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

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Annexes

SECTION A. General description of project activity

A.1 Title of the project activity:

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Project title: CERTEL – Cooperativa Regional de Eletrificação Teutônia Ltda -Small Hydropower Plants (hereafter referred to as "*CERTEL Project*").

PDD Version number: 3.

Date: June 9th, 2008.

A.2. Description of the project activity:

The project activity consists on the supply of clean hydroelectric energy to the Brazilian National Interconnected System (SIN) through the implantation and operation of two Small Hydroelectric Plants (SHP), named Cazuza Ferreira and Rastro de Auto. All the entrepreneurships are located in the Southern Region of Brazil and totalize an installed capacity of 16.12 MW, using a small reservoir, with low environmental impact.

The main objective of the Small Hydroelectric Plants Cazuza Ferreira and Rastro de Auto is to help attend the growing demand for energy in Brazil, due to the country's economical and population growth, supplying clean and renewable energy, contributing, thus, to the environmental, social and economical sustainability, by increasing the participation of clean and renewable energy in relation to the country's total consumption of electricity.

The project activity reduces the emissions of green house gases (GHG), avoiding the generation of electricity through sources of fossil fuels with consequent CO_2 emissions, which would be produced if the project did not exist. The supply of clean and renewable electricity will bring and important contribution to environmental sustainability, reducing the emissions of carbon dioxide taking place in the absence of this project.

Cooperativa Regional de Eletrificação Teutônia Ltda (CERTEL) is the sole owner of the SHP Rastro de Auto, while the SHP Cazuza Fereira is an entrepreneurship realized in partnership through a consortium established between CERTEL, with 60% of the participation, and CERJATA, with 40%.

CERTEL, founded in February 19, 1956, integrates the system's board of Federation of Energy, Telephoning and Rural Development Cooperatives of the state of Rio Grande do Sul (from Portuguese Federação das Cooperativas de Energia, Telefonia e Desenvolvimento Rural do Rio Grande do Sul), composed by fifteen cooperatives acting in an area that sums 47 cities pertaining to the region of Vale do Taquari, Rio Pardo, Paranhana and Caí.

The cooperative serves more than 42 thousand users of electrical energy, benefiting a population of around 180 thousand inhabitants. Since its foundation, CERTEL has been acting in the electrical system, consolidating itself as a service supplier of energy distribution, incorporating the distribution grid of many cities in the state of Rio Grande do Sul. The cooperative acts, however, in many branches, such as the elaboration of electrical projects and the construction of energy networks, the commercialization of house appliances, furniture, electrical materials and of civil construction and telecommunications. Due to the high demand of energy in the region and to the necessity pointed out by the population, expressed through the opinion of the cooperativists, the generation of energy has become the Cooperative's priority since mid-nineties.

The first CERTEL's entrepreneurship of energy generation was the SHP Salto Forqueta, located between the cities of Putinga and São José do Herval in the state of Rio Grande do Sul, which initiated its operation in March, 2003, making available an installed capacity of 6.12 MW, using the Forqueta River to generate energy.

Before the successful experience in managing this first project, CERTEL incorporated in its mid-term planning the implantation of two more Small Hydroelectric Plants: SHP Cazuza Ferreira and SHP Rastro de Auto.

SHP Cazuza Ferreira is an entrepreneurship between CERTEL, with its 60% participation, and CERTAJA, with its 40% participation, which also integrates the system of the Federation of Energy, Telephoning and Rural Development Cooperatives of the state of Rio Grande do Sul. SHP Cazuza Ferreira is located in the city of São Francisco de Paula, has an installed potency of 9.1 MW and will provide energy through the river Lajeado Grande, using 0.221 km² of a flooded area. The estimated date to the beginning its operation is January 2010.

SHP Rastro de Auto is an entrepreneurship whose property is 100% CERTEL's and it is situated in the Forqueta River, between the cities of São José do Herval and Putinga, presenting an installed capacity of 7,0 MW. CERTEL also projects to January 2010 the beginning of the operation of this SHP.

CERTEL's Project contribute to the sustainable development once contributing to the economic growth without compromising the future generations, respecting the concept of Sustainable Development, established by Brundtland Report, elaborated by the World Commission on Environment and Development, which defines the term "sustainable development" as " the development that satisfies the present necessities, without compromising the capacity of future generations of supplying their own necessities"[1]

Through the following actions, CERTEL Project contributes to the sustainable development of its region and country:

(a) Through CERTEL projects, clean and renewable energy will be dispatched to the Brazilian National Interconnected System, displacing possible entrepreneurships that would generate energy through the burning of fossil fuels, avoiding, thus, the emission of poluent gases to the atmosphere and preserving the environment to future generations.

(b) Through the involvement of over 42,000 cooperativists in the entrepreneurship's decisions, CERTEL promotes the popular participation in conducting the region's economic development, which happens through the generation of income to the Cooperative and to its employees and through the taxes and tributes generated by the activities of Project CERTEL to the cities involved, reverted into benefits to the population itself.

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[1] WCED [CMMAD], 1987. Our Commom Future [Nosso Futuro Comum]. The World Commission on Environment and Development [Comissão Mundial sobre Meio Ambiente e Desenvolvimento]. Oxford University Press.

(c) Although all the SHPs developed by CERTEL show low environmental impact, with the formation of small reservoirs and high power density, the Cooperative will make considerable investments in environmental programs and actions. Programs to monitor flora and fauna, besides specific programs aimed at environmental education have been contributing to the awareness of the population in the cities involved in the entrepreneurship about environmental and ecological issues.

(d) As the SHPs of CERTEL Project are located in the rural area of Rio Grande do Sul, the implantation of this kind of entrepreneurship in the region demands the capacitation of the collaborators. Therefore, the Cooperative implemented an ample Human Development Program, in which grants are offered, motivating the graduation in elementary and high school, as well as under graduation and graduation to its collaborators, besides specific training programs. Through this action, CERTEL seeks to capacitate its collaborators to the market and contribute to increase the knowledge and education level of the population in the cities where it acts.

(e) As a partner of the regional development, CERTEL takes part in social, educational and cultural actions, directed to the associates and to the community of the cities involved in general. As an example, it can be cited (i) Project Light Weight, in which a group of multidisciplinary professionals provides nutritional consults and guides to over 42 thousand associates; (ii) the financial support to the campaign of health entities, such as Holding Hands Campaign (from Portuguese, Campanha Mãos Dadas), which aimed at raising funds to a hospital in Teutônia (where the company's headquarters is); (iii) the support to sports activities, such as the sponsorship for over 8 years of the amateur regional soccer championship; and (iv) the investment in cultural activities, with the incentive, for instance, to the CERTEL choir, formed since 2001 by collaborators of the Cooperative.

For all these initiatives, CERTEL has been acquiring awards and recognition in the market. The Cooperative is considered by the magazine *Exame*, since 2005, one of the 150 top companies to work in Brazil. Besides, in 2003, it was awarded by the Regional Program of Quality and Productivity (from Portuguese Programa Gaúcho de Qualidade e Produtividade – PGQP) with the RS Golden Award in Quality and has been awarded for many years with the Certificate of Social Responsibility from the State's Legislative Assembly. In 2007, the company received from Brazil's Cooperative Organizations the award of Cooperative of the year.

Through its performance in several sectors in society and the investments in the energetic sector, CERTEL seeks to continue contributing to the sustainable development of the cities where it acts, in the region and in the country as a whole.

The annex 6 of this PDD presents some photographs of CERTEL Project.

A.3. Project participants:

CERTEL is the owner of SHPs Cazuza Ferreira (60%) and Rastro de Auto and is responsible for all activities related to electricity generation. CERTAJA owns 40% participation in SHP Cazuza Ferreira and it shared responsibility on the energy generation from this SHP.

Enerbio Consultoria Ltda advises CERTEL to develop CDM Projects and to monitor the CERs to be generated from the CERTEL Project.

CERTEL and Enerbio Consultoria Ltda are the Project Focal Point. The table 1 below represents the parties and entities involved in the CERTEL Project.

Table 1 – Private and public parties and entities involved in the activity

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: CERTEL (Cooperativa Regional de Eletrificação Teutônia Ltda)	No
	Private Entity: CERTAJA (Cooperativa de Geração de Energia e Desenvolvimento Taquari Jacuí)	No
	Private Entity: Enerbio Consultoria 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.		

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

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.:

Region: South of Brazil

State: Rio Grande do Sul.

A.4.1.3. City/Town/Community etc:

SHP Rastro de Auto: Municipalities of Putinga and São José do Herval

SHP Cazuza Ferreira: Municipality of São Francisco de Paula

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

SHP Rastro de Auto (Latitude: 29°03'43" South and Longitude: 52°13'05 West) is located between the municipalities of Putinga and São José do Herval, generating electricity from Forqueta River and the SHP Cazuza Ferreira (Latitude: 29°01'10" South and Longitude: 50°43'50" West) is located in the municipality of São Francisco de Paula and it will generate electricity from Lajeado Grande River.

The table below shows some socio-economical indicators of the municipalities where the CERTEL Project's Small Hydropower Plants are located:

Table 2 – Socio-Economical indicators of municipalities where the CERTEL Project`s SHPs are located

Municipality	Total Population (2006)	Area (km^2)	Anual GDP per capita (2004)	Iliteracy Rate (2000)	Life expectancy (2000)
Putinga	4,239	219.9	R$ 20,486	10.68%	73,84 years
São José do Herval	2,756	103.1	R$ 7,869	24.31%	75,01 years
São Francisco de Paula	22,028	3.273.5	R$ 8,950	9.54%	68,97 years

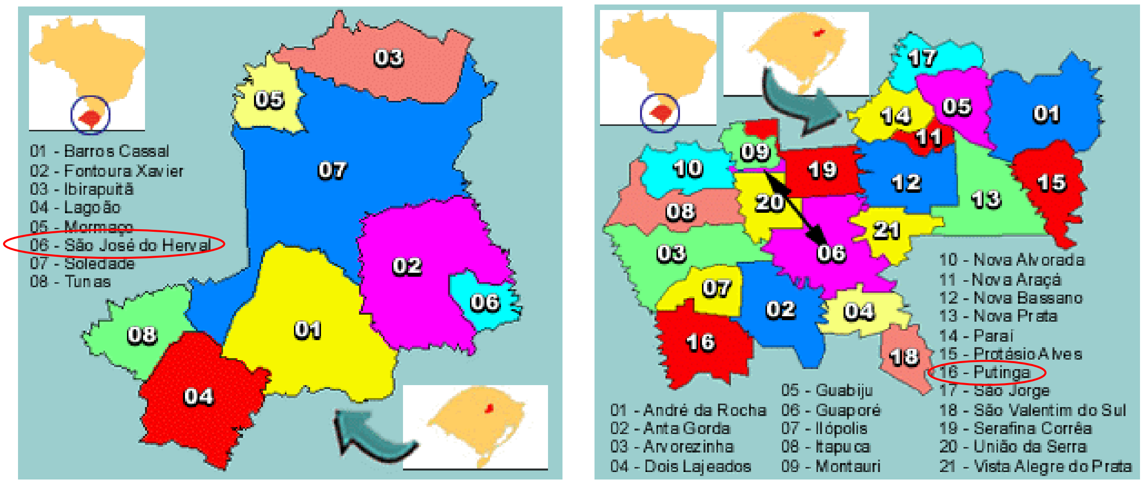
*Data Source: Fundação de Economia e Estatística, organization linked to Secretaria do Planejamento e Gestão of Rio Grande do Sul State`s Government.
Available at: www.fee.rs.gov.br/sitefee/pt/content/resumo/pg_municipios.php

The maps below show the Rio Grande do Sul State's localization in the Brazilian political-administrative structure and the municipalities' localization where the CERTEL Project's SHPs are situated.

Map 1 – Brazilian political-administrative structure, highlighting the state of Rio Grande do Sul

Map 2 – Region of Rio Grande do Sul where São Francisco de Paula is located

Map 3 – Region of Rio Grande do Sul where the municipalities of São José do Herval and Putinga are located



Source: www.citybrazil.com.br/mapas.htm .

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

Sectoral Scope 1 – Energy Industries (Renewable Source)

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

By the legal definition of the National Agency of Electric Energy (ANEEL), exposed in the resolution 652, of December 9, 2003, small hydroelectric plants in Brazil must have the installed capacity of over 1 MW and inferior to 30 MW and a reservoir area inferior to 3 km². The SHP Cazuza Ferreira and Rastro de Auto are within these characteristics and generate energy with a high power density, presenting minimal environmental impacts.

The Table 3 below presents the main technical parameters of these three SHPs:

Table 3: Technical Characteristics of SHPs Cazuza Ferreira and Rastro de Auto

Technical Characteristics	SHP Cazuza Ferreira	SHP Rastro de Auto
Installed Capacity (MW)	9.1	7.02
Reservoir Area (km^2)	0.221	0.28
Assured Energy (MW)	5.00	3.96
Monthly Historical Flow (m^3/s)	8.71	17.34
Turbines		
Turbines Quantity	2	2
Turbines Type	Double Horizontal Francis Spiral	Double Horizontal Francis Spiral
Unit Nominal Power (MW)	4.74	3.656
Maxim Performance	92%	92%
Turbine`s Manufacturer	It is not defined yet (Project Phase)	It is not defined yet (Project Phase)
Generators		
Generators Quantity	2	2
Type	Synchron Threephase Brushless	Synchron Threephase Brushless
Unit Nominal Power (kVA)	5.500	4.350
Synchronous Speed (rpm)	720	514
Power`s Factor	0.82	0.82
Maximum Performance	96%	96%
Dam		
Type	Gravity	Gravity
Maximum Height (meters)	8.0	19.0
Total Lenght of Spillway or Top (meters)	100	110
Level of Spillway or Top (meters)	778.5	250

The equipments and technologies to be employed in the project were developed in Brazil and have already been successfully applied to similar projects in the country and in the world. The technology applied in the project is well established in the sector, since Francis turbine is one of the most widely used in projects of small hydroelectric plants in the country.

Francis turbine is adequate to operate in entrepreneurships that have water falls between 20 and 400 m. The name and development of this hydraulic turbine are owed to James Bicheno Francis (1815-1892), born in England, who emigrated later to the United States, working as an engineer in companies on the shore of Marrimac River. In 1874, he was in charge of studying a turbine to take advantage of the energy generated in delevel of a river. His interest was on a centripetal flow machine, already patented in 1838 by Samuel Dowd (1804-1879). However, so important were Francis's modifications on Dowd's project that this kind of turbine was named after him.

These turbines are rigorously centripetal and permit the use of a tube to conduct the water after the exit of the rotor to the well, that for its similarities to those seen on bombs, was named suction tube. It keeps the continuity of the liquid mass in flow, since its exit in the rotor to the water level in the well, hindering the water from falling freely, resulting in the gain of not only the greatest part of water's kinetic energy, but also the topographic delevel between the rotor's exit and the water level in the well.

Water distribution through the rotor's blades is done through a series of distributor blades or guide blades – regulated externally – which distribute water in a symmetric and simultaneous way to all the rotor's blades.

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

Using baseline emission factor calculated as described on the item B.6.1, the complete implementation of the CERTEL Project, connected to the South Brazilian interconnected grid, will generate a yearly average estimated reduction of **38,366 tCO_{2e}** and a total reduction of **268,562 tCO_{2e}** during the first 7-year-period, described in the table below:

Table 4: Estimation of CERTEL Project's emissions reductions

Year	Annual estimation of emission reductions (tCO_2e)e
*2010	38,366
2011	38,366
2012	38,366
2013	38,366
2014	38,366
2015	38,366
2016	38,366
Total Estimated Reductions (tCO_2e)	**268,562**
Total Number of Crediting Years	**7**
Annual average over the crediting period of estimated reductions (tonnes of CO2e)	**38,366**

- * The prevision for SHPs Cazuza Ferreira and Rastro de Auto beggining its operation in January, 2010;

A.4.5. Public funding of the project activity:

No public funding for the project activity was solicited by parties involved in Annex I for the project activities.

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:

- Consolidated baseline and monitoring methodology ACM0002, version 7 - Methodology Consolidated for grid-connected electricity generation from renewable sources.

- Tool for Demonstration and Assessment of Additionality, Version 4.

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 ACM0002 consolidated methodology is applicable to grid-connected renewable power generation that involves electricity capacity additions:

- The project activity is the installation or modification/retrofit of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit.

- In case of hydro power plants:

  - The project activity is implemented in an existing reservoir, with no change in the volume of reservoir;
  - The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emission section, is greater than 4 W/m^2.
  - The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m^2.

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

The ACM0002 methodology can be applicable to CERTEL Project due to the following aspects:

- SHPs Cazuza Ferreira and Rastro de Auto are installation of a hydro power plant/unit;

- The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on characteristics of the grid is available due to the geographic data and the relevant electricity grid system limits are easily identified, as well as all information about the grid is available in ONS, Operador Nacional do Sistema (National System Operator), (www.ons.org.br), and in ANEEL, Agência Nacional de Energia Elétrica (National Agency of Electric Energy), (www.aneel.gov.br).

- SHPs Cazuza Ferreira and Rastro de Auto are project activities which result in new reservoirs and the power density of the power plants is greater than 4 W/m^2 (and it is also greater than 10 W/m^2);

The project activity`s power density, according ACM0002 methodology, is calculated as demonstrated below:

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}}$$ **Equation 1**

Where:

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

The table 5 below evidences that SHPs Cazuza Ferreira and Rastro de Auto have reservoirs where the power densities are greater than 4 W/m^2 and also greater than 10 W/m^2.

Table 5: Power Density of SHPs Cazuza Ferreira and Rastro de Auto

Item	SHP Cazuza Ferreira	SHP Rastro de Auto
Cap_{PJ}	9,100,000	7,002,000
Cap_{BL}	0	0
A_{PJ}	221,000	280,000
A_{BL}	0	0
PD	**41.17**	**25.07**

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

The National Interconnected System (from Portuguese Sistema Interligado Nacional - SIN) is managed by ONS, which is responsible for all activities related to the operation's planning. The ONS traditionally subdivides the National Interconnected System into four subsystems interconnected: the South

Subsystem, the Southeast/Midwest Subsystem, the North Subsystem and the Northeast Subsystem. These Subsystems are related to the Brazilian geographic regions: South Region, the Southeast/Midwest Regions, the North Region and the Northeast Region.

Due to the offer's real availability and the consumption behavior in each region, ONS establishes inter-regional energy exchange politics, besides exceptional attitudes to thermal generation dispatch, in case the storage levels of water significantly reduce and tend to violate the security curves. These conditions are permanently monitored and available to the electric industry agents.

According to ACM0002, version 07, the special extension of the project's boundaries includes the project power plant and all power plants physically connected to the electricity system that the CDM project power plant is connected to. All CERTEL Project's hydropower plants are connected to National Interconnected System, more specifically to the South Subsystem.

The greenhouse gases and emission sources included in or excluded from the project boundary are shown in the table below:

Table 6: Emissions sources included in or excluded from the project boundary

	Source	Gas	Included?	Justification / Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that is displaced due to the project activity	CO_2	Included	Main Emission Source. The presence of thermal power plants in the National Interconnected System and in the South Subsystem, where the CERTEL Project is located, provides emission of GHGs which would occur in the absence of the Project
		CH_4	Excluded	Minor Emission Source
		N_20	Excluded	Minor Emission Source

	Source	Gas	Included?	Justification / Explanation
Project Activity	Hydropower Electricity Generation	CO_2	Excluded	As described on the item B.2, the CERTEL Project`s SHPs power density are greater than $10W/m^2$, so the GHGs` emissions from the project activities are zero (PE_y=0).
		CH_4	Excluded	
		N_20	Excluded	

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

In the absence of the project activity, the clean energy generated by CERTEL's Project dispatched to the National Interconnected System (SIN), through the delivery in the South Subsystem, would have been generated through non-renewable sources from Power Plants connected to the interconnected grid, fostering the emission of greater quantities of green house gases.

According to the methodology ACM0002, if the project activity is the installation of a new renewable grid-connected power generation plant, the baseline scenario is the following:

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

The CO_2 emission factors for power generation in the Brazilian National Interconnected System (SIN), necessary to Combined Margin (CM) calculation, are calculated based on the generation record of plants centrally dispatched by the **National Operator of the System** (From the Portuguese Operador Nacional do Sistema - ONS). The procedures to calculate are available in the website http://www.mct.gov.br/upd_blob/0022/22960.pdf and it was elaborated in cooperation between ONS, Ministry of Mines and Energy (MME) and the Ministry of Science and Tecnology (MCT).

It will be used the combined margin emission factor for South Subsystem of the National Interconnected System to calculate project's emissions reduction.

This baseline is perfectly applicable to SHPs Cazuza Ferreira and Rastro de Auto.

Through the projection established by the Ministry of Mines and Energy (MME) in the Decennial Plan of Electrical Energy Expansion[2] to the period of 2006-2015, we can notice that other activities and technologies that propitiate a higher emission of green house gases would occur in the absence of these projects.

Brazilian Decennial Plan for Electric Energy Expansion (2006-2015)

In 2006, the Ministry of Mines and Energy elaborated the Decennial Plan for Electric Energy Expansion to the period of 2006-2015, establishing three possible scenarios, based on the growth projection of the country's Gross Domestic Product (GDP). We adopted to this analysis the scenario pointed out by the MME as the most likely to happen, called reference scenario. This reference scenario adopts the premises cited in Annex 3 to estimate the necessity of expansion of the Brazilian electrical sector.

According to MME, the installed capacity existent in Brazil in December 2005 was as presented in the table below:

Table 7: Brazilian Installed Capacity on December/2005

[2] Source: Ministério de Minas e Energia (MME) - Plano Decenal de Expansão de Energia Elétrica, 2006-2015

Source	Installed Capacity (MW)
Hydroelectric	69,631
Thermoelectric	19,770
Nuclear	2,007
SHP	1,330
Subtotal	**92,738**
Interligation with Argentina	2,178
ANDE`s Itaipu Portion	5,600
Total	**100,516**

Considering MME's projection, based on the premises cited in annex 3, it was traced a plan for the generation expansion based on the energetic offer from the implantation of entrepreneurships of hydroelectric and thermoelectric generation.

It was estimated a necessity of growth in the energetic offer, based on the following matrix:

Table 8: Estimation of Increase in Energy's Offer to 2006-2015 Period by Source of Energy

Source of Energy	Additional Energy Offer (MW)
Hydroelectric	31,144.5
Thermoelectric	10,486
Total	**41,630.5**

It is important to highlight that from the additional offer of 10,486 MW coming from Thermoelectric Plants, the projection indicates that 1,769 MW will be generated from the entrepreneurships that will dispatch energy to SIN through the South Subsystem. The Thermoelectric Plants projected to start their operation through the South Subsystem in the period of 2006-2015 are described below:

Table 9: Thermoelectric Plants to be connected to the Brazilian South Subsystem predicted in the Decennial Plan for the Expansion of the Electrical Sector.

Power Plant	Power (MW)	Fuel	Start of Operation
Canoas	250	Natural Gas	January/08
Araucária	469	Natural Gás	December/08
Jacuí	350	Mineral Coal	December/08
Candiota III	350	Mineral Coal	December/08
Carvão Indic. S	350	Mineral Coal	December/09
Total	**1,769**		

It is also important to highlight that there are currently 7 thermoelectric plants in Brazil, operating with mineral coal, totalizing an installed potency of 1,461 MW, according to the table[3] below:

Table 10: Thermo Power Plants in Operation in Brazil

[3] Source: Aneel - http://www.aneel.gov.br/area.cfm?idArea=15&idPerfil=2

Power Plant	Power (MW)	State
Figueira	20	Paraná
Charqueadas	72	Rio Grande do Sul
Pres. Médici A, B	446	Rio Grande do Sul
São Jerônimo	20	Rio Grande do Sul
Jorge Lacerda I e II	232	Santa Catarina
Jorge Lacerda III	262	Santa Catarina
Jorge Lacerda IV	363	Santa Catarina
Total	**1,415**	

All the thermo electrical entrepreneurships that generate energy from mineral coal burning in the country are situated in the South Region, where CERTEL Project is located.
It can be noticed that the Energetic Expansion Plan to the period of 2006-2015 projects a growth of 74% in the offer of electrical energy based on mineral coal in the country, all the projects being located in the South region, connected to the National Interconnected System through the South Subsystem.

It is reasonable to consider that the electric energy generation of CERTEL Project can avoid the thermo electrical entrepreneurships that generate energy from the burning of mineral coal, whether they are new or existent, from being activated.

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):

This item is elaborated based on "Tool for the demonstration an assessment of additionality", version 4, available on the website http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html .

This tool describes some steps to be followed to demonstrate and assess the project`s additionality. Before starting to analyse the steps established in the tool, it is necessary to talk about the starting date of the project activity.

SHPs Cazuza Ferreira and Rastro de Auto have not begun their build yet and the predicted for their operation to start is January, 2010.

CERTEL has several evidences of the CDM's consideration in the decision to implant and proceed with the project activity. CERTEL's CEO since 1971, Mr. Egon Édio Hoerlle, is also the CEO of the Federation of Energy, Telephoning and Rural Development Cooperatives of Rio Grande do Sul (FECOERGS) since 1994, entity which assembles 15 cooperatives around all the state of Rio Grande do Sul. He commanded in this entity several studies and meetings to discuss the viability of important revenues for FECOERGS associated futures entrepreneurships through CDM.

CERTEL, as a FECOERGS's associated and represented by its CEO, who has the same position in this entity, actively participated. CERTEL and FECOERGS together have several minutes of meetings and emails which happened from 2000 to 2007, when it was discussed the possibility to hire consulting companies to develop CDM projects, the opportunities of revenues from selling CERs and the contribution of these revenues to the project`s economic viability. A draft of contract was established with a consulting company, situated in Brasília, in May 2003, to develop CDM Projects, however, the project development did not evolve.

Although CERTEL had considered essential to implement its entrepreneurships the revenues from selling CERs because of the lack of knowledge about how to develop CDM projects and the lack of definition existing in this market, CERTEL decided to wait for more knowledge accumulation and for a greater maturity in the CDM market to begin its projects.

All evidences that the CDM was seriously considered in the decision to proceed with the project activity were available and delivered to the Designated Operational Entity in the validation process.

Following the tool, the following requirements are necessary to demonstrate and assess the additionality of the CERTEL Project:

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:

- The continuity of the present scenario, with electricity generation happening according to the current generation composition of the Brazilian South Subsystem;

- The construction of a new Mineral Coal Thermoelectric Power Plant, with similar installed capacity to the CERTEL Project's SHPs;

- The project activity undertaken without being registered as a CDM Project Activity.

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

Both the activity project and the alternative scenarios are in accordance to the applicable laws and regulamentations. As exposed in item B.4 of this PDD, it is in the South Submarket where the only thermoelectric mineral coal plants of the country are located.

Particularly, approximately 38% of thermo electrical coal plants of the country are located in Rio Grande do Sul. Moreover, according to the Brazil's Atlas of Electric Energy[4], 90% of the national reservations of mineral coal are concentrated in Rio Grande do Sul, state where CERTEL Project is located.

It is also remarkable that according to what was exposed in item B.4, the Ministry of Mines and Energy projects a growth in the offer of energy generation from mineral coal thermoelectric centrals and that this projection indicates that, until 2015, the capacity to generate energy of the entrepreneurships that dispatch energy from mineral coal in the South Electrical Subsystem will grow approximately 74%.

[4] Atlas de Energia Elétrica do Brasl, ANEEL, 2002

It is important to clarify that the Brazilian Institutional New Model of the Electric Sector allows the private and public agents to decide the amount of energy to be hired and the investments to be realized from the participation in auctions of power plants and systems of transmission.

According to MME [5], "it is the agents of distribution that decide and compromise themselves to pay, through contracts resulting from auctions, amounts of electrical energy coming from new installations of electric energy generation to be delivered (…). With the distributors' information, the generators may then decide which new entrepreneurships of generation they wish to build, presenting in the auctions proposals of selling prices of their electric energy, competing for contracts of energy purchase from distributors. Additionally, the generators may also hire direct and freely with free consumers".

This way, it can be noticed that there are no restrictions in the applicable laws and regulamentations to the implantation of the alternative scenarios to CDM's activity project. Furthermore, we can also verify that through the projection mentioned before there is even a tendency with great probabilities of occurrence in the absence of projects similar to CERTEL Project.

It is further noticeable that the Brazilian Institutional New Model of the Electric Sector provides autonomy to the economic agents about the investments to be realized in the Brazilian electric sector, not existing, therefore, restrictions nor impositions to the project activity and to its alternatives.

Thus, both the activity project and the alternative scenarios fulfil all the Brazilian norms and regulamentations, being also plausible according to the tendencies in the country's electrical sector.

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 shown, 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

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:

[5] Ministério de Minas e Energia (MME) – Plano Decenal de Expansão de Energia Elétrica, 2006-2015

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 it must be applied the simple cost analysis (Option I). Otherwise, it must be used the investment comparison analysis (Option II) or the benchmark analysis (Option III).

The Option III – Benchmark analysis was chosen to analyze the project activity of CERTEL project.

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

Identify the financial indicator and the relevant benchmark which will be used to represent standard returns in the market:

- It will be used shareholder IRR as a project financial indicator and as a reference to represent standard returns in the market, it will be used the Selic Rate, which is the mainly reference for Brazilian Public Bonds traded in the market.

SELIC RATE

The SELIC rate has its name due to the Special System of Clearance and Custody (from Portuguese: Sistema Especial de Liquidação e Custódia), SELIC, which registers the operations involving the Brazilian public titles. SELIC is a great-computerized system that works under the responsibility of Brazilian Central Bank and of the National Association of the Open Market Institutions, since 1980, when it was created.

The definition of Selic Target Rate is carried out by COPOM, the National Committee of Monetary Politics, formed by the members of Brazilian Central Bank Collegiate Directors and the directors of Monetary Politics, Economic Politics, Special Studies, International Affairs, Norms and Organization of the Finance System, Fiscalization, Clearances and Destatization, and Administration. The Selic Target Rate defined through the meeting of COPOM is the target to Selic rate (average rate for the daily finances, with gold deposit in federal titles, computed in the Especial System of Clearance and Custody) to a certain period, which is in force throughout the whole period between ordinary meetings of the Committee.

The real Selic Rate practiced in daily operations is computed in the SELIC system and obtained through a calculus of the pondered average rate and adjusted to the finances operations for a day, spread in public federal titles and coursed in the referred system or in chambers of compensation and clearance of actives in the form of compromised operations. The latter should be understood as operations of titles' sales with the compromise of re-buying them, taken up by the seller, along with the one of re-selling them taken up by the buyer, to the clearance in the following weekdays.

Among the qualified institutions apt to perform operations are fundamentally the financial institutions, such as banks, savings bank, titles and imobiliary broker societies. The operators of these institutions transfer to SELIC online the businesses related to public titles involving the institutions that sell and buy them.

Selic Rate is originated, therefore, of interest taxes effectively observed in the market and, thus, is the rate that remunerates the investors in the business of selling and buying public titles. SELIC is the reference to investments in public titles and would be an investment with reduced risks to CERTEL that could generate the continuity of the current scenario, with energy being produced by the current composition of generation from the South Submarket.

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

Since CERTEL's Project is formed by two small hydroelectric plants, the cash flows and the assumptions used to its elaboration are presented separately to the three SHP **in Annex 5**. All the cash flows presented refer to the starting point of the project, when the shareholders analyzed the viability of the investment in the project.

Internal Rate of Return of the Projects

Through the analysis of the prediction for cash flows shown in Annex 5, it is obtained the following internal rate of return to the SHPs of CERTEL Project:

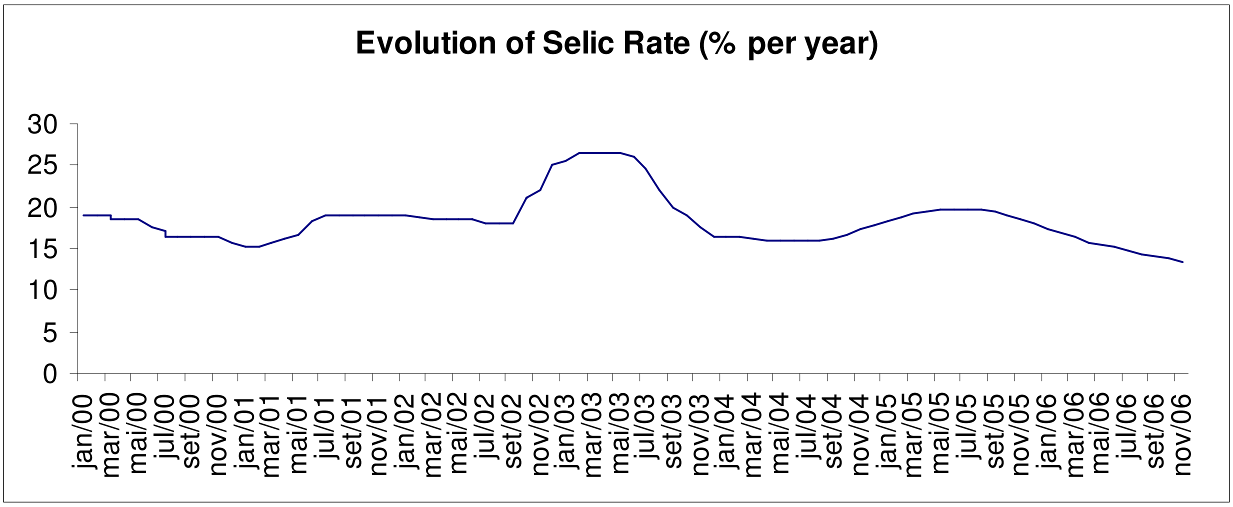
Table 11: Internal Rate of Return of CERTEL Project`s SHPs

SHPs	SHP Cazuza Ferreira	SHP Rastro de Auto
IRR	7.09%	1.65%

When analyzing the indicator set as reference to standard returns in the market, the Selic rate, it is noticeable that there has been a variation, ranging from 26.5% and 13.25%, with an average rate of 18.5%.

It is presented below a graphic that shows the evolution of Selic Rate from January 2000 to December 2006:

Graph 1 – Evolution of Selic Rate in the period 01/2000 a 12/2006 (% per year)



Source: Central Bank of Brazil (www.bcb.gov.br)

The Table 12 shows a summary comparing the project's financial indicators to the reference one:

Table 12: SHPs` Internal Rate of Return X Selic Rate

Average SELIC Rate *	SHP Cazuza Ferreira	SHP Rastro de Auto
18.50	7.09%	1.65%

* Period: jan/2000 to dec/2006.

One of the alternative scenarios to the project activity is the continuity of the current situation with the generation of electricity through the current composition of generation in the South Subsystem. The fact the reference indicator to the investment in Brazilian public titles (SELIC Rate) is generally, during the whole period of conception of the CERTEL Project`s SHP, higher than the internal rates of return of CERTEL's Projects' entrepreneurships, demonstrates that the occurrence of this scenario is completely plausible and that, financially speaking, there are more attractive alternatives to investors.

- 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 two main variables that might affect the project's finance are:

- Electricity price
- The Investment Amount

As CERTEL Project is composed of three small hydropower plants, the sensitivity analysis will be developed for the three SHPs, as shown in the table below:

Table 13: CERTEL Project's SHPs Sensitivity Analysis

VARIATIONS ON ELECTRICITY PRICE				
Projected Situation	MWh Price - CF	MWh Price - RA	IRR CF	IRR RA
0%	R$ 78,33	R$ 76,88	7,09%	1,65%
5%	R$ 82,25	R$ 80,72	7,96%	2,21%
10%	R$ 86,16	R$ 84,57	8,84%	2,77%
15%	R$ 90,08	R$ 88,41	9,74%	3,33%
VARIATIONS ON INVESTMENT TOTAL AMOUNT				
Projected Situation	Investment CF	Investment RA	IRR CF	IRR RA
0%	R$ 21.244.511	R$ 24.536.734	7,09%	1,65%
-15%	R$ 18.057.834	R$ 20.856.224	10,02%	3,50%
-10%	R$ 19.120.060	R$ 22.083.060	8,92%	2,81%
-5%	R$ 20.182.285	R$ 23.309.897	7,95%	2,20%

Caption:

- *CF: SHP Cazuza Ferreira*
- *RA: SHP Rastro de Auto*

The sensitivity analysis demonstrates that the CERTEL's Project SHPs are not the most attractive alternative once the entrepreneurships' internal rate of return is lower than the reference indicator in all scenarios analyzed. The average Selic rate for the period (January 2000 – December 2006) was 18.5%, above the IRR of all the entrepreneurships in all scenarios.

The tool for demonstration an assessment of additionality says that:

"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)."

Therefore, as the sensitivity analysis having shown that the proposed activity is not attractive in the financial point of view, we should proceed to the fourth step (the analysis of common practices).

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

It is observed that there are in Rio Grande do Sul, state where the CERTEL's Project SHPs are located, entrepreneurships with activities similar to those of the project being proposed.

It follows below a summary of these entrepreneurships in operation, in construction and granted by ANEEL, in the state of Rio Grande do Sul:

Table 14 – Entrepreneurships in Operation in the state of Rio Grande do Sul (Source: ANEEL[6] – January/2008)

Entrepreneurships in Operation		
Type	**Power (kW)**	**%**
CGH	17,524	0.26
EOL	150,000	2.26
SHP	153,716	2.31
UHE	4,673,650	70.38
UTE	1,645,665	24.78
Total	**6,640,555**	**100**

Table 15 – Entrepreneurships under construction in the state of Rio Grande do Sul (Source: ANEEL[7] – January/2008)

Entrepreneurships under Construction		
Type	**Power (kW)**	**%**
SHP	115,500	9.09
UHE	1,152,000	90.61
UTE	3,825	0.30
Total	**1,271,325**	**100**

[6] http://www.aneel.gov.br/area.cfm?idArea=15&idPerfil=2

[7] http://www.aneel.gov.br/area.cfm?idArea=15&idPerfil=2

Table 16 – Granted Entrepreneurships in the state of Rio Grande do Sul which have not started their build (Source: ANEEL – January/2008)[8]

Granted Entrepreneurships between 1998 e 2004 (which have not started their build)		
Type	**Power (kW)**	**%**
CGH	5,297	0.19
EOL	1,153,512	41.82
SHP	264,398	9.59
UHE	420,000	15.23
UTE	914,800	33.17
Total	**2,758,007**	**100**

The table presented shows there are similar activities taking place in the state where CERTEL project is located, however, this project activity is not predominant in the region. It can be perceived the following characteristics in the energetic matrix of the state of Rio Grande do Sul:

- 2.37% of the installed capacity of the current energetic matrix (entrepreneurships in operation) in Rio Grande do Sul are Small Hydroelectric Plants, same as CERTEL Project's Entrepreneurships;
- 9.09% of the project's installed power in construction in the state are generated from small hydroelectric plants;
- 9.59% of the granted project's installed capacity that have not yet begun to be constructed are small hydroelectric plants.

As examples of SHPs similar to CERTEL Project's Entrepreneurships, we can mention SHP Linha Emília, with 19.5 MW of installed power and SHP Caçador, with 22.5%.

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

In spite of the existence of projects similar to CERTEL Project's in operation or in construction in Rio Grande do Sul, it is necessary to establish peculiar characteristics of these entrepreneurships that do not allow them to be configured as a common business scenario in the country.

The fact that projects with this configuration, without the additional income from the commercialization of the certified emission reduction, are not attractive in the financial point of view can be proved through the creation of the program PROINFA, created by the Federal Government through the Law 10,438 in April 26th, 2002.

PROINFA is a governmental program that seeks to motivate, through the financial point of view, the development of entrepreneurships that make use of renewable technologies, due to the difficulties in financing, in offering guarantees to the finance suppliers and in the necessity of investments considered reasonable to small organizations. This way, the Federal Government tries to motivate projects through differentiated lines of finance, besides the guarantees of minimal revenues through the compromise of establishing Power Purchase Agreements (PPAs), to be firmed with a mixed economy society, Eletrobrás, which will secure to the entrepreneur a minimal revenue of 70% of the energy purchased

[8] http://www.aneel.gov.br/area.cfm?idArea=15&idPerfil=2

during the financing period and complete protection to the risks of exposure in the short-term market. The contracts have duration of 20 years and involve selected projects that should start operating until December 2006. The projects of SHPs are one of the types eligible to participate in the PROINFA.

The entrepreneurships of CERTEL Project do not take part into PROINFA and consider the revenues form the commercialization of certified reductions of emission as an important factor in the moment of investment.

With that, the organization has to deal with the difficulties inherent to the small agents of the Brazilian electrical sector: (i) the little power of attraction to potential buyers in face of the small quantity of electric energy to be produced and commercialized; (ii) the excess of guarantees demanded by long-term financing banks that compromise the company's financial solvency; (iii) the bureaucracy inherent to the construction process of a small hydroelectric, from its beginning until their effective operation.

Moreover, as it was mentioned in item 4.a of this PDD, the percentage of installed capacity in entrepreneurships such as the one in CERTEL's Project in the energetic matrix in Rio Grande do Sul is very small. When analyzing the participation in this kind of activity in the Brazilian energetic matrix, we notice that the participation is even smaller, as suggests the table below:

Table 17 – Entrepreneurships in operation in Brazil (Source: ANEEL[9] – January/2008)

Entrepreneurships in Operation in Brazil		
Type	**Granted Power (kW)***	**%**
CGH	113,249	0.11
EOL	249,450	0.25
PCH	1,847,050	1.81
SOL	20	0
UHE	74,442,295	74.65
UTE	21,139,341	21.17
UTN	2,007,000	2
Total	**102,798,405**	**100**

* Granted Power means the power considered in the Concession Act.

Caption for Tables 13, 14, 15 and 16:

- *CHG: Hydro Power Plant Central Generation*
- *EOL: Wind Power Plant*
- *PCH: Small Hydro Power Plant*
- *UHE: Hydro Power Plant*
- *UTE: Thermal Power Plant*
- *UTN:Nuclear Thermal Plant*
- *SOL:Solar Power Plant*

The Small Hydroelectric Plants participation forms 1.81% of the installed capacity in the country, due to the difficulties presents in this kind of entrepreneurships mentioned before. This way, the Brazilian

[9] http://www.aneel.gov.br/area.cfm?idArea=15&idPerfil=2

energetic matrix is formed predominantly by hydroelectric plants of high performance (74.65%) and in its majority with big reservoirs, besides the important participation of thermoelectric plants (21.17%).

With this, it can be noticed that in spite of the existence of activities similar to those in CERTEL Project`s project activity occurring in the country, many of them were made possible through the program of the Federal Government, of which CERTEL's projects are not part.

SATISFIED/APPROVED – Project is ADDITIONAL

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

According to ACM0002 methodology (version 07), the emission reduction are calculated as follows:

$$ER_y = BE_y – PE_y – LE_y$$ **Equation 2**

Where:

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

BEy Calculation (Baseline emissions in year y (t CO_2e/year)

The baseline methodology ACM0002 establishes that baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The baseline emission is calculated as follows:

$$BE_y = (EG_y – EG_{baseline}) * EF_{grid,CM,y}$$ **Equation 3**

Where:

BEy = Baseline Emission in year y (t CO_2e/year)
EGy = Electricity supplied by the project activity to the grid (MWh)
$EG_{baseline}$ = Baseline electricity supplied to the grid in case of modified or retrofit facilities (MWh). For new power plants this value is taken as zero.
$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system"

It was considered for the variable EGy the SHP`s assured electricity which represent the electricity projection based on the historical levels of 30 years river`s flow.

The SHPs Cazuza Ferreira and Rastro de Auto are new power plants to be connected to the interconnected grid, therefore, the $EG_{baseline}$ is 0 (zero).

To calculate $EF_{grid,CM,y}$, it was used the tool to calculate the emission factor for an electricity system (version 01) which suggests the following steps:

Step 1*. Identify the relevant electric power system*

For the purpose of determining the electricity emission factors, a **project electricity system** is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity and that can be dispatched without significant transmission constraints. Similarly, a **connected electricity system**, e.g. national or international, is defined as an electricity system that is connected by transmission lines to the project electricity system. Power plants within the connected electricity system can be dispatched without significant transmission constraints but transmission to the project electricity system has significant transmission constraint.

According to the Tool, electricity transfers from connected electricity systems to the project electricity system are defined as **electricity imports** and electricity transfers to connected electricity systems are defined as **electricity exports**.

For the purpose of determining the operation margin emission factor, it must be used one of the following options to determine the CO_2 emission factor(s) for net electricity imports (EFgrid,import,y) from a connected electricity system within the same host country:

(a) 0 tCO_2/MWh, or
(b) The emission factor(s) of the specific power plant(s) from which electricity is imported, only if the specific plants are clearly known, or
(c) The average emission rate of the exporting grid, if and only if net imports do not exceed 20% of the total generation in the project electricity system, or
(d) The emission factor of the exporting grid, determined with te use of the combined margin as described, if net imports exceed 20% of the total generation in the project electricity system.

For the Brazilian interconnected system, option (c) was adopted, with the calculation of the monthly average emission rate for each Subsystem, considering the system as isolated from the others.

For imports from connected electricity system located in another country, the emission factor is é 0 ton CO_2 per MWh.

Electricity exports should not be subtracted from the electricity generation data used for calculating the baseline emission factors.

According to the tool to calculate the emission factor for an electricity system, if the DNA of the Host Country has published a delineation of the project electricity system and connected electricity system, these delineations should be used.

This way, the Brazilian DNA made use of the legal definition used by ONS for the National Interconnected System, which sets the subsystems or submarkets: North (Interconnected), Northeast, Southeast/Midwest; South. In the case of CERTEL Project, all SHPs are located in South Subsystem.

***Step 2**. Select an operating margin (OM)method*

The operating margin aims to assess the contribution of the power plants that would be dispatched in the absence of the project activity's generation. The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods:

(a) Simple OM, or
(b) Simple Adjusted OM, or
(c) Dispatch data analysis OM, or
(d) Average OM

The method chosen to calculate the emission factor of SHPs Cazuza Ferreira and Rastro de Auto was the operation margin by dispatch data analysis. This method was chosen because it is, according to Brazilian DNA, the most accurate and the most recommended if information is available.

***Step 3**. Calculate the operating margin emission factor according to the selected method*

The calculation for the operating margin emission factor through the chosen method follows the methodology described below:

The dispatch data analysis OM emission factor ($EF_{grid,OM\text{-}DD,y}$) is determined based on the power units that are actually dispatched at the margin during each hour *h* where the project is displacing electricity. This approach is not applicable to historical data and, thus, requires annual monitoring of $EF_{grid,OM\text{-}DD,y}$.

The dispatch data analysis OM emission factor is calculated as follows:

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

Equation 4

Where:

$EF_{grid,OM\text{-}DD,y}$ = Dispatch data analysis operating margin CO_2 emission factor in year y (tCO_2e/MWh);
$EG_{PJ,h}$ = Electricity displaced by the project activity in hour *h* of year y (MWh);
$EF_{EL,DD,h}$ = CO_2 emission factor for power units in the top of the dispatch order in hour *h* in year *y* (tCO_2e/MWh);
$EG_{PJ,y}$ = Total electricity displaced by the project activity in year y (MWh);
h = Hours in year y in which the project activity is displacing grid electricity;
y = Year in which the project activity is displacing grid electricity.

If hourly fuel consumption data is available, then, the hourly emissions factor is determined as:

$$EF_{EL,DD,h} = \frac{\sum_{i,n} FC_{i,n,h} \cdot NCV_{i,y} \cdot EF_{CO2,i,y}}{\sum_{n} EG_{n,h}}$$

Equation 5

Where:

$EF_{EL,DD,h}$ = CO_2 emission factor for power units in the top of the dispatch order in hour *h* in year *y* (tCO_2e/MWh);
$FC_{i,n,h}$ = Amount of fossil fuel type *i* consumed by power unit *n* in hour *h* (Mass or volume unit);
$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type *i* in year *y (GJ/*mass or volum unit*);*
$EF_{CO_2,i,y}$ = CO_2 emission factor of fossil fuel type *i* in year *y* (tCO_2e/GJ);
$EG_{n,h}$ = Electricity generated and delivered to the grid by power unit *n* in hour *h* (MWh);
n = Power Units in the top of the dispatch;
i = Fossil Fuel types combusted in power unit *n* in year *y;*
h = Hours in year y in which the project activity is displacing grid electricity;
y = Year in which the project activity is displacing grid electricity.

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

$$EF_{EL,DD,h} = \frac{\sum_n EG_{n,h} \times EF_{EL,n,y}}{\sum_n EG_{n,h}}$$

Equation 6

Where:

$EF_{EL,DD,h}$ = CO_2 emission factor for power units in the top of the dispatch order in hour *h* in year *y* (tCO_2e/MWh);
$EG_{n,h}$ = Net quantity of electricity generated and delivered to the grid by power unit *n* in hour *h* (MWh);
$EF_{EL,n,y}$ = CO_2 emission factor of power unit *n* in year *y* (tCO_2e/ano)
n = Powers units in the topo f the dispatch (as defined below)
h = Hours in year *y* in which the project activity is displacing grid electricity;

The CO_2 emission factor of the power units *n* should be determined as per the guidance for the simple OM.

To determine the set of power units *n* that are in the top of dispatch, obtain from a national dispatch centre:

- The grid system dispatch order of operation for each power unit of the system including power units from which electricity is imported; and
- The amount of power (MWh) that is dispatched from all power units in the system during each hour *h* that the project activity is displacing electricity.

At each hour *h*, it must stack each power unit`s generation using the merit order. The group of power units *n* in the dispatch margin includes the units in the top x% of total electricity dispatched in he hour *h*, where x% is equal or greater of either:

(a) 10% or

(b) The quantity of electricity displaced by the project activity during hour *h* divided by the total electricity generation in the grid during that hour *h.*

The CO_2 emission factors for power generation in the Brazilian National Interconnected System (SIN) are calculated based on the generation record of plants centrally dispatched by the **National Operator of the** System (From the Portuguese Operador Nacional do Sistema - ONS). The procedures to calculate are available in the website http://www.mct.gov.br/upd_blob/0022/22960.pdf and it was elaborated in cooperation between ONS, Ministry of Mines and Energy (MME) and the Ministry of Science and Tecnology (MCT).

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

The dispatch data OM emission factor is defined as the weighted average of the emission factors of the set of power plants in the top 10% of the grid system dispatch order and is calculated for each hour.

The emission factor for each plant in the system is calculated annually based on values for generation and fuel consumption of the plant in the previous year. For the new thermal plants that come into operation each year, the value for a similar plant in the previous year has been adopted.

Until the preparation of this PDD, it is available information about dispatch data OM emission factor, related to all the year of 2006 and related to the period from January 2007 to September 2007.

The dispatch data OM emission factor for period from January 2007 to September 2007 will be used for an ex-ante estimation of CERs generation, because they are the latest data available. All data used to calculate the ex-ante operating margin emission factor are available in the Annex 3 of this PDD.

Step 4. *Identify the cohort of power units to be included in the building margin*

The sample group of power units *m* used to calculate the build margin consists of either:

(a) The set of five power units that have been built most recently, or
(b) The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

As a general guidance, a power unit is considered to have been built at the date when it started to supply electricity to the grid.

Power plants registered as CDM project activities should be excluded from the sample group *m.* However, if group of power units, not registered as CDM project activities, identified for estimating the build margin emission factor includes power unit(s) that is(are) built more than 10 years ago then:

(i) Exclude power unit(s) that is(are) built more than 10 years ago from the group;
(ii) To include grid connected power projects registered as CDM project activities, which are dispatched by dispatching authority to the electricity system.

Capacity additions from retrofits of power plants should not be included on the calculation of the build margin emission factor.

In terms of vintage of data, project participants can choose between one of the following two options:

Option 1. For the first crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group *m* at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2. For the first crediting period, the build margin emission factor shall be updated annually, *ex-post*, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emission factor shall be calculated *ex-ante*, as described in option 1 above. For the third crediting period, the built margin emission factor calculated for the second crediting period should be used.

The option that was chosen by project participants was Option 2.

Step 5. *Calculate the build margin emission factor*

The build margin emission factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units *m* during the most recent year *y* for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

Equation 7

Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year *y* (tCO_2e/MWh);
$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh);
$EF_{EL,m,y}$ = CO_2 emission factor of power unit *m* in year *y* (tCO_2e/MWh);
m = Power units included in the build margin;
y = Most recent historical year for which power generation data is available.

The CO_2 emission factor of each power unit *m* ($EF_{EL,m,y}$) should be determined as per the guidance in step 3(a) for the simple OM, using options B1, B2 or B3, using for *y* the most recent historical year for which power generation data is available, and using for *m* the power units included in the build margin.

The build margin emission factor started to be calculated by ONS to the four subsystems in the National Interconnected System (North, Northeast, South-East/Central-West and South) from the generation's records of the plants centrally dispatched by ONS from January 2006 and, therefore, started to be consulted by the public interested in it and by investors. The calculus systematic is available at the website http://www.mct.gov.br/upd_blob/0022/22960.pdf

The build margin emission factor for period from January 2007 to September 2007 was used for an ex-ante estimation of CERs generation, since they are the latest data available. The data used to calculate the ex-ante operating margin emission factor are available in the Annex 3 of this PDD.

***Passo 6**. Calculate the combined margin emission factor*

The combined margin emission factor is calculated as follows:

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

Equation 8

Onde:
$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year *y* (tCO_2e/ MWh)
$EF_{grid,OM,y}$ = Operating Margin CO_2 emission in year *y* (tCO_2e/ MWh)
W_{OM} = Weighting of operating margin emissions factor (%)
W_{BM} = Weighting of build margin emissions factor (%)

The tool to calculate the emission factor for an electricity system recommends that the following default values should be used for W_{OM} and $W_{BM:}$

- Wind and Solar power generation project activities: W_{OM} = 0.75 and W_{BM} = 0.25 for the first crediting period and for subsequent crediting periods.
- All other projects: W_{OM} = 0.5 and W_{BM} = 0.5 for the first crediting period, and W_{OM} = 0.25 and W_{BM} = 0.75 for the second and third crediting period, unless otherwise specified in the approved methodology which refers to this tool.

This way, for CERTEL Projects, it was adopted the following weights: W_{OM} = 0.50 and W_{BM} = 0.50.

PEy Calculation (project emissions in year y (t CO_2e/year))

According to the methodology adopted, for hydro power project activities that result in new reservoirs and hydro power project activities that result in the increase of existing reservoirs, the project proponents shall account for project emissions, estimated as follows:

(a) If the power density (PD) of power plant is greater than 4 W/m2 and less than or equal to 10 W/m2:

$$PE_y = \frac{EF_{Res} * TEG_y}{1000}$$ **Equation 9**

Where:

PEy = Emission from reservoir expressed as tCO_2e/ano;
EF_{Res} = is the default emission factor for emissions from reservoirs, and the default value as perEB23 is 90 Kg CO_2e/MWh;
TEGy = Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year y (MWh)

(b) If the power density of the project activity is greater than 10 W/m2, PEy = 0.

As described on the table 5 on the item B.2, the power density of SHPs Cazuza Ferreira and Rastro de Auto are higher than 10 W/m2. Therefore, for all CERTEL Projects SHPs, PEy = 0.

LEy Calculation (leakage emissions in year y (t CO2e/year))

The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction, fuel handling (extraction, processing, and transport), and land inundation. According to the Methodology applied, the project participants do not need to consider these emission sources as leakage. The project participants will not claim any credit for the project on account of reducing these emissions below the level of the baseline scenario. Therefore, for SHPs Cazuza Ferreira and Rastro de Auto, the leakage emissions represented by LEy is 0 (zero).

Project Emissions Reductions

To summarize, the project emission reductions are calculated based on equation 2 of this PDD, in which PEy is zero (0) and LEy is zero (0). Therefore, the project emission reductions are calculated according to equation 3 of this PDD, where ERy = BEy = (EGy – EGbaseline) * EFgrid,CM,y.

As CERTEL Projects` SHPs are new power plants, EGbaseline is 0 (zero) and the emission reductions are calculated as the simple product between the electricity supplied by the project activity to the grid times the combined margin emission factor, where the operating margin emission factor will be calculated according to dispatch data analysis OM and the build margin emission factor will be calculated through the option 2 which considers that this emission factor must be updated ex-post. Besides it will be considered 50% for the weights that forms the combined margin emission factor.

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

Data / Parameter:	Cap_{BL}
Data unit:	W
Description:	Installed capacity of the hydro power plant before the implementation of the project activity. For new hydro power plant, this value is zero.
Source of data used:	Project Site
Value applied	0
Justification of the choice of data or description of measurement methods and procedures actually applied	As all CERTEL Project`s SHPs are new power plants, this value is 0 (zero).
Any comment :	

Data / Parameter:	A_{BL}
Data unit:	m^2
Description:	Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2). For new reservoirs, this value is zero.
Source of data used:	Project Site
Value applied	0
Justification of the choice of data or description of measurement methods and procedures actually applied	As all CERTEL Projects` SHPs are new power plants, this value is 0 (zero).
Any comment :	

B.6.3 Ex-ante calculation of emission reductions:

As described on the item B.6.1, the project emissions reduction will be calculated based on equation 2, where it must be considered PEy as 0 (zero) and LEy as 0 (zero). Therefore, the project emissions reduction will be calculated according equation 3, as follows:

$$ERy = BEy = (EGy - EG_{baseline}) * EF_{grid,CM,y} \quad \text{Equation 3}$$

Where:

ERy = Emission Reduction in year y (tCO_2e/ano)
BEy = Baseline emissions in year y (tCO_2e/ano)
EGy = Electricity supplied by the project activity to the grid (MWh)
$EG_{baseline}$ = Baseline electricity supplied to the grid in case of modified or retrofit facilities (MWh). For new power plants this value is taken as zero. For CERTEL Project, this value is zero.

$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system". CERTEL Project emissions reduction is described as follows below.

(EG_y – $EG_{baseline}$) Calculation

Table 18 – (EGy – EGbaseline) Calculation

Period	Cazuza Ferreira		Rastro de Auto		Total		
	EGy	EGbaseline	EGy	EGbaseline	EGy	EGbaseline	EGy-EGbaseline
2010	43.200	-	34.214	-	77.414	-	77.414
2011	43.200	-	34.214	-	77.414	-	77.414
2012	43.200	-	34.214	-	77.414	-	77.414
2013	43.200	-	34.214	-	77.414	-	77.414
2014	43.200	-	34.214	-	77.414	-	77.414
2015	43.200	-	34.214	-	77.414	-	77.414
2016	43.200	-	34.214	-	77.414	-	77.414
Total	302.400	-	239.501	-	541.901	-	541.901

Assumptions:

- EGy and $EG_{baseline}$ projections were made assuming power plants operation during 24 hours per day, 30 days per month and 12 months per year;
- The prevision for SHPs Cazuza Ferreira and Rastro de Auto operation's start is in January 2010.
- The electricity generation is projected according to SHPs assured energy, described on the item A.4.3.

Table 19– EFgrid,CM,2007 Calculation

2007	January	February	March	April	May	June	July	August	September
$EF_{grid,OM,2007*}$	0.9295	0.8317	0.8356	0.7902	0.5677	0.8450	0.8115	0.9245	0.8212
$EF_{grid,BM,2007*}$	0.1737	0.1737	0.1737	0.1737	0.1737	0.1737	0.1737	0.1737	0.1737
W_{OM}	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
W_{BM}	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
$EF_{grid,CM,2007*}$	**0.5516**	**0.5027**	**0.5046**	**0.4819**	**0.3707**	**0.5093**	**0.4926**	**0.5491**	**0.4974**

The emission factor which will be used for ex-ante estimation of **CERTEL Project** emission reduction is 0.4955 which was obtained from simple arithmetic average of South Subsystem monthly EFgrid,CM,2007.

Observations:

- The most recent information available by Brazilian Designated National Authority refers to the period from January to September 2007;
- The daily data for Operating Margin Emission Factor is available on Annex 3;
- The hourly data for Operating Margin Emission Factor are available on the website: http://www.mct.gov.br/index.php/content/view/67514.html ;
- The systematics of the calculation used by Brazilian Designated National Authority to set the operating margin emission factor and the build margin emission factor for each subsystem on the National Interconnected System is available on the website: http://www.mct.gov.br/upd_blob/0019/19707.pdf .

Therefore, the ex-ante estimation of project emission reduction is shown through the table below:

Table 20 – Ex-ante estimation of CERTEL Project Emissions Reduction (tCO_2)

Year	Cazuza Ferreira (tonnes of CO2 e)	Rastro de Auto (tonnes of CO2 e)	Total (tonnes of CO2 e)
2010	21.410	16.956	38.366
2011	21.410	16.956	38.366
2012	21.410	16.956	38.366
2013	21.410	16.956	38.366
2014	21.410	16.956	38.366
2015	21.410	16.956	38.366
2016	21.410	16.956	38.366
Total	**149.867**	**118.695**	**268.562**

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

Table 21 – Summary of the ex-ante estimation of emission reduction

Year	Estimation of project activity emissions (tonnes of CO2 e)	Estimation of baseline emissions (tonnes of CO2 e)	Estimation of Leakage (tonnes of CO2 e)	Estimation of overall emission reductions (tonnes of CO2 e)
2010	0	38.366	0	38.366
2011	0	38.366	0	38.366
2012	0	38.366	0	38.366
2013	0	38.366	0	38.366
2014	0	38.366	0	38.366
2015	0	38.366	0	38.366
2016	0	38.366	0	38.366
Total (tCO2 e)	0	268.562	0	268.562

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

B.7.1 Data and parameters monitored:

The consolidated baseline methodology for grid-connected electricity generation from renewable sources, version 07, must be applied together with the monitoring methodology present into that methodology.

Based on the applied methodology and on what was described on the item B.6.1, there are neither leakage nor project emissions to be monitored. Therefore, the parameters to be monitored are just the baseline emissions through the project activity, the electricity generation by the project and the project activities` power plants reservoirs area

This energy measurement is essential to verify and monitor the GHG emission reduction. It is necessary, therefore, to use meter equipment to register and check the electricity generated by the unit. The Monitoring Plan (item B.7.2) allows the calculation of GHG emissions generated by the project activity in a direct manner, applying the baseline emissions factor.

All data collected as part of monitoring will be archived and be kept at least for 2 years after the end of the last crediting period. All measurements will be conducted with calibrated measurement equipment according to Brazilian industry standards.

Data / Parameter:	**Electricity Generated (EG_y)**
Data unit:	MWh
Description:	Electricity supplied by the project activity to the grid
Source of data to be used	Project Activity Site
Value of data applied for the purpose of calculating expected emission reduction in section B.5	The SHP`s assured energy was used for the purpose of calculating expected emission reduction in section B.5, as follows: a) SHP Cazuza Ferreira – 5.0 MW b) SHP Rastro de Auto – 3.96 MW
Description of measurement methods and procedures to be applied (if any)	Spreadsheets will be used, obtained directly from the meters with information generated hourly or within every 15 minutes. Monthly, the information will be checked with the generation spreadsheets available at the CCEE's Website. Besides, information of generation can be checked by receipt of sales, if it is necessary to do so.
QA/QC procedures to be applied:	The uncertainty level for these data is low. They will be used to calculate the emission reductions. The electricity generated will be monitored by the project participants and it will be checked by spreadsheets available at the CCEE`s Website (information comparison between operation data and CCEE reports).
Any comment:	*CCEE - Entity responsible for measurements, accounting and settlement on Brazilian electric energy market.

Data / Parameter:	**Eletricidade Total Gerada (TEG_y)**
Data unit:	MWh
Description:	Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year y.
Source of data to be used:	Project Activity Site
Value of data applied for the purpose of calculating expected emission reduction in section B.5	This data was not used to calculate the expected emission reduction, but it can be considered the installed capacity of the SHPs.
Description of measurement methods and procedures to be applied (if any)	Spreadsheets will be used, obtained directly from the meters with information generated hourly or within every 15 minutes.
QA/QC procedures to be applied:	The uncertainty level for these data is low. The electricity generated will be monitored by the project participants.
Any comment:	

Data / Parameter:	**($EF_{grid,CM,y}$) Combined Margin CO_2 Emission Factor**
Data unit:	tCO_2/MWh
Description:	The combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system”. The combined margin CO_2 emission factor to be used on CERTEL project will be calculated based on data supplied for south subsystem on the National Interconnected System by Brazilian DNA.
Source of data to be used:	Ex-post emission factor will be calculated by MCT with the ONS data. The variables $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$, necessary for $EF_{grid,CM,y}$ calculation, will be also monitored and calculated by MCT and ONS, through the Dispatch Data of the South Grid Subsystem.
Value of data applied for the purpose of calculating expected emission reduction in section B.5	The values of ($EF_{grid,CM,y}$) Combined Margin CO_2 Emission Factor which will be used for ex-ante estimation of **CERTEL Project** emission reduction is 0.4955 which was obtained from simple arithmetic average of South Subsystem monthly EFgrid,CM,2007 as described on table 19 on the item B.6.3 and as described on the Annex 3.
Description of measurement methods and procedures to be applied (if any)	As described in the most recent version of the “Tool to calculate the emission factor for an electricity system”.
QA/QC procedures to be applied:	As described in the most recent version of the “Tool to calculate the emission factor for an electricity system”. The uncertainty level for these data is low.
Any comment:	

Data / Parameter:	Cap_{PJ}
Data unit:	W
Description:	Installed capacity of the hydro power plant after the implementation of the project activity.
Source of data to be used:	Project Site
Value of data applied for the purpose of calculating expected emission reduction in section B.5	This data was not used to calculate the expected emission reduction. But it can be considered the installed capacity of the SHPs described on table 3 in the item A.4.3
Description of measurement methods and procedures to be applied (if any)	The installed capacity will be monitored annually by Aneel, or by sub-hired companies, according recognized standards.
QA/QC procedures to be applied:	The uncertainty level for these data is low. The installed capacity is determined on the project's beginning and it will be monitored by the Regulator Agent.
Any comment:	

Data / Parameter:	**Area of the reservoir (A_{PJ})**
Data unit:	m^2
Description:	Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full.
Source of data to be used:	Project Site
Value of data applied for the purpose of calculating expected emission reduction in section B.5	The area of the reservoir of the SHPs was used for the purpose of calculating expected emission reduction in section B.5, as follows: a) SHP Cazuza Ferreira – 221.000 m^2 b) SHP Rastro de Auto – 280.000 m^2
Description of measurement methods and procedures to be applied (if any)	The first measurement will be a topographical measurement with map, descriptive memoirs and technical responsibility registration (ART). After that, yearly, it will occur measurements through satellite pictures.
QA/QC procedures to be applied:	
Any comment:	

B.7.2 Description of the monitoring plan:

The monitoring plan is elaborated according to the monitoring methodology included in the Consolidated Baseline methodology for grid-connected electricity generation from renewable sources ACM0002, version 07.

Responsibilities

- Special Measurement Department – responsible for collecting information directly from the CERTEL Project's SHPs meters;

- Electricity Generation Department – responsible for the consolidation and analysis of monthly generation spreadsheets and for SCDE software supervision, through the collected data consistence analysis and software operation monitoring.

<u>Process Description</u>

I – Procedure of Generation Data Collection

CERTEL will collect generation data through two ways:

- Via 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 in the National Interconnected System measurement points.

The data collected by SCDE is transferred to the software SCL to accounting and financial clearance based on the CCEE's Rules and Procedures for Commercialization.

The data collection is accomplished in a passive way, through Central Unit of Measurement Collection (UCM). In this collection, the generation data are obtained directly from the meters and made available in files on xml format for each one. These files are generated through UCM work routines and automatically transmitted by the Client SCDE application. In case of unavailability of any measurement point, due to maintenances, commissioning or for any other reason, the methodology of data estimation will be used according to the item 14.3 of the Commercialization Procedure PdC ME.01.

- Via Internal Reading of Special Measurements Department

Each SHP possesses the measuring equipment ELO 2180 class 0,2%. Monthly, a CERTEL's employee of the special measurements sector, properly prepared to the execution of the task, collects the Mass Memory through the ELO543 reader. Each meter has an optical port (magnetic) which is located in the frontal part and the reader has a serial port DB9 on its side, where a specific cable is connected for the communication between the reader and the meter. Through the command 00 typed in the reader, followed by ENTER, the mass memory data from the measuring tool begin to be transferred to the reader. This transference happens in blocks, with a countdown shown in the screen, beginning in 322 and taking around 2 and a half minutes to the end of the function 00.

After the data collection in the SHP, the reader is connected through a specific cable in a computer in the special measurements sector using the ELO70 software, through serial ports of both to discharge the reader's data. The reader's connection is established through the command 89, typed in the reader followed by an ENTER and; in the computer it is selected the command "COPY READINGS FROM READER" in the ELO70 software.

After the data discharge, a report is generated with the data of energy supply in periods of 15 minutes (in detail) or a summary showing the accumulated values (the energy generated in total) between the last reading and the one before the last (code 00). In order to do this, it is used the ELO50 software. This software allows the visualization of all energy supply data.

All measurements will be conducted with calibrated measurement equipment according to Brazilian industry standards.

II – Data Consolidation Procedure:

The Special Measurement Department, through an electronic technician, is responsible for generating, at each month in the first working day, based on consultation from a meters` database, the spreadsheets with the generation data, consolidated hourly, regarding the previous month. The generated spreadsheets are archived in the directory info_con\Energia\3_Relatorios\Geral Energia\Macro-setor_Suprimento_de_energia\Arquivos Elo in the Data Server.

The Electricity Generation Department, through the Manager of electricity generation, makes the consolidation of generation data and totals the amounts of generated electricity monthly.

Daily, the Information Technology Department, through a system technician, accomplishes the Data Server backup for all company`s data. This automatic task is verified daily by a system technician.

III – Confronting of the internal generation data with the third part reports

In order to compare the information, the generation data consolidated and analyzed by the Manager of Electricity Generation internally will be confronted monthly with the spreadsheets available at CCEE's Website that supply the generation information hourly.

If an inconsistency between the internal data and data from CEEE occurs, it will be generated a non-conformity report that will verify with CCEE the cause for the disagreement between the information.

IV – Data Storage:

The generation information, both the internally generated and the spreadsheets generated through the CCEE website, are electronically stored by the Electricity Generation Department in the directory info_con\Energia\1_projetos\Macrosetor Geracao\Operacao_Manutencao\Usinas Hidreletricas. All data collected as part of the monitoring will be archived and be kept for at least 2 years after the end of the last crediting period. The reports are also archived in a printed way, where a copy is kept in the Billing Department and other copy stays in the Special Measurement Department. The electronic file is stored in the Data Server and it is also archived in a computer located in the Special Measurement Department.

V – Calibration of Meters (measuring tools):

The calibration of meters will follow what was described on the document elaborated by ONS – Sub module 12.3 - Maintenance of the measurement system for billing (Annex 4), which establishes that:

(a) The periodicity for the responsible agent's preventive maintenance for SMF is of 2 (two) years at the most. That periodicity can be altered in function of the occurrence history observed for all 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 starts to apply from the inspection date.

V– Meter (measuring tools)'s Location:

Each SHP will have a meter located in their own installation.

Emission Factors

These data will be calculated each year as described on the item B.6.2. To calculate the emission factors will be used data supplied by Ministry of the Science and Technology (MCT) (www.mct.gov.br), institution which chairs the Brazilian DNA.

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)

The baseline study and monitoring methodology for the project activity were elaborated by Enerbio Consultoria and they were completed on January 25th 2008. Enerbio Consultoria is also a project participant.

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

Eduardo Baltar de Souza Leão
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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:

SHP Cazuza Ferreira – 21/12/2005;
SHP Rastro de Auto – 01/12/2006.

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

30 years for each Small Hydropower Plant

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:

01/01/2010 or the date of Project's Registration in CDM EB, which occurs 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:

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The growing global concern on sustainable resources is leading to a requirement for more sensitive environmental management practices. This is increasingly reflected in legislation and policies around the world. In Brazil, the situation is not different. The licensing policies and environmental rules are very demanding, just as the best international practices.

In Brazil, it is required to 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, a series of licenses from the pertinent environmental agency (federal and/or local, depending on the project).

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

- Inundation of indigenous lands and slave historic areas – authorization for that 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 department. Afterwards, if the project is considered environmentally feasible, the sponsors have to prepare an Environmental Assessment, which is basically composed of the following information:

- Reasons to implement the project;
- Project Description, 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.

To obtain the installation license (IL), it is necessary to present (a) additional information about the previous assessment; (b) a new simplified assessment; or (c) the Environmental Basic Project 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 building phase, carried out to verify if all the exigencies made by the local environmental agency were fulfilled.

The most recent CERTEL Project SHPs`s licenses follows below.

SHP Cazuza Ferreira

- Installation License (IL) - nº 23/2007 – DL
    - Signed on: February 11th, 2007
    - Valid until: December 30th, 2009

SHP Rastro de Auto

- Installation License (IL) - nº 281/2006 – DL
    - Signed on: June 10th, 2006
    - Valid until: March 30th, 2008

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 due to the small installed capacity of the entrepreneurships and to the little necessity of flooded areas for the reservoirs.

The CERTEL Project's SHP have the necessary licenses, satisfying the several demands of the state's environment legislation – FEPAM – and of the Brazilian electric system – ANEEL.

In all its electrical energy generation entrepreneurships, CERTEL adopts the philosophy that it is necessary to generate energy in harmony with the environment. In face of that, several programs and actions are adopted, aiming at minimizing the environmental impact of its entrepreneurships in the physical, biotic and anthropic fields.

It is presented below a detailed account of the actions that have already been adopted, as well as the ones to be adopted in each of the entrepreneurships that compose CERTEL's Project.

In the implantation of SHP Cazuza Ferreira and Rastro de Auto, it will be developed environmental programs in all levels related to fauna, flora, water and community involved. The whole execution of the environmental programs probably will be executed together with Centro Universitário (University Centre) UNIVATES, known as UNIVATES, bringing transparency and scientific approach to the implantation of the plant.

Some highlighted environmental actions in the implantation of the CERTEL Project's entrepreneurships are described below:

Agro forest system

Through the agro forest project, which will use the same principle used in the implantation of SHP Salto Forqueta (first SHP of the Group), CERTEL will execute an ample forest reposition which will generate socioeconomic benefits to owners of rural areas nearby and communities close to the small hydroelectric plant. Through the plantation of small branches, the project of the SHPs Cazuza Ferreira and Rastro de Auto will guarantee an alternative income to collaborative producers. After some years, many farmers involved in this project may obtain financial resources from the commercialization of herb mate leaf, which, from a specific technical monitoring, may obtain the seal of ecologically produced herb mate.

In the agro forest system proposed by CERTEL's environment department, the following permanent consortium cultures will be put to practice:

- Herb mate: native species perfectly adapted to the soil and climate of the region, which may generate income in a short-term;
- Brazilian pine tree: species already adapted to the ecosystem and that provide mid-term income through the commercialization of pine harvesting
- Bracatinga: native meliphera species perfectly adapted to the climate of the region that naturally sows itself and can, since the sixth or seventh year be transformed into firewood;
- Native fruitful species: give the necessary balance to the system, whose fruits may attract birds that are predator of lizards that attack herb mate.

The project will be highly important for it stimulated the development of projects for environmental preservation and recuperation in the region, making communities aware of the great relevance of vegetable cover to the ecosystem balance.

Monitoring of Aquatic Flora and Fauna

A continuous and permanent monitoring of aquatic flora and fauna will be done since the beginning of the entrepreneurship, allowing population adjustments and giving the guarantee of the reservoir's flora and fauna balance.

Monitoring and Control of Soil Erosion

The entrepreneurships' working areas will receive recovering treatment through techniques of terrain and vegetation recomposition. In all impacted areas vegetation was and will be replanted with native species and vegetable covers, in order to guarantee the control of erosive processes and its recuperation and regeneration. In the other areas, besides reforestation, it will be implanted rigorous measures to control erosion.

Conservation Unit

To the projects of SHP Cazuza Ferreira and Rastro de Auto, an APP (Permanent Preservation Area) will be formed by the 100 metres surrounding the reservoir, aiming at the recomposition and restoration of the forest.

Environmental Education

With a specific environmental education program to the workers, students and stakeholders, CERTEL will seek to involve the local community with environmental concern, both in the area of the project and in the urban areas of the cities involved.

Through a partnership with UNIVATES, CERTEL will develop environmental education programs with its main target being to guide the people involved in building the entrepreneurship, residents near the flooded area and students from municipal and state school systems, in order to inform them on the importance of handling the region's organisms.

This program's work proposal also deals with information about environmental legislation, hunting, vector animals (that transmit diseases) and poisonous ones.

The development of environmental awareness, that respects culture and the regional sustainable development in the area is of great relevance and was and will be systematically dealt with during community encounters, at schools and with the workers in the construction.

Community Development and Capacitation

The implantation of CERTEL's project entrepreneurships will demand the capacitation of collaborators and, this way, it has been implemented an ample Human Development Program, in which scholar grants are offered, motivating graduation in elementary and high school, as well as under graduation and graduation courses to its employees, besides the programs of specific training.

Through this action, CERTEL seeks to capacitate its collaborators to the market and to contribute to increase the knowledge and education level of the population in the cities where it acts.

Partnership in Socialcultural development

CERTEL takes part in several social, educational, and cultural actions, directed to the cooperatives and to the community in general.

As an example, we may refer to (i) Project Light Weight, in which a group of multidisciplinary professionals provides nutritional consults and guides to over 42 thousand associates; (ii) the financial support given to the campaign of health entities, such as Holding Hands campaign, whose objective was to raise funds for a hospital in Teutônia (where the company's headquarters is located); (iii) the support to sports activities, such as the sponsorship for over 8 years of the amateur regional soccer championship; and (iv) the investment in cultural activities, with the incentive, for instance, to the CERTEL choir, formed since 2001 by collaborators of the Cooperative.

Green Energy Project

At the end of year 2007, CERTEL instituted the Green energy project, aiming at stimulating environmental awareness of companies and partners. The project has the objective of guiding other companies of the region to neutralize the emission of green house gases through compensation actions.

Emissions' inventories will be created from the data collected every year and the process of neutralization must be annual to the companies and organizations. Each company will develop their own strategies of reduction and neutralization of emissions.

The Green Energy Project's main objective are:

- Develop the concept of neutral activities in the companies' internal environment in the region where CERTEL works;
- Capacitate voluntary companies to initiate the quantification of green house gases in their operations, to create their inventories of emissions and to develop neutral environmental activities;
- Implement emissions reduction strategies and actions to neutralize them;
- Carry out foresting and reforesting in partnership with other companies;
- Keep a partnership with public and private institutions and schools to plant trees in degraded areas and projects that aim at environmental preservation.

For all these initiatives, CERTEL has been acquiring awards and recognition in the market. The Cooperative is considered by the magazine Exame, since 2005, one of the 150 top companies to work in Brazil. Besides, in 2003, it was awarded by the Regional Program of Quality and Productivity with the RS Golden Award in Quality and has been awarded for many years with the Certificate of social responsibility from the Legislative Assembly of the state of Rio Grande do Sul. In 2007, the company received from Brazil's cooperative organizations the award of Cooperative of the year.

SECTION E. Stakeholders' comments

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

According to Resolution nº 1 of Brazilian DNA, local stakeholder must be invited to comment the CDM Project.

Therefore, the project proponents sent letters to the following local stakeholders:

Table 22 – Local stakeholders consulted

Local stakeholder
Municipality of Putinga
Putinga City Hall
Putinga Municipal Assembly
Municipal Environmental Secretary
Municipality of São José do Herval
São José do Herval City Hall
São José do Herval Municipal Assembly
Municipal Environmental Department
Municipality of São Francisco de Paula
São Francisco de Paula City Hall
São Francisco de Paula Municipal Assembly
Municipal Environmental Department
Community Associations
Pró-Rio Taquari Foundation
ECOBÉ Foundation
Projeto-Terra Foundation
Others Local Stakeholders
State of RS Attorney for Public Interest
Brazilian Forum of NGOs and Social Movements for Environment and Development
State Environmental Agency (FEPAM)

The letters were sent before the validation process and a 30 days term was given for the local stakeholders to make some pronunciation and giving opinions about CERTEL Project. Besides the letters sent to local stakeholders, the PDD was available to public comments for the local stakeholders at the website www.enerbio-rs.com.br.

E.2. Summary of the comments received:

The project did not receive any comments.

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

It is not applicable, because the project did not receive any comments.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	CERTEL (COOPERATIVA REGIONAL DE ELETRIFICAÇÃO TEUTÔNIA LTDA)
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Last Name:	Salecker
First Name:	Júlio
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Organization:	CERTAJA (COOPERATIVA DE GERAÇÃO DE ENERGIA E DESENVOLVIMENTO TAQUARI JACUÍ)
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Salutation:	Mr.
Last Name:	Pereira Martins
First Name:	Renato
Department:	Board of Management

Organization:	ENERBIO CONSULTORIA LTDA
Street/P.O.Box:	Carlos Gomes Avenue, nº 281, 202 Floor, Auxiliadora.
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URL:	www.enerbio-rs.com.br
Title:	Director
Salutation:	Mr.
Last Name:	Baltar
First Name:	Eduardo
Department:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

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

Annex 3

BASELINE INFORMATION

Although the baseline information had been discussed on the item B to this PDD, some assumptions taken to draft the baseline scenario were based on the assumptions used by the Ministry of Mines and Energy on the Decennial Plan of Electric Industry Expansion, elaborated by the Ministry of Mines and Energy in 2006. Some assumptions are described in the tables below:

Table 23: Growing Rate of Brazilian GDP (%)

Year	2006	2007-2011	2012-2015	2006-2015
Growing Rate	4.0	4.0	4.5	4.2

Table 24: Growing Rate of Population and Number of Residence in Brazil (%)

Period	Population	Number of Residences
2005-2010	1.13	2.67
2010-2015	0.93	2.62
2005-2015	**1.04**	**2.65**

To estimate the population and Brazilian residences growing rate, data from IBGE – Brazilian Geographic and Statistic Institute – and from the paper "Estimations on Population and Residences for Prevision Studies on Residential Class's Electric Energy Market, 2004-2015 (translated from Portuguese: "Estimativas da População e Domicílios para os Estudos de Previsão do Mercado de Energia Elétrica da Classe Residencial, 2004-2014") were used.

Table 25: Projection of Classic Energetic Self-Production Level (TWh) - Brazil

Discrimination	2005	2010	2015
Big Consumers	17.6	27.5	34.8
Others	9.8	12.5	16.0
Total	**27.4**	**40.0**	**50.8**

The energetic self-production, named classic, means the electric energy generated to supply local unit consumer, without using the transmission and distribution electric grid. It is very relevant to present the classic self-production evolution, particularly for big industrial electric energy consumers, which concentrate great amount of shares of self-production potential.

Table 26: Projection of electric energy demand from big industrial consumers (TWh) - Brazil

Discrimination	2005	2010	2015
Consumption – Electric System	66.1	81.2	98.8
Classic Self-Production	17.6	27.5	34.8
Total	83.7	108.7	133.6
Classic Self-Production/Total (%)	**21.1**	**25.3**	**26.2**

The projection for the big industrial consumers' total consumption of electricity was elaborated based on the installed capacity perspective and on the assumptions related to internal and external sectorial markets dynamics, estimating, in this way, the respective physical volume production.

Table 27: Projection of electric energy consumption per Class and Subsystem – Brazil

Discrimination	**Consumption TWh**			**Variation (% ao ano)**		
	2005	**2010**	**2015**	**2005-2010**	**2010-2015**	**2005-2015**
Classe						
Residential	82.3	109.2	142.5	5.8	5.5	5.6
Industrial	161.1	198.4	244.7	4.3	4.3	4.3
Commercial	52.9	73.4	101.9	6.7	6.8	6.8
Others	49.8	62.6	77.8	4.7	4.4	4.6
Total	**346.1**	**443.6**	**566.9**	**5.1**	**5.0**	**5.1**
Subsytem						
North	23.5	30.7	45.5	5.5	8.1	6.8
Northeast	47.5	61.2	78.1	5.2	5.0	5.1
Southeast/Midwest	209.1	266.8	335.1	5.0	4.7	4.8
South	58.8	73.9	92.2	4.7	4.5	4.6
SIN (National Interconnectd System)	**338.9**	**432.6**	**550.9**	**5.0**	**5.0**	**5.0**
Isolated	7.2	10.9	16.0	8.7	8.0	8.3
Total	**346.1**	**443.5**	**566.9**	**5.1**	**5.0**	**5.1**

The projection above indicates a greater increase of residential and commercial consumption until 2015 concentrated mainly in North Subsystem, either in North Subsystem interconnected to SIN, or in the Isolated Systems.

Besides the description about the assumptions used in the baseline delineation, it is necessary to detail some criteria taken for baseline`s emission calculation.

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'".

From 2006, the MCT in cooperation with the MME and ONS, started to make available the calculation methodology for CO_2 emission factor for grid-connected electricity generation in the Brazilian National Interconnected System according to ACM0002 Methodology using dispatch data analysis. The emission factor started to be widespread for each Brazilian Interconnected System`s Subsystem. As described along this PDD, CERTEL Project is located in South Subsystem. All calculation and explanation about the CO_2 emission factor for grid-connected electricity generation in the Brazilian National Interconnected System can be found on the website http://www.mct.gov.br/index.php/content/view/68301.html .

The tables below present the values considered to calculate the operating margin emission factor ($EF_{grid,OM,y}$) and the build margin emission factor ($EF_{grid,BM,y}$) which were used for CERTEL Project *ex-ante* estimation of emission reduction:

Table 28 – Monthly Medial Operating Emission Factor – South Subsystem of Brazilian SIN

South Subsystem												
	Monthly Medial Emission Factor (tCO_2/MWh)											
2007	Month											
	January	February	March	April	May	June	July	August	September	October	November	December
	0,9295	0,8317	0,8356	0,7903	0,5678	0,8450	0,8115	0,9246	0,8213			

Table 29 – Daily Medial Operating Emission Factor – South Subsystem of Brazilian SIN

South Subsystem												
	Daily Medial Emission Factor (tCO_2/MWh)											
2007	Month											
Day	January	February	March	April	May	June	July	August	September	October	November	December
1	1,035	0,841	0,988	1,021	0,935	0,444	0,816	0,891	1,140			
2	1,012	0,936	0,834	0,805	0,818	0,454	0,849	0,933	1,134			
3	0,899	0,863	0,766	0,814	0,644	0,596	0,919	0,936	1,044			
4	0,894	0,903	0,953	0,839	0,616	0,571	0,898	0,929	0,910			
5	0,848	0,658	0,926	0,851	0,600	0,946	0,779	0,888	0,793			
6	1,131	0,671	0,865	0,904	0,650	0,952	0,782	0,895	0,829			
7	1,158	0,739	0,869	0,842	0,490	1,056	0,755	0,796	0,674			
8	1,107	0,681	0,787	0,956	0,478	0,906	0,776	0,790	0,669			
9	1,057	0,767	0,807	0,810	0,454	1,076	0,771	0,893	0,604			
10	0,989	0,908	0,797	0,723	0,608	1,056	0,776	0,877	0,704			
11	0,907	1,106	0,929	0,709	0,664	0,956	0,798	0,801	0,737			
12	0,879	0,803	0,775	0,597	0,665	0,958	0,776	0,793	0,765			
13	1,056	0,754	0,728	0,658	0,785	0,969	0,773	0,914	0,857			
14	1,199	0,728	0,871	0,815	0,608	0,952	0,764	0,980	0,887			
15	1,003	0,747	0,939	0,970	0,597	0,942	0,726	1,027	0,751			
16	0,882	0,719	0,933	0,717	0,551	0,822	0,785	0,963	0,657			
17	0,887	0,818	1,082	0,875	0,504	0,794	0,793	0,840	0,783			
18	0,915	0,978	1,121	0,870	0,493	0,851	0,809	0,853	0,803			
19	0,897	0,808	0,930	0,791	0,502	0,873	0,913	0,838	0,829			
20	1,003	1,022	0,864	0,625	0,504	0,869	0,923	0,913	0,886			
21	1,118	1,018	0,851	0,661	0,434	0,871	0,923	0,918	0,838			
22	0,917	0,951	0,800	0,698	0,423	0,861	0,735	0,930	0,751			
23	0,709	0,815	0,687	0,590	0,522	0,810	0,827	1,006	0,841			
24	0,659	0,807	0,774	0,739	0,541	0,779	0,766	0,978	0,794			
25	0,785	0,914	0,760	0,817	0,522	0,822	0,772	1,143	0,806			
26	0,774	0,674	0,711	0,810	0,687	0,837	0,773	1,187	0,804			
27	0,917	0,820	0,759	0,826	0,849	0,827	0,818	0,981	0,824			
28	0,980	1,033	0,613	0,708	0,566	0,826	0,840	0,931	0,828			
29	0,864		0,727	0,978	0,410	0,819	0,815	0,911	0,888			
30	0,868		0,728	0,906	0,421	0,784	0,847	0,953	0,687			
31	0,833		0,915		0,449		0,836	0,975				

The hourly average emission factors are also available on the link: http://www.mct.gov.br/index.php/content/view/67514.html (accessed on Jan/2008).

The operating margin emission factor is calculated for each Brazilian National Interconnected System`s Subsystem for each hour based on the value of energy dispatched by each plant, generation cost of each plant (dispatch priority), hourly exchange with neighboring subsystem and emission factors for thermoelectric plants. The operating margin emission factor is the hourly emission factor weighted average for the subsystem where the project is located.

The dispatch order for Brazilian SIN Subsystem is: hydroelectric power plants, wind, nuclear, imports from other systems in ascending order of cost, thermoelectric power plants in ascending order of generation cost.

Table 30 – Build Margin Emission Factor – South Subsystem of Brazilian SIN

Region	Built Margin Emission Factor (tCO_2/MWh)
South	0,1737

Source: MCT (http://www.mct.gov.br/index.php/content/view/67514.html - acessed on Jan/2008).

The build emission factor is the average emission factor of the most recent plants of the subsystem. This set should comprise at least 5 plants and its installed capacity should be greater than 20% of installed capacity of the subsystem.

Others information about the baseline scenario and baseline emissions is presented on item B.

Annex 4

MONITORING PLAN

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

All procedures which will be used to monitor the project are described on item B.7.1 and B.7.2. Some additional information is presented below.

Some details about the CCEE Energy Measurement Process are described below:

The Commercialization Process

The Electric Power Commercialization Process takes place in accordance to the parameters that have been established by Law 10848/2004, by Decrees 5163/2004 and 5.177/2004 (which instituted 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. Such 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 valued 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 Subsystem, having as basis the marginal cost to operate the system, which is limited by a minimum and by a maximum price.

Measurement

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

Accounting Measurement

The National Interconnected System is represented at the CCEE through a structure made-up of the measurement of consumption and generation points, which are defined through the Electric System Modeling, and whose purpose is 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 such 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 Measurement

Aggregation (from Portuguese 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 measurement 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 measurements taken at different actual points of the SIN.

The points of the SIN that become part of the apportionment process mentioned 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 from the measurement 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 measurement 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 measurement 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 temporarily by ANEEL’S Authoritative Resolution no. 787, of 23/01/2007.

To establish the periodicity which the CERTEL Project’s SHPs measuring tools should be calibrated, it follows below the orientation presented in Grid Procedures Sub-Module 12.3, established by ONS.

Preventive maintenance – Meters Calibration

Source: 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 devices.

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

<u>**Annex 1 of ONS Sub-Module 12.3**</u>

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 2 (two) years at the most. That periodicity can be altered in function of the occurrence report observed for all facilities.

(b) The preventive maintenance can be postponed by the period of up to 2 (two) years, in case an inspection happens in the measurement point. The postponement of that maintenance starts to be applied from the inspection date.

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

(d) In all maintenance or meters calibration, these should be substituted by another properly programmed and calibrated, when there is not an extra device, in order to minimize the interruption in the registration's load

(e) Any changing in the relation of TI's transformation 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 data registered change in the Electric Power Data Collection System - SCDE and submit it to the approval of the CCEE. After the alterations in the measurement system, the involved agents should program an inspection to restore the sealing waxes.

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

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

(h) The meter's calibration 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 should be equal to the meter's nominal tension.

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

(k) The standards, the artificial load and the meter must, when necessary, 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' meters orientations and pattern - for the thermal stabilization.

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

(m) The meter in calibration that presents 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 currents phasorial, the tensions and the sequence's phase's studies should be accomplished before and after the maintenance.

(p) In case the connected agent's or responsible agent for SMF is 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.

Annex 5

ASSUMPTIONS USED AND CERTEL PROJECT'S SHPs CASH FLOW

As CERTEL Project is composed of two small hydropower plants, it will be presented the shareholder's internal rate of return for two SHPs independently. All cash flows presented refer to the project initial time, when shareholders evaluated the investment project's viability.

SHP Cazuza Ferreira Internal Rate of Return

The table below shows the main assumptions used on elaborating SHP Cazuza Ferreira`s Cash Flow and on shareholder`s internal rate of return calculation for this SHP Project:

Table 31: Main Assumptions used at SHP Cazuza Ferreira`s Cash Flow

Item	Assumptions
Concession Term	30 years
Construction Time	18 months
Total Investment	21,244,511
% Shareholder	20%
% Debt	80%
Uses	
Construction and Equipment	95%
Others Items	5%
Loan Conditions	
Interest Rate	14.75%
Interest During Construction	12%
Grace Period	6 months
Amortization Time	10 years
Insurance Costs	1.20% over Funded Value
Operation and Maintenance Annual Cost	R$ 5.17/MWh
Taxes	
PIS	0.65% over Gross Revenue
COFINS	3% over Gross Revenue
IR	25% over Gross Profit
CSLL	9% over Gross Profit
CPMF	0.38% over Gross Revenue
ANEEL Supervisory Tax	
Revenues	
Electricty Price	78.33
Electricity Amount Sold	5.01 MW/h

Using these assumptions, CERTEL had the following cash flow for Cazuza Ferreira Project:

Table 32: Cash Flow of SHP Cazuza Ferreira:

CASH INFLOW	CONSTR. 1	CONSTR. 2	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9
I - Total Revenues	-	**858.571,21**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**
I.1 - Operational Revenues (electricity selling)	-	858.571,21	3.434.284,85	3.434.284,85	3.434.284,85	3.434.284,85	3.434.284,85	3.434.284,85	3.434.284,85	3.434.284,85	3.434.284,85
I.2 - Financial investment	-	-	-	-	-	-	-	-	-	-	-
II - BNDES Loan	**8.497.804,40**	**8.497.804,40**	-	-	-	-	-	-	-	-	-
III - Equity	**2.124.451,10**	**2.124.451,10**	-	-	-	-	-	-	-	-	-
IV - Total Cash Inflow (I + II + III)	**10.622.255,50**	**11.480.826,71**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**
CASH OUTFLOW											
V - Total Investment (V.1 + V.2)	**10.622.255,50**	**10.622.255,50**	-	-	-	-	-	-	-	-	-
V.1 - Construction and Equipment Investment	10.091.142,73	10.091.142,73	-	-	-	-	-	-	-	-	-
V.2 - Others Items Investment (2)	531.112,78	531.112,78	-	-	-	-	-	-	-	-	-
VI - Total Expenses (VI.1 + VI.2)	-	**95.556,89**	**382.227,57**	**382.227,57**	**382.227,57**	**382.227,57**	**382.227,57**	**382.227,57**	**382.227,57**	**382.227,57**	**382.227,57**
VI.1 - Operational Expenses	-	**60.956,47**	**243.825,89**	**243.825,89**	**243.825,89**	**243.825,89**	**243.825,89**	**243.825,89**	**243.825,89**	**243.825,89**	**243.825,89**
VI.1.1 - CCC	-	-	-	-	-	-	-	-	-	-	-
VI.1.2 - Royalties	-	-	-	-	-	-	-	-	-	-	-
VI.1.3 - ANEEL	-	4.292,86	17.171,42	17.171,42	17.171,42	17.171,42	17.171,42	17.171,42	17.171,42	17.171,42	17.171,42
VI.1.4 - Concession Cost	-	-	-	-	-	-	-	-	-	-	-
VI.1.5 - Operation and Maintenance (O&M)	-	56.663,62	226.654,46	226.654,46	226.654,46	226.654,46	226.654,46	226.654,46	226.654,46	226.654,46	226.654,46
VI.2 - Total of PIS, COFINS, ISS and CPMF	-	**34.600,42**	**138.401,68**	**138.401,68**	**138.401,68**	**138.401,68**	**138.401,68**	**138.401,68**	**138.401,68**	**138.401,68**	**138.401,68**
VI.2.1 - PIS	-	5.580,71	22.322,85	22.322,85	22.322,85	22.322,85	22.322,85	22.322,85	22.322,85	22.322,85	22.322,85
VI.2.2 - COFINS	-	25.757,14	103.028,55	103.028,55	103.028,55	103.028,55	103.028,55	103.028,55	103.028,55	103.028,55	103.028,55
VI.2.3 - ISS	-	-	-	-	-	-	-	-	-	-	-
VI.2.4 - CPMF	-	3.262,57	13.050,28	13.050,28	13.050,28	13.050,28	13.050,28	13.050,28	13.050,28	13.050,28	13.050,28
VII - BNDES`s Loan Amortization	-	-	**2.094.076,76**	**2.094.076,76**	**2.094.076,76**	**2.094.076,76**	**2.094.076,76**	**2.094.076,76**	**2.094.076,76**	**2.094.076,76**	**2.094.076,76**
VIII - BNDES`s Loan Interest	-	-	**3.088.763,22**	**2.779.886,90**	**2.471.010,58**	**2.162.134,26**	**1.853.257,93**	**1.544.381,61**	**1.235.505,29**	**926.628,97**	**617.752,64**
IX - Insurance	**219.079,15**	-	-	-	-	-	-	-	-	-	-
X - Transmission and Distribution	-	-	-	-	-	-	-	-	-	-	-
XI - Total of Tax over results	-	**235.424,87**	-	-	-	**9.634,22**	**94.666,43**	**199.684,38**	**304.702,33**	**409.720,28**	**514.738,23**
XI.1 - Social Contribution	-	68.671,29	-	-	-	3.612,83	31.411,70	59.210,57	87.009,44	114.808,31	142.607,18
XI.2 - Income Tax	-	166.753,58	-	-	-	6.021,39	63.254,73	140.473,81	217.692,89	294.911,97	372.131,05
Total Cash Outflow	**10.841.334,65**	**10.953.237,26**	**5.565.067,55**	**5.256.191,23**	**4.947.314,90**	**4.648.072,80**	**4.424.228,69**	**4.220.370,32**	**4.016.511,94**	**3.812.653,57**	**3.608.795,20**
Cash in the period	**(219.079,15)**	**527.589,45**	**(2.130.782,69)**	**(1.821.906,37)**	**(1.513.030,05)**	**(1.213.787,95)**	**(989.943,84)**	**(786.085,46)**	**(582.227,09)**	**(378.368,72)**	**(174.510,35)**
Accumulated Cash	**(219.079,15)**	**308.510,30**	**(1.822.272,39)**	**(3.644.178,76)**	**(5.157.208,81)**	**(6.370.996,76)**	**(7.360.940,60)**	**(8.147.026,06)**	**(8.729.253,15)**	**(9.107.621,87)**	**(9.282.132,21)**
Cash Net of Equity	**(2.343.530,25)**	**(1.596.861,65)**	**(2.130.782,69)**	**(1.821.906,37)**	**(1.513.030,05)**	**(1.213.787,95)**	**(989.943,84)**	**(786.085,46)**	**(582.227,09)**	**(378.368,72)**	**(174.510,35)**
Accumulated Cash Net of Equity	**(2.343.530,25)**	**(3.940.391,90)**	**(6.071.174,59)**	**(7.893.080,96)**	**(9.406.111,01)**	**(10.619.898,96)**	**(11.609.842,80)**	**(12.395.928,26)**	**(12.978.155,35)**	**(13.356.524,07)**	**(13.531.034,41)**

Table 32: Cash Flow of SHP Cazuza Ferreira (Continuation):

CASH INFLOW	YEAR 10	YEAR 11	YEAR 12	YEAR 13	YEAR 14	YEAR 15	YEAR 16	YEAR 17	YEAR 18	YEAR 19	YEAR 20	YEAR 21
I - Total Revenues	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**
I.1 - Operational Revenues (electricity selling)	3.434.284,85	3.434.284,85	3.434.284,85	3.434.284,85	3.434.284,85	3.434.284,85	3.434.284,85	3.434.284,85	3.434.284,85	3.434.284,85	3.434.284,85	3.434.284,85
I.2 - Financial investment	-	-	-	-	-	-	-	-	-	-	-	-
II - BNDES Loan	-	-	-	-	-	-	-	-	-	-	-	-
III - Equity	-	-	-	-	-	-	-	-	-	-	-	-
IV - Total Cash Inflow (I + II + III)	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**	**3.434.284,85**
CASH OUTFLOW												
V - Total Investment (V.1 + V.2)	-	-	-	-	-	-	-	-	-	-	-	-
V.1 - Construction and Equipment Investment	-	-	-	-	-	-	-	-	-	-	-	-
V.2 - Others Items Investment **(2)**	-	-	-	-	-	-	-	-	-	-	-	-
VI - Total Expenses (VI.1 + VI.2)	**382.227,57**	**382.227,57**	**382.227,57**	**382.227,57**	**382.227,57**	**382.227,57**	**382.227,57**	**382.227,57**	**382.227,57**	**382.227,57**	**382.227,57**	**382.227,57**
VI.1 - Operational Expenses	**243.825,89**	**243.825,89**	**243.825,89**	**243.825,89**	**243.825,89**	**243.825,89**	**243.825,89**	**243.825,89**	**243.825,89**	**243.825,89**	**243.825,89**	**243.825,89**
VI.1.1 - CCC	-	-	-	-	-	-	-	-	-	-	-	-
VI.1.2 - Royalties	-	-	-	-	-	-	-	-	-	-	-	-
VI.1.3 - ANEEL	17.171,42	17.171,42	17.171,42	17.171,42	17.171,42	17.171,42	17.171,42	17.171,42	17.171,42	17.171,42	17.171,42	17.171,42
VI.1.4 - Concession Cost	-	-	-	-	-	-	-	-	-	-	-	-
VI.1.5 - Operation and Maintenance (O&M)	226.654,46	226.654,46	226.654,46	226.654,46	226.654,46	226.654,46	226.654,46	226.654,46	226.654,46	226.654,46	226.654,46	226.654,46
VI.2 - Total of PIS, COFINS, ISS and CPMF	**138.401,68**	**138.401,68**	**138.401,68**	**138.401,68**	**138.401,68**	**138.401,68**	**138.401,68**	**138.401,68**	**138.401,68**	**138.401,68**	**138.401,68**	**138.401,68**
VI.2.1 - PIS	22.322,85	22.322,85	22.322,85	22.322,85	22.322,85	22.322,85	22.322,85	22.322,85	22.322,85	22.322,85	22.322,85	22.322,85
VI.2.2 - COFINS	103.028,55	103.028,55	103.028,55	103.028,55	103.028,55	103.028,55	103.028,55	103.028,55	103.028,55	103.028,55	103.028,55	103.028,55
VI.2.3 - ISS	-	-	-	-	-	-	-	-	-	-	-	-
VI.2.4 - CPMF	13.050,28	13.050,28	13.050,28	13.050,28	13.050,28	13.050,28	13.050,28	13.050,28	13.050,28	13.050,28	13.050,28	13.050,28
VII - BNDES`s Loan Amortization	**2.094.076,76**	-	-	-	-	-	-	-	-	-	-	-
VIII - BNDES`s Loan Interest	**308.876,32**	-	-	-	-	-	-	-	-	-	-	-
IX - Insurance	-	-	-	-	-	-	-	-	-	-	-	-
X - Transmission and Distribution	-	-	-	-	-	-	-	-	-	-	-	-
XI - Total of Tax over results	**619.756,18**	**724.774,13**	**724.774,13**	**724.774,13**	**724.774,13**	**724.774,13**	**724.774,13**	**724.774,13**	**724.774,13**	**724.774,13**	**724.774,13**	**724.774,13**
XI.1 - Social Contribution	170.406,05	198.204,92	198.204,92	198.204,92	198.204,92	198.204,92	198.204,92	198.204,92	198.204,92	198.204,92	198.204,92	198.204,92
XI.2 - Income Tax	449.350,13	526.569,21	526.569,21	526.569,21	526.569,21	526.569,21	526.569,21	526.569,21	526.569,21	526.569,21	526.569,21	526.569,21
Total Cash Outflow	**3.404.936,83**	**1.107.001,69**	**1.107.001,69**	**1.107.001,69**	**1.107.001,69**	**1.107.001,69**	**1.107.001,69**	**1.107.001,69**	**1.107.001,69**	**1.107.001,69**	**1.107.001,69**	**1.107.001,69**
Cash in the period	**29.348,03**	**2.327.283,16**	**2.327.283,16**	**2.327.283,16**	**2.327.283,16**	**2.327.283,16**	**2.327.283,16**	**2.327.283,16**	**2.327.283,16**	**2.327.283,16**	**2.327.283,16**	**2.327.283,16**
Accumulated Cash	**(9.252.784,19)**	**(6.925.501,03)**	**(4.598.217,87)**	**(2.270.934,71)**	**56.348,45**	**2.383.631,62**	**4.710.914,78**	**7.038.197,94**	**9.365.481,10**	**11.692.764,26**	**14.020.047,42**	**16.347.330,58**
Cash Net of Equity	**29.348,03**	**2.327.283,16**	**2.327.283,16**	**2.327.283,16**	**2.327.283,16**	**2.327.283,16**	**2.327.283,16**	**2.327.283,16**	**2.327.283,16**	**2.327.283,16**	**2.327.283,16**	**2.327.283,16**
Accumulated Cash Net of Equity	**(13.501.686,39)**	**(11.174.403,23)**	**(8.847.120,07)**	**(6.519.836,91)**	**(4.192.553,75)**	**(1.865.270,58)**	**462.012,58**	**2.789.295,74**	**5.116.578,90**	**7.443.862,06**	**9.771.145,22**	**12.098.428,38**

Table 32: Cash Flow of SHP Cazuza Ferreira (Continuation):

CASH INFLOW	YEAR 22	YEAR 23	YEAR 24	YEAR 25	YEAR 26	YEAR 27	YEAR 28
I - Total Revenues	3.434.284,85	3.434.284,85	3.434.284,85	3.434.284,85	3.434.284,85	3.434.284,85	3.434.284,85
I.1 - Operational Revenues (electricity selling)	3.434.284,85	3.434.284,85	3.434.284,85	3.434.284,85	3.434.284,85	3.434.284,85	3.434.284,85
I.2 - Financial investment	-	-	-	-	-	-	-
II - BNDES Loan	-	-	-	-	-	-	-
III - Equity	-	-	-	-	-	-	-
IV - Total Cash Inflow (I + II + III)	3.434.284,85	3.434.284,85	3.434.284,85	3.434.284,85	3.434.284,85	3.434.284,85	3.434.284,85
CASH OUTFLOW							
V - Total Investment (V.1 + V.2)	-	-	-	-	-	-	-
V.1 - Construction and Equipment Investment	-	-	-	-	-	-	-
V.2 - Others Items Investment (2)	-	-	-	-	-	-	-
VI - Total Expenses (VI.1 + VI.2)	382.227,57	382.227,57	382.227,57	382.227,57	382.227,57	382.227,57	382.227,57
VI.1 - Operational Expenses	243.825,89	243.825,89	243.825,89	243.825,89	243.825,89	243.825,89	243.825,89
VI.1.1 - CCC	-	-	-	-	-	-	-
VI.1.2 - Royalties	-	-	-	-	-	-	-
VI.1.3 - ANEEL	17.171,42	17.171,42	17.171,42	17.171,42	17.171,42	17.171,42	17.171,42
VI.1.4 - Concession Cost	-	-	-	-	-	-	-
VI.1.5 - Operation and Maintenance (O&M)	226.654,46	226.654,46	226.654,46	226.654,46	226.654,46	226.654,46	226.654,46
VI.2 - Total of PIS, COFINS, ISS and CPMF	138.401,68	138.401,68	138.401,68	138.401,68	138.401,68	138.401,68	138.401,68
VI.2.1 - PIS	22.322,85	22.322,85	22.322,85	22.322,85	22.322,85	22.322,85	22.322,85
VI.2.2 - COFINS	103.028,55	103.028,55	103.028,55	103.028,55	103.028,55	103.028,55	103.028,55
VI.2.3 - ISS	-	-	-	-	-	-	-
VI.2.4 - CPMF	13.050,28	13.050,28	13.050,28	13.050,28	13.050,28	13.050,28	13.050,28
VII - BNDES`s Loan Amortization	-	-	-	-	-	-	-
VIII - BNDES`s Loan Interest	-	-	-	-	-	-	-
IX - Insurance	-	-	-	-	-	-	-
X - Transmission and Distribution	-	-	-	-	-	-	-
XI - Total of Tax over results	724.774,13	724.774,13	724.774,13	724.774,13	724.774,13	724.774,13	724.774,13
XI.1 - Social Contribution	198.204,92	198.204,92	198.204,92	198.204,92	198.204,92	198.204,92	198.204,92
XI.2 - Income Tax	526.569,21	526.569,21	526.569,21	526.569,21	526.569,21	526.569,21	526.569,21
Total Cash Outflow	1.107.001,69	1.107.001,69	1.107.001,69	1.107.001,69	1.107.001,69	1.107.001,69	1.107.001,69
Cash in the period	2.327.283,16	2.327.283,16	2.327.283,16	2.327.283,16	2.327.283,16	2.327.283,16	2.327.283,16
Accumulated Cash	18.674.613,74	21.001.896,90	23.329.180,06	25.656.463,22	27.983.746,38	30.311.029,54	32.638.312,70
Cash Net of Equity	2.327.283,16	2.327.283,16	2.327.283,16	2.327.283,16	2.327.283,16	2.327.283,16	2.327.283,16
Accumulated Cash Net of Equity	14.425.711,54	16.752.994,70	19.080.277,86	21.407.561,02	23.734.844,18	26.062.127,34	28.389.410,50

The Cazuza Ferreira equity internal rate of return was calculated based on Cash Net of Equity for each year (line: “Cash Net of Equity).

SHP Rastro de Auto Internal Rate of Return

The table below shows the main assumptions used on elaborating SHP Rastro de Auto`s Cash Flow and on shareholder`s internal rate of return calculation for this SHP Project:

Table 33: Main Assumptions used at SHP Rastro de Auto`s Cash Flow

Item	Assumptions
Concession Term	30 years
Construction Time	18 months
Total Investment	24,536,733.86
% Shareholder	20%
% Debt	80%
Uses	
Construction and Equipment	95%
Others Items	5%
Loan Conditions	
Interest Rate	14.75%
Interest During Construction	12%
Grace Period	6 months
Amortization Time	10 years
Insurance Costs	1.20% over Funded Value
Operation and Maintenance Annual Cost	R$ 5.64/MWh
Taxes*	
PIS	0.65% over Gross Revenue
COFINS	3% over Gross Revenue
IR	25% over Gross Profit
CSLL	9% over Gross Profit
CPMF	0.38% over Gross Revenue
ANEEL Supervisory Tax	
Revenues	
Electricty Price	76.88
Electricity Amount Sold	3.85 MW/h

The predicted cash flow for this SHP based on these assumptions is planned according described below:

Table 34: Cash Flow of SHP Rastro de Auto:

CASH INFLOW	CONSTR. 1	CONSTR. 2	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9
I - Total Revenues	-	1.296.427,44	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88
I.1 - Operational Revenues (electricity selling)	-	1.296.427,44	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88
I.2 - Financial investment	-	-	-	-	-	-	-	-	-	-	-
II - BNDES Loan	9.814.693,54	9.814.693,54	-	-	-	-	-	-	-	-	-
III - Equity	2.453.673,39	2.453.673,39	-	-	-	-	-	-	-	-	-
IV - Total Cash Inflow (I + II + III)	12.268.366,93	13.564.794,37	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88
CASH OUTFLOW											
V - Total Investment (V.1 + V.2)	12.268.366,93	12.268.366,93	-	-	-	-	-	-	-	-	-
V.1 - Construction and Equipment Investment	11.654.948,58	11.654.948,58	-	-	-	-	-	-	-	-	-
V.2 - Others Items Investment (2)	613.418,35	613.418,35	-	-	-	-	-	-	-	-	-
VI - Total Expenses (VI.1 + VI.2)	-	153.870,11	307.740,22	307.740,22	307.740,22	307.740,22	307.740,22	307.740,22	307.740,22	307.740,22	307.740,22
VI.1 - Operational Expenses	-	101.624,09	203.248,17	203.248,17	203.248,17	203.248,17	203.248,17	203.248,17	203.248,17	203.248,17	203.248,17
VI.1.1 - CCC	-	-	-	-	-	-	-	-	-	-	-
VI.1.2 - Royalties	-	-	-	-	-	-	-	-	-	-	-
VI.1.3 - ANEEL	-	6.482,14	12.964,27	12.964,27	12.964,27	12.964,27	12.964,27	12.964,27	12.964,27	12.964,27	12.964,27
VI.1.4 - Concession Cost	-	-	-	-	-	-	-	-	-	-	-
VI.1.5 - Operation and Maintenance (O&M)	-	95.141,95	190.283,90	190.283,90	190.283,90	190.283,90	190.283,90	190.283,90	190.283,90	190.283,90	190.283,90
VI.2 - Total of PIS, COFINS, ISS and CPMF	-	52.246,03	104.492,05	104.492,05	104.492,05	104.492,05	104.492,05	104.492,05	104.492,05	104.492,05	104.492,05
VI.2.1 - PIS	-	8.426,78	16.853,56	16.853,56	16.853,56	16.853,56	16.853,56	16.853,56	16.853,56	16.853,56	16.853,56
VI.2.2 - COFINS	-	38.892,82	77.785,65	77.785,65	77.785,65	77.785,65	77.785,65	77.785,65	77.785,65	77.785,65	77.785,65
VI.2.3 - ISS	-	-	-	-	-	-	-	-	-	-	-
VI.2.4 - CPMF	-	4.926,42	9.852,85	9.852,85	9.852,85	9.852,85	9.852,85	9.852,85	9.852,85	9.852,85	9.852,85
VII - BNDES`s Loan Amortization	-	-	2.418.591,99	2.418.591,99	2.418.591,99	2.418.591,99	2.418.591,99	2.418.591,99	2.418.591,99	2.418.591,99	2.418.591,99
VIII - BNDES`s Loan Interest	-	-	3.567.423,19	3.210.680,87	2.853.938,55	2.497.196,23	2.140.453,91	1.783.711,59	1.426.969,27	1.070.226,96	713.484,64
IX - Insurance	253.029,44	-	-	-	-	-	-	-	-	-	-
X - Transmission and Distribution	-	-	-	-	-	-	-	-	-	-	-
XI - Total of Tax over results	-	364.469,49	-	-	-	-	-	-	-	56.020,40	176.654,63
XI.1 - Social Contribution	-	102.830,16	-	-	-	-	-	-	-	21.007,65	53.114,46
XI.2 - Income Tax	-	261.639,33	-	-	-	-	-	-	-	35.012,75	123.540,17
Total Cash Outflow	12.521.396,37	12.786.706,53	6.293.755,40	5.937.013,08	5.580.270,76	5.223.528,44	4.866.786,13	4.510.043,81	4.153.301,49	3.852.579,57	3.616.471,48
Cash in the period	(253.029,44)	778.087,84	(3.700.900,52)	(3.344.158,20)	(2.987.415,88)	(2.630.673,56)	(2.273.931,25)	(1.917.188,93)	(1.560.446,61)	(1.259.724,69)	(1.023.616,60)
Accumulated Cash	(253.029,44)	525.058,39	(3.175.842,13)	(6.520.000,33)	(9.507.416,21)	(12.138.089,78)	(14.412.021,02)	(16.329.209,95)	(17.889.656,56)	(19.149.381,25)	(20.172.997,85)
Cash Net of Equity	(2.706.702,83)	(1.675.585,55)	(3.700.900,52)	(3.344.158,20)	(2.987.415,88)	(2.630.673,56)	(2.273.931,25)	(1.917.188,93)	(1.560.446,61)	(1.259.724,69)	(1.023.616,60)
Accumulated Cash Net of Equity	(2.706.702,83)	(4.382.288,38)	(8.083.188,90)	(11.427.347,10)	(14.414.762,98)	(17.045.436,55)	(19.319.367,79)	(21.236.556,72)	(22.797.003,33)	(24.056.728,02)	(25.080.344,62)

Table 34: Cash Flow of SHP Rastro de Auto (Continuation):

CASH INFLOW	YEAR 10	YEAR 11	YEAR 12	YEAR 13	YEAR 14	YEAR 15	YEAR 16	YEAR 17	YEAR 18	YEAR 19	YEAR 20	YEAR 21
I - Total Revenues	**2.592.854,88**	**2.592.854,88**	**2.592.854,88**	**2.592.854,88**	**2.592.854,88**	**2.592.854,88**	**2.592.854,88**	**2.592.854,88**	**2.592.854,88**	**2.592.854,88**	**2.592.854,88**	**2.592.854,88**
I.1 - Operational Revenues (electricity selling)	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88
I.2 - Financial investment	-	-	-	-	-	-	-	-	-	-	-	-
II - BNDES Loan	-	-	-	-	-	-	-	-	-	-	-	-
III - Equity	-	-	-	-	-	-	-	-	-	-	-	-
IV - Total Cash Inflow (I + II + III)	**2.592.854,88**	**2.592.854,88**	**2.592.854,88**	**2.592.854,88**	**2.592.854,88**	**2.592.854,88**	**2.592.854,88**	**2.592.854,88**	**2.592.854,88**	**2.592.854,88**	**2.592.854,88**	**2.592.854,88**
CASH OUTFLOW												
V - Total Investment (V.1 + V.2)	-	-	-	-	-	-	-	-	-	-	-	-
V.1 - Construction and Equipment Investment	-	-	-	-	-	-	-	-	-	-	-	-
V.2 - Others Items Investment (2)	-	-	-	-	-	-	-	-	-	-	-	-
VI - Total Expenses (VI.1 + VI.2)	**307.740,22**	**307.740,22**	**307.740,22**	**307.740,22**	**307.740,22**	**307.740,22**	**307.740,22**	**307.740,22**	**307.740,22**	**307.740,22**	**307.740,22**	**307.740,22**
VI.1 - Operational Expenses	**203.248,17**	**203.248,17**	**203.248,17**	**203.248,17**	**203.248,17**	**203.248,17**	**203.248,17**	**203.248,17**	**203.248,17**	**203.248,17**	**203.248,17**	**203.248,17**
VI.1.1 - CCC	-	-	-	-	-	-	-	-	-	-	-	-
VI.1.2 - Royalties	-	-	-	-	-	-	-	-	-	-	-	-
VI.1.3 - ANEEL	12.964,27	12.964,27	12.964,27	12.964,27	12.964,27	12.964,27	12.964,27	12.964,27	12.964,27	12.964,27	12.964,27	12.964,27
VI.1.4 - Concession Cost	-	-	-	-	-	-	-	-	-	-	-	-
VI.1.5 - Operation and Maintenance (O&M)	190.283,90	190.283,90	190.283,90	190.283,90	190.283,90	190.283,90	190.283,90	190.283,90	190.283,90	190.283,90	190.283,90	190.283,90
VI.2 - Total of PIS, COFINS, ISS and CPMF	**104.492,05**	**104.492,05**	**104.492,05**	**104.492,05**	**104.492,05**	**104.492,05**	**104.492,05**	**104.492,05**	**104.492,05**	**104.492,05**	**104.492,05**	**104.492,05**
VI.2.1 - PIS	16.853,56	16.853,56	16.853,56	16.853,56	16.853,56	16.853,56	16.853,56	16.853,56	16.853,56	16.853,56	16.853,56	16.853,56
VI.2.2 - COFINS	77.785,65	77.785,65	77.785,65	77.785,65	77.785,65	77.785,65	77.785,65	77.785,65	77.785,65	77.785,65	77.785,65	77.785,65
VI.2.3 - ISS	-	-	-	-	-	-	-	-	-	-	-	-
VI.2.4 - CPMF	9.852,85	9.852,85	9.852,85	9.852,85	9.852,85	9.852,85	9.852,85	9.852,85	9.852,85	9.852,85	9.852,85	9.852,85
VII - BNDES`s Loan Amortization	**2.418.591,99**	-	-	-	-	-	-	-	-	-	-	-
VIII - BNDES`s Loan Interest	**356.742,32**	-	-	-	-	-	-	-	-	-	-	-
IX - Insurance	-	-	-	-	-	-	-	-	-	-	-	-
X - Transmission and Distribution	-	-	-	-	-	-	-	-	-	-	-	-
XI - Total of Tax over results	**297.947,01**	**419.239,40**	**419.239,40**	**419.239,40**	**419.239,40**	**419.239,40**	**419.239,40**	**419.239,40**	**419.239,40**	**419.239,40**	**419.239,40**	**419.239,40**
XI.1 - Social Contribution	85.221,27	117.328,08	117.328,08	117.328,08	117.328,08	117.328,08	117.328,08	117.328,08	117.328,08	117.328,08	117.328,08	117.328,08
XI.2 - Income Tax	212.725,75	301.911,33	301.911,33	301.911,33	301.911,33	301.911,33	301.911,33	301.911,33	301.911,33	301.911,33	301.911,33	301.911,33
Total Cash Outflow	**3.381.021,55**	**726.979,63**	**726.979,63**	**726.979,63**	**726.979,63**	**726.979,63**	**726.979,63**	**726.979,63**	**726.979,63**	**726.979,63**	**726.979,63**	**726.979,63**
Cash in the period	**(788.166,67)**	**1.865.875,25**	**1.865.875,25**	**1.865.875,25**	**1.865.875,25**	**1.865.875,25**	**1.865.875,25**	**1.865.875,25**	**1.865.875,25**	**1.865.875,25**	**1.865.875,25**	**1.865.875,25**
Accumulated Cash	**(20.961.164,51)**	**(19.095.289,26)**	**(17.229.414,01)**	**(15.363.538,75)**	**(13.497.663,50)**	**(11.631.788,24)**	**(9.765.912,99)**	**(7.900.037,73)**	**(6.034.162,48)**	**(4.168.287,23)**	**(2.302.411,97)**	**(436.536,72)**
Cash Net of Equity	**(788.166,67)**	**1.865.875,25**	**1.865.875,25**	**1.865.875,25**	**1.865.875,25**	**1.865.875,25**	**1.865.875,25**	**1.865.875,25**	**1.865.875,25**	**1.865.875,25**	**1.865.875,25**	**1.865.875,25**
Accumulated Cash Net of Equity	**(25.868.511,29)**	**(24.002.636,03)**	**(22.136.760,78)**	**(20.270.885,52)**	**(18.405.010,27)**	**(16.539.135,01)**	**(14.673.259,76)**	**(12.807.384,51)**	**(10.941.509,25)**	**(9.075.634,00)**	**(7.209.758,74)**	**(5.343.883,49)**

Table 34: Cash Flow of SHP Rastro de Auto (Continuation):

CASH INFLOW	YEAR 22	YEAR 23	YEAR 24	YEAR 25	YEAR 26	YEAR 27	YEAR 28
I - Total Revenues	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88
I.1 - Operational Revenues (electricity selling)	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88
I.2 - Financial investment	-	-	-	-	-	-	-
II - BNDES Loan	-	-	-	-	-	-	-
III - Equity	-	-	-	-	-	-	-
IV - Total Cash Inflow (I + II + III)	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88	2.592.854,88
CASH OUTFLOW							
V - Total Investment (V.1 + V.2)	-	-	-	-	-	-	-
V.1 - Construction and Equipment Investment	-	-	-	-	-	-	-
V.2 - Others Items Investment (2)	-	-	-	-	-	-	-
VI - Total Expenses (VI.1 + VI.2)	307.740,22	307.740,22	307.740,22	307.740,22	307.740,22	307.740,22	307.740,22
VI.1 - Operational Expenses	203.248,17	203.248,17	203.248,17	203.248,17	203.248,17	203.248,17	203.248,17
VI.1.1 - CCC	-	-	-	-	-	-	-
VI.1.2 - Royalties	-	-	-	-	-	-	-
VI.1.3 - ANEEL	12.964,27	12.964,27	12.964,27	12.964,27	12.964,27	12.964,27	12.964,27
VI.1.4 - Concession Cost	-	-	-	-	-	-	-
VI.1.5 - Operation and Maintenance (O&M)	190.283,90	190.283,90	190.283,90	190.283,90	190.283,90	190.283,90	190.283,90
VI.2 - Total of PIS, COFINS, ISS and CPMF	104.492,05	104.492,05	104.492,05	104.492,05	104.492,05	104.492,05	104.492,05
VI.2.1 - PIS	16.853,56	16.853,56	16.853,56	16.853,56	16.853,56	16.853,56	16.853,56
VI.2.2 - COFINS	77.785,65	77.785,65	77.785,65	77.785,65	77.785,65	77.785,65	77.785,65
VI.2.3 - ISS	-	-	-	-	-	-	-
VI.2.4 - CPMF	9.852,85	9.852,85	9.852,85	9.852,85	9.852,85	9.852,85	9.852,85
VII - BNDES`s Loan Amortization	-	-	-	-	-	-	-
VIII - BNDES`s Loan Interest	-	-	-	-	-	-	-
IX - Insurance	-	-	-	-	-	-	-
X - Transmission and Distribution	-	-	-	-	-	-	-
XI - Total of Tax over results	419.239,40	419.239,40	419.239,40	419.239,40	419.239,40	419.239,40	419.239,40
XI.1 - Social Contribution	117.328,08	117.328,08	117.328,08	117.328,08	117.328,08	117.328,08	117.328,08
XI.2 - Income Tax	301.911,33	301.911,33	301.911,33	301.911,33	301.911,33	301.911,33	301.911,33
Total Cash Outflow	726.979,63	726.979,63	726.979,63	726.979,63	726.979,63	726.979,63	726.979,63
Cash in the period	1.865.875,25	1.865.875,25	1.865.875,25	1.865.875,25	1.865.875,25	1.865.875,25	1.865.875,25
Accumulated Cash	1.429.338,54	3.295.213,79	5.161.089,04	7.026.964,30	8.892.839,55	10.758.714,81	12.624.590,06
Cash Net of Equity	1.865.875,25	1.865.875,25	1.865.875,25	1.865.875,25	1.865.875,25	1.865.875,25	1.865.875,25
Accumulated Cash Net of Equity	(3.478.008,24)	(1.612.132,98)	253.742,27	2.119.617,53	3.985.492,78	5.851.368,03	7.717.243,29

The Rastro de Auto equity internal rate of return was calculated based on Cash Net of Equity for each year (line: “Cash Net of Equity).

Annex 6

CERTEL PROJECT`S ENTERPRISES PHOTOS

Photo 1: Place where the Power House of SHP Cazuza Ferreira will be located

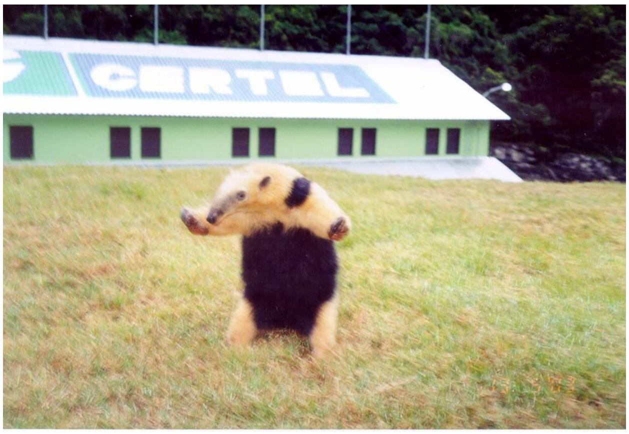
Photo 2: Place where the Power House of SHP Rastro de Auto will be located

Photo 3: Place where the Dam of SHP Rastro de Auto will be located

Photo 4: Popular Participation on CERTEL's Decisions

Photo 5: Receiving the Cooperative of year 2007 Award granted by Organization of Cooperatives of Brazil (OCB)

Photo 6: CERTEL – Generating Energy with Environmental Harmony



Annex 7

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