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

CONTENTS

SECTION A. General description of project activity

A.1 Title of the project activity:

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Baruíto Hydroelectric Project
PDD Version Number 02
12/03/2007

A.2. Description of the project activity:

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The Baruíto Hydroelectric Project (hereafter, the "Project") developed by Global Energia S.A.(hereafter referred to as the "Project Developer") consists of the installation of a small hydroelectric plant with a capacity of 18MW, located in Sangue River, in the municipality of Campo Novo do Parecis, Mato Grosso State, Brazil.

The plant has the objective to provide renewable electricity to the municipality of Campo Novo dos Parecis in Mato Grosso State, Midwest region of Brazil. The 54.19 km transmission line will be built by the project developer and will be connected to the S-SE-CO interconnected system (hereafter referred to as "the Grid") through the municipality of Campo Novo dos Parecis.

The plant was built in a remote area, which was isolated from the interconnected grid in the near past. The plant will bring renewable electricity to develop this remote area both socially and economically, which has always been a difficult issue. This project will increase the supply of electricity to the grid, offsetting thermal generation with a renewable source of energy, thus the project will reduce CO_2e emissions. The power density of the proposed project is 29.83 W/m², therefore project emissions will not be accounted for.

The participants of the project recognize that this Project activity is helping Brazil to fulfil its goals of promoting sustainable development. Specifically, the project is in line with host-country specific CDM requirements due to the following reasons:

- Contributes to local environmental sustainability, since it decreases the dependence on fossil fuels, thus improving air quality.
- Contributes towards better working conditions and increases employment opportunities in the area where the project is located.
- Contributes towards better revenue distribution since it contributes to the regional/local economic development.
- Contributes to development of technological capacity because the technology, hand labour and technical maintenance will be provided inside Brazil, consolidating the technology in the country
- Contributes to regional integration and connection with other sectors. The project facilitates the increase of small hydroelectricity as a generating source in the region and therefore may encourage other similar companies that want to replicate this experience.

A.3. Project participants:

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Table 1 - Project participants

Name of party involved (*) ((host) indicates a host party)	Private and/or public entity(ies) Project participants (*) (as applicable)	Kindly indicate if the party involved wishes to be considered as project participant (Yes/No)
Brazil (host)	Global Energia S.A.	No
United Kingdom of Great Britain and Northern Ireland	EcoSecurities Group PLC	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 requesting registration, the approval by the Party(ies) involved is required.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

Brazil. (the "Host Country")

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

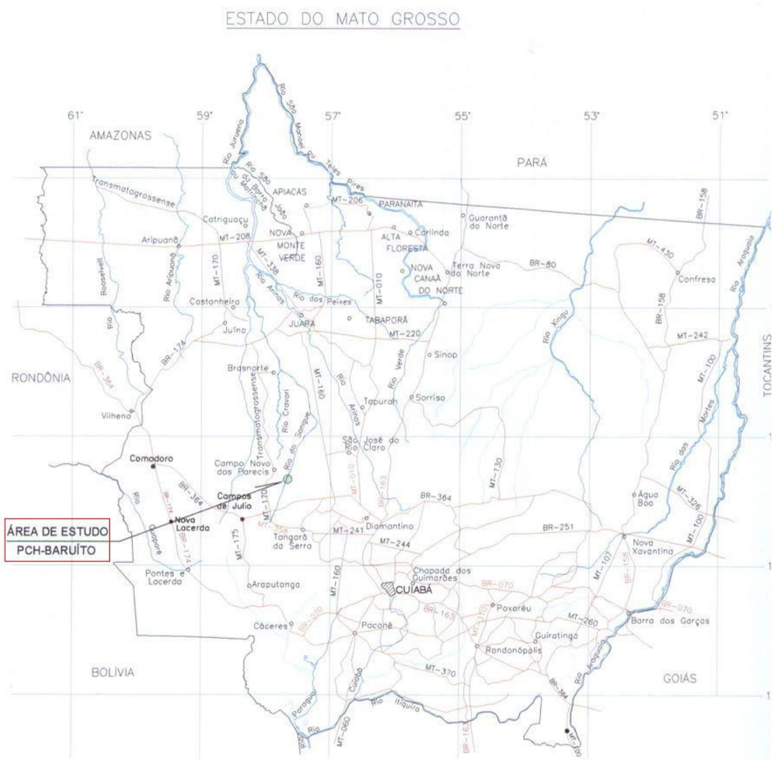
Mato Grosso State.

A.4.1.3. City/Town/Community etc:

Campo Novo dos Parecís Municipality.

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

The exact location of the project is defined using GPS coordinates 13°19'05"S, 57°35'49"W.



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

According to Annex A of the Kyoto Protocol, this project fits in UNFCCC Sectoral Category 1: Energy Industries (renewable / non-renewable sources).

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

The project consists of a plant that generates renewable electricity to supply electricity to the grid. The hydro power plant has three sets of equipments. Each consists of one Brazilian horizontal Kaplan S type turbine and Brushless three-phase generators. A Kaplan turbine is a propeller-type water turbine with adjustable blades.

Table 2 – Turbine technical description

Turbine Manufacturer/Type	ALSTOM / Kaplan S
Quantity	3
Nominal Capacity	6.1 MW[1]

Table 3 - Generator technical description

Generators Manufacturer/Type	WEG / S1000
Nominal Power	6630 kVA
Nominal Tension	6.9 kV
Power factor	0.9

By legal definition of the Brazilian Power Regulatory Agency (ANEEL – *Agência Nacional de Energia Elétrica*), resolution number 652, issued on December 9th, 2003, small hydro in Brazil must have installed capacity greater than 1MW but not more than 30MW.

A low level diversion dam (height 20m) raises the water level of the river sufficiently to enable an intake structure to be located on the side of the river. The general arrangement of the diversion dam consists of the implementation of slide bar structures, a spillway and an adduction structure, with total extension of about 430 m. A 138 kV transmission line (total distance 54.19 km) will be built from the switchyard to the CEMAT sub-station at Campo Novo dos Parecís to connect the plant to the grid.

The technology used in the project is environmentally safe and sound, for being a hydro power plant requiring for a minimum diversion dam, which stores water to generate clean electricity; the project's reservoir area is 0,6034 km^2. The project power density is 29.83 W/m^2, greater than the applicability condition of the methodology.

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

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Table 4 - Estimated Emissions Reductions from the Project

Years	Annual estimation of emission reductions in tonnes of CO2e
2007 (since October)	8,217
2008	32,868
2009	32,868
2010	32,868
2011	32,868
2012	32,868

[1] Although the nominal total installed capacity is 18,3 MW, the actual installed capacity to be used is 18 MW, the amount that the project developer is authorised to sell to the grid. The ANEEL dispatch authorization states 18 MW, this value will be used as the installed capacity.

2013	32,868
2014 (until September)	24,651
Total estimated reductions (tonnes of CO2e)	230,076
Total number of Crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO2e)	32,868

A.4.5. Public funding of the project activity:

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The project will not receive any public funding from Parties included in Annex I of the UNFCCC.

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:

1. The baseline methodology: ACM0002: "Consolidated baseline methodology for grid connected electricity generation from renewable sources" version 06, in effect as of 19 May 2006;

2. The monitoring methodology: the approved consolidated monitoring methodology ACM0002:"Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources", Version 06 in effect as of 19 May 2006;

3. The tool for demonstration and assessment of additionality: "the tool for demonstration and assessment of additionality", Version 03, in effect as of 16 February 2007 (EB29).

More information about the methodology can be obtained at:
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:

Table 5 - Applicability criteria as set out in the methodology

Criteria	Are the criteria met?	Justification
Applies to electricity capacity additions from: · Run-of-river hydro power plants; hydro power projects with existing reservoirs where the volume of the reservoir is not increased. · New hydro electric power projects with reservoirs having power densities (installed power generation capacity divided by the surface area at full reservoir level) greater than 4 W/m² · Wind sources; · Geothermal sources; · Solar sources; · Wave and tidal sources.	Yes	As the description in section A.4.3, the Project consists of a hydro power plant with a diversion dam and thus is in accordance with this requirement.
This methodology is not applicable to project activities that involve switching from fossil fuels to renewable energy at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;	Yes	The project consists of the construction of a new hydroelectric plant, therefore no fuel switch is applicable.
The geographic and system boundaries for the relevant	Yes	The plant is connected to the S-

electricity grid can be clearly identified and information on the characteristics of the grid is available		SE-CO interconnected system. All data necessary to calculate the grid is available. See Annex 3.
Applies to grid connected electricity generation from landfill gas capture to the extent that it is combined with the approved "Consolidated baseline methodology for landfill gas project activities" (ACM0001).	Not applicable	The project is a hydroelectric project, thus this condition is not applicable.

The project activity meets all the conditions above and is therefore applicable to the methodology.

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

The project boundary includes the S-SE-CO interconnected system, the physical site of the plant as well as the reservoir area. For the baseline determination, only CO_2 emissions from electricity generation in fossil fuel fired power that is displaced due to the project activity were accounted for.

The grid boundary is clearly defined as the spatial extent of the power plants that can be dispatched without significant transmission constraints. Specifically for this project the grid in question is the S-SE-CO interconnected system.

Table 6 - GHG included or excluded in the project boundary

	Source	Gas	Included?	Justification / Explanation
Baseline	Grid electricity production	CO_2	Included	According to ACM0002 only CO_2 emissions from electricity generation should be accounted for.
		CH_4	Excluded	According to ACM0002
		N_2O	Excluded	According to ACM0002
Project Activity	Hydro electric electricity production	CO_2	Excluded	As the power density of the project is more than 10 W/m^2 no greenhouse gas emissions from the project have to be considered according to ACM0002.
		CH_4	Excluded	
		N_2O	Excluded	

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

The project consists of a new electricity generation facility that will supply electricity to the grid. As stated in the methodology, for project activities that do not modify or retrofit an existing electricity generation facility, the baseline scenario is the following:

Electricity delivered to the grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in section B.6.1.

The following table provides the key information and data used to determine the baseline scenario:

Table 7 - key information and data used to determine the baseline scenario

Variable	Unit	Data Source
Operating Margin Emissions Factor (EF_OM_y, in tCO_2/MWh)	tCO_2/MWh	See Annex 3
Build Margin Emissions Factor (EF_BM_y, in tCO_2/MWh)	tCO_2/MWh	
Baseline Emissions factor (EF_y)	tCO_2/MWh	

The national grid is divided in two main subsystems. There are transmission constrains the link between these two systems that limit the energy throughput between them so that they must been seen as separate systems. Specifically for this project the baseline is defined as the S-SE-CO interconnected system.

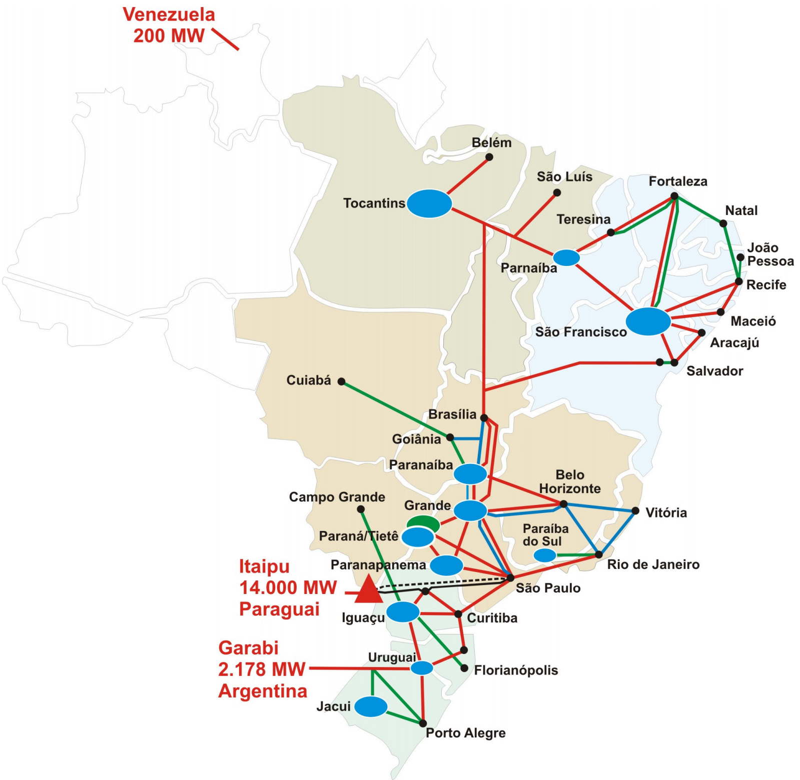


Figure 1 - National Grid Configuration

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):

Project participants wish to have the crediting period starting after to the registration of their project activity. In spite of that, the communication between the project developer and the carbon consultants started before the project started operation and before the start of the crediting period. The president of the Developer Company and also shareholder of the project asked EcoSecurities to take a course related to Carbon Credits in the year 1999, before the project activity began to be constructed. Subsequently, meetings and discussions were held between EcoSecurities and the project developer concerning CDM accreditation for the project.

As will be shown in Step 2 above, the project is unlikely to move forward without the additional financial support. The additional revenue generated by carbon sales would be very important to make the project go ahead, since the project NPV with carbon revenues became less negative, see Table 8 below. Although with carbon revenues, the NPV, under current carbon prices, remains negative, CDM participation brings numerous other attendant benefits, including reduced currency risks due to the fact that CDM revenue is gained in US$, enhanced international participation in the project, international publicity of the project and recognition of its environmental benefits, and the added prestige associated with a CDM project activity.

Table 8 - Financial analysis considering carbon credits revenues

Analysis with Carbon Revenues		
NPV with Carbon Credits	R$	(5,227,159.45)

Step 1. Identification of alternatives to the project activity consistent with current laws and regulations

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

All realistic and credible baseline alternatives to the project activity were identified and are listed below.

Scenario 1 Continuation of current practices, i.e. Electricity will continue to be generated by the existing generation mix operating in the grid;

Scenario 2 Build a thermoelectric plant, with internal combustion technology, diesel fueled and with a energy output similar to project activity and;

Scenario 3 The Project Activity not taken as a CDM project.

Scenario 2 can be excluded from further consideration since the project developer is a hydro company, and building thermal power plants is not part of its core business. This is also conservative, since scenario 1 (continuation of generation by the existing grid generation mix) would have lower emissions. According to the full assessment of alternatives (see section B.5) alternative 1 is identified as the baseline scenario.

Sub-step 1b. Enforcement of applicable laws and regulations:

Scenario 1 – Is consistent with current laws and regulations. There is no regulation in Brazil to prevention of continuation of current practice.

Scenario 3 – Is consistent with ANEEL laws and regulations. There is no regulation in Brazil to prevent implementation of hydroelectric plants.

Step 2. Investment Analysis

Sub-step 2a: Determine appropriate analysis method

According to the tool for the demonstration and assessment of additionality, one of three options must be applied for this step: simple cost analysis (where no benefits other than CDM income exist for the project), investment comparison analysis (where comparable alternatives to the project exist) or benchmark analysis.

Option three was chosen (benchmark analysis).

Sub-step 2b: Option III - Apply benchmark analysis

The Net Present Value (NPV) will be used as the most appropriate financial indicator for comparison. The NPV places a valuation, in terms of present value, of the future income associated to a project or investment alternative, i.e. it measures the present value of cash flows generated by the project. The decision to go ahead with the project is made if the NPV is positive. A positive NPV generates value to the company and a negative NPV represents a loss to the company.

In order to perform a benchmark analysis using NPV, a discount rate must be chosen. The basis for the selected discount rate used in the financial analysis is the SELIC rate (Sistema Especial de Liquidação e Custodia, that is, Special System of Clearance and Custody), set by the Banco Central do Brasil (Central Bank of Brazil) which represents the expected return of a low risk investment fund[2]. Results with negative NPV mean that the investment return is lower than the discount rate, thus lower than the return from a low risk investment. Positive NPV represents a return higher than a conservative investment. Scenarios with a negative NPV presents significant financial/economical barrier. In 2000, the year when the decision to go ahead with the project activity was taken, the SELIC rate oscillated between 13.49% and 16.49% (Brazil Central Bank, http://www.bcb.gov.br/?english). In order to be conservative, 13% has been taken as a reference value for the financial and sensitivity analysis. This is conservative given that

[2] Central Bank of Brazil http://www.bcb.gov.br/?SELICEN

the SELIC rate represents the return on a zero risk government bond, as compared to investment in a hydro electric grid connected power plant, which incurs many risks.

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

Table 9 below shows the financial analysis for the project activity without carbon finance. As shown, the project NPV without carbon is negative, proving that the Project is not attractive for investors, which inhibits the project's implementation. The cash flow analysis was done for 12 years period, this is the average length of loans in the electric sector.

Table 9– Project Financial Results

Parameter	Unit	value	source
Investments	R$	72,017,908.00	Project developer
Installed Capacity	MW	18.00	ANEEL
Electricity generation	MWh	125,881.00	Project developer
Electricity Tariff	R$/MWh	64.00	PPA
Annual Increase in tariff	%	10%	IGPM 2001-6
O&M Costs	R$/month	2,037,096.00	Project developer
Discount Rate	%	13.00%	SELIC
Depreciation[3]	%	3.33%	Calculated
NPV without Carbon Credits	R$	(12,571,131.21)	Calculated

Sub-step 2d: Sensitivity analysis

A sensitivity analysis was conducted by altering the following parameters:

- O&M costs reduction;
- Discount rate reduction;
- Investment reduction and;
- Electricity tariff increase.

Those parameters were selected as being the most likely to fluctuate over time. Financial analyses were performed altering these parameters by 10% in favour of the project, and assessing what the impact on the project NPV would be (see Table 10 below).

Table 10 - Sensitivity analysis summary

Parameter	Variation	NPV
O&M costs	-10%	(R$ 11,504,333.42)
Discount Rate	-10%	(R$ 7,858,952.47)
Investments	-10%	(R$ 5,822,917.05)
Electricity Tariff	+10%	(R$ 6,013,232.38)

[3] The depreciation was considered linear during the project lifetime.

The financial analysis shows that even if the critical parameters are varied more than expected, the NPV of the project is still negative and therefore not financially attractive for a rational investor.

Step 4. Common Practice Analysis

Sub-step 4a: Analyse other activities similar to the proposed project activity

Brazilian electricity sector expansion was practiced during the 60's and 70's fundamentally based on state owned large hydro plants. It was only during the 90's, with the privatization of the sector, that the influence of central planning started to diminish. Central planning, as carried out in Brazil, always sought the large plants as a means of keeping control of the system and allocating scarce resources (monetary and workforce) to the best projects. As of now, less than 2% of the country's installed capacity is located in small hydro plants, with less than 30 MW of installed capacity; Figure 2 shows the installed capacitydistribution among the different types of power plants. One of the side effects of central planning was the absence of market driven players seeking alternative sources. It is felt that the traditional players (privatized utilities) are still seeking larger plants and that both the new player and the regulatory agencies are still in the learning process of dealing with a more decentralized system. By the end of 2004, only 9 new small-hydro projects were authorized by the regulatory agency.

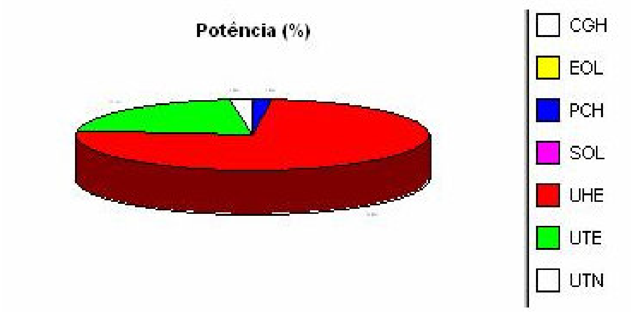


Figure 2 – Installed capacity distribution per type of generation (Source: ANEEL BIG)[4]

In order to stimulate other alternatives, Brazilian government launched a program called Proinfa (Programa de Incentivo as Fontes Alternativas de Energia Elétrica – Alternative Sources for Electric Energy Incentive Program) that sought to increase the share of small hydro, biomass cogeneration and wind plants. Basically, it offers a better-than-market purchase price and long-term contracts for electricity and lower interest rates in loans from the federal development bank (BNDES). Even with these conditions, the program attracted fewer projects than intended to. Even now, some of the projects that were included in the program are withdrawing from it, basically due to the cumbersome process in

[4] **CGH** – *Central Geradora Hidrelétrica*, meaning Hydroelectric Power Unit (less than 1MW); **EOL** - *Central Geradora Elioelétrica*, meaning Wind Power Unit; **PCH** – *Pequena Central Hidrelétrica*, meaning Small Power Hydro (between 1 and 30MW); **SOL** – *Central Geradora Solar Fotovoltaica*, meaning Solar Photovoltaic Power Unit; **UHE** – *Usina Hidrelétrica de Energia*, meaning Hydroelectric Unit (more than 30MW); **UTE** – *Usina Termelétrica de Energia*, meaning Thermoelectric Unit; **UTN** – *Usina Termonuclear*, meaning Thermonuclear Unit.

obtaining finance from BNDES. As other similar projects, despite its attractiveness, the Project did not apply for participation in Proinfa.

It should also be noted that several of the projects being developed have included CER revenues in their feasibility studies. As of now, there are more than 15 plants with CDM projects in different stages of development showing that CER revenues are an important aspect of these projects.

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

The Figure 3 below shows the trends for installed capacity expansions in the electric sector in Brazil, including projects that are authorized by the electricity agency, ANEEL, but that are not operating yet.

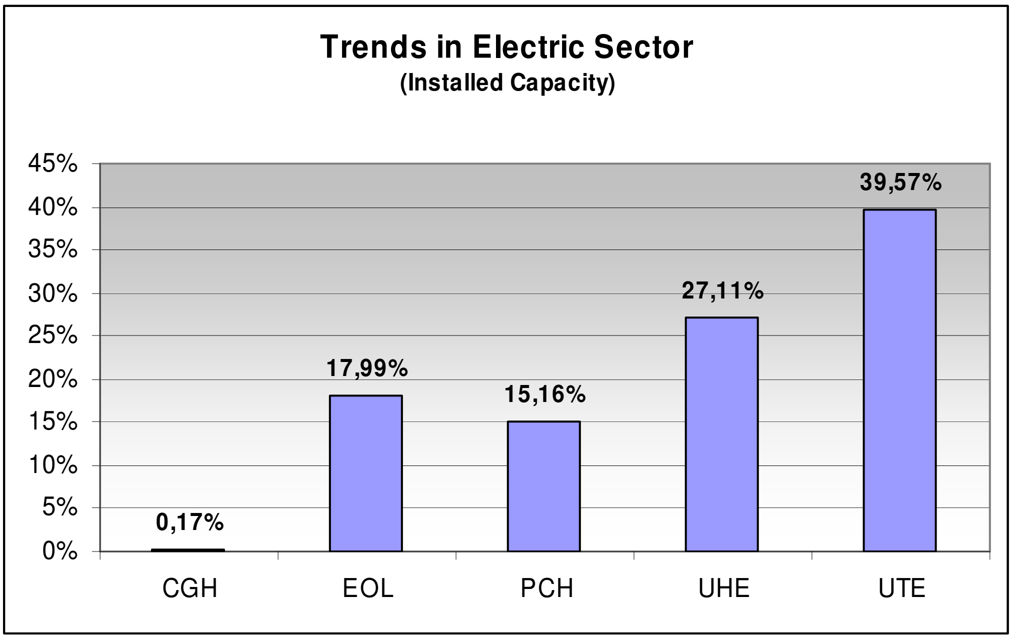


Figure 3 - Trends in the electric sector, based in installed capacity. (Source: adapted from ANEEL BIG)

As shown by the information provided above, generating electricity in small hydroelectric plants is neither the common practice nor the expansion trends in Brazil. Therefore, based on these data, it is clearly demonstrated that the prevailing practice, is not the construction or operation of small hydro plants.

All steps of the Tool for the demonstration and assessment of additionality were satisfied, thus the project is additional to what would have occurred in absence of the project activity.

B.6 Emission reductions

B.6.1. Explanation of methodological choices:

Step 1 – Calculate the Operating Margin emission factor: the calculation was based on the simple OM method, option (b) of the methodology. This method was selected becausethere is no there was no detailed information available to apply option (c). For more information please see Annex 3

The OM was calculated *ex-ante*, using the full generation-weighted average for the most recent 3 years for which data are available at the time of PDD submission.

The Simple OM emission factor ($EF_{OM,simple}$) is calculated as the generation-weighted average emissions per electricity unit (tCO_2/MWh) of all generating sources serving the system, not including low-operating cost and must-run power plants:

$$EF_{OM,simple\_ajusted,y}\,(tCO_2/MWh) = (1-\lambda_y)\frac{\sum_{i,j} F_{i,j,y} * COEF_{i,j}}{\sum_j GEN_{j.y}} + \lambda_y \frac{\sum_{i,k} F_{i,k,y} * COEF_{i,k}}{\sum_k GEN_{k.y}} \qquad (1)$$

Where,

F_{ij} is the amount of fuel *i* (in GJ) consumed by power source *j* or *k* in year *y*;
k is the set of low-cost or must-run plants and carbon financed plants delivering electricity to the grid;
j is the other sources delivering electricity to the grid, not included in the set *k*.
$COEF_{i,j}$ is the carbon coefficient of fuel *i* (tCO_2/GJ), consumed in plants *j* or *k*;
GEN_j is the electricity (MWh) delivered to the grid by sources *j* or *k*.

$$\lambda_y = \frac{number\ of\ hours\ per\ year\ for\ wich\ low-\cos t/must-run\ are\ on\ m\arg in}{8760\ hours\ per\ year} \qquad (2)$$

Step 2 – Calculate the Build Margin emission factor: the calculation was done as the generation-weighted average emission factor (tCO_2/MWh) of a sample of power plants *m*, as follows:

$$EF_{BM} = \frac{\sum_{im} F_{im} \cdot COEF_{ij}}{\sum_m GEN_m} \qquad (3)$$

Where $F_{i,m,y}$, $COEF_{i,m}$ and $GEN_{m,y}$ are analogous to the variables described for the simple adjusted OM method above, for plants *m*. This sample includes either the last five plants built or the most recent plants that combined account for 20% of the total generation, whichever is greater (in MWh). From these two options the sample group that comprises the larger annual generation are the 20% of the total generation .

The option 1 of the methodology was chose to calculate the Build Margin emission factor *ex-ante* based on the most recent information available on plants already built for sample group *m* at the time of PDD submission.

Step 3 – Calculate the baseline emission factor: the calculation was done as the weighted average of the Operating Margin emission factor and the Build Margin emission factor:

$$EF = w_{OM} \cdot EF_{OM,simple\_ajusted} + w_{BM} \cdot EF_{BM} \qquad (4)$$

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

Project Emissions: (*PE*)

According to Annex 5, EB 23, hydroelectric power plants with power densities greater than 4 but less than 10 W/m^2 have to account for project emissions due to the reservoir. Project power density is 29.83 W/m², thus project emissions were not accounted for.

$$PE = 0 \qquad (5)$$

Baseline Emissions: (*BE*) resulting from the electricity supplied and/or not consumed from the grid is calculated as follows,

$$BE = EG_y \cdot EF \qquad (6)$$

Where,

EG_y is the annual net electricity generated from the Project and delivered to the grid

Leakage Emissions: (*L*) no leakage emissions calculation is needed.

Emission Reductions: (*ER*)

$$ER = BE - PE \qquad (7)$$

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

Data / Parameter:	**$EF_{OM, simple\_ajusted}$**
Data unit:	tCO_2/MWh
Description:	Grid Operating Margin
Source of data used:	See Annex 3
Value applied:	0.4349
Justification of the choice of data or description of measurement methods and procedures actually applied :	OM is calculated according to option (b) Simple Ajusted OM method of methodology ACM0002. For further information please refer to Annex 3.
Any comment:	

Data / Parameter:	**$F_{i,y}$**

Data unit:	TJ
Description:	Amount of each fossil fuel consumed by each power source.
Source of data used:	See Annex 3.
Value applied:	See Annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	All values were provided by governmental agencies. Those agencies are responsible to control the electric system.
Any comment:	

Data / Parameter:	**$COEF_i$**
Data unit:	tCO_2/TJ
Description:	CO_2 emission factor for each fossil fuel consumed.
Source of data used:	See Annex 3.
Value applied:	See Annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	See Annex 3.
Any comment:	

Data / Parameter:	**GEN_{jkny}**
Data unit:	MWh
Description:	Electricity generation of each power source
Source of data used:	See Annex 3.
Value applied:	See Annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	All values were provided by governmental agencies. Those agencies are responsible to control the electric system.
Any comment:	

Data / Parameter:	**Plant name**
Data unit:	Text
Description:	Identification of power sources for OM.
Source of data used:	See Annex 3.
Value applied:	See Annex 3.
Justification of the choice of data or description of	See Annex 3.

measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	**Plant name**
Data unit:	Text
Description:	Identification of power sources for BM.
Source of data used:	See Annex 3.
Value applied:	See Annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	See Annex 3.
Any comment:	

Data / Parameter:	**$GEN_{jklly\ IMPORTS}$**
Data unit:	MWh
Description:	Electricity imports to the grid.
Source of data used:	See Annex 3.
Value applied:	See Annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	See Annex 3.
Any comment:	

Data / Parameter:	**$COEF_{ijy}$**
Data unit:	tCO_2/TJ
Description:	CO_2 emission coefficient of fuels used in connected electricity systems (if imports occur)
Source of data used:	See Annex 3.
Value applied:	See Annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	See Annex 3.
Any comment:	

Data / Parameter:	w_{OM}
Data unit:	Fraction
Description:	Weighting
Source of data used:	ACM0002
Value applied:	0.5
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default weighting value for Operating Margin taken from ACM0002
Any comment:	

Data / Parameter:	EF_{BM}
Data unit:	tCO_2/MWh
Description:	Grid Build Margin
Source of data used:	See Annex 3
Value applied:	0.0872
Justification of the choice of data or description of measurement methods and procedures actually applied :	BM is calculated according to methodology ACM0002. For further information please refer to Annex 3.
Any comment:	

Data / Parameter:	w_{BM}
Data unit:	Fraction
Description:	Weighting
Source of data used:	ACM0002
Value applied:	0.5
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default weighting value for Build Margin taken from ACM0002
Any comment:	

Data / Parameter:	EF_y
Data unit:	tCO_2/MWh
Description:	Grid emission factor. Is the CO2 emissions intensity of the electricity displaced in the grid
Source of data used:	See Annex 3

Value applied:	0.2611
Justification of the choice of data or description of measurement methods and procedures actually applied :	The Baseline Emission Factor calculation consists of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the approved methodology ACM0002. Detailed information is attached in Annex 3.
Any comment:	

Data / Parameter:	λ_{2003}
Data unit:	Fraction
Description:	Number of hours per year for which low-cost must-run sources are on margin, for 2003
Source of data used:	See Annex 3
Value applied:	0.5312
Justification of the choice of data or description of measurement methods and procedures actually applied :	λ calculation was done according to the Methodology ACM0002.
Any comment:	

Data / Parameter:	λ_{2004}
Data unit:	Fraction
Description:	Number of hours per year for which low-cost must-run sources are on margin, for 2004
Source of data used:	See Annex 3
Value applied:	0.5055
Justification of the choice of data or description of measurement methods and procedures actually applied :	λ calculation was done according to the Methodology ACM0002.
Any comment:	

Data / Parameter:	λ_{2005}
Data unit:	Fraction
Description:	Number of hours per year for which low-cost must-run sources are on margin, for 2005
Source of data used:	See Annex 3
Value applied:	0.5130
Justification of the choice of data or description of	λ calculation was done according to the Methodology ACM0002.

measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	Area submerged
Data unit:	km^2
Description:	Surface area of the reservoir
Source of data used:	Project developer data, PRAD dated December 2004.
Value applied:	0,6034
Justification of the choice of data or description of measurement methods and procedures actually applied :	Area submerged
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

All equations used to estimate the emission reductions were provided in section B.6.1. The grid emission factor was calculated using equations 1, 2, 3 and 4, according to the description provided in the methodology. Project emissions, equation 5, Baseline emissions, equation 6 and emissions reduction calculations, equation 7, were done also according to the methodology.

Detailed information of how the equations were used, and values applied are provided in Table 11

Table 11 - The ex-ante emission reductions values and calculations

Parameter	Formula	Value	Unit
BM	provided in section B.6.1	0.0872	tCO_2/MWh
wBM	-	0.5	-
OM	provided in section B.6.1	0.4349	tCO_2/MWh
wOM	-	0.5	-
EF	provided in section B.6.1	0.2611	tCO_2/MWh
Installed_capacity	-	18.00	MW
Average_capacity	provided by project developer	14.37	MW
EG	= Average_capacity * 8760	125,881.00	MWh
Reservoir_area	-	0.6034	km^2

Power density	= Instaled_capacity/Reservoir_area	29.83	MW/km²

BE	= EG * EF	32,868	tCO_2e
PE	-	0	tCO_2e
ER	= BE - PE	32,868	tCO_2e

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

Table 12 - Ex-ante estimation

Years	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of emission reductions (tonnes of CO_2e)
2007 (since October)	0	8,217	0	8,217
2008	0	32,868	0	32,868
2009	0	32,868	0	32,868
2010	0	32,868	0	32,868
2011	0	32,868	0	32,868
2012	0	32,868	0	32,868
2013	0	32,868	0	32,868
2014 (until September)	0	24,651	0	24,651
Total (tonnes of CO_2e)	0	230.076	0	230.076
Average	0	32.868	0	32.868

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

B.7.1. Data and parameters monitored:

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Net electricity delivered to the grid
Source of data to be used:	Project developer and CEMAT
Value of data applied for the purpose of calculating expected emission reductions in section B.5	125,881
Description of measurement methods and	Data collected will be the continuous reading from the plant meters and the monthly reading from the utility meter (SAGA1000 - model 1317, the

procedures to be applied:	accuracy is ±0.5%. The utility monthly reading is used for issuing the electricity sale invoices (this document will show the amount of energy supplied to the grid).
QA/QC procedures to be applied:	According to national standards, equipment will be subject to a regular maintenance, calibration and testing regime to ensure accuracy. Collected data has low uncertainty levels and to guarantee its accuracy it will be cross checked with the electricity sales receipts obtained from the grid operator.
Any comment:	Data will be archived at least for two years after crediting period.

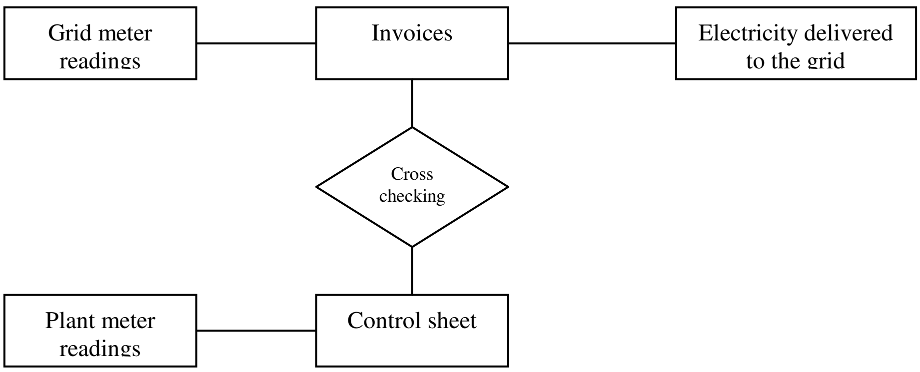
B.7.2 Description of the monitoring plan:

The monitoring of this type of project consists of metering the electricity generated by the renewable technology. Below you find the description of monitoring procedures for data measurement, quality assurance and quality control.

1. Monitoring organisation

The grid operator reads the meter in a monthly basis and this data will be used by the project developer to issue electricity sale invoices. Those invoices contain the amount of electricity delivered to the grid and will be used to calculate the amount of CERs generated from the project activity.

Power plant operators read, in an hourly basis, the electricity generated and delivered to the grid, in order to oversight the plant operation. The plant operation control is automatically done by ALSTOM equipment. Internal readings are also used to check the consistency of the amount of electricity stated in the invoices read by the grid operator.



<u>Metering of Electricity Supplied to the Grid</u>

The main electricity meter for establishing the electricity delivered to the grid is owned by the grid operator. This electricity meter will be the revenue meter and measures the quantity of electricity that the project will be paid for. As this meter provides the main data for CER measurement, it will be the key part of the verification process.

Data will also be measured continuously by the plant operator and at the end of each month the monitoring data will be filed electronically and a back-up will be made regularly. The project developer will keep the electricity sale invoices. Data will be archived electronically and on paper and will be kept for at least two years after the crediting period.

The electricity meter should meet relevant local standards at the time of installation. The meter will be installed by either the project developer or the grid company in accordance with Brazilian standards, established by INMETRO *("Instituto Nacional de Metrologia, Normalização e Qualidade Industrial"*- entity responsible for calibration standards) and by ANEEL (*Agencia Nacional de Energia Elétrica –* The Electricity National Agency.

Quality Control and Quality Assurance

Quality control and quality assurance procedures will guarantee the quality of data collected. The electricity meter(s) will undergo maintenance subject to industry standards. Moreover, meter(s) are calibrated by the distribution concessionaire CEMAT - which signs a long term PPA with the plants - in accordance with national standards established by INMETRO *("Instituto Nacional de Metrologia, Normalização e Qualidade Industrial"*- entity responsible for calibration standards) and recalibrated according to manufacturer specifications, but at least once every 3 years.

Internal equipment and meters use to undergo to maintenance or inspection frequently. If necessary, equipment and meters are repaired or calibrated. The calibration is done by a private entity, which is accredited by INMETRO, contracted at the time that the calibration is necessary.

To guarantee the consistency and accuracy of the data collected from the meter(s), data will be cross-checked with the sale invoices which will show the amount of electricity supplied to the grid.

Before the crediting period starts, the organisation of the monitoring team will be established and clear roles and responsibilities will be assigned to all staff involved in the CDM project.

Data will be read off the meter and energy sale invoices will be collected from the small hydro by the plant operation personnel. This information will be transferred to EcoSecurities on a monthly basis in order to monitor emission reductions.

The energy generating equipment will not be transferred from another activity; therefore, leakage effects do not need to be accounted.

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 the monitoring methodology were concluded on 08/02/2007. The entity determining the baseline study and the monitoring methodology and participating in the project as the Carbon Advisor is EcoSecurities Group PLC, listed in Annex 1 of this document.

Leandro Noel
Rua Lauro Müller, 116/4303.
Rio de Janeiro - RJ
Brazil
CEP: 22290-160

Telephone	55 (21) 2275 9570
Email	leandro.noel@ecosecurities.com
Website	www.ecosecurities.com

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

01/05/2000 (start of construction)

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

30 years.

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:

01/10/2007

C.2.1.2. Length of the first crediting period:

7 years – 0 months

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

Not applicable

C.2.2.2. Length:

Not applicable

SECTION D. Environmental impacts

D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

The Project generates no emissions of greenhouse gases and produces no toxic waste, and has limited, controlled and reversible effects on the environment because the project is a small hydro, using water from the river with a small storage area designed only to allow the water intake to operate. The project has easy integration in the landscape and has compatibility with the protection of water, fauna and flora.

As for the regulatory permit, the project developer has authorization to operate issued by ANEEL (ANEEL Dispatch nº 203, issued on 11/05/2000).

As for the environmental permits, the project has the necessary environmental licenses. The license of operation was issued by the state environmental agency, SEMA/MT, LO number 1907/2007 issued on 19/01/2007.

A PRDA (Program for Recovering of Degraded Areas) was developed with the purpose to analyse, address and establish the recovering plan for the eventual negative impacts derived from the project activity. According to the PRDA all impacted areas were isolated and recovered. The impacts due to the project are not significant and recovery actions have been done.

All documents related to operational and environmental licensing are public and can be obtained at the state environmental agency.

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 project is already in operation under the approval of the environmental agency, SEMA/MT, and the environmental impacts are not significant.

SECTION E. Stakeholders' comments

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

According to Resolution #1 dated December 2nd, 2003 from the Brazilian Inter-Ministerial Commission of Climate Change (Comissão Interministerial de Mudança Global do Clima -CIMGC), any CDM project must send a letter with a description of the project and an invitation for comments by local stakeholders. In this case, letters were sent to the following local stakeholders:

- City Hall of Campo Novo dos Parecís;
- District Attorney (known in Portuguese as Ministério Público, i.e. the permanent institution essential for legal functions responsible for defending the legal order, democracy and social/individual interests);
- Chamber of Deputy of Campo Novo dos Parecís;
- SEMA;
- Brazilian Fórum of NGOs;
- Environmental Agency of Campo Novo dos Parecís;
- Local community associations

Local stakeholders were invited to raise their concerns and provide comments on the project activity for a period of 30 days after receiving the letter of invitation.

E.2. Summary of the comments received:

>>

The Brazilian Fórum of NGOs, raised a comment on February 16th, 2007, to the project suggesting the use of the Gold Standard certificate.

Also the Chamber of Deputy of Campo Novo dos Parecís raised a comment asking for more information about social, technical and environmental characteristics of the project.

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

>>

The comments were assessed and accounted to the project, however no modification was necessary to the PDD.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	GLOBAL ENERGIA ELÉTRICA S.A.
Street/P.O.Box:	Rua Bosque da Saúde, 129
Building:	
City:	Cuiabá
State/Region:	Mato Grosso
Postfix/ZIP:	78088-105
Country:	Brazil
Telephone:	+55 65 3051 5050
FAX:	+55 65 3051 5052
E-Mail:	
URL:	
Represented by:	
Title:	President
Salutation:	Mr.
Last Name:	Garcia
Middle Name:	Antonio
First Name:	Carlos
Department:	Direction
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	carlosantonio@globalgardenhotel.com.br

Project Annex 1 participant:

Organization:	EcoSecurities Group Plc.
Street/P.O.Box:	40 Dawson Street
Building:	
City:	Dublin
State/Region:	
Postfix/ZIP:	02
Country:	Ireland
Telephone:	+353 1613 9814
FAX:	+353 1672 4716
E-Mail:	cdm@ecosecurities.com
URL:	www.ecosecurities.com
Represented by:	
Title:	COO & President
Salutation:	Dr.
Last Name:	Moura Costa
Middle Name:	

First Name:	Pedro
Mobile:	
Direct FAX:	
Direct tel:	+44 1865 202 635
Personal E-Mail:	cdm@ecosecurities.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

This project will not receive any public funding from Annex 1 parties.

Annex 3

BASELINE INFORMATION

Financial Analysis Information

BARUÍTO SHP

BARUÍTO SHP	UNIT	Value	0	1	2	3	4	5	6	7	8	9	10	11	12
INVESTMENTS															
Total Investments	R$	72,017,908.00	72,017,908.00												-43210744.8
REVENUES															
Installed Capacity	MW	18													
Electricity Generation	MWh	125,881													
Electricity Tariff	R$/MWh	64.00													
Income	R$	8,056,384.00		8,056,384.00	8,862,022.40	9,748,224.64	10,723,047.10	11,795,351.81	12,974,887.00	14,272,375.70	15,699,613.26	17,269,574.59	18,996,532.05	20,896,185.26	22,985,803.78
Total Revenues	R$			8,056,384.00	8,862,022.40	9,748,224.64	10,723,047.10	11,795,351.81	12,974,887.00	14,272,375.70	15,699,613.26	17,269,574.59	18,996,532.05	20,896,185.26	22,985,803.78
O&M COSTS															
Unitary Costs	R$	2,037,096.00													
Total Costs	R$	2,037,096.00		2,037,096.00	2,037,096.00	2,037,096.00	2,037,096.00	2,037,096.00	2,037,096.00	2,037,096.00	2,037,096.00	2,037,096.00	2,037,096.00	2,037,096.00	2,037,096.00
depreciation	%	0.03		2,400,596.93	2,400,596.93	2,400,596.93	2,400,596.93	2,400,596.93	2,400,596.93	2,400,596.93	2,400,596.93	2,400,596.93	2,400,596.93	2,400,596.93	2,400,596.93
Net Cash Flow			(72,017,908.00)	3,618,691.07	4,424,329.47	5,310,531.71	6,285,354.17	7,357,658.88	8,537,194.06	9,834,682.76	11,261,920.33	12,831,881.66	14,558,839.12	16,458,492.32	61,758,855.65

Discount Rate	%	13%
NPV	R$	(R$ 12,571,131.21)
IRR	%	10%

CARBON CREDITS

CARBON CREDITS	UNIT	Value	0	1	2	3	4	5	6	7	8	9	10	11	12
Validation Costs	R$	15,000.00	15,000.00												
Verrification Costs	R$	15,000.00		15,000.00	15,000.00	15,000.00	15,000.00	15,000.00	15,000.00	15,000.00	15,000.00	15,000.00	15,000.00	15,000.00	15,000.00
Emission Reduction	tCO2e	32,868													
CER Price	R$/tCO2e	43													
Income	R$	1,419,877		1,419,877.26	1,419,877.26	1,419,877.26	1,419,877.26	1,419,877.26	1,419,877.26	1,419,877.26	1,419,877.26	1,419,877.26	1,419,877.26	1,419,877.26	1,419,877.26
Carbon Credits Cash Flow			(15,000.00)	1,404,877.26	1,404,877.26	1,404,877.26	1,404,877.26	1,404,877.26	1,404,877.26	1,404,877.26	1,404,877.26	1,404,877.26	1,404,877.26	1,404,877.26	1,404,877.26
Project Cash Flow			(72,032,908.00)	5,023,568.32	5,829,206.72	6,715,408.96	7,690,231.43	8,762,536.14	9,942,071.32	11,239,560.02	12,666,797.59	14,236,758.92	15,963,716.37	17,863,369.58	63,163,732.91

Discount Rate	%	13%
NPV	R$	(R$ 5,227,265.98)
IRR	%	12%

CER price US$	20
Exchange R$ x US$	2.16

Note: the residual value after the 12 years analysis period is accounted as a negative investment, thus a positive value to the cash flow

Grid Emission Factor Information

Generation data used to calculate the Grid Emission Factor (Combined Margin) is from ONS – The National System Operator and ANEEL – The Electricity National Agency. Figures bellow shows the data used to calculate the Grid EF:

Fuel (i)		$COEF_i(tCO_2/TJ)$
Bituminous Coal	C	94,15
Diesel	D	73,33
Natural Gas	G	55,82
Hydro	H	0,00
Nuclear	N	0,00
Fuel Oil	O	76,59

	2003				
	Generation (MWh)	Fuel Consumption (TJ)	Fuel	BM	OM
JAURU	78.921	0	H		
GUAPORÉ	86.201	0	H		
TRÊS LAGOAS	233.793	2.806	G		X
FUNIL (MG)	370.111	0	H		
ITIQUIRA I	408.728	0	H		
ARAUCÁRIA	22	0	G		X
CANOAS	182.256	2.187	G		X
PIRAJU	417.894	0	H		
N. PIRATININGA	47.847	574	G		X
PCT CGTEE	0	0	O		X
ROSAL	316.262	0	H		
IBIRITÉ	530.761	6.369	G		X
CANA BRAVA	2.200.434	0	H		
STA CLARA	169.471	0	H		
MACHADINHO	3.436.304	0	H		
JUIZ DE FORA	5.845	75	G		X
Macaé Merchant	2.389.507	35.843	G		X
LAJEADO (ANEEL res. 402/2001)	4.457.790	0	H		
ELETROBOLT	242.364	3.635	G		X
D. FRANCISCA	895.131	0	H		
Porto Estrela	410.136	0	H		
Cuiaba (Mario Covas)	2.228.109	26.737	G		X
W.ARJONA	549.729	7.916	G		X
URUGUAIANA	1.751.486	24.251	G		X
S.CAXIAS	5.556.125	0	H		
CANOAS I	594.298	0	H		
CANOAS II	507.843	0	H		
IGARAPAVA	1.140.260	0	H		
P.PRIMAVERA	9.059.670	0	H		
Cuiaba (Mario Covas)	0	0	D		X
SOBRAGI	341.073	0	H		
PCH EMAE	103.188	0	H		
PCH CEEE	240.724	0	H		
PCH ENERSUL	119.405	0	H		
PCH CEB	76.857	0	H		
PCH ESCELSA	260.910	0	H		
PCH CELESC	442.080	0	H		
PCH CEMAT	966.348	0	H		
PCH CELG	80.656	0	H		
PCH CERJ	256.284	0	H		
PCH COPEL	421.439	0	H		
PCH CEMIG	564.461	0	H		
PCH CPFL	328.332	0	H		
S. MESA	4.490.258	0	H		
PCH EPAULO	0	0	H		
Guilmam Amorim	511.414	0	H		
CORUMBÁ	1.604.930	0	H		
MIRANDA	1.778.457	0	H		
NOVA PONTE	2.208.901	0	H		
SEGREDO (Gov. Ney Braga)	5.253.636	0	H		
TAQUARUÇU	2.251.810	0	H		
MANSO	841.600	0	H		
ITÁ	5.222.285	0	H		
ROSANA	2.029.045	0	H		
ANGRA	13.355.432	0	N		
T.IRMÃOS	2.493.761	0	H		
ITAIPU 60 Hz	46.309.279	0	H		
ITAIPU 50 Hz	36.692.448	0	H		
EMBORCAÇÃO	3.928.062	0	H		
Nova Avanhandava	1.377.657	0	H		
Gov. Bento Munhoz - GBM	4.178.204	0	H		

	2004				
	Generation (MWh)	Fuel Consumption (TJ)	Fuel	BM	OM
TermoRio	120.326	1.444	G		X
Candonga	129.327	0	H		
Queimado	360.952	0	H		
Norte Fluminense	1.507.181	18.086	G		X
JAURU	487.636	0	H		
GUAPORÉ	335.127	0	H		
TRÊS LAGOAS	1.419.067	17.029	G		X
FUNIL (MG)	667.597	0	H		
ITIQUIRA I	856.539	0	H		
ARAUCÁRIA	22	0	G		X
CANOAS	527.587	6.331	G		X
PIRAJU	466.775	0	H		
N. PIRATININGA	13.820	166	G		X
PCT CGTEE	0	0	O		X
ROSAL	384.555	0	H		
IBIRITÉ	1.245.228	14.943	G		X
CANA BRAVA	2.214.839	0	H		
STA CLARA	345.880	0	H		
MACHADINHO	4.337.016	0	H		
JUIZ DE FORA	66.002	849	G		X
Macaé Merchant	740.098	11.101	G		X
LAJEADO (ANEEL res. 402/2001)	4.331.991	0	H		
ELETROBOLT	1.324.501	19.868	G		X
D. FRANCISCA	683.674	0	H		
Porto Estrela	554.865	0	H		
Cuiaba (Mario Covas)	1.659.230	19.911	G		X
W.ARJONA	538.087	7.748	G		X
URUGUAIANA	2.270.176	31.433	G		X
S.CAXIAS	6.015.459	0	H		
CANOAS I	578.928	0	H		
CANOAS II	486.299	0	H		
IGARAPAVA	1.090.945	0	H		
P.PRIMAVERA	9.472.700	0	H		
SOBRAGI	395.652	0	H		
PCH EMAE	137.132	0	H		
PCH CEEE	215.617	0	H		
PCH ENERSUL	174.892	0	H		
PCH CEB	109.606	0	H		
PCH ESCELSA	353.471	0	H		
PCH CELESC	468.240	0	H		
PCH CEMAT	1.353.714	0	H		
PCH CELG	73.309	0	H		
PCH CERJ	297.264	0	H		
PCH COPEL	707.277	0	H		
PCH CEMIG	672.546	0	H		
PCH CPFL	458.822	0	H		
S. MESA	4.397.135	0	H		
Guilmam Amorim	661.366	0	H		
CORUMBÁ	2.163.267	0	H		
MIRANDA	1.069.831	0	H		
NOVA PONTE	1.302.583	0	H		
SEGREDO (Gov. Ney Braga)	5.897.593	0	H		
TAQUARUÇU	2.022.042	0	H		
MANSO	732.036	0	H		
ITÁ	6.054.272	0	H		
ROSANA	1.864.543	0	H		
ANGRA	11.581.987	0	N		
T.IRMÃOS	2.058.733	0	H		
ITAIPU 60 Hz	46.853.256	0	H		
ITAIPU 50 Hz	36.935.778	0	H		
EMBORCAÇÃO	4.312.481	0	H		

	2005				
	Generation (MWh)	Fuel Consumption (TJ)	Fuel	BM	OM
Quebra Queixo	16.197	0	H	X	
Ourinhos	25.167	0	H	X	
Barra Grande	248.690	0	H	X	
Mimoso	48.329	0	H	X	
Ponte de Pedra	439.462	0	H	X	
Aimorés	122.877	0	H	X	
Santa Clara PR	321.818	0	H	X	
Monte Claro	243.331	0	H	X	
TermoRio	1.150.380	8.283	G	X	X
PCH CESP	0	0	H	X	
Candonga	565.935	0	H	X	
Queimado	588.657	0	H	X	
Norte Fluminense	3.635.646	26.177	G	X	X
JAURU	514.779	0	H	X	
GUAPORÉ	389.619	0	H	X	
TRÊS LAGOAS	690.051	7.763	G	X	X
FUNIL (MG)	800.466	0	H	X	
ITIQUIRA I	1.104.190	0	H	X	
ARAUCÁRIA	0	0	G	X	X
CANOAS	927.537	10.435	G	X	X
PIRAJU	446.366	0	H	X	
N. PIRATININGA	231.010	2.599	G	X	X
PCT CGTEE	0	0	O	X	X
ROSAL	421.691	0	H	X	
IBIRITÉ	490.201	5.515	G	X	X
CANA BRAVA	2.316.663	0	H	X	
STA CLARA MG	332.249	0	H	X	
MACHADINHO	4.480.027	0	H	X	
JUIZ DE FORA	232.477	2.615	G	X	X
Macaé Merchant	119.568	1.345	G	X	X
LAJEADO (ANEEL res. 402/2001)	4.539.333	0	H	X	
ELETROBOLT	190.904	2.148	G	X	X
D. FRANCISCA	761.279	0	H	X	
Porto Estrela	593.357	0	H	X	
Cuiaba (Mario Covas)	1.229.232	13.829	G	X	X
W.ARJONA	728.835	8.199	G	X	X
URUGUAIANA	1.733.424	12.481	G	X	X
S.CAXIAS	5.920.260	0	H	X	
CANOAS I	555.667	0	H	X	
CANOAS II	441.828	0	H	X	
IGARAPAVA	1.297.196	0	H	X	
P.PRIMAVERA	9.686.480	0	H	X	
SOBRAGI	385.988	0	H	X	
PCH EMAE	149.526	0	H	X	
PCH CEEE	173.917	0	H	X	
PCH ENERSUL	162.165	0	H	X	
PCH CEB	114.097	0	H	X	
PCH ESCELSA	500.563	0	H	X	
PCH CELESC	481.799	0	H	X	
PCH CEMAT	1.515.897	0	H	X	
PCH CELG	72.592	0	H	X	
PCH CERJ	311.762	0	H	X	
PCH COPEL	578.787	0	H	X	
PCH CEMIG	619.029	0	H	X	
PCH CPFL	461.440	0	H	X	
S. MESA	4.731.322	0	H	X	
PCH EPAULO	0	0	H	X	
Guilmam Amorim	632.333	0	H	X	
CORUMBÁ	1.923.111	0	H	X	
MIRANDA	1.480.071	0	H	X	
NOVA PONTE	2.015.019	0	H	X	

S.SANTIAGO	6.124.508	0	H		
ITUMBIARA	7.342.183	0	H		
IGARAPÉ	33.791	405	O		X
ITAUBA	1.895.033	0	H		
A. Vermelha (Jose E. Moraes)	7.280.135	0	H		
S.SIMÃO	10.850.060	0	H		
CAPIVARA	3.527.028	0	H		
S.OSÓRIO	4.305.490	0	H		
MARIMBONDO	6.614.912	0	H		
PROMISSÃO	998.520	0	H		
Pres. Medici	1.306.186	18.086	C		X
Volta Grande	1.892.826	0	H		
Porto Colombia	1.849.042	0	H		
Passo Fundo	1.176.518	0	H		
PASSO REAL	771.223	0	H		
Ilha Solteira	16.060.345	0	H		
MASCARENHAS	777.134	0	H		
Gov. Parigot de Souza - GPS	1.001.495	0	H		
CHAVANTES	2.026.711	0	H		
JAGUARA	2.649.364	0	H		
SÁ CARVALHO	302.343	0	H		
Estreito (Luiz Carlos Barreto)	3.084.368	0	H		
IBITINGA	600.891	0	H		
JUPIA	8.944.402	0	H		
ALEGRETE	0	0	O		X
CAMPOS (Roberto Silveira)	0	0	G		X
Santa Cruz (RJ)	540.073	6.272	G		X
PARAIBUNA	265.808	0	H		
LIMOEIRO (A Salles de Oliviera)	128.521	0	H		
CACONDE	340.046	0	H		
J.LACERDA C	1.985.975	28.598	C		X
J.LACERDA B	1.126.809	19.317	C		X
J.LACERDA A	583.250	11.665	C		X
BARIRI (Alvaro de Souza Lima)	541.316	0	H		
FUNIL (RJ)	619.432	0	H		
FIGUEIRA	54.554	655	C		X
FURNAS	4.499.554	0	H		
Barra Bonita	477.594	0	H		
CHARQUEADAS	136.595	2.138	C		X
Jurumirim (Armando A. Laydner)	439.132	0	H		
JACUI	1.419.402	0	H		
Pereira Passos	326.708	0	H		
Tres Marias	1.818.886	0	H		
Euclides da Cunha	419.565	0	H		
CAMARGOS	157.100	0	H		
Santa Branca	134.029	0	H		
Cachoeira Dourada	2.959.147	0	H		
Salto Grande (Lucas N. Garcez)	427.192	0	H		
Salto Grande (MG)	513.869	0	H		
Mascarenhas de Moraes (Peixoto)	2.207.257	0	H		
ITUTINGA	210.152	0	H		
S. JERÔNIMO	43.993	609	C		X
CARIOBA	0	0	O		X
PIRATININGA	289.700	3.725	O		X
CANASTRA	237.695	0	H		
Nilo PEÇANHA	2.386.456	0	H		
FONTES NOVA	719.497	0	H		
H.BORDEN Sub.	63.638	0	H		
H.BORDEN Ext	448.281	0	H		
I. POMBOS	680.168	0	H		
JAGUARI	54.835	0	H		
Import international	360.234				X
Export international	0				
Import NNE	99.352				X
Export NNE	7.632.626				

Nova Avanhandava	1.406.957	0	H		
Gov. Bento Munhoz - GBM	5.352.443	0	H		
S.SANTIAGO	6.886.744	0	H		
ITUMBIARA	7.854.963	0	H		
IGARAPÉ	19.989	240	O		X
ITAUBA	1.233.332	0	H		
A. Vermelha (Jose E. Moraes)	6.520.363	0	H		
S.SIMÃO	12.205.751	0	H		
CAPIVARA	3.302.087	0	H		
S.OSÓRIO	484.648	0	H		
MARIMBONDO	6.349.261	0	H		
PROMISSÃO	1.048.625	0	H		
Pres. Medici	1.492.153	20.661	C		X
Volta Grande	1.793.617	0	H		
Porto Colombia	1.715.325	0	H		
Passo Fundo	705.586	0	H		
PASSO REAL	549.702	0	H		
Ilha Solteira	15.868.207	0	H		
MASCARENHAS	786.812	0	H		
Gov. Parigot de Souza - GPS	1.204.667	0	H		
CHAVANTES	1.935.377	0	H		
JAGUARA	2.506.033	0	H		
SÁ CARVALHO	464.819	0	H		
Estreito (Luiz Carlos Barreto)	2.948.054	0	H		
IBITINGA	712.124	0	H		
JUPIA	8.790.288	0	H		
ALEGRETE	0	0	O		X
CAMPOS (Roberto Silveira)	0	0	G		X
Santa Cruz (RJ)	199.124	2.312	G		X
PARAIBUNA	199.289	0	H		
LIMOEIRO (A Salles de Oliviera)	165.483	0	H		
CACONDE	280.607	0	H		
J.LACERDA C	2.330.323	33.557	C		X
J.LACERDA B	1.304.788	22.368	C		X
J.LACERDA A	873.490	17.470	C		X
BARIRI (Alvaro de Souza Lima)	638.646	0	H		
FUNIL (RJ)	685.740	0	H		
FIGUEIRA	73.448	881	C		X
FURNAS	4.288.104	0	H		
Barra Bonita	567.300	0	H		
CHARQUEADAS	239.467	3.748	C		X
Jurumirim (Armando A. Laydner)	445.781	0	H		
JACUI	1.178.249	0	H		
Pereira Passos	384.696	0	H		
Tres Marias	1.892.922	0	H		
Euclides da Cunha	561.413	0	H		
CAMARGOS	188.520	0	H		
Santa Branca	99.619	0	H		
Cachoeira Dourada	3.315.489	0	H		
Salto Grande, SP (Lucas N. Garcez)	484.648	0	H		
Salto Grande (MG)	579.580	0	H		
Mascarenhas de Moraes (Peixoto)	2.337.376	0	H		
ITUTINGA	239.530	0	H		
S. JERÔNIMO	30.845	427	C		X
CARIOBA	0	0	O		X
PIRATININGA	162.952	2.095	O		X
CANASTRA	148.084	0	H		
Nilo PEÇANHA	2.689.893	0	H		
FONTES NOVA	803.368	0	H		
H.BORDEN Sub.	5.393	0	H		
H.BORDEN Ext	417.167	0	H		
I. POMBOS	881.028	0	H		
JAGUARI	35.455	0	H		
Import international	189.847				X
Export international	1.180.696				
Import NNE	1.278.428				X
Export NNE	3.830.322				

SEGREDO (Gov. Ney Braga)	5.587.794	0	H		
TAQUARUÇU	2.032.597	0	H		
MANSO	616.312	0	H		
ITÁ	5.940.371	0	H		
ROSANA	1.880.873	0	H		
ANGRA	9.854.879	0	N		
T.IRMÃOS	2.030.080	0	H		
ITAIPU 60 Hz	43.263.219	0	H		
ITAIPU 50 Hz	38.437.460	0	H		
EMBORCAÇÃO	5.428.696	0	H		
Nova Avanhandava	1.424.680	0	H		
Gov. Bento Munhoz - GBM	5.264.925	0	H		
S.SANTIAGO	6.337.245	0	H		
ITUMBIARA	8.818.284	0	H		
IGARAPÉ	13.604	148	O		X
ITAUBA	1.725.629	0	H		
A. Vermelha (Jose E. Moraes)	7.426.577	0	H		
S.SIMÃO	11.878.356	0	H		
CAPIVARA	3.445.003	0	H		
S.OSÓRIO	4.404.318	0	H		
MARIMBONDO	6.694.731	0	H		
PROMISSÃO	1.022.782	0	H		
Pres. Medici	1.699.573	18.541	C		X
Volta Grande	2.181.749	0	H		
Porto Colombia	1.955.931	0	H		
Passo Fundo	994.464	0	H		
PASSO REAL	671.226	0	H		
Ilha Solteira	16.814.478	0	H		
MASCARENHAS	795.700	0	H		
Gov. Parigot de Souza - GPS	1.240.817	0	H		
CHAVANTES	1.785.328	0	H		
JAGUARA	2.694.735	0	H		
SÁ CARVALHO	478.444	0	H		
Estreito (Luiz Carlos Barreto)	4.208.999	0	H		
IBITINGA	688.094	0	H		
JUPIA	9.114.514	0	H		
ALEGRETE	0	0	O		X
CAMPOS (Roberto Silveira)	0	0	G		X
Santa Cruz (RJ)	176.628	1.987	G		X
PARAIBUNA	272.422	0	H		
LIMOEIRO (A Salles de Oliviera)	157.213	0	H		
CACONDE	400.542	0	H		
J.LACERDA C	2.012.313	21.953	C		X
J.LACERDA B	1.188.746	12.968	C		X
J.LACERDA A	877.032	9.568	C		X
BARIRI (Alvaro de Souza Lima)	603.788	0	H		
FUNIL (RJ)	857.914	0	H		
FIGUEIRA	81.238	886	C		X
FURNAS	5.687.817	0	H		
Barra Bonita	547.013	0	H		
CHARQUEADAS	213.418	2.328	C		X
Jurumirim (Armando A. Laydner)	454.698	0	H		
JACUI	1.174.695	0	H		
Pereira Passos	397.305	0	H		
Tres Marias	2.543.413	0	H		
Euclides da Cunha	534.411	0	H		
CAMARGOS	200.117	0	H		
Santa Branca	148.713	0	H		
Cachoeira Dourada	3.604.388	0	H		
Salto Grande (Lucas N. Garcez)	486.456	0	H		
Salto Grande (MG)	632.393	0	H		
Mascarenhas de Moraes (Peixoto)	2.781.338	0	H		
ITUTINGA	251.290	0	H		
S. JERÔNIMO	33.587	366	C		X
CARIOBA	0	0	O		X
PIRATININGA	187.501	2.045	O		X
CANASTRA	213.576	0	H		
Nilo PEÇANHA	2.818.325	0	H		
FONTES NOVA	748.752	0	H		
H.BORDEN Sub.	199.758	0	H		
H.BORDEN Ext	551.061	0	H		
I. POMBOS	874.876	0	H		
JAGUARI	99.160	0	H		
Import international	490.209				X
Export international	620.561				
Import NNE	3.045.043				X
Export NNE	4.789.574				

A summary of the calculation is provided below, as well as all sources of information used to calculate the Grid EF.

Emission factors for the Brazilian South-Southeast-Midwest interconnected grid

Baseline (including imports)	EF_{OM} [tCO2/MWh]	Load [MWh]	LCMR [MWh]	Imports [MWh]
2003	0.9823	288,933,290	274,670,644	459,586
2004	0.9163	302,906,198	284,748,295	1,468,275
2005	0.8086	314,533,592	296,690,687	3,535,252
	Total (2003-2005) =	906,373,081	856,109,626	5,463,113
	$EF_{OM, simple-adjusted}$ [tCO2/MWh]	$EF_{BM,2005}$	Lambda	
	0.4349	0.0872	λ_{2003}	
	Alternative weights	Default weights	0.5312	
	w_{OM} = 0.75	w_{OM} = 0.5	λ_{2004}	
	w_{BM} = 0.25	w_{BM} = 0.5	0.5055	
	Alternative EF_y [tCO2/MWh]	Default EF_y [tCO2/MWh]	λ_{2005}	
	0.3480	0.2611	0.5130	

Sources:

Fossil Fuel Conversion Efficiency	Bosi, M., A. Laurence, P. Maldonado, R. Schaeffer, A. F. Simoes, H. Winkler and J.-M. Lukamba. Road testing baselines for greenhouse gas mitigation projects in the electric power sector. OECD and IEA information paper, October 2002. / Planilha R. Shaeffer: COPPE-2002-IEA termo 1
Carbon emission factor (tC/TJ)	Intergovernamental Panel on Climate Change. Revised 1996 Guidelines for National Greenhouse Gas Inventories.
Fraction carbon oxidized	Intergovernamental Panel on Climate Change. Revised 1996 Guidelines for National Greenhouse Gas Inventories.
Fossil fuel conversion efficiency for Operation Margin calculation (%)	Bosi, M., A. Laurence, P. Maldonado, R. Schaeffer, A. F. Simoes, H. Winkler and J.-M. Lukamba. Road testing baselines for greenhouse gas mitigation projects in the electric power sector. OECD and IEA information paper, October 2002. / Planilha R. Shaeffer: COPPE-2002-IEA termo 1

Agência Nacional de Energia Elétrica. *Banco de Informações da Geração* (http://www.aneel.gov.br/, data collected in november 2004).
Bosi, M., A. Laurence, P. Maldonado, R. Schaeffer, A. F. Simoes, H. Winkler and J.-M. Lukamba. *Road testing baselines for greenhouse gas mitigation projects in the electric power sector.* OECD and IEA information paper, October 2002. / Planilha R. Shaeffer: COPPE-2002-IEA termo 1
Intergovernamental Panel on Climate Change. *Revised 1996 Guidelines for National Greenhouse Gas Inventories.*
Operador Nacional do Sistema Elétrico. Centro Nacional de Operação do Sistema. *Acompanhamento Diário da Operação do SIN* (daily reports from Jan. 1, 2002 to Dec. 31, 2004).
Agência Nacional de Energia Elétrica. Superintendência de Fiscalização dos Serviços de Geração. *Resumo Geral dos Novos Empreendimentos de Geração* (http://www.aneel.gov.br/, data collected in november 2004).
Centrais Elétricas Brasileiras S/A. Plano anual de combustíveis - Sistema interligado S/SE/CO 2005 (released December 2004).

Annex 4

MONITORING INFORMATION

All background information used in the application of the monitoring methodology has been provided in section B.7 above.

REFERENCES

ANEEL – BIG, http://www.aneel.gov.br/15.htm

BOSI, M., Na Initial View on Methodologies for emissiond Baselines: Electricity Generation Case Study. Paris: International Energy Agency, 2000.

IPCC, 2006 Guidelines for national greenhouse gas inventories

Ministério de Minas e Energia, 2003 - Balanço Energético Nacional 2003 - Secretaria de Energia - www.mme.gov.br

Bosi, M. 2001, An Initial View on Methodologies for Emission Baselines: Electricity Generation Case Study - OECD and IEA Information Paper COM/ENV/EPOC/IEA/SLT (2001)4

Bosi, M. and Laurence, A., 2002, Road Testing Baselines for Greenhouse Gas Mitigation Projects in the Electric Power Sector - OECD and IEA Information Paper COM/ENV/EPOC/IEA/SLT (2002)6

Operador Nacional do Sistema Elétrico, Planejamento Anual da Operação Energética – Ano 2004, ONS RE 3/036/2004