CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

CONTENTS

A. General description of project activity

B. Application of a baseline and monitoring methodology

C. Duration of the project activity / crediting period

D. Environmental impacts

E. Stakeholders' comments

Annexes

Annex 1: Contact information on participants in the project activity

Annex 2: Information regarding public funding

Annex 3: Baseline information

Annex 4: Monitoring plan

SECTION A. General description of project activity

A.1 Title of the project activity:

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Project title: Ceran´s Castro Alves Hydro Power Plant CDM Project Activity (hereafter referred as "*HPP Castro Alves*").

PDD Version number: 3.

Date: December 5th, 2007.

A.2. Description of the project activity:

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The main objective of *HPP Castro Alves* is to help meet the growing demand of electric energy in Brazil, due to economic growth and to increase the supply of electricity, while contributing to environmental, social and economic sustainability by increasing renewable energy's share of the total Brazilian (and the Latin American and Caribbean region) electricity consumption.

The countries within the Latin American and Caribbean region expressed their commitment by achieving a target of 10% of renewable energy in relation to the total used energy in the region. Through an initiative from the Ministers of the Environment in 2002 (UNEP-LAC, 2002), a preliminary meeting was held at the World Summit for Sustainable Development in Johannesburg, also in 2002. In the final Implementation Plan, no specific targets or timeframes were stated; however, its importance was recognized for achieving sustainability in accordance with the Millennium Development Goals[1.]

The Brazilian electric sector privatization process initiated in 1995 was undertaken expecting adequate tariffs and better prices for the generators. It drew the attention of investors for possible alternatives that were unavailable in the centrally planned electricity market. At the end of the 90's, a strong increase in demand coupled with a under-average increase in installed capacity caused the supply rationing/crisis from 2001/2001. One of the solutions the government offered was flexible legislation favoring small-scale independent electric energy producers. Furthermore, occasional eligibility according to the Clean Development Mechanism from the Kyoto Protocol drew investors' attention to hydropower projects.

This indigenous and cleaner source of electricity will also bring an important contribution to environmental sustainability, reducing carbon dioxide emissions that would have occurred in the absence of the project. The project activity reduces greenhouse gas (GHGs) emissions, so avoiding electricity generation by fossil fuel sources (and CO_2 emissions), which would be generating (and emitting) in the absence of the project.

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[1] 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."

The *HPP Castro Alves* will improve the supply of electricity when dispatching through the SIN (National Integrated System) with clean and renewable hydroelectric power, while contributing to the regional/local economic development.

Background

The first studies in the hydrographic basin of the Taquari/Antas River go back to the 30’s, when the presently inactive company, *Empresas Elécticas Brasileiras S.A.* (Brazilian Electric Companies Inc.), proposed the construction of three hydropower plants in the basin.

In the 90’s, CEEE – *Companhia Estadual de Energia Elétrica* (State Company of Electric Energy) utility companies in the state of Rio Grande do Sul carried out several investigative studies of the basin's hydro potential, culminating in the identification of 57 sites with powers varying from one to 130 MW. On the Antas River, specifically, 20 sites were selected, among them *Castro Alves (figures 1 and 2), Monte Claro* and *14 de Julho* with 130 MW, 130 MW and 100 MW of installed power, respectively.

Composed of *HPPs Castro Alves*, Monte Claro and 14 de Julho, the Antas River Energy Complex is situated mid-stream on the Antas River, in the Northeastern region of the state of Rio Grande do Sul, serving the cities of Bento Gonçalves, Veranópolis, Cotiporã, Nova Roma do Sul, Nova Pádua, Flores de Cunha, and Antonio Prado.

Figure 1 – *HPP Castro Alves*., downstream works. (Source: Ceran)

1. **Service Bridge**
2. **Dam**
3. **River Deviation through the flood-gate**
4. **Water intake**
5. **Access tunnel to the adduction tunnel**

Figure 2 – *HPP Castro Alves*., upstream works. (Source: Ceran)

1. **Substation Yard**
2. **Escape Channel**
3. **Access tunnel to the Power House**
4. **Access tunnel to the balance chimney**

HPP Castro Alves will initiate commercial operation according to the following schedule:

Activities	**Date**
▪ Begin the plant construction	01/04/2004
▪ Begin concreting the strong house	01/06/2006
▪ Lower the 1st turbine rotor	01/06/2007
▪ Begin operation of 1st hydro generator unit	01/12/2007
▪ Begin operation of 2nd hydro generator unit	01/02/2008
▪ Begin operation of 3rd hydro generator unit	01/04/2008

Table 1: *HPP Castro Alves* Schedule (Source: Ceran and Concession Contract ANEEL)

A.3. Project participants:

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The credit owner and Project CDM´s Focal Point of *HPP Castro Alves*, the private company *Companhia Energética Rio das Antas* is the author and responsible entity for all the project activities related to management, approving, registering, monitoring, measurement and reporting.

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Brazil (host)	Private Entity: CERAN (*Companhia Energética Rio das Antas*)	No
	Private Entity: *C-Trade Comercializadora de Carbono Ltda*	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.		

Table 2 – Private and public parties and entities involved in the activity

Detailed information for contact with the party (ies) and with the public/private entities involved in the project activity is related in Annex 1.

This project was developed under the responsibility of CERAN with the support of *C-Trade Comercializadora de Carbono Ltda.* All the activities are being developed in and limited to Brazil.

The following is a brief description about the companies involved in the project:

CERAN (*Companhia Energética Rio das Antas*)

In November 2000, the Consortium consisting of CPFL - *Geração de Energia S.A.*, *CEEE* - *Companhia Estadual de Energia Elétrica*, from the state of Rio Grande do Sul, and *DESENVIX S.A.* was declared the winner of the Brazilian Power Regulatory Agency (ANEEL – *Agência National de Energia Eléctrica*) acquisition contract, according to Auction Notice *Nº 03/2000*, referring to the Concession Request for implantation and operation of the hydropower sites on the Antas River in the state of Rio Grande do Sul.

Giving sequence on that process, on January 11th, 2001, CERAN - *Companhia Energética Rio das Antas*, a close corporation, was founded. Nowadays CERAN has the following shareholders´ structure:

- CPFL Geração de Energia S.A.: 65%
- CEEE – Companhia Estadual de Energia Elétrica: 30%
- Desenvix S.A.: 5%

The company's social objective is to implant and operate the hydropower sites on the Antas River Energy Complex. The Complex consists of the HPPs Monte Claro, *Castro Alves* and 14 de Julho Power Plants.

The Concession Contract nº 08/2001 for the Use of Public Property was signed on March 15th, 2001. It conferred Ceran the rights to establishment and operation of the hydroelectric uses mentioned above, for 35 years.

The operation of the three Power Plants will represent an increase of 360 megawatts in the installed power of Rio Grande do Sul. This means, approximately, 10% of the current demand of electric power of the State.

In October 2001, FEPAM – State Foundation of Environmental Protection (*Fundação Estadual de Proteção Ambiental*) authorized the Preliminary License for the three Ceran´s HPP. The *HPP Castro Alves* Installment License was authorized on July 11th, 2002.

Projects as *HPP Castro Alves* are associated to the intensive use of labor during the phase of construction of the Power Plant, besides the future operation teams and maintenance. In 2007 3.228 people's were worked in Ceran Complex´s works, of which 2.077 were allocated in *HPP Castro Alves*.

C-TRADE COMERCIALIZADORA DE CARBONO LTDA.

C-Trade is a private company created for the purpose of identifying, certifying and negotiating Carbon Credits. C-Trade develops studies and analyses aimed towards the development of greenhouse gas (GHG) emissions reduction projects. Not only the identification but also the validation and certification of CERs (Certified emission reductions) fall within the scope of these projects.

The C-Trade team is specialized in the identification and reduction development of GHG emissions that are effected directly or indirectly by each project, among these: Small Power Plants, Electric and Biomass Power Plants, Wind Power Plants, substitution of petroleum fuels, reforestation projects and sanitary landfills.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

>>
Brazil.

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

>>
State of Rio Grande do Sul.

A.4.1.3. City/Town/Community etc:

>>
Nova Pádua, Flores da Cunha, Nova Roma do Sul and Antonio Prado.

A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):

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Figure 3 – Location of *HPP Castro Alves* (Source: Google Earth)

HPP Castro Alves is located on the Antas River, the hydrographic basin of the Taquari-Antas river, 277 km from the mouth, between the cities of Nova Pádua and Flores da Cunha (left bank) and Nova Roma do Sul and Antonio Prado (right bank) in the State of Rio Grande do Sul, South of Brazil.

The UTM coordinates of *HPP Castro Alves* are:

- 6.799.000 North
- 482.900 East
- UTM Zone: 22 J

The figure 3 shows the localization of *HPP Castro Alves* under these coordinates.

A.4.2. Category(ies) of project activity:

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Sectoral Scope 1 – Energy Industries (Renewable Source)

A.4.3. Technology to be employed by the project activity:

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HPP Castro Alves will exploit the Antas River water to generate electricity of 130 MW of installed capacity. This run-of-river[2] project has a small reservoir of 5 km^2, and complies with Brazilian regulations for HPP projects.

Below are the principal parameters of *HPP Castro Alves*:

Power and Energy		**Forced Tunnels**	
Installed Power	130 MW	Amount	3
Assured Power	107.9 MW	Total lenght	200 m
Assured Energy	64 MW average	Lenght armored passage	20.5 m
		Section armored passage	Ø 3.3 m
Hydrology and Hydraulics		Section passage in concrete	4.8 m
Daily maximum flow	4,129.00 m^3/s		
Long Term medium flow	162.00 m^3/s	**Power House**	
Flow - 10 years	9,011.00 m^3/s	Type	Underground
Reference Fall	83.6 m	Lenght with assembly area	87.5 m
Project Fall	86.4 m	Widht	18.9 m
Operational max fall	90.3 m	Max lenght	39.6 m
Operational min fall	79.5 m		
Exceptional min fall	80.7 m	**Turbines**	
		Type	Francis
Dam with sill slope		Number o turbines	3
Type	Gravity, in CCR	Nominal Power	44.58 MW
Top lenght	341 m	Reference flow	58.52 m^3/s
Max foundation height	48 m		
Sill slope lenght	240 m	**Generators**	
Sill slope elevation	240 m	Type	Synchronous of vertical axis
		Nominal Power	48.461 MVA
Watter intakes		Power Factor	0.9
Type	Relieved gravity	Nominal Voltage	13.8 kV
Intakes number	1	Nominal Rotation	300 rpm
Sill elevation	225.5 m	Poles´ number	24
Crowing elevation	250 m		
openings number	2		
gap opening	(4.55 x 8) m	**Reservoir**	
		Volume (Watter level max normal)	91.77 x 10^6 m^3
Delivery Tunnel		Max depth	45 m
Amount	1	Max level	240 m
Section	Arch-Rectangle	Min level	239 m
Dimensions	11.45 x 8 m	Max level of inundation	246.36 m
Lenght	7,090.7 m	Flooded area (elevation 240.00)	5 km^2

Table 3 – Technical Description of the *HPP Castro Alves* Project

[2] Unlike traditional hydroelectric facilities, which flood large areas of land, run of river projects do not require a big damming of water. Instead, some of the water is diverted from a river, and sent into a pipe called a penstock. The penstock feeds the water downhill to a generating station. The natural force of gravity creates the energy required to spin the turbines that in turn generate electricity. The water leaves the generating station and is returned to the river without altering the existing flow or water levels.

Summarizing the table 3, the facility description is as follows:

- 86.40 m waterfall for a total installed capacity of 130 MW (3 Francis turbines of a nominal power of 44.58 MW each), and the yearly firm electric energy output of 560,640 MWh annual (assured power of 64 MW averages). The first Francis turbine began operation on December 1st, 2007. The second turbine will begin operation on February 1, 2008. Finally, the third turbine will begin commercial operations in April 2008.

- Reservoir size is 5 km² and the gross power density is 26 W/m^2.

The figures 4.1 to 4.4 are detaching the work process of *HPP Castro Alves*. (Source: CERAN – Status Reporting from May 21 to May 27 of 2007).

Figure 4.1 – Power House – Generation Unity 01 – Source: CERAN

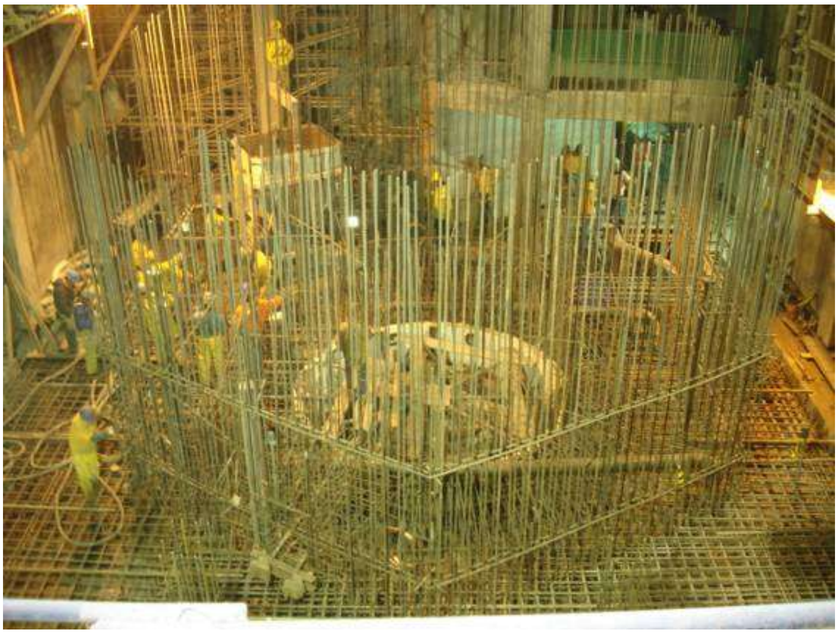

Figure 4.2 – Power House – Generation Unity 3– Source: CERAN

Figure 4.3 – Dam – Upstream General View – Source: CERAN

Figure 4.4 – Dam – Downstream General View – Source: CERAN

A.4.4 Estimated amount of emission reductions over the chosen crediting period:

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Using the ex-post emission factor of the baseline calculated presented at the item B.7.1, the complete implementation of the *HPP Castro Alves Project*, connected to the South Brazilian interconnected grid, will generate an yearly average estimated reduction of **314,636 tCO_{2e}** and a total reduction of **2,202,454 tCO_{2e}** during the first 7-year-period, described in the table 4 below:

Year	**Annual estimation of emission reductions in tones of tCO_2e**
***2007**	15,234
2008	307,900
2009	317,252
2010	317,252
2011	317,252
2012	317,252
2013	317,252
****2014**	293,059
Total estimated reductions (tones of CO_2e)	**2,202,454**
Total number of crediting years	**7**
Annual average over the crediting period of estimated reductions (tones of CO_{2e})	**314,636**

Table 4 – Estimation of emissions reductions of the *HPP Castro Alves* Project

*2007 accounts just the generation of December (from Dec/1/2007 to Dec/31/2007)

**2014 accounts 11 months of generation (from Jan/1st/2014 to Nov/30/2014)

A.4.5. Public funding of the project activity:

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The parties involved in Annex I for the project activities solicited no public funding.

SECTION B. Application of a baseline and monitoring methodology

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

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- Baseline methodology: ACM0002 – "Consolidated baseline methodology for grid-connected electricity generation from renewable sources", version 6, May 19th, 2006.

- Monitoring methodology: ACM0002 – Consolidated monitoring methodology for zero emissions grid-connected electricity generation from renewable sources", version 6, May 19th, 2006.

- Tool for Demonstration and Assessment of Additionality, Version 3.

For more information about the methodology consult the following link:

http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

B.2 Justification of the choice of the methodology and why it is applicable to the project activity:

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The consolidated methodology ACM0002 is applicable to grid-connected renewable power generation project activities under the following conditions:

- Applies to electricity capacity addition from:
  - Run-of-river hydro power plants; hydro power projects with existing reservoirs where the volume of the reservoir is not increased.
  - New hydro electric power projects with reservoirs having power densities (installed power generation capacity divided by the surface area at full reservoir level) greater than 4 W/m^2.
  - Wind Sources;
  - Geothermal sources;
  - Solar sources;
  - Wave and tidal sources.

The methodology ACM0002 can be applied to the *HPP Castro Alves*' project due to the project is about a new hydro electric power project with reservoir having power density equals 26 W/m^2, greater than 4 W/m^2 (also greater than 10 W/m^2). The Reservoir Power Density calculation is shown below:

- **Power Density of the Reservoir =** Installed Power Generation Capacity ÷ Surface area at full reservoir level = 130 MW ÷ 5 km^2 **= 26 W/m^2**
(Formula 1 of PDD)

- This methodology is not applicable to project activities that involve switching from fossil fuel to renewable energy at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;

  Not applicable.

- The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on characteristics of the grid is available;

  The methodology ACM0002 can also be applied to project due to the geographic data and the relevant electricity grid system limits can be clearly identified, as well the available information about the grid. Sources: ONS (www.ons.org.br): ANEEL (www.aneel.gov.br).

- Applies to grid connected electricity generation from landfill gas capture to the extent that it is combined with the approved "Consolidated baseline methodology for landfill gas project activities". (ACM0001).

  Not applicable.

B.3. Description of the sources and gases included in the project boundary

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The Greenhouse Gas (GHG) emissions by the project activity are equal to zero ($PE_y = 0$), according to the ACM0002: **"(II) New Hydro electric power projects with reservoir, project proponents shall account for project emissions, estimated as follow:** If the power density of project is greater than $10W/m^2$, PE_y=0."

	Source	Gas	Included?	Justification / Explanation
Baseline	Electricity Generated to the Grid	CO_2	Included	In accordance with ACM0002 only the CO_2 emissions from the electricity generation must be taken into account.
		CH_4	Excluded	
		N_20	Excluded	

	Source	Gas	Included?	Justification / Explanation
Project Activity	Hydropower Electricity Generation	CO_2	Excluded	The reservoir's power density of the project is 26 W/m^2 (formula 1), greater than $10W/m^2$, so GHGs from the project activities must not be considered (PE_y=0).
		CH_4	Excluded	
		N_20	Excluded	

Table 5 – Project Activities GHG Emissions

Project Boundaries

The project boundaries are defined by the emissions directed or directly affected by the project activities, construction and operation. It encompasses the geographic and physical site of the hydropower generation source, which is represented by the corresponding basin to the river of each project, close to the power plant and the interconnected grid.

Brazil is a country with great territorial dimensions and it is divided in five geographical macro-areas: North, Northeast, Southeast, South and Midwest. Thus electric energy generation, and consequently, transmission are concentrated in four subsystems: South, Southeast/Midwest and Northeast. Electric energy expansion was concentrated in two specific areas:

- North/Northeast: This region's electricity is basically supplied by the São Francisco River. There are seven hydropower plants on the river, with a total installed capacity of approximately 10.5 GW. Eighty percent of the Northern region is supplied by diesel fueled power plants;

- South/Southeast/Midwest: The majority of the electricity generated in the country is concentrated in this subsystem. These regions also concentrate 70% of GDP generation in Brazil. There are more than 50 hydropower plants generating electricity for it.

From 2006 on, the Brazilian Science and Technology Ministry (MCT), Energy and Mines Ministry (MME) and the National System Operation (ONS) have divided the subsystem South/Southeast/Midwest into two subsystems, South and Southeast/Midwest, to calculate the Emission Factors; those are available since January 2006 for investors and public to be consulted.

The boundaries of the subsystems are defined by the transmission capacity. The transmission lines between the subsystems are defined by the transmission capacity. The lack of transmission lines forces the concentration of generated electricity in each of the subsystems. Thus, the South interconnected subsystem of the Brazilian grid, where the project activity is located, is considered a boundary.

The *HPP Castro Alves* is located in the South Subsystem.

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

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According to ACM0002, for project activities that do not modify or remodel an existing electricity generating plant, the baseline is as follows:

- "The electricity delivered to the grid by the project would have been generated another way by the operation of a grid-connected power plant and by the addition of new generating sources, reflected in the combined margin described in the item B.6.1 of the PDD".

In the absence of a project the electricity should continue to be generated by the present mix of generation operating for the grid. The *HPP Castro Alves* electricity generation will avoid GHG emissions for the South Subsystem, avoiding the electric power generation starting from the use of fossil fuels of the existing Thermal Power Plants, those generated around 19% of the total generated electric energy of the South Subsystem in 2006 (source: ONS).

Three alternatives for the project scenario are considered:

- Alternative 1: The proposed project activity without CDM: construction of a new plant for grid-connected renewable generation with 130 MW of installed capacity, implemented without considering the CDM funds.
    - This alternative could present barriers according to the additionality analysis presented in this PDD.

- Alternative 2: Construction of a new Coal Thermal Power Plant grid-connected non-renewable with 130 MW of installed capacity, due to the South of Brazil has the most of the coal reservoirs of the country.

- Alternative 3: Continuation of the present situation. Electricity would continue to be generated by the present generators operating for the grid.

The project meets all the prerequisites of "additionality" (see the application of "***Tool for the demonstration and assessment of Additionality – version 3"***) and demonstrates that the project would not occur in the absence of the CDM.

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 CDM project activity (assessment and demonstration of additionality):

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The *HPP Castro Alves* is a project for generating greenhouse gas (GHG) emission free power and will offer reductions in GHG emissions by replacing fossil fuel burning Thermo Power plant generation that, in other ways, would be supplying the interconnected grid.

As Kartha et al. (2002) affirmed: "the central issue of the challenge of the baseline for electricity projects clearly resides in determining the 'avoided generation' or that which would have occurred without the CDM or another GHG mitigation project. The fundamental question is if the avoided generation is in the 'build margin' (or rather, substituting a facility that would have otherwise been constructed) and/or in the 'operating margin' (or rather, affecting the operation of present and/or future plants)."

The baseline emission factor is calculated as a combined margin, consisting in the combination of the factors of the build margin and the operating margin. In order to determine the emission factors of the build margin, an electric system of the project is defined as being a physical extension of the plants that could be dispatched without significant restrictions in transmission. Similarly, an interconnected electric system is defined as a system that is interconnected by transmission lines to the electric system of the project and in which hydropower plants can dispatch without significant restrictions in transmission.

The approved consolidated baseline methodology ACM0002 – "Consolidated baseline methodology for grid-connected power generation from renewable sources" is applied to increases in electric capacity from run-of-river hydropower plants, included in the project activity proposal. The baseline scenario considers the electricity that would be generated in another way by grid-connected power plant operation and by the addition of new generation sources.

The ***additionality*** of the project activity should be demonstrated and evaluated using the most recent version of “Tool for Demonstration and Assessment of Additionality” accepted by the CDM – Executive Board, available on the CDM website of UNFCCC. The most recent version of this tool is the version 3.

The following steps are necessary for demonstrating and evaluating of the additionality of Project Ceran, *HPP Castro Alves*:

- The project activity must be after January 1st 2000.

  The beginning of the *HPP Castro Alves* construction was initiated on 01/04/2004, accomplishing this requirement;

- Evidence that the project was seriously considered in the decision of continuing with the project activity.

  The project sponsor began to evaluate the carbon market potential before the acquisition contract process for the *Castro Alves* hydropower employment. During the year 2000 the principal shareholder of Ceran, CPFL, contacted consulting companies and specialists to evaluate potential from CDM revenues.

Step 1. Identification of alternatives to the project activity according to current laws and regulation

Sub-step 1a. Define alternatives to the project:

1. The realistic alternatives to the project activity are:

- Continuation of the present situation. Electricity would continue to be generated by the present generators operating for the grid;

- Construction of a new Coal Thermal Power Plant grid-connected non-renewable with 130 MW of installed capacity, due to the South of Brazil has the most of the coal reservoirs of the country;

- The proposed project activity without CDM: construction of a new plant for grid-connected renewable generation with 130 MW of installed capacity, implemented without considering the CDM funds.

Sub-step 1b. Compliment with the applicable laws and norms:

1b.2. The alternative(s) shall be in compliance with all mandatory applicable legal and regulatory requirements, even if these laws and regulations have objectives other than GHG reductions.

Market Trends

The market trends show that the project activity and the alternative scenarios are widely observed in the Country and they are under the ANEEL (National Agency of Electric Energy) norms and regulation. The website of FEPAM (State Foundation of Environment) (http://www.fepam.rs.gov.br/) should also be

visited. There the licenses of projects like the project activity *HPP Castro Alves* and the alternative scenarios will be found.

According to ANEEL, the scenario of South Brazilian subsystem is the follow[3]:

The South Brazilian Subsystem is formed by three States: Rio Grande do Sul, Santa Catarina and Paraná. They have about 30% of the total of Installed Capacity of the Brazilian Electric System.

The projects activity like *HPP Castro Alves* (HPP) represents 86.16% of the enterprises in operation, 89.85% of the enterprises under construction and 30.19% of the granted enterprises those didn't started to be constructed yet. (Source: Aneel)

The alternative scenario projects activity like Coal Thermal Power Plants (TPP) represents 11.65% of the enterprises in operation, 25.83% of the granted enterprises those didn't started to be constructed yet. (Source: Aneel)

It is worthwhile to point out that most of the reservations of mineral coal are in the south area of the Brazil.

- Coal Mines Localization: 100% in the South (Source: MME)
  - 0.28% in Paraná
  - 9.64% in Santa Catarina and
  - 90.08% in the Rio Grande do Sul

Norms and Regulation

Brazilian Electric Sector: LEGISLATION and INSTITUTIONS (Source: CCEE website[4])

The following figure presents a diagram of the institutions that are active in the Brazilian Electric Sector:

[3] http://www.aneel.gov.br/aplicacoes/ResumoEstadual/ResumoEstadual.asp

[4] CCEE: http://www.ccee.org.br/cceeinterdsm/v/index.jsp?vgnextoid=15e6a5c1de88a010VgnVCM100000aa01a8c0RCRD

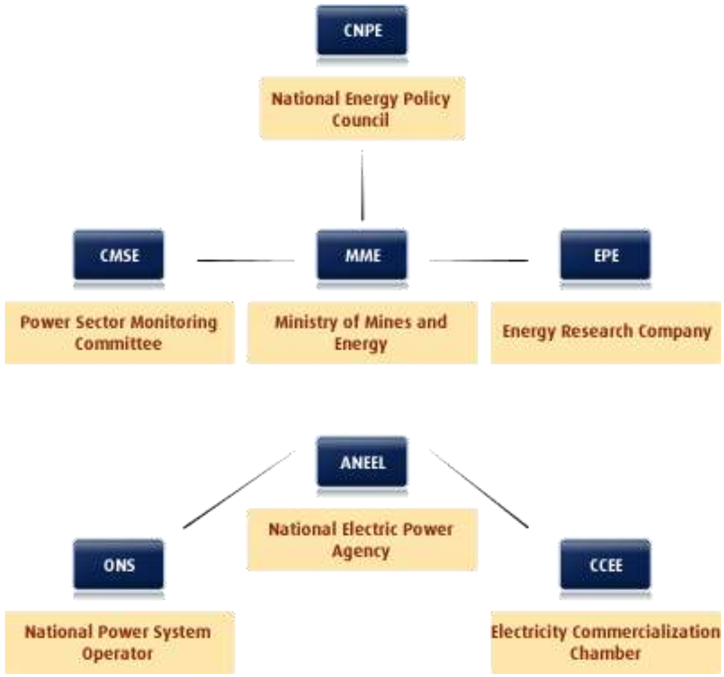

Figure 5 – Brazilian Electric Sector Institutions Chart

Legislation

Both alternatives are according to the Brazilian norms and regulations of the mentioned institutions above. There is not an imposition by any of these legislation and regulations obligating the construction of a Thermal or a Hydroelectric Power Plant.

Conclusions:

The project activity and the alternative scenarios follows all the Brazilian norms and regulations and them can also be observed as being tendencies of Brazilian market.

1b.3. If an alternative does not comply with all mandatory applicable legislation and regulations, then show that, based on an examination of current practice in the country or region in which the law or regulation applies, those applicable legal or regulatory requirements are systematically not enforced and that noncompliance with those requirements is widespread in the country. If this cannot be sho\wn, then eliminate the alternative from further consideration.

Not applicable.

1b.4. If the proposed project activity is the only alternative amongst the ones considered by the project participants that is in compliance with mandatory regulations with which there is general compliance, then the proposed CDM project activity is not additional.

Not applicable

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SATISFIES/PASSES – Go to Step 2

Step 2. Investment analysis

Determine whether the proposed project activity is economically or financially less attractive than at least one other alternative, identified in step 1, without the revenue from the sale of certified emission reductions (CERs). To conduct the investment analysis, use the following sub-steps:

Sub-step 2a. Determine appropriate analysis method

Determine whether to apply simple cost analysis, investment comparison analysis or benchmark analysis (sub-step 2b). If the CDM project activity generates no financial or economic benefits other than CDM related income, then apply the simple cost analysis (Option I). Otherwise, use the investment comparison analysis (Option II) or the benchmark analysis (Option III).

Benchmark analysis (Option III) will be used to analyse the *HPP Castro Alves* Project Activities.

Sub-step 2b – Option III. Apply benchmark analysis

Identify the financial indicator:

- 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 description

SELIC - Special System for Settlement and Custody (Sistema Especial de Liquidação e de Custódia)

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 and distributing societies of titles and values furniture 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). 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 almost the CDI rate, which is influenced by the SELIC rate, defined by COPOM.

The SELIC rate has been oscillating since 1999, from a minimum of 11.73% a.a. in July 2007 up to a maximum of 43.25% a.a. in January 2003 (Figure 6).

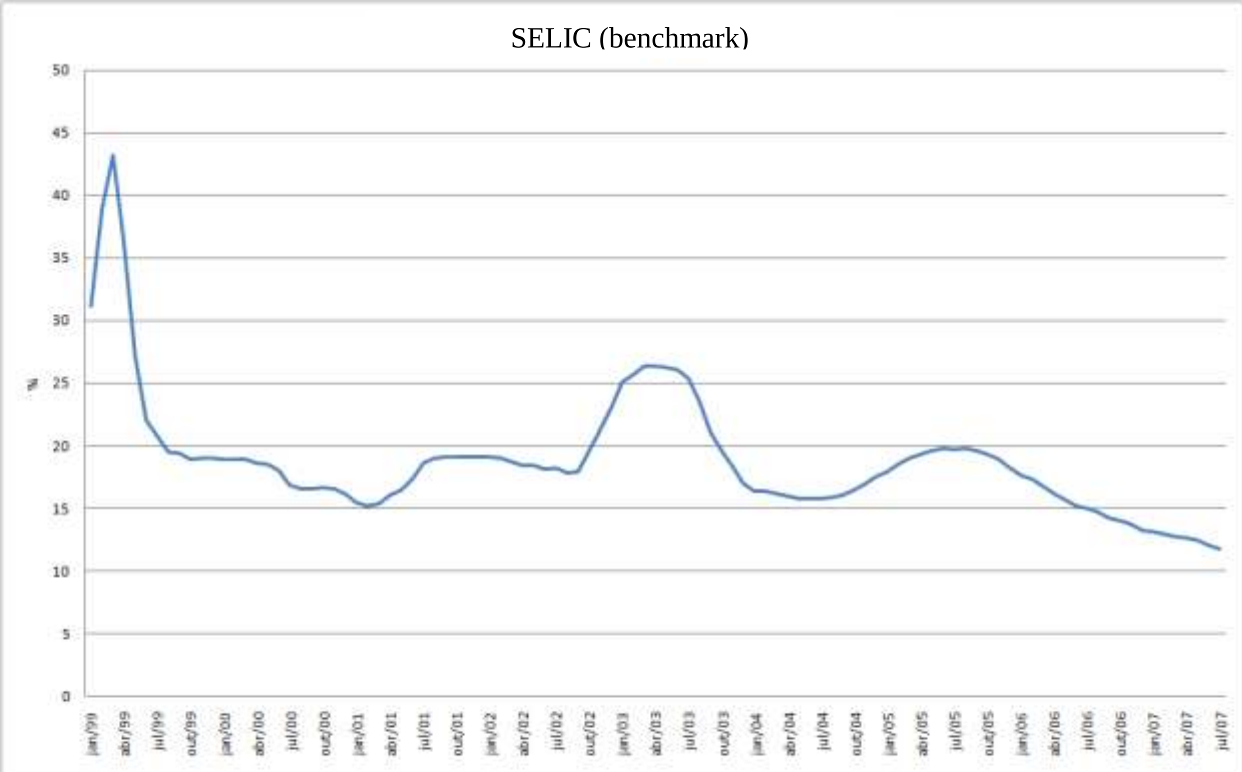


Figure 6 - SELIC rate evolution 1999 to 2007 (Source: Banco Central do Brasil)

The Ceran´s project analysis considering each Power Plant separately was made in November, 2003.

It will be considered the average average from January 1999 to October 2003 for the SELIC: 20.87%.

Sub-step 2c. Calculation and comparison of financial indicators

CDM's "Tool for the demonstration and assessment of additionality" was approved after the project started operations. In order to comply with that Tool, the financial analysis shown below was performed using the original assumptions for investment, revenues from sales of electricity and operational costs for the scenario without CDM related revenues.

For the following calculations the assumptions were:

Investment	212,401	R$ thousand	72,665.41	US$ thousand
Electricity Price	104.78	R$/MWh	35.85	US$/MWh
Operational Costs	3.6	R$/MWh	1.23	US$/MWh
Administrative Costs	1.52	R$/MWh	0.52	US$/MWh

Table 6 - Cash Flow Assumptions

Considering the following exchange quotation: 1 US$ = 2.923 R$, as of 25/Nov/2003 (Source: Banco Central do Brasil).

The values used here should be seen as a conservative projection of tariffs and prices. The revenues projection was based on the result of electricity price time the assured energy annual generation, which is of 560,640 GWh/year. During 2007, *HPP Castro Alves* is expected to generate 29,419 GWh, because the plant will start operation on 1st December, 2007, with the start of just one turbine that will make available just 40.3 MW averages.

The table below show the Cash Flow, according to the assumptions presented in table 5:

COMPANHIA ENERGÉTICA RIO DAS ANTAS - HPP CASTRO ALVES - Balance Sheet (R$ thousand, constants)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
TOTAL REVENUES	**-**	**-**	**-**	**-**		**15.732**	**57.921**	**57.921**	**57.921**	**57.921**	**57.921**	**57.921**	**57.921**	**57.921**	**57.921**	**57.921**	**57.921**
Operational total revenues					-	15.732	57.921	57.921	57.921	57.921	57.921	57.921	57.921	57.921	57.921	57.921	57.921
PIS - Social Integration Program	-	-	-	-		(260)	(956)	(956)	(956)	(956)	(956)	(956)	(956)	(956)	(956)	(956)	(956)
COFINS - Social Security Financing Contribution	-	-	-	-		(472)	(1.738)	(1.738)	(1.738)	(1.738)	(1.738)	(1.738)	(1.738)	(1.738)	(1.738)	(1.738)	(1.738)
CPMF						(60)	(220)	(220)	(220)	(220)	(220)	(220)	(220)	(220)	(220)	(220)	(220)
NET REVENUES	**-**	**-**	**-**	**-**	**-**	**14.941**	**55.008**	**55.008**	**55.008**	**55.008**	**55.008**	**55.008**	**55.008**	**55.008**	**55.008**	**55.008**	**55.008**
SECTORIAL CHARGES	-	-	-	-		(702)	(3.274)	(3.274)	(3.274)	(3.274)	(3.274)	(3.274)	(3.274)	(3.274)	(3.274)	(3.274)	(3.274)
RESEARCH & DEVELOPMENT	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-
O&M COSTS	-	-	-	-		(541)	(1.990)	(1.990)	(1.990)	(1.990)	(1.990)	(1.990)	(1.990)	(1.990)	(1.990)	(1.990)	(1.990)
ADMINISTRATIVE COSTS	-	-	-	-		(228)	(841)	(841)	(841)	(841)	(841)	(841)	(841)	(841)	(841)	(841)	(841)
CONCESSION COSTS	-	-	-	-		-	(2.504)	(2.504)	(2.504)	(2.504)	(2.504)	(2.504)	(2.504)	(2.504)	(2.504)	(2.504)	(2.504)
DEPRECIATION				-		(1.522)	(4.592)	(4.592)	(4.592)	(4.592)	(4.592)	(4.592)	(4.592)	(4.592)	(4.592)	(4.592)	(4.592)
AMORTIZATION	-	-	-	-		(2.058)	(6.185)	(6.185)	(6.185)	(6.185)	(6.185)	(6.185)	(6.185)	(6.185)	(6.185)	(4.127)	0
PROFIT BEFORE INTERESTS AND INCOME TAX	**-**	**-**	**-**	**-**	**-**	**9.890**	**35.622**	**35.622**	**35.622**	**35.622**	**35.622**	**35.622**	**35.622**	**35.622**	**35.622**	**37.681**	**41.808**
FINANCIAL REVENUES																	
FINANCIAL EXPENSES (Loan servicing activity)	-	-	-	-			(10.717)	(20.074)	(17.859)	(15.829)	(13.748)	(11.614)	(9.425)	(7.143)	(4.830)	(2.481)	(349)
ACCRUED INTEREST	-	-	-	-			(13.655)	(3.265)	(2.021)	(1.799)	(1.568)	(1.330)	(1.083)	(731)	(464)	(223)	(29)
PROFIT BEFORE INTEREST ON OWN WORKING CAPITAL	**-**	**-**	**-**	**-**	**-**	**9.890**	**11.250**	**12.284**	**15.742**	**17.994**	**20.306**	**22.679**	**25.114**	**27.749**	**30.328**	**34.977**	**41.430**
INTERESTS OVER WORKING CAPITAL																	
PROFIT BEFORE INCOME TAX	**-**	**-**	**-**	**-**	**-**	**9.890**	**11.250**	**12.284**	**15.742**	**17.994**	**20.306**	**22.679**	**25.114**	**27.749**	**30.328**	**34.977**	**41.430**
INCOME TAX	-	-	-	-		(2.472)	(2.813)	(3.071)	(3.936)	(4.499)	(5.076)	(5.670)	(6.278)	(6.937)	(7.582)	(8.744)	(10.358)
SOCIAL CONTRIBUTION	-	-	-	-		(890)	(1.013)	(1.106)	(1.417)	(1.619)	(1.828)	(2.041)	(2.260)	(2.497)	(2.730)	(3.148)	(3.729)
EARNINGS	**-**	**-**	**-**	**-**	**-**	**6.527**	**7.425**	**8.107**	**10.390**	**11.876**	**13.402**	**14.968**	**16.575**	**18.314**	**20.016**	**23.085**	**27.344**
Shareholder - Cash Flow Assessment																	
Capital Increase	(6.596)	(2.624)	-	(16.847)	(21.645)	(11.492)	-	-	-	-	-	-	-	-	-	-	-
Dividends	-	-	-	-	-	-	7.425,15	3.196,44	3.937,78	4.930,47	5.973,95	7.045,76	8.153,41	9.295,60	10.501,41	11.054,05	24.577,75
Capital Reduction	-	-	2.076,16	-	-	-	8.418,14	-	-	-	-	-	-	-	-	-	-
Cash on Hand Variation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SHAREHOLDERS CASH-FLOW	**(6.596,11)**	**(2.624,37)**	**2.076,16**	**(16.847,32)**	**(21.644,78)**	**(11.491,64)**	**15.843,30**	**3.196,44**	**3.937,78**	**4.930,47**	**5.973,95**	**7.045,76**	**8.153,41**	**9.295,60**	**10.501,41**	**11.054,05**	**24.577,75**

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
TOTAL REVENUES	**57.921**	**57.921**	**57.921**	**57.921**	**57.921**	**57.921**	**57.921**	**57.921**	**57.921**	**57.921**	**57.921**	**57.921**	**57.921**	**57.921**	**57.921**	**57.921**	**57.921**	**57.921**	**14.480**
Operational total revenues	57.921	57.921	57.921	57.921	57.921	57.921	57.921	57.921	57.921	57.921	57.921	57.921	57.921	57.921	57.921	57.921	57.921	57.921	14.480
PIS - Social Integration Program	(956)	(956)	(956)	(956)	(956)	(956)	(956)	(956)	(956)	(956)	(956)	(956)	(956)	(956)	(956)	(956)	(956)	(956)	(239)
COFINS - Social Security Financing Contribution	(1.738)	(1.738)	(1.738)	(1.738)	(1.738)	(1.738)	(1.738)	(1.738)	(1.738)	(1.738)	(1.738)	(1.738)	(1.738)	(1.738)	(1.738)	(1.738)	(1.738)	(1.738)	(434)
CPMF	(220)	(220)	(220)	(220)	(220)	(220)	(220)	(220)	(220)	(220)	(220)	(220)	(220)	(220)	(220)	(220)	(220)	(220)	(55)
NET REVENUES	**55.008**	**55.008**	**55.008**	**55.008**	**55.008**	**55.008**	**55.008**	**55.008**	**55.008**	**55.008**	**55.008**	**55.008**	**55.008**	**55.008**	**55.008**	**55.008**	**55.008**	**55.008**	**13.752**
SECTORIAL CHARGES	(3.274)	(3.274)	(3.274)	(3.274)	(3.274)	(3.274)	(3.274)	(3.274)	(3.274)	(3.274)	(3.274)	(3.274)	(3.274)	(3.274)	(3.274)	(3.274)	(3.274)	(3.274)	(818)
RESEARCH & DEVELOPMENT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
O&M COSTS	(1.990)	(1.990)	(1.990)	(1.990)	(1.990)	(1.990)	(1.990)	(1.990)	(1.990)	(1.990)	(1.990)	(1.990)	(1.990)	(1.990)	(1.990)	(1.990)	(1.990)	(1.990)	(498)
ADMINISTRATIVE COSTS	(841)	(841)	(841)	(841)	(841)	(841)	(841)	(841)	(841)	(841)	(841)	(841)	(841)	(841)	(841)	(841)	(841)	(841)	(210)
CONCESSION COSTS	(2.504)	(2.504)	(2.504)	(2.504)	(2.504)	(2.504)	(2.504)	(2.504)	(2.504)	(2.504)	(2.504)	(2.504)	(2.504)	(2.504)	(2.504)	(2.504)	(2.504)	(2.504)	(2.504)
DEPRECIATION	(4.592)	(4.592)	(4.592)	(4.592)	(4.592)	(4.592)	(4.592)	(4.592)	(4.592)	(4.592)	(4.592)	(4.592)	(4.592)	(4.427)	(4.098)	(4.098)	(4.098)	(4.098)	(4.098)
AMORTIZATION	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PROFIT BEFORE INTERESTS AND INCOME TAX	**41.808**	**41.808**	**41.808**	**41.808**	**41.808**	**41.808**	**41.808**	**41.808**	**41.808**	**41.808**	**41.808**	**41.808**	**41.808**	**41.972**	**42.301**	**42.301**	**42.301**	**42.301**	**5.624**
FINANCIAL REVENUES																			
FINANCIAL EXPENSES (Loan servicing activity)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ACCRUED INTEREST	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PROFIT BEFORE INTEREST ON OWN WORKING CAPITAL	**41.808**	**41.808**	**41.808**	**41.808**	**41.808**	**41.808**	**41.808**	**41.808**	**41.808**	**41.808**	**41.808**	**41.808**	**41.808**	**41.972**	**42.301**	**42.301**	**42.301**	**42.301**	**5.624**
INTERESTS OVER WORKING CAPITAL																			
PROFIT BEFORE INCOME TAX	**41.808**	**41.808**	**41.808**	**41.808**	**41.808**	**41.808**	**41.808**	**41.808**	**41.808**	**41.808**	**41.808**	**41.808**	**41.808**	**41.972**	**42.301**	**42.301**	**42.301**	**42.301**	**5.624**
INCOME TAX	(10.452)	(10.452)	(10.452)	(10.452)	(10.452)	(10.452)	(10.452)	(10.452)	(10.452)	(10.452)	(10.452)	(10.452)	(10.452)	(10.493)	(10.575)	(10.575)	(10.575)	(10.575)	(1.406)
SOCIAL CONTRIBUTION	(3.763)	(3.763)	(3.763)	(3.763)	(3.763)	(3.763)	(3.763)	(3.763)	(3.763)	(3.763)	(3.763)	(3.763)	(3.763)	(3.777)	(3.807)	(3.807)	(3.807)	(3.807)	(506)
EARNINGS	**27.593**	**27.593**	**27.593**	**27.593**	**27.593**	**27.593**	**27.593**	**27.593**	**27.593**	**27.593**	**27.593**	**27.593**	**27.593**	**27.702**	**27.919**	**27.919**	**27.919**	**27.919**	**3.712**
Shareholder - Cash Flow Assessment																			
Capital Increase	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dividends	27.593,17	27.593,17	27.593,17	27.593,17	27.593,17	27.593,17	27.593,17	27.593,17	27.593,17	27.593,17	27.593,17	27.593,17	27.593,17	27.701,64	27.918,58	27.918,58	27.918,58	27.918,58	3.711,59
Capital Reduction	4.591,53	4.591,53	4.591,53	4.591,53	4.591,53	4.591,53	4.591,53	4.591,53	4.591,53	4.591,53	4.591,53	4.591,53	4.591,53	4.427,18	4.098,48	4.098,48	4.098,48	4.098,48	4.098,48
Cash on Hand Variation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SHAREHOLDERS CASH-FLOW	**32.184,70**	**32.184,70**	**32.184,70**	**32.184,70**	**32.184,70**	**32.184,70**	**32.184,70**	**32.184,70**	**32.184,70**	**32.184,70**	**32.184,70**	**32.184,70**	**32.184,70**	**32.128,82**	**32.017,06**	**32.017,06**	**32.017,06**	**32.017,06**	**7.810,06**

Table 7 - The 20 year analysis period corresponds to the average length of analysis in the electric sector.

Results:

INTERNAL RATE OF RETURN (IRR)	**16.59%**
SELIC (AVERAGE OF 1999-2003)	**20.87%**
DIFFERENCE	**-4.28%**

Table 8 – Project Results IRR x Benchmark

According to the results the *HPP Castro Alves*, the Shareholders IRR was under the benchmark. The difference between them was about 4.3%, considering the benchmark average of the period between 1999 and 2003.

This shows that without CER revenues, the project would reach lower rates of return than the benchmark rate, concluding that:

- Sub-step 2.c – 8b (ACM0002): The financial benchmark, if Option III (benchmark analysis) is used. If the CDM project activity has a less favourable indicator (e.g. lower IRR) than the benchmark, then the CDM project activity *cannot be considered as financially attractive*.

Sub-step 2d. Sensitivity analysis

The three main variables that might affect the project's finance are:

- Electricity revenues
- Operational Costs
- Administrative costs

The table 9 summarizes the sensitivity results:

Electricity Price Scenarios		
Scenarios	**Electricity Price R$/ MWh**	**IRR**
Projected Situation	104,78	16,59%
-5%	99,54	15,17%
-10%	94,3	13,75%
5%	110,02	18,02%
10%	115,26	19,45%
O&M Costs Scenarios		
Scenarios	**O&M Costs R$/MWh**	**IRR**
Projected Situation	3,6	16,59%
-5%	3,42	16,64%
-10%	3,24	16,69%
5%	3,78	16,54%
10%	3,96	16,49%
Administrative Costs Scenarios		
Scenarios	**Administrative Costs R$/MWh**	**IRR**
Projected Situation	1,52	16,59%
-5%	1,45	16,61%
-10%	1,37	16,63%
5%	1,6	16,57%
10%	1,67	16,55%

Table 9 – Project Sensibility analysis

According to the sensitivity analysis the CDM project are unlikely to be financially attractive due to its IRR are lower than benchmark. The average SELIC for the period (Jan/1999 – Oct/2003) was 20.87%.

According to the Addicionality Tool, the expected outcome from the step 2 is the follow:
"If after the sensitivity analysis is concluded that the proposed CDM project activity is unlike to be the most financially attractive (as per step 2c -8a) or is unlikely to be financially attractive (as per step 2c – 8b), then proceed to Step 4 (Common practice analysis). If the project participants so wish, they may apply the step 3 (Barrier Analysis) as well."

SATISFIES/PASSES – Go to Step 3

Step 3. Barrier analysis

This step will not be considered.

Continue to Step 4

Step 4. Common practice analysis

Sub-step 4a. Analyze other activities similar to the proposed project activity, and

It can be observed that in the Region South, where the project *HPP Castro Alves* is located, there are activities similar the project activities.

Follow a summary of the enterprises under operation, constructions and granted, in the State of Rio Grande do Sul:

Enterprises in Operation			
Type	Quantity	Power (kW)	%
CGH	28	17,524	0.26
EOL	3	150,000	2.26
PCH	24	153,716	2.32
UHE	11	4,673,650	70.41
UTE	22	1,643,225	24.75
Total	**88**	**6,638,115**	100

Table 10.1– Enterprises in Operation in Rio Grande do Sul(source: ANEEL)

Enterprises under Construction			
Type	Quantity	Power (kW)	%
PCH	5	115,500	9.62
UHE	3	1,085,000	90.38
Total	**8**	**1,200,500**	100

Table 10.2– Enterprises in Construction in Rio Grande do Sul(source: ANEEL)

Granted Enterpresis between 1998 and 2004 (The construction hasn´t started)			
Type	Quantity	Power (kW)	%
CGH	9	6,297	0.22
EOL	25	1,153,512	40.73
PCH	16	266,318	9.4
UHE	4	487,000	17.2
UTE	7	918,625	32.44
Total	**61**	**2,831,752**	100

Table 10.3– Granted Enterprises in Rio Grande do Sul(source: ANEEL)

Types of Enterprises description:

- CGH (Hydro Power Plant Central Generation)

- EOL (Wind Power Plant)
- PCH (Small Hydro Power Plant)
- UHE (Hydro Power Plant - HPP)
- UTE (Thermal Power Plant)

Tables 10.1 to 10.3 above show that there are similar activities occurring in the region of *HPP Castro Alves*, as follows:

- 70.41% of the operating projects are Hydro Power Plants, as *HPP Castro Alves*;
- 90.38% of the projects under constructions are HPP;
- 17.2% of the granted projects those didn´t started to be constructed yet are HPP.

But *HPP Castro Alves* has some differences between the similar projects (Hydro Power Plants, run-of-river, Installed Capacity around 130 MW). These differences will be showed next.

The picture 6 is showing the Power Plants next to *HPP Castro Alves*.

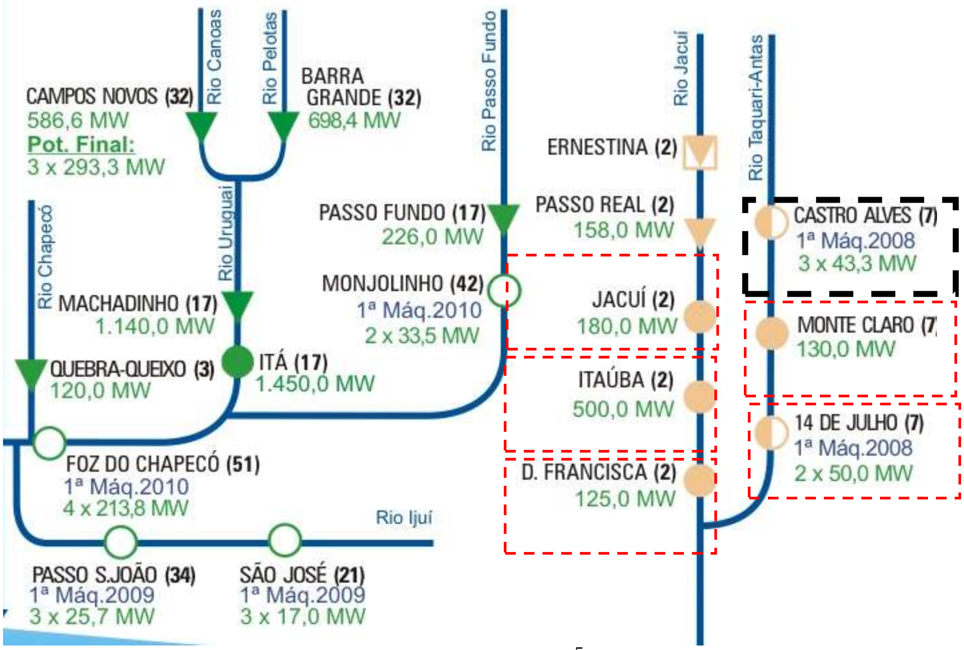


Figura 6 - Description of the plants near *HPP Castro Alves*[5], with almost the same Installed Capacity. (Source: ONS)

	Run-of-River
	With reservoir

Legend of Picture 7 – (if the circle or the triangle is white it means that it is for the future. A half white means already under construction).

The Hydro Power Plants near *HPP Castro Alves* and with almost the same installed capacity are:

- HPP Jacuí – 180 MW – Companhia Estadual de Energia Elétrica – Run-of-river
- HPP Passo Fundo – 226 MW – Tractebel Energia S/A – with reservoir
- HPP Passo Real – 158 MW – Companhia Estadual de Energia Elétrica – with reservoir
- HPP Monte Claro - 130 MW – CERAN – Run-of-river
- HPP 14 de Julho – 100 MW – CERAN – Run-of-river
- HPP Dona Francisca – 125 MW – Dona Francisca Energética S/A; Companhia Estadual de Energia Elétrica – Run-of-river

Sub-step 4b. Discuss similar options that are occurring:

The growing demands requested by the environmental organs have been provoking great delay in the approval of new projects of hydroelectric generation. Projects like *HPP Castro Alves* are faster approved due to them lower environmental impact. See the following small briefing:

[5] http://www.ons.org.br/conheca_sistema/pop/pop_diagrama_esquemat_usinas.aspx

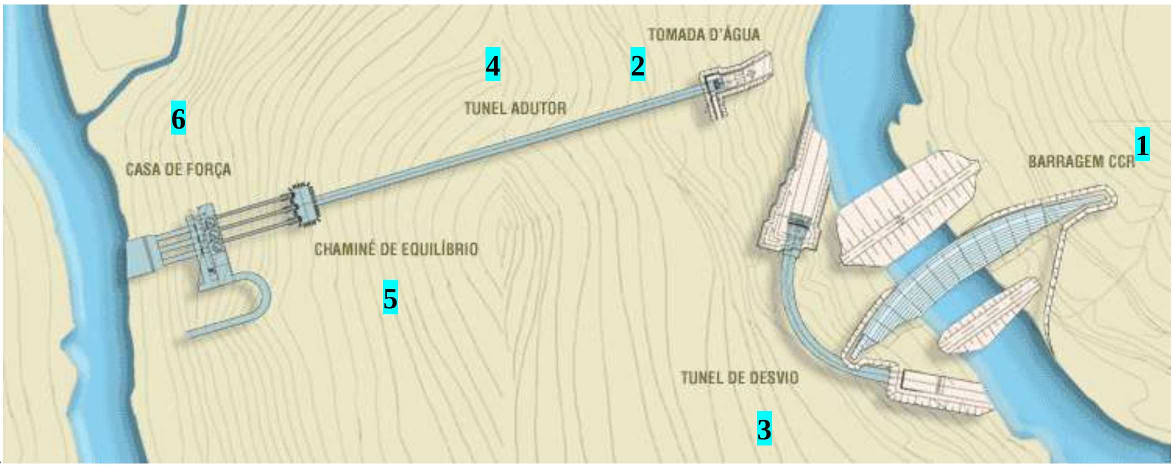
HPP Castro Alves project is different from the other plants. One of the main differences is in the fact that it works with an adduction tunnel of around 7 km. The environmental impact due to this was less than the other kind of hydropower projects. But this kind of project uses to cost more than the others. It´s one of the reasons the IRR of the project was low.

HPP Monte Claro and HPP 14 de Julho, belonging to CERAN, also participating of CDM, to improve a little the financial results with the CERs revenues. Both Plants are similar to *HPP Castro Alves* in terms of power and they are run-of-rive too.

The difference among the quota of water intake in the reservoir and the quota where are located the generating units (Power house) is based, fundamentally, in the topography of the land of the area where Rio of the Tapirs is located. This way, the construction of a adductor tunnel in the rock avoids the construction of a dam of a larger height.

An HPP, as the case of *HPP Castro Alves*, with the general arrangement as the illustration below, provokes smaller environmental impacts (due to smallest flooded area), if compared to the HPPs with the same potency installed that have a system water intake/generation system close to the dam.

The following picture schematizes the general arrangement of *HPP Castro Alves*:



.

Figure 7 – General arrangement of *HPP Castro Alves*

1) Dam
2) Water Intake
3) Deviation Tunnel
4) Adduction Tunnel
5) Balance Chimney

SATISFIED/APPROVED – Project is ADDITIONAL

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>>

The project activity is a run-of-river hydropower project interconnected to the Brazilian electric grid, through the South Subsystem. The project meets all the requirements of “additionality” (see the application of “Tool of Additionality” 3 to follow) and shows that the project would not occur in the absence of the CDM.

In a period of restructuring the entire electric market (generation, transmission and distribution), the case in Brazil, investment, uncertainty, is the main barrier to small and medium projects for renewable electric energy generation. In this scenario, other possible new projects compete with the existing plants (operating margin) and with new projects (build margin), which normally attract the attention of the investors. The build and operating margins were used to calculate the emissions factor for the interconnected grid.

The ACM0002 (version 6) methodology, for the generation of interconnected grid electricity from renewable sources, uses derived margins that were applied to the context of the project activity by determining emissions factors from the South subsystem of the Brazilian interconnected grid (electric system that is interconnected by transmission lines to the project electric system, and in which the plants can be dispatched without significant restrictions in transmission.

According to the approved selected methodology (ACM0002, 2006), the baseline emission factor (EF_y) is calculated as the combined margin (*CM*), which consists of the combination of factors of the operating margin (*OM*) and the build margin (*BM*). In order to determine the emissions factors of the build margin and the operating margin, a project electric system is defined as being the physical extension of the plants that can be dispatched without significant restrictions on transmission. Similarly, an interconnected electric system is defined as being an electric system that is interconnected by transmission lines to the project electric system, in which the plants can be dispatched without significant restrictions in transmission.

<u>According to ACM0002 (version 06), a baseline emission factor (EF_y) is calculated as follows:</u>

STEP 1 - Calculate the operating margin factor(s), based on one of the following methods

(a) Simple operating margin
(b) Simple adjusted operating margin
(c) Dispatch data analysis operating margin
(d) Average operating margin.

The build margin calculated by the dispatch data analysis must be the first choice and it will be followed for the *HPP Castro Alves* Calculations. The method is described as follow:

(c) *Dispatch Data Analysis OM*. The Dispatch Data OM emission factor ($EF_{OM,Dispatch\ Data,y}$) is summarized as follows:

$$EF_{OM,DispatchData,y} = \frac{E_{OM,y}}{EG_y}$$ (Formula 6 of ACM0002)

Where *EGy* is the generation of the project (in MWh) in year *y*, and *EOM.y* are the emissions (tCO2) associated with the operating margin calculated as

$$E_{OM,y} = \sum_h EG_h \cdot EF_{DD.h}$$ (Formula 7 of ACM0002)

Where *EGh* is the generation of the project (in MWh) in each hour *h* and $EF_{DD,h}$ is the hourly generation weighted average emissions per electricity unit (tCO2/MWh) of the set of power plants (*n*) in the top 10% of grid system dispatch order during hour *h*:

$$EF_{DD,h} = \frac{\sum_{i,n} F_{i,n,h} \cdot COEF_{i,n}}{\sum_n GEN_{n,h}}$$ (Formula 8 of ACM0002)

Where *F*, *COEF* and *GEN* are analogous to the variables described for the simple OM method above, but calculated on an hourly basis for the set of plants (*n*) falling within the top 10% of the system dispatch.

To determine the set of plants (*n*), obtain from a national dispatch center: a) the grid system dispatch order of operation for each power plant of the system; and b) the amount of power (MWh) that is dispatched from all plants in the system during each hour that the project activity is operating (*GENh*). At each hour *h*, stack each plant's generation (*GENh*) using the merit orders. The set of plants (*n*) consists of those plants at the top of the stack (i.e., having the least merit), whose combined generation (*Σ GENh*) comprises 10% of total generation from all plants during that hour (including imports to the extent they are dispatched).

STEP 2 – Calculate the build margin emission factor ($EF_{BM,y}$) since the generation pondered average emission factor (tCO$_2$e/MWh) from a sample of the centers *m*, as follows:

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \cdot COEF_{i,m}}{\sum_m GEN_{m,y}}$$ (Formula 9 of ACM0002)

Where $F_{i,m,y}$, $COEF_{i,m}$ and $GEN_{m,y}$ are analogous to the variables described for the simple OM method above for plants *m*.

Project participants shall choose between one of the following two options. The choice among the two

options should be specified in the PDD, and cannot be changed during the crediting period.

The options are the follows:

Option 1. Calculate the Build Margin emission factor $EF_{BM,y}$ ex-ante based on the most recent information available on plants already built for sample group m at the time of PDD submission. The sample group m consists of either the five power plants that have been built most recently, or the power plant capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.7 Project participants should use from these two options that sample group that comprises the larger annual generation.

Option 2. For the first crediting period, the Build Margin emission factor $EF_{BM,y}$ must be updated annually ex-post for the year in which actual project generation and associated emissions reductions occur. For subsequent crediting periods, $EF_{BM,y}$ should be calculated ex-ante, as described in option 1 above. The sample group m consists of either the five power plants that have been built most recently, or the power plant capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.8 Project participants should use from these two options that sample group that comprises the larger annual generation.

It will be used the **Option 2** for ***HPP Castro Alves*** project.

STEP3. Calculate the baseline emission factor EF_y as the weighted average of the Operating Margin emission factor ($EF_{OM,y}$) and the Build Margin emission factor ($EF_{BM,y}$):

$$EF_y = w_{OM} \cdot EF_{OM,y} + w_{BM} \cdot EF_{BM,y}$$

(Formula 10 of ACM0002)

Where the weights w_{OM} and w_{BM}, by default, are 50% (i.e., $w_{OM} = w_{BM} = 0.5$), and $EF_{OM,y}$ and $EF_{BM,y}$ are calculated as described in Steps 1 and 2 above and are expressed in tCO_2/MWh.

Alternative weights can be used, as long as $w_{OM} + w_{BM} = 1$, and the guidance provided below is followed.

The weighted average applied by project participants should be fixed for a crediting period and may be revised at the renewal of the crediting period.

Guidance on selecting alternative weights

The following guidance provides a number of project-specific and context-specific factors for developing alternative operating and build margin weights to the above defaults. It does not, however, provide specific algorithms to translate these factors into quantified weights, nor does it address all factors that might conceivably affect these weights. In this case, project participants are suggested to propose specific quantification methods with justifications that are consistent with the guidance provided below. Given that it is unlikely that a project will impact either the OM or BM exclusively during the first crediting period, it is suggested that neither weight exceed 75% during the first crediting period.

Where the weights w_{OM} and w_{BM}, by standard, are 50% (or, $w_{OM} = w_{BM} = 0.5$). They can be used as alternative weights, if $w_{OM} + w_{BM} = 1$ and appropriate evidence is presented justifying the alternative weights.

According to MCT, MME and ONS the Brazilian electric subsystem is divided in four subsystems: South, Southeast/Midwest, Northeast and North. MCT will make available de emission factor data for each subsystem.

Project Emissions

The project activity mainly reduces carbon dioxide through substitution of grid electricity generation with fossil fuel fired power plants by renewable electricity. The emission reduction *ERy* by the project activity during a giving year y is the difference between baseline emissions (*BEy*), project emissions (*PEy*) and emissions due to leakage (*Ly*), as follows:

$$ERy = BEy - PEy - Ly \text{ (Formula 11 of ACM0002)}$$

Where the baseline emissions (*BEy* in tCO_2) are the product of the baseline emissions factor (*EFy* in tCO_2/MWh) calculated in Step 3, times the electricity supplied by the project activity to the grid (*EGy* in MWh) minus the baseline electricity supplied to the grid in the case of modified or retrofit facilities ($EG_{baseline}$ in MWh) as follows:

$$BEy = (EGy - EG_{baseline}) * EFy \text{ (Formula 12 of ACM0002)}$$

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

>>

(Copy this table for each data and parameter)

Data / Parameter:	**Area**
Data unit:	km^2
Description:	Reservoir surface area at maximum level
Source of data used:	CERAN
Value applied:	5
Justification of the choice of data or description of measurement methods and procedures actually applied :	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.
Any comment:	This data was measured once at the beginning of the project.

Data / Parameter:	**Installed Capacity**
Data unit:	MW
Description:	Project activity installed capacity
Source of data used:	Feasibility study
Value applied:	130
Justification of the choice of data or description of measurement methods and procedures actually applied :	It will be used to calculate the power density of the reservoir as the item above. It will be also used to calculate de Certified Emission Reductions of the project activity, due to the calculation of assured electric energy depend on this data.
Any comment:	This value will not be altered.

B.6.3 Ex-ante calculation of emission reductions:

>>

CERs Calculation Sheet													
Emission Factor (tCO2/MWh)													
Month	**Jan**	**Feb**	**March**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	
EF_{OM}	0.9074	0.9663	0.9719	0.9648	1.0027	0.9771	1.0236	1.0110	1.0273	0.8161	0.9667	0.8620	
EF_{BM}	0.1737	0.1737	0.1737	0.1737	0.1737	0.1737	0.1737	0.1737	0.1737	0.1737	0.1737	0.1737	
W_{OM}	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	
W_{BM}	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	
EF	**0.5405**	**0.5700**	**0.5728**	**0.5692**	**0.5882**	**0.5754**	**0.5986**	**0.5923**	**0.6005**	**0.4949**	**0.5702**	**0.5178**	
Estimated Generation (MWh)													***TOTAL***
2007	-	-	-	-	-	-	-	-	-	-	-	29,419	**29,419**
2008	29,419	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	**543,339**
2009	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	**560,640**
2010	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	**560,640**
2011	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	**560,640**
2012	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	**560,640**
2013	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	**560,640**
2014	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	46,720	-	**513,920**
TOTAL	**309,739**	**327,040**	**327,040**	**327,040**	**327,040**	**327,040**	**327,040**	**327,040**	**327,040**	**327,040**	**327,040**	**309,739**	**3,889,878**
Estimated CERs (tCO2)													***TOTAL***
2007	-	-	-	-	-	-	-	-	-	-	-	15,234	**15,234**
2008	15,902	26,630	26,760	26,595	27,481	26,883	27,968	27,674	28,055	23,120	26,640	24,193	**307,900**
2009	25,254	26,630	26,760	26,595	27,481	26,883	27,968	27,674	28,055	23,120	26,640	24,193	**317,252**
2010	25,254	26,630	26,760	26,595	27,481	26,883	27,968	27,674	28,055	23,120	26,640	24,193	**317,252**
2011	25,254	26,630	26,760	26,595	27,481	26,883	27,968	27,674	28,055	23,120	26,640	24,193	**317,252**
2012	25,254	26,630	26,760	26,595	27,481	26,883	27,968	27,674	28,055	23,120	26,640	24,193	**317,252**
2013	25,254	26,630	26,760	26,595	27,481	26,883	27,968	27,674	28,055	23,120	26,640	24,193	**317,252**
2014	25,254	26,630	26,760	26,595	27,481	26,883	27,968	27,674	28,055	23,120	26,640	-	**293,059**
TOTAL	**167,426**	**186,411**	**187,317**	**186,162**	**192,364**	**188,181**	**195,778**	**193,717**	**196,385**	**161,843**	**186,479**	**160,392**	**2,202,454**

Table 11 – ex-ante emission reduction calculation

Emission Factor Calculation - *EFy*

EF_{OM} and EF_{BM} were given by the Brazilian Ministry of Science and Technology (MCT[6]). They were calculated under the method ***Dispatch data analysis operating margin*** described in the item B.6.1 of this PDD.

It was considered the default w_{OM} and w_{BM} (50% and 50% respectively) according to this methodology. It was also explain on item B.6.1 of this PDD.

The Emission Factor calculation was concluded using the formula 10 of ACM0002 (described on item B.6.1):

$$EF_y = EF_{OM} * w_{OM} + EF_{BM} * w_{BM} \textbf{ (formula 10 of ACM0002).}$$

It was used the same emission factors of 2006 to the following years for a estimative of CERs.

Estimated Generation Calculation – *EGy*

According to the Commercial Operational Schedule, described in the Concession Contract and its Additive[7], between CERAN and ANEEL, the following assured energy was estimated:

SCHEDULE	Assured Energy		
Commercial Operational Start	MWh/year	MWh/month	MWh/hour
01/dez/07	353,028	29,419	967
01/fev/08	560,640	46,720	1,536
01/abr/08	560,640	46,720	1,536

Table12 – Assured Energy of *HPP Castro Alves*

For the calculation of table 11 it was taken into account the values above described.

Baseline Emissions Calculation – *BEy*

According to the formula 12 of ACM0002 (see item B.6.1),

---

[6] **MCT links**:

http://www.mct.gov.br/index.php/content/view/50958.html - Emission Factors (EF_{OM} and EF_{BM}) – Visited on 19th July 2007.

http://www.mct.gov.br/index.php/content/view/50965.html - Manual of the Emission Factor Calculations – Visited on 19th July 2007.

[7] **CERAN Concession Contract and Additive:**

http://www.aneel.gov.br/aplicacoes/Contrato/Documentos_Aplicacao/08_2001.pdf - Concession Contract

http://www.aneel.gov.br/aplicacoes/Contrato/Documentos_Aplicacao/1TA0108CERAN.pdf - Additive to the Concession Contract

$BEy = (EGy - EG_{baseline}) * EFy$ (Formula 12 of ACM0002)

According to the methodology ACM0002 *PEy*, *Ly* and $EG_{baseline}$ are zero. See the following reasons:

- *PEy* – see item **B.3**;

- Leakage (L_y) – "The main emissions potentially given rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction, fuel handling and land inundation. Project participants do not need to consider these emission sources as leakages in applying this methodology. Project activities using this baseline methodology shall not claim any credit for the project on account of reducing these emissions below the level of baseline scenario."

- $EG_{baseline}$ – The project is a new hydro power plant.

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

>>

Year	Estimation of project activity emissions	Estimation of baseline emissions	Estimation of leakage	Estimation of overall emission reductions
	(tones of CO_2e)	(tones of CO_2e)	(tones of CO_2e)	(tones of CO_2e)
2007	0	15,234	0	15,234
2008	0	307,900	0	307,900
2009	0	317,252	0	317,252
2010	0	317,252	0	317,252
2011	0	317,252	0	317,252
2012	0	317,252	0	317,252
2013	0	317,252	0	317,252
2014	0	293,059	0	293,059
Total (tones of CO2e)	**0**	**2,202,454**	**0**	**2,202,454**

Table 13 – Summary of ex-ante estimative of emission reduction

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

>>

Approved consolidated monitoring methodology ACM0002 – "Consolidated monitoring methodology for generation of grid-interconnected electricity with zero emissions from renewable sources," version 06 on May 19, 2006.

This monitoring methodology must be used with the approved baseline methodology ACM0002 ("Consolidated baseline methodology for generation of grid-connected electricity with zero emissions from renewable sources"), and is applied to the increases in electric capacity from run-of-river hydropower plants.

The methodology is applicable to the project. It consists of the use of measurement equipment designed for registering or verifying the energy generated by the unit. This electric energy measurement is essential for verifying and monitoring the GHG emission reductions. The monitoring plan (item B.7.2) permits the GHG emissions formula generated by the project in a direct manner, applying the baseline emissions factor.

Based on hydroelectric energy technology, the project emissions (*PEy*) are equal to zero; thus, formulas for the direct emissions are not necessary.

The indirect emissions can be consequences of the project construction, the transportation of materials and fuel and other upstream activities. The project does not require emissions reductions from these activities. Nevertheless, no significant leakages were identified from these activities.

The project emissions in the form of methane also can result from the construction and operation of a water reservoir if the biomass is permanently submerged in the process. The project activity is a run-of-river hydropower plant; however, there is only one small reservoir, having insignificant methane emissions resulting from the biomass decay.

Thus, no emissions source was identified and due to this, no data will be collected nor archived for these data.

B.7.1 Data and parameters monitored:

>>

(Copy this table for each data and parameter)

Data / Parameter:	**Electric energy Generated (EG_y)**
Data unit:	MWh
Description:	Electric energy generated
Source of data to be used:	It will be used spreadsheets got every month directly of the meters with the hourly generation information. Monthly, the information will be confronted with the available generation spreadsheets at the website of CCEE..
Value of data applied for the purpose of calculating expected emission reductions in section B.5	560,640 (assured electric energy per year)
Description of measurement methods and procedures to be applied:	See the description on item B.7.2.1.
QA/QC procedures to be applied:	Uncertainty level of data is Low. These data will be used for calculate the emission reductions. The electricity generated will be monitored by the project participants and it will be checked by the available datasheets in the CCEE website (information comparison between operation data and CCEE reports).
Any comment:	

<table>
<tr><th>Data / Parameter:</th><th>Emission Factor (EFy)</th></tr>
<tr><td>Data unit:</td><td>tCO2/MWh</td></tr>
<tr><td>Description:</td><td>South Grid Emission Factor</td></tr>
<tr><td>Source of data to be used:</td><td>MCT</td></tr>
<tr><td>Value of data applied for the purpose of calculating expected emission reductions in section B.5</td><td>
<table>
<tr><th colspan="13">Emission Factor (tCO2/MWh)</th></tr>
<tr><td>Month</td><td>Jan</td><td>Feb</td><td>March</td><td>Apr</td><td>May</td><td>June</td><td>July</td><td>Aug</td><td>Sept</td><td>Oct</td><td>Nov</td><td>Dec</td></tr>
<tr><td>EF</td><td>0.5405</td><td>0.5700</td><td>0.5728</td><td>0.5692</td><td>0.5882</td><td>0.5754</td><td>0.5986</td><td>0.5923</td><td>0.6005</td><td>0.4949</td><td>0.5702</td><td>0.5178</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_y formula items, EF_{OM} and EF_{BM}, will be also monitored and calculated by MCT and ONS, with the Dispatch Data of the South Grid Subsystem.</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><td>Data / Parameter:</td><td>Emission Factor Operating Margin (EF_{OM})</td></tr>
<tr><td>Data unit:</td><td>tCO2/MWh</td></tr>
<tr><td>Description:</td><td>South Grid Emission Factor</td></tr>
<tr><td>Source of data to be used:</td><td>MCT</td></tr>
<tr><td>Value of data applied for the purpose of calculating expected emission reductions in section B.5</td><td>
<table>
<tr><th colspan="13">Emission Factor (tCO2/MWh)</th></tr>
<tr><th>Month</th><th>Jan</th><th>Feb</th><th>March</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>EF_{OM}</td><td>0.9074</td><td>0.9663</td><td>0.9719</td><td>0.9648</td><td>1.0027</td><td>0.9771</td><td>1.0236</td><td>1.0110</td><td>1.0273</td><td>0.8161</td><td>0.9667</td><td>0.8620</td></tr>
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</td></tr>
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<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><td>Data / Parameter:</td><td>Emission Factor Build Margin (EF_{BM})</td></tr>
<tr><td>Data unit:</td><td>tCO2/MWh</td></tr>
<tr><td>Description:</td><td>South Grid Emission Factor</td></tr>
<tr><td>Source of data to be used:</td><td>MCT</td></tr>
<tr><td>Value of data applied for the purpose of calculating expected emission reductions in section B.5</td><td>
<table>
<tr><th colspan="13">Emission Factor (tCO2/MWh)</th></tr>
<tr><th>Month</th><th>Jan</th><th>Feb</th><th>March</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>EF_{BM}</td><td>0.1737</td><td>0.1737</td><td>0.1737</td><td>0.1737</td><td>0.1737</td><td>0.1737</td><td>0.1737</td><td>0.1737</td><td>0.1737</td><td>0.1737</td><td>0.1737</td><td>0.1737</td></tr>
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</td></tr>
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<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:

>>

<u>Generated Electric energy</u>

The monitoring will be done according to the defined procedures for Approved Consolidated Monitoring Methodology ACM0002 - "Monitoring Methodology consolidated for the electricity generation to an interconnected grid with zero emissions from renewable sources."

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 the System operation.

PROCESS DESCRIPTION

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

SCDE is a system administered by CCEE, responsible for the daily collection and treatment of the generation and consumption data of the SIN measurement points.

The data collected by SCDE are transferred for the computation system SCL for ends of Accountancy and Financial Clearance sale with base in the Rules and Procedures of Commercialization of CCEE.

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 of the meters and made available in files of format xml for each one of the meter. These files are generated through routines of work of 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, is responsible for generating, in the first useful day of every month, starting from consultation to the data base of the meters of gross and net energy, the spreadsheets with the generation data, consolidated hour the hour, regarding the previous month. The generated spreadsheets are filed in the Data Server in the directory G:\Operaçao\OPERAÇÃO\Registros SE - Medições Energia.

The Operation Department, through the Engineer of Operation, makes the consolidation of the generation data obtained and it totals the monthly amounts of generated energy.

Monthly, the Operation Supervisor sends to CPFL Brasil, contracted agent for CERAN for relationship with CCEE, the spreadsheets with the generated energy data for conference of the data and eventual adjustments in SCL that are done necessary.

Weekly, the Maintenance Area, through a system technician, accomplishes the backup of the Data Server (G) according to Procedure of Maintenance MPS 54 – Data Server Backup.

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

For ends of 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 hour the hour. Those spreadsheets are accessed through the site of CCEE.

In case it happens inconsistency in the internal data with the data obtained in CCEE, it will be generated a non-conformity report that will be verified CCEE close 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, are stored by the Operation Department electronically in the folder G:\Operaçao\OPERAÇÃO\Registros IF - Medições Energia. The backup is weekly accomplished according to item II.

Emission Factors

These data will be supplied annually by MCT (www.mct.gov.br), described below:

CO_2 Emission Factors for the electric power generation in the National System of Brazil (SIN)

The CO_2 Emission Factors of the electric power generation verified 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 are necessary to the projects of renewable electric energy connected to the electric net and implanted in Brazil in the extent of the Mechanism of Clean Development (CDM) of the Protocol of Kyoto.

The systematic of calculation of the factors of emission of CO_2 was developed in cooperation between the Ministry of the Science and Technology (MCT) and the Ministry of Minas and Energy (MME), tends as base the guidelines of the methodology ACM0002, approved for Executive Council of CDM, in Bonn, Germany. ONS had to explain to the group the operative practices of SIN, regulated by ANEEL.

Following that systematic one, the CO_2 Emission Factors started to be calculated by ONS for the four subsystems of SIN (North, Northeast, Southeast/Midwest and South) from January of 2006 and it will be available to be consulted by the interested public and investors.

MCT supplies, besides the emission factors, a descriptive manual of the formulas used in the calculations of the factors.

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

>>

Data from the baseline study application and monitoring methodology finalization: June 22th 2007.

Responsible for the project and participant listed on Annex I with the contact information

- Vendolino Fischer / CERAN (Companhia Energética Rio das Antas)
- Sergio Augusto Weigert Ennes / C-Trade Comercializadora de Energia Ltda.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>
01/04/2004 (construction beginning)

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

>>
31 years – 9 months – 14 days (from C.1.1)

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

C.2.1. Renewable crediting period

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

>>
01/12/2007 or date of registration whichever is later

C.2.1.2. Length of the first crediting period:

>>
7 years

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. Documentation on the analysis of the environmental impacts, including transboundary impacts:

>>

The growing global concern on sustainable resources is driving the requirement for more sensitive environmental management practices. Increasingly, this is reflected in legislation and policies around the world. In Brazil the situation is no different. The licensing policies and environmental rules are very demanding, in line with the best international practices.

In Brazil, the sponsor of any project that involves construction, installation, expansion or operation of any polluting or potentially pollutant activity or any other activity that may cause environmental decay is required to obtain a series of licenses from the pertinent environmental agency (federal and/or local, depending on the project).

To obtain all the environmental licenses, every the hydroelectric projects must mitigate the following impacts:

- Inundation of indigenous lands and slave historic areas – authorization for this depends on the National Congress resolution;
- Inundation of environmental preservation areas, legally defined as National Parks and Conserve Units;
- Inundation of urban areas or rural communities;
- Reservoirs where future urban expansion will occur;
- Elimination of natural patrimony;
- Expressive losses for other uses of water;
- Inundation of protected historic areas; and
- Inundation of cemeteries and other sacred locations.

The process begins with a previous analysis (preliminary studies) made by the local environmental agency. After this, if the project is considered environmentally feasible, the sponsors have to prepare an Environmental Assessment, which is basically composed of the following information:

- Reasons for implementing the project;
- Description of the project, including information related to the reservoir;
- Preliminary Environmental Diagnosis, mentioning the main physical, biotic and anthropic aspects;
- Preliminary estimation of the project impacts; and
- Possible mitigating measures and environmental programs.

The result of these evaluations is the Preliminary License (PL), which reflects the positive understanding of the local environmental agency on the project environmental concepts.

The presentation of (a) additional information on the previous assessment; (b) a new simplified assessment; or (the Environmental Basic Project, is needed to obtain the installation license (IL), according to the resolution of the environmental agency informed on the PL.

The operation license (OL) is a result of pre-operational tests performed during the construction phase, carried out to verify if all the exigencies made by the local environmental agency were completed.

See below the history of the licenses:

- Preliminary License (PL) EIA/RIMA – Nº 0695/2001 – DL
    - Issued in: October 3rd, 2001.
    - Valid for: 1 year.

- Installation License (IL) – Nº 476/2002 – DL
    - Issued in: July 11th, 2002.
    - Valid for: 1 year.

- Installation License (IL) – Nº 112/2003 – DL
    - Issued in: February 7th, 2003.
    - Valid for: 1 year.

- Installation License (IL) – Nº 117/2004 – DL
    - Issued in: February 4th, 2004.
    - Valid for: until April 30th, 2007.

- **Installation License (IL) – Nº 393/2007 – DL**
    - Issued in: June 18th, 2007.
    - Valid for: until December **12th, 2007**.
    - http://eta.fepam.rs.gov.br:81/doclics/signed/256149_signed.pdf

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

>>

The environmental impact of the project activity is considered small. With the use of run-of-river hydroelectric facilities for generation of electricity, the project substitutes part of the obtained electricity of fossil fuel.

The forecast is that the project activity will contribute to improve the provisioning of electricity and, at the same time, it will contribute to the sustainability environmental, social and economical.

The project has all of the environmental licenses and necessary installation satisfying several demands of the state environmental legislation - FEPAM (State Foundation of Environmental Protection of Rio Grande do Sul) - and of the Brazilian electric section - ANEEL (National Agency of Electric power).

In the processes of licenses obtainment, reports were prepared containing the investigation of the following aspects, among others:

- Impacts in the climate and in the quality of the air.
- Geological impacts and in the soil.
- Impacts in the hydrology (underground water and of surface).
- Impacts in the flora and in the animal life.
- Socioeconomic (necessary infrastructure, legal and institutional aspects, etc.).

Other important aspect in the undertaking implementation was the dedicated study of the environmental viability starting from the elaboration of the Environmental Basic Project (PBA) that contemplates the mitigation of all of the identified environmental impacts in the EIA-RIMA. PBA has 27 specific programs divided in three great areas: physical, biotic and atrophic environmental, according to the follow:

- **Physical environmental**: climatic conditions monitoring; underground waters monitoring; characterization and monitoring of the stability of the marginal hillsides; monitoring limnologic and of the quality of the water; recovery of the degraded areas; investigation would mine; monitoring seismograph; monitoring hydrous-sedimentologic; control of the hydrous pollution of the river of the Tapirs.

- **Biotic environmental**: cleaning of the reservoirs; monitoring and rescue of the ictiofauna; rescue, rescue and monitoring of the fauna; rescue, rescue and monitoring of the flora; reforestation; control of the macrophyte proliferation.

- **Anthropic environmental**: transferring of the population; monitoring of the reached population; monitoring of the public health; rescue of the patrimony historical, cultural, archeological and landscapist ; re-dimensioning and infrastructure reallocation; support to the municipal districts; decrease of losses and combat to the waste of energy; environmental education; social communication; administration of the reservoirs; environmental administration; support to the migrating population.

SECTION E. Stakeholders' comments

>>

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

>>

In addition to the stakeholders' comments, solicited for obtaining environmental licenses, the Brazilian Designated National Authority, "*Comissão Interministerial de Mudanças Globais do Clima*", solicits stakeholders' comments based on a translated version of the PDD and the validation report emitted by an authorized DOE according to Resolution No. 1, issued on September 11th, 2003, in order to provide the letter of approval.

The project proponents sent these letters to the stakeholders to solicit their comments while the project PDD remained open to comments during the validation stage on the CDM – Executive Board's website (http://cdm.unfccc.int/), since anyone can have access to the document mentioned coming from a legitimate source.

E.2. Summary of the comments received:

>>

The *HPP Castro Alves PDD* was opened for comments at the CDM website. There weren't comments received.

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

>>

The *HPP Castro Alves PDD* was opened for comments at the CDM website. There weren't comments received.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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E-Mail:	ceran@ceran.com.br
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Represented by:	
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding coming from Annex I countries was or will be used in this project.

Annex 3

BASELINE INFORMATION

All information is presented in Section B.

The Brazilian electricity system (Figure 8) is divided in four subsystems: North, Northeast, South and Southeast/Midwest.

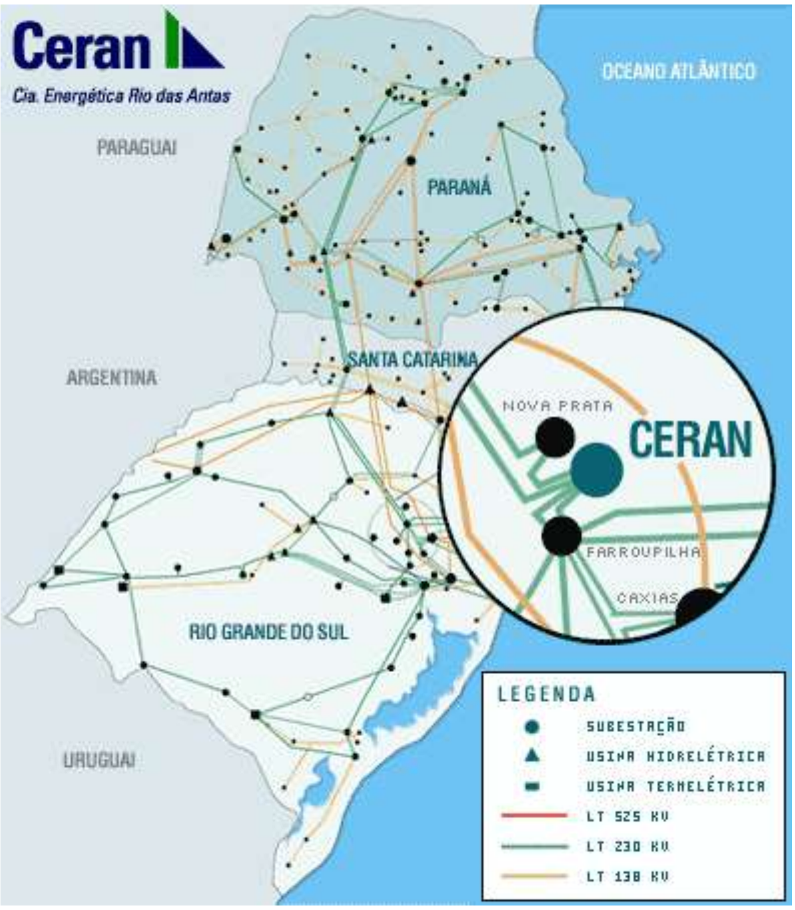

Figure 8– CERAN connection to the south subsystem of the SIN. Source: CERAN (www.ceran.com.br)

Furthermore, Bosi (2000) makes a solid argument in favor of having so-called multi-project baselines:

"For large countries with differing circumstances within their boarders and different power grids based on each region, multi-project baselines in the electric sector may need to be separated below the country-level to promote a reliable representation of what would have happened otherwise'".

Finally, it must be taken into account that although the systems are presently interconnected, the electric energy flow between the N-NE and the S-SE-CO systems is severely limited by the transmission line capacity. As such, only a fraction of the total electric energy generated in the two subsystems is sent from one side to the other. It is natural that this fraction may change its direction and magnitude (until reaching the transmission line capacity) depending on hydrological standards, the climate and other uncontrollable factors. However, this change must not represent a significant amount of electricity demand from each subsystem. It must be considered that the integration between the Southeast and the Northeast systems was concluded only in 2004.

Nowadays, the Brazilian electric system encompasses approximately 107.48 GW of installed capacity, with a total of 1,629 electricity generation enterprises. Of these, approximately 71.3% are hydroelectric plants, about 10.1 % are natural gas-fired generation plants, 4.03% are fuel and diesel oil plants, 3.1% are biomass sources (sugar cane bagasse, black liquor, wood, rice chaff and biogas agricultural waste), 1.9% are nuclear plants, 1.3% are mineral coal plants, and there are also 8.17 GW of installed capacity in the neighboring countries (Argentina, Uruguay, Venezuela, and Paraguay), which may dispatch electricity for the Brazilian grid (http://www.aneel.gov.br/aplicacoes/capacidadebrasil/OperacaoCapacidadeBrasil.asp). In truth, this last capacity encompasses principally 6.3 GW of the Paraguayan part of *Itaipu Binacional*, a central hydropower plant operated in conjunction with Brazil and Paraguay, but whose electric energy almost entirely is sent to the Brazilian grid.

The approved methodology ACM0002 requires that the project proponents answer for all generation sources serving the system." In this way, when applying the methodology, the project proponents in Brazil must search for, and research, all the plants serving the Brazilian system.

Now, the MCT (Science and Technology Ministry – www.mct.gov.br), MME (Mines and Energy Ministry – www.mme.gov.br) and ONS (National System Operator – www.ons.org.br) have divided the Subsystem South/Southeast/Midwest into two: South and Southeast/Midwest, for effect of emission factor calculation, for CMD project activities. All the emission factor calculation and explanation documents can be found at MCT website: http://www.mct.gov.br/index.php/content/view/50862.html

For this project it will be considered the South subsystem, where the project is located. The following tables show the Operating Margin and Build Margin factors:

- Operating Margin (EF_{OM})

South Subsystem

Average Month Factor (tCO2/MWh)												
2006	Month											
	Jan	Feb	March	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
	0.9074	0.9663	0.9719	0.9648	1.0027	0.9771	1.0236	1.0110	1.0273	0.8161	0.9667	0.8620

Daily Average Emission Factors (tCO2/MWh)												
2006	Month											
Day	Jan	Feb	March	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
1	0.9660	0.8929	1.0400	0.9444	0.9993	1.0100	1.1199	1.0276	0.9622	0.7591	1.0701	1.0877
2	0.9160	0.8076	1.0446	0.9376	0.9201	0.9985	1.0949	1.0132	1.0007	0.8007	1.1068	1.1341
3	0.8909	0.7897	1.0089	0.9667	0.9763	0.9890	1.0562	1.0069	1.0462	0.7775	1.1031	1.0891
4	0.9151	0.8823	0.9904	0.9378	0.9688	0.8600	1.0142	1.0122	1.0331	0.8299	1.0611	0.9721
5	0.8160	0.9312	1.0033	1.0531	0.9675	0.9775	1.0394	1.0001	1.0663	0.8139	1.0511	0.9441
6	0.8946	0.9343	0.9669	0.9823	1.0021	1.0077	1.0531	1.0143	1.0713	0.7935	1.0256	1.0438
7	1.0171	0.9768	1.0308	0.9619	1.0177	0.9811	0.9910	0.9712	1.0430	0.6796	1.0423	0.9083
8	1.0143	0.8921	0.9578	0.9618	1.0046	0.9827	0.9900	0.9752	1.0590	0.5819	0.9633	0.8332
9	0.8348	1.0073	0.9891	0.9693	1.0836	0.9892	1.0337	0.9409	1.0303	0.7555	0.9963	0.7647
10	0.8565	1.0538	0.9911	1.0320	1.0357	0.8994	1.0102	1.0341	1.0446	0.7213	0.9780	0.8572
11	0.8088	1.1049	0.9750	0.9887	1.0092	0.8822	1.0121	1.0315	1.0374	0.7321	1.0475	0.7998
12	0.8836	1.0415	0.9598	1.0098	1.0168	0.9517	1.0214	1.0127	0.9514	0.6556	1.0275	0.7190
13	0.9296	1.0340	0.9619	1.0029	1.0153	0.9911	1.0134	1.0166	1.0304	0.7037	0.9617	0.7559
14	0.9741	1.0039	0.9245	0.9870	1.0433	1.0029	1.0129	0.8969	1.1121	0.6630	0.9751	0.7478
15	0.9170	1.0193	0.9818	1.0076	1.0145	0.9942	1.0170	1.0266	1.0549	0.5925	1.0293	0.7328
16	0.7970	1.0193	0.9986	1.0103	1.0113	1.0104	1.0498	0.9724	1.0238	0.6821	0.8720	0.7435
17	0.8176	1.0265	0.9332	0.9288	1.0216	1.0147	1.0103	1.0123	1.0584	0.6861	0.7860	0.6837
18	0.8801	1.0428	0.9753	0.8640	1.0209	0.9654	1.0213	1.0069	1.0524	0.6819	0.9863	0.7572
19	0.9313	0.9944	0.9535	0.8541	1.0097	1.0222	1.0249	1.0468	1.0515	0.6868	1.0241	0.6960
20	0.9206	1.0224	0.9637	0.9549	1.0106	1.0388	1.0205	1.0685	1.0412	0.9621	0.7323	0.7355
21	0.9526	0.9855	0.9349	0.9844	1.0454	1.0058	1.0124	1.0782	0.9836	1.0694	0.8363	0.7061
22	0.9269	0.8767	0.9626	0.9479	1.0196	0.9789	1.0086	1.0260	1.0314	1.0394	0.9141	0.6769
23	0.9084	0.8652	0.9671	0.9362	1.0233	1.0055	1.0633	0.9682	1.0166	0.8089	0.8036	0.8184
24	0.8873	0.9415	0.9571	0.9329	1.0317	0.9231	1.0089	0.9659	1.0569	0.8400	0.7396	1.1035
25	0.9014	0.9491	0.9570	0.9231	1.0014	0.9324	0.9756	1.0266	1.0490	0.9968	0.8305	1.1985
26	0.9063	1.0077	0.9326	0.9559	0.9803	0.9831	1.0179	1.0571	1.0254	0.8931	1.1325	1.0114
27	0.9611	1.0203	0.8930	0.9598	0.9580	0.9838	1.0088	1.0319	0.9917	0.9208	0.9636	0.9003
28	0.9724	1.0128	0.9465	1.0047	0.9868	0.9753	0.9923	1.0506	0.9593	0.9696	0.9454	0.8914
29	0.9405		0.9669	0.9634	0.9788	1.0007	1.0136	1.0581	0.9999	1.0388	1.0240	0.8560
30	0.9370		0.9800	0.9984	0.9898	0.9656	1.0379	1.0406	0.9606	0.9996	1.1494	0.9311
31	0.9553		0.9790		0.9383		1.0403	0.9948		1.0641		0.9424

Table 14 – Construction Margin Factors

Source: MCT (http://www.mct.gov.br/index.php/content/view/50871.html - accessed on 20/June/2007)

- Build Margin (EF_{BM})

2006	**Build Margin**
Subsystem	(tCO2/MWh)
South	0.1737

Table 15 – Build Margin Factor

Source: MCT (http://www.mct.gov.br/index.php/content/view/50871.html - accessed on 20/June/2007)

Project References

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Annex 4

MONITORING INFORMATION

The "Consolidated monitoring methodology ACM0002" defines the monitoring procedures of the project activities.

According to the procedures defined by "Approved consolidated monitoring methodology ACM0002"- "Consolidated monitoring methodology for grid-connected electricity generation with zero emissions from renewable sources."

All the procedures those will be used in the monitoring are described on the item B.7. Some additional information is the following: '

Additional information:

Employees Qualification

The whole process of Training and Development of the CERAN's employees is based on the crossing of the description of positions with the employee's profile and through the process of acting evaluation.

The implantation of the employees acting evaluation process happened in August of 2007. With base in the acting evaluation, it will be developed an Action Plan that seeks to help the employee in his development for the service of the function requirements. Besides, the company makes available the managers a formal procedure of training request.

Concomitantly to the formal process of Training and Development, CERAN follows the orientation of ONS in relation to the Operators Certification, according to the Operation Procedures Manual "RO-MP BR 04."

Some details of the Process of Measurement of Energy of CCEE:

The Commercialization Process

The Electric Power Commercialization Process takes place in pursuance to the parameters that have been established by Law 10848/2004, by Decrees 5163/2004 and 5.177/2004 (which instituted the CCEE) and by ANEEL's Normative Resolution 109/2004, which instituted the Electric Power Commercialization Convention.

The business relationships between the Agents members of the CCEE are predominately regulated by electric power purchase and sale agreements, and all the agreements executed between the Agents within the context of the National Interconnected System must be recorded at CCEE. Said recording includes only the parties involved, the amounts of energy and the period of effectiveness; the prices for the electric power on the agreements are not recorded at CCEE, and they are used specifically by the parties involved during their bilateral settlements.

CCEE posts the differences between what has been produced or consumed and what has been contracted. The positive or negative differences are settled on the Short Term Market and are valorized according to the Spot Price (also called Price for the Settlement of Differences (PLD – Preço de Liquidação das

Diferenças), set weekly for each load level, and for each submarket, having as basis the marginal cost to operate the system, which is limited by a minimum and by a maximum price.

Commensuration

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.

Accounting Commensuration

The Domestic Interconnected System (SIN - Sistema Interligado Nacional) is represented at the CCEE through a structure made-up of the commensuration of consumption and generation points, which are defined through the Electric System Modeling, and which purports to obtain the measured net amounts of electric power for each Agent, thus allowing the Posting and Financial Settlement of short term market operations.

In order to obtain said amounts, the Commercialization Rules have established a process for the determination and the treatment of the electric power consumption and generation amounts commercialized by the Agents. The processing of the data is called Accounting Commensuration Aggregation (Agregação Contábil da Medição). There is need for adjustments because losses of electricity occur in the transmission system while the consumption through generation is being accomplished.

At CCEE these losses are apportioned among the Agents which own the consumption and generation commensuration points. Through the apportionment of these losses an assurance is given that the total effective generation of the system will be consonant with the total effective load of the system. The virtual point where the losses of the generation and consumption points become even is called the Gravity Point, and at this point all the purchases and sales of electric power at the CCEE are computed. The existence of this virtual point makes it possible to establish a comparison between the commensurations taken at different actual points of the SIN System.

The points of the SIN system that become part of said apportionment process are those defined by Aneel as being participants in the apportionment of the losses which occurred within the basic network. The losses of electric power are shared equally between the points of generation and consumption, where half the losses are deducted from the total amount generated and the other half is added to the total amount consumed. The generation and consumption totals of each Agent at the Gravity Point are computed as of the commensuration values informed by the Agents to CCEE, so as to be used in the process of posting the energy that has been commercialized on the Short Term Market.

Electric Power Data Collection System - SCDE

The Electric Power Data Collection System - SCDE (Sistema de Coleta de Dados de Energia Elétrica) is responsible for the daily collection and treatment of commensuration data, whereby the acquisition of these data is accomplished automatically, directly from the measuring device or through the Agent's database (UCM).

This system allows the carrying out of logical inspections, providing direct access to the measuring devices, and allowing greater reliability and accuracy to the data obtained. Through the SCDE, market agents achieve greater ease in sending the commensuration data to CCEE, as well as they are able to monitor the information sent on a daily basis.

Technical specifications

When of the need of installation/adaptation of the measurement System for Billing (SMF), the constant technical requirements should be observed in the Annex 1 - technical Specification of the measurements for billing of the sub module 12.2 - Installation of Measurement for Billing of the Module 12 of the Procedures of Net of ONS.

The use was authorized in temporary character by the Resolution Authoritative no. 787, of 23/01/2007 of ANEEL.

For larger details consult the Grid Procedures of ONS - Module 12.

Preventive maintenance - Calibration of the Meters

ONS – Sub module 12.3 - Maintenance of the measurement system for billing

In order to make the System of Measurement for Billing - SMF effective in its operation, it is necessary periodically accomplished preventive maintenances and, when necessary, corrective maintenances in the involved agents' facilities. Inspections in SMF are also accomplished with the intention of verifying the correct operation of the meters.

The activities to be accomplished by the agents involved in the National System - SIN in the maintenances and in the inspections they are described in the Enclosures 1 and 2 of this sub module.

OBJECTIVE

The objective of this sub module is the establishment of the maintenance procedures and of inspection of SMF, as well as the responsibilities, the stages and the periods for its execution.

ANNEX 1

Activities to be accomplished in the maintenance of the System of Measurement for Billing - SMF

(a) The periodicity for the responsible agent's preventive maintenance for SMF is of at the most 2 (two) years. That periodicity can be altered in function of the occurrence report observed in all of the facilities.

(b) The preventive maintenance can be postponed by the period of up to 2 (two) years, in the case of happening inspection in the measurement point. The postponement of that maintenance begins to be in force starting from the date of the inspection.

(c) The minimum tests the transformers should be submitted for instruments (TI) are the following ones: imposed load and diphase with periodicity of, at the most, 8 (eight) years.

(d) In all maintenance or calibration of the meters, these should be substituted by other properly programmed and calibrated, when there is not rear guard meter, in order to minimize the interruption in the registration of the load.

(e) Any changing in the relation of transformation of the TI to assist the protection or any operational condition that affects the measurement circuit for billing should be previously communicated to the responsible agent. That agent should make the changing of the data registered in the System of Collection of Data of Energy - SCDE and to submit it to the approval of the Camera of Commercialization of Electric power - CCEE. After the execution of the alterations in the measurement system, the involved agents should program an inspection to restore the sealing waxes.

(f) The verification of the perfect operation of the several functions of the meter should be accomplished, as programming, mass memory, schedule, registrations, aside reading etc. The conformity of the configuration of mass memory should be verified (Data Record), with the declared by the supplier and constant on the site of CCEE.

(g) The general inspection of the connections of SMF should be accomplished to verify the existence of eventual irregularity to affect the measurement.

(h) The calibration of the meter should be made by comparative method of consumption of Wh, with artificial load, single-phase or three-phase tests, in laboratories or in the field, with patterns tracked to the National Institute of Metrology, Normalization and Industrial Quality - INMETRO.

(i) The applied tension for calibration end should be same to the nominal tension of the meter.

(j) The pattern used in the calibration should be it of the responsible agent for SMF or of contracted laboratory for the responsible agent, but, just for comparison, it can be adopted the agent's pattern that accompanies the maintenance. The standards must be accomplished of their certificates of calibration valid in the period of the event.

(k) The standards, the artificial load and the meter owe, when necessary, to be energized before the tests with tension and nominal current, during the necessary time - at least 30 (thirty) minutes or in agreement with the manufacturers' of the meters orientations and of the pattern - for the thermal stabilization.

(l) The minimum tests that should be submitted each meter are the following ones: calibration with nominal load, activates, reactivates inductive and it reactivates capacitive, and with load activates small, according to the norm ABNT 14520 or IEC 687.

(m) The meter in calibration that present mistakes out of the limits specified by the used norm should be substituted.

(n) The meter identification code supplied by CCEE should be programmed and/or verified.

(o) The phasorial studies of the currents, of the tensions and of the sequence of phases they should be accomplished before and after the maintenance.

(p) In the connected agent's case or the responsible agent for SMF be late in the arrival to the place, the involved agents should wait 2 (two) hours, when, then, they should cancel the service, except for agreement among the parts regarding the awaiting period.