data. This data is sent to SCL for conference of the data and eventual adjustments if necessary.

III – Confronting of the internal information of generation with the reports of a third part:

For comparison of the information, monthly, the consolidated generation data consolidated and analyzed by the Engineer of Operation internally will be confronted with the available data in the spreadsheets made available in the system SCDE that supply the generation information on hourly basis. Those spreadsheets are accessed through the site of CCEE. In case of inconsistencies, a non-conformity report will be generated that will be verified by CCEE to the cause of the disagreement of the data.

IV – Data Storage:

The generation information, the internally generated and the spreadsheets generated through the site of CCEE, will be stored by the Operation Department electronically.

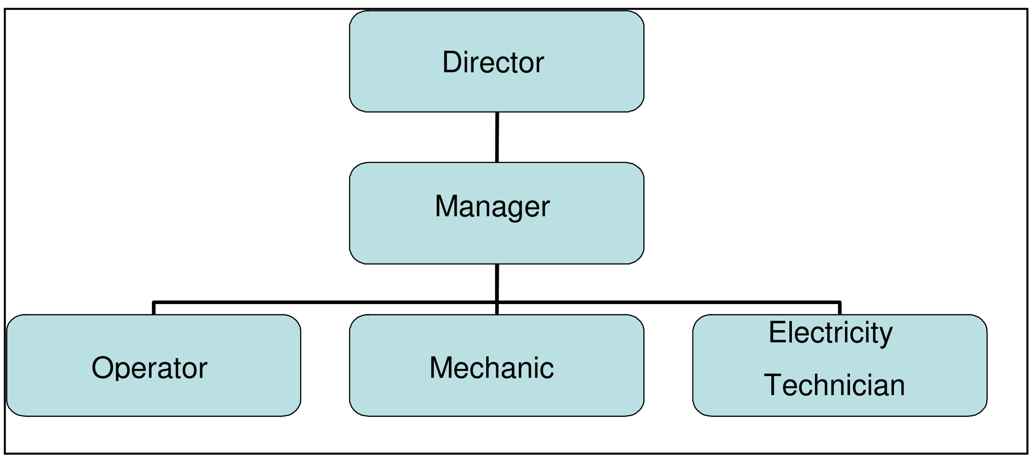
The equipment will be calibrated once in every three years. This equipment will be on line to the CCEE (Electrical Energy Commercialization Chamber), who will be responsible for the accounting of the supplied energy.

All the monitored data will be archived for the crediting period and two more years.

During the period that precedes the first crediting period, an internal written procedure will be prepared, covering the aspects to warrant the quality and the reliability of the monitoring process, including essentially the following items:

- Procedures for training, periodical update and eventual substitution of operators and other personnel involved in the monitoring process;
- Procedures for quality assurance and calibration of measuring equipment;
- Procedures for archiving and back-up of monitored data;
- Procedure for emergency preparedness that may lead to unintended emissions
- Procedures for recording activities related to above mentioned subjects.
- Procedures for internal audits and project performance reviews

The operational and management structure to be implemented is the following:



CO_2 Emission Factor for the National System of Brazil (SIN)

The CO_2 Emission Factors of the electric power generation in the National System (SIN) of Brazil are calculated from the registrations of generation of the dispatched plants centralized by the National Operator of the Electric System (ONS) and, especially, in the Thermo Electrical Plants. That information is necessary to the projects of renewable electric energy connected to the electric net and implanted in Brazil in the extent of CDM. The systematic calculation of the factors of emission of CO_2 is being developed in cooperation between the Ministry of the Science and Technology (MCT) and the Ministry of Minas and Energy (MME).

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

Date of completing the final draft of this baseline section and the monitoring methodology: 10/03/2008
Name and Address of the person: Nicolas Thouverez, Project manager.

The person/entity is also the project participant listed in Annex-I.

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:

20/08/2007

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

25 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:

1st January 2010 or the date of registration, which ever is later

C.2.1.2. Length of the first crediting period:

7 years – 0 months

C.2.2. Fixed crediting period:

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:

In Brazil, any project that involves construction, installation, expansion or operation of any polluting or potentially polluting activity or any other activity capable of causing environmental degradation is obliged to secure a series of permits from the relevant environmental agency (federal and/or local, depending on the project).

The environmental impact of the project is considered small by the host country definition of small-hydro plant. By legal definition of the Brazilian Power Regulatory Agency (ANEEL), Resolution no. 652, December 9th, 2003, small hydro in Brazil must have installed capacity greater than 1 MW but not more than 30 MW and with reservoir area less than 3 km², or, if the area is between 3 km² and 13 km², it should have a minimum environmental impact.

Although small hydro projects has reduced environmental impacts given the smaller dams and reservoir size, project sponsors have to obtain all licenses required by the Brazilian Environmental Regulation (Resolution CONAMA - *Conselho Nacional do Meio Ambiente* (National Environmental Council) n° 237/97):

- The preliminary license (*Licença Prévia* or LP),
- The construction license (*Licença de Instalação* or LI); and
- The operating license (*Licenca de Operação* or LO).

The environmental permit process has an administrative nature and was implemented by the National Environmental Policy, established by the Law no. 6938 dated on October 31st, 1981. Additionally, other norms and laws were issued by CONAMA and local state agencies.

In order to obtain all environmental licenses every small hydro projects shall mitigate the following impacts:

- Inundation of Indian lands and slaves historical areas – the authorization for that depends on National Congress decision;
- Inundation of environmental preservation areas, legally formed as National Parks and Conservation Units;
- Inundation of urban areas or country communities;
- Reservoirs where there will be urban expansion in the future;
- Elimination of natural patrimony;
- Expressive losses for other water uses;
- Inundation of protected historic areas; and
- Inundation of cemeteries and other sacred places.

The process starts with preliminary studies by the local environmental department. After that, if the project is considered environmentally feasible, the sponsors have to prepare the Environmental Assessment, which is basically composed by the following information:

- Reasons for project implementation;
- Project description, including information regarding the reservoir;
- Preliminary Environmental Diagnosis, mentioning main biotic, and anthropic aspects;
- Preliminary estimation of project impacts;
- Possible mitigating measures and environmental programs.

The result of those assessments is the Preliminary License (LP), which reflects the environmental local agency positive understanding about the environmental project concepts.

In order to obtain the Construction License (LI) it is necessary to present (a) additional information about previous assessment; (b) a new simplified assessment; or (c) the Environmental Basic Project, according to the environmental agency decision informed at the LP.

The Operation License (LO) is a result of pre-operational tests during the construction phase to verify if all exigencies made by environmental local agency were completed.

Other guideline was used in order to evaluate the project with respect to environmental sustainability, the requirements of the Brazilian government to obtain the letter of approval. The results of the evaluations follow.

The plant possesses preliminary and construction licenses issued by Santa Catarina Environmental Agency (*FATMA - Fundação do Meio Ambiente de Santa Catarina*). We underline here that the project does imply no relocation of riverside residents.

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 growing global concern on sustainable use of resources is driving the requirement for more sensitive environmental management practices. Increasingly this is being reflected in countries' policies and legislation. In Brazil the situation is not different; environmental rules and licensing process policy are very demanding in line with the best international practices.

The environmental impacts of the Project are considered small by the host country definition of small hydro plants. By legal definition of the Brazilian Power Regulatory Agency (ANEEL), Resolution no. 652, December 9th, 2003, small hydro in Brazil must have installed capacity greater than 1 MW but not more than 30 MW and with reservoir area less than 3 km², or, if the area is between 3 km² and 13 km², it should have a minimum environmental impact. Rodeio Bonito SHP is rated at 14.637 MW and its reservoir is 0.838 km².

The plant possesses preliminary and construction licenses. The preliminary licenses were issued by the Santa Catarina Environmental Agency FATMA - *Fundação do Meio Ambiente de Santa Catarina*. All licenses for the project are available for consultation under request, as well as the environmental studies.

The timeline of the project activities so far are as follows:

- 16th November 2006 - Signature of the contract transferring the rights of Rodeio Bonito to Velcan Desenvolvimento Energético do Brasil Ltda, Brazil

- 13th January 2007 – Procurement of Environmental Installation License Extension for a 09 month-period, Paper nº 000392, issued by the Environmental Foundation of Santa Catarina – FATMA.

- 19th March 2007 - Procurement of the Environmental Installation License Renewal nº 01/2007 issued by the Environmental Foundation of Santa Catarina – FATMA for a 36 month-period.

- 24th May 2007 - Publication on Brazil's Official Journal of the Installation Environmental License Renewal.

- 5th June 2007 - Procurement of the Deforestation Authorization issued by the Environmental Foundation of Santa Catarina – FATMA (AuC nº 70/200)

- 4th July 2007 -Publication on Brazil's Official Journal of ANEEL's Authoritative Resolution nº 955 of 12th June 2007, declaring that the land required for the construction of Rodeio Bonito SHP – located at the Municipality of Chapecó, State of Santa Catarina - is of public utility for matters of expropriation.

- 7th August 2007 – ANEEL's Authoritative Resolution nº 1.002 transferring to Velcan Desenvolvimento Energético do Brasil Ltda the authorization for the setting up and exploitation of Rodeio Bonito SHP

- August 20th 2007 – Signature of the contract between VELCAN and SETA Engenharia S/A for the execution of Rodeio Bonito construction works

- 21st August 2007 – Publication on Brazil's Official Journal of ANEEL's Authoritative Resolution nº 1.002

- 21st August 2007– Starting of construction works

- 10th October 2007 – Presentation of the Consolidated Basic Project of Rodeio Bonito SHP for approval to the Superintendence of Hydric Generation of the Brazilian Electricity Regulatory Agency (ANEEL) for approval.

Socio-environmental responsibility is one of the main values that guides the company all along the planning, construction and operation of its renewable energy plants.

During the construction of Rodeio Bonito SHP, several programs such as environmental monitoring, animal and plant conservation, archaeological patrimony survey and social communication have been scheduled in order to ensure the safety, the respect and the quality of life of the local communities. Technical studies, diagnostics, stabilizing and interactive actions are being conducted for the harmonic and dynamic region of the populations concerned by the project.

As the project was considered as an environment low-impact, it was approved a specific environmental plan that involves different programs as follows:

Environmental Monitoring	➢ Quality control of surface waters ➢ Quality control of subterraneous waters ➢ Monitoring and control of riverbank slopes stability ➢ Sediment monitoring in the reservoir area ➢ Ictyofauna monitoring ➢ Control of aquatic macrophytes ➢ Control of vectors and hosts of human diseases
Environmental control	➢ Clean-up of the reservoir area

	➢ Control of the construction works area
Fauna and Flora Conservation	➢ Animal and plant conservation actions ➢ An area of 45.82 ha is being maintained
Archaeological Patrimony survey	➢ Identification and characterization of archaeological patrimony
Social Communication	➢ Creation of a continuous communication vehicle between the company and the local communities concerned by the project
Environmental management	➢ Coordination of the environmental actions/programs proposed and the different institutes concerned by the project

SECTION E. Stakeholders' comments

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

Brazilian Designated National Authority requests comments from local stakeholders, and the validation report issued by an authorized DOE according to the Resolution no. 7, in order to provide the letter of approval.

The Resolution determines that copies of the invitations for comments sent by the project proponents at least to the following agents involved in and affected by project activities:

- Municipal governments and City Councils;
- State and Municipal Environmental Agencies;
- Brazilian Forum of NGOs and Social Movements for Environment and Development;
- Community associations;
- State Attorney for the Public Interest;
- Government Attorney's Office.

Invitation letters were sent to the following agents (copies of the letters and confirmation of receipt communication are available upon request):

- Chapecó City Hall
- Municipal Assembly of Chapecó
- Community association
- Santa Catarina state Environmental Agency (FATMA)
- State Attorney for the Public Interest of the State of Santa Catarina

- Brazilian Forum of NGOs and Social Movements for the Development and Environment (FBOMS)

- Government Attorney's Office

No concerns were raised in the public calls regarding the project.

E.2. Summary of the comments received:

There were no comments.

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

No comments were received

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Rodeio Bonito Hidrelétrica S/A.
Street/P.O.Box:	Av. Getúlio Dorneles Vargas, 283-S 3º andar
Building:	Edifício V Avenida
City:	Chapecó
State/Region:	Santa Catarina
Postfix/ZIP:	89802-001
Country:	Brazil
Telephone:	+55 (49) 3328-4077
FAX:	+55 (49) 3328-4077
E-Mail:	thouverez@velcan.fr
URL:	http://www.rodeiobonito.com/
Represented by:	
Title:	Project manager
Salutation:	Mr.
Last Name:	Thouverez
Middle Name:	
First Name:	Nicolas
Department:	Hydroelectricity
Mobile:	+55 (11) 8129-2427
Direct FAX:	+55 (11) 3055-2119
Direct tel:	+55 (11) 3055-2015
Personal E-Mail:	thouverez@velcan.fr

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding has been involved in financing this project activity.

Annex 3

BASELINE INFORMATION

The CO_2 emission factors for power generation in the Brazilian National Interconnected System (SIN) are calculated based on generation records of plants centrally dispatched by the **National Operator of the Electric System (ONS)** and, in particular, thermoelectric power plants. Such information is required by renewable energy projects connected to the electrical grid and implemented by Brazil under the **Clean Development Mechanism (CDM)** of the Kyoto Protocol.

The procedures to calculate the emission factors has been described in a manual that has been developed in cooperation between the National Operator of the Electric System (ONS), the Ministry of Mines and Energy (MME) and the Ministry of Science and Technology (MCT), with a view to making available to CDM project proponents the necessary information to apply the AMS I.D; methodology approved by the CDM Executive Board in Bonn, Germany.

In April 2008, the CIMGC (General Coordination Office on Global Climate Change), as the CDM designated national authority in Brazil, defined a single system for the connected electric system, the National Interconnected System (SIN). This configuration is valid for calculating CO2 emission factors in CDM projects that use the “tool to calculate the emission factor for an electricity system”..

Annex 4

MONITORING INFORMATION

In accordance with the procedures set by the Approved Methodology for Small Scale Activities, type I, category D – "Renewable Energy Projects; Renewable electricity generation for a grid", monitoring shall consist of metering the electricity generated by the renewable technology.

The project will proceed with the necessary measures for the power control and monitoring.

Information about power generation and energy supplied to the grid are controlled by the CCEE that regulates the electricity energy commercialization and is responsible for monitoring, the energy delivered to the grid.

Two energy meters are planned to be installed in Rodeio Bonito SHP, one will work as the principal meter and the other will function as a back-up. The meters to be used in Rodeio Bonito SHP have been successfully applied to similar projects in Brazil and around the world and have by legal requirements extremely low level of uncertainty. They are going to be calibrated according to the specification of the company responsible for the automation of the plant.

Measurements are controlled in real time by the SHP Digital System and in case of any problem plant personnel will be put in action. There will be 4 operators directly supervising the plant working in a 6 hour shift each one. They are going to be supervised by an electrical engineer.

The SHP is responsible for the project management, as well as for organizing and training of the staff in the appropriate monitoring, measurement and reporting techniques according to the determination of the equipments suppliers.

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