Project design document form

(Version 10.1)

Complete this form in accordance with the instructions attached at the end of this form.

BASIC INFORMATION	
Title of the project activity	SHPs Tambaú, das Pedras and Rio do Sapo CDM Project (JUN1132), Brazil
Scale of the project activity	☒ Large-scale ☐ Small-scale
Version number of the PDD	3.4
Completion date of the PDD	12/12/2018
Project participants	Tambaú Energética S.A, Euclides Maciel Energética S/A, Rio do Sapo Energia S.A., Carbotrader Assessoria e Consultoria em Energia Eireli
Host Party	Brazil
Applied methodologies and standardized baselines	Methodology ACM0002 "Grid-connected electricity generation from renewable sources" version 14.0
Sectoral scopes linked to the applied methodologies	1 - Energy Industries (renewable/non-renewable sources),
Estimated amount of annual average GHG emission reductions	27,723 tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The project activity consist in the construction of three Small Hydro Power Plants (SHPs) to be installed in Brazil called Tambaú, das Pedras and Rio do Sapo, which together have a total installed capacity of 20.25 MW.

The **SHP Tambaú** has installed capacity of 8.82[1] MW and is located on the Guarita river, between the Erval Seco and Redentora cities, Rio Grande do Sul state.

The **SHP das Pedras** has installed capacity of 5.67 MW and is located on the Chapecó river, Água Doce city, Santa Catarina state.

The **SHP Rio do Sapo** has installed capacity of 5.76 MW and is located on the "do Sapo" river, in Tangará da Serra city, Mato Grosso state.

The project activity main purpose is to provide renewable electricity power to the National Interconnected System - *SIN* (from portuguese – *Sistema Interligado Nacional*), displacing the fossil fuelled thermal generation presented in the system for renewable energy generation . The baseline scenario is the same as the scenario existing prior to the project activity implementation , and shall be detailed in section B3 and B4. Also the scenario existing prior to the project activity implementation is only the place without any other power plant constructed (this is a greenfield project for the 3 SHPs).

Moreover, it improves the country electricity supply , contributing to its environmental sustainability due to increasing the renewable energy share in relation to total electricity consumption. Thus, the project activity supports the construction of new renewable energy project as environmentally sustainable alternative to electric energy generation (estimated emission reductions are 27,723 tCO_2/year or 194,059 tCO_2 for the 7 first years).

Considering that project activity forecasts three small reservoirs construction (0.2060[2] km^2, 0.46[3] km^2, and 1.005[4] km^2 respectively to Tambaú, das Pedras and Rio do Sapo), it represents a virtually zero environmental impact when compared to large hydroelectric facilities. This fact is important because the Small Hydro Power plants construction can really contributes to natural resources efficient use , avoiding growth of environmental and social liabilities caused by new large hydroelectric plants implementation and those which have fossil fuels associated.

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

The project activity is also aligned with the specific requirements of the host country, because:

- It contributes to environmental sustainability as reduce the fossil energy use (non-renewable sources). Thus the project contributes to natural resources best use and makes use of clean and efficient technologies;
- It enlarges the employment opportunity r in areas where the projects are located;

[1] Based on the equipments' plaque

[2] ANEEL Dispatch Nº 617, 27.02.2012 (http://www.aneel.gov.br/cedoc/dsp2012617.pdf)

[3] Installation License 476/08/CRO

[4] ANEEL Dispatch Nº 1.298, 11.05.2010 http://www.aneel.gov.br/cedoc/atdsp20101298.pdf

- It contributes to local economy better conditions , because the renewable energy use reduces our fossil fuels dependence , reduce the amount of pollution and the associated social costs related to it.

Moreover, the project diversifies the generation sources and also decentralize the energy generation, bringing specific benefits such as:

- Increased reliability, with shorter and less extensive interruptions;
- Less demands related to reserve margin;
- Better quality energy for the region;
- Less losses in transmission and distribution lines;
- Reactive energycontrol;
- Mitigation of transmission and distribution congestion .

A.2. Location of project activity

Brazil

Regions:

SHP Tambaú	- South Region	– Rio Grande do Sul State
SHP das Pedras	- South Region	– Santa Catarina State
SHP Rio do Sapo	- Midwest Region	– Mato Grosso State

Cities:

SHP Tambaú	- Erval Seco and Redentora cities
SHP das Pedras	- Água Doce city
SHP Rio do Sapo	- Tangará da Serra city

The **SHP Tambaú** is located on the Guarita river, Uruguai basin, Brazil south region . The project activity geographical coordinates (dam) are: 27º 26' 24" S and 53º 33'41" W (in UTM Latitude -53.5620327248 ; Longitude -27.4404164163).

The figures 1 and 2 illustrate Erval Seco and Redentora cities localization .

Source: Wikipedia - pt.wikipedia.org[5]

Figure 1: Erval Seco city localization in Rio Grande do Sul state

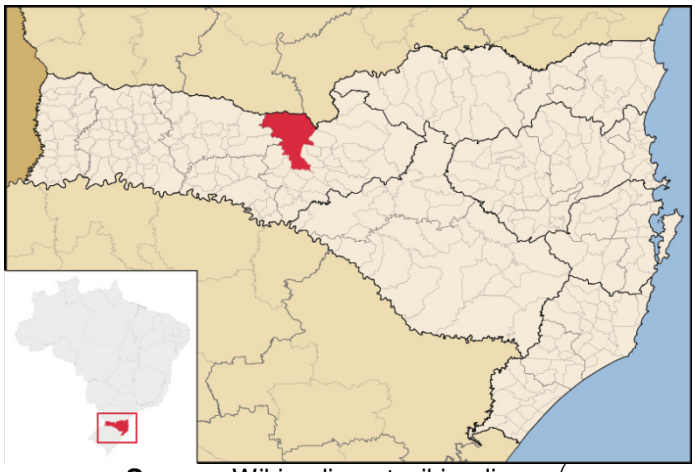
[5] See the weblink: http://pt.wikipedia.org/wiki/Erval_seco

Source: Wikipedia - pt.wikipedia.org[6]

Figure 2: Redentora city localization in Rio Grande do Sul state

The **SHP das Pedras** is located on the Chapecó river, Uruguai basin, Brazil south region . The project activity geographical coordinates (dam) are: 26º 40' 43" S and 51º 46' 50" W (in UTM Latitude -26.6786111111; Longitude -51.7805555556).

The figure 3 illustrates the localization of Água Doce city.



Source: Wikipedia - pt.wikipedia.org[7]

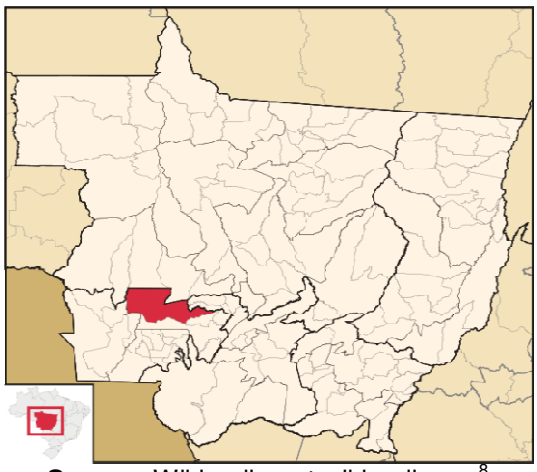
Figure 3: Água Doce city localization in Santa Catarina state

The **SHP Rio do Sapo** is located on the Rio do Sapo river, Paraná basin, Midwest region of Brazil. The project activity geographical coordinates (dam) are: 14º 37' 03" S and 57º 44' 44" W (in UTM Latitude -14.6175 ; Longitude -57.7455555556).

The figure 4 illustrates the localization of Tangará da Serra city.

[6] See the weblink: http://pt.wikipedia.org/wiki/Redentora

[7] See the weblink: http://pt.wikipedia.org/wiki/%C3%81gua_Doce



Source: Wikipedia - pt.wikipedia.org[8]

Figure 4: Tangará da Serra city localization in Mato Grosso state

A.3. Technologies/measures

The project activities are greenfield run-of-river hydropower plants (sectoral scope: Energy industries – renewable/now renewable sources).
Prior to implementation of the proposed project, the electricity was generated by the operational power plants matrix that has a strong participation of fossil fuel power plants[9]. The project activity reduces GHG emissions avoiding operating entrance of fossil fuelled thermoelectric power plants (estimated in 27,723 tCO_2/year). In project activity absence , fossil fuel would be burned in thermoelectric plants which are grid interconnected .

The enterprise technology used is the hydro energy potential use of rivers “Guarita”, “Chapecó” and “do Sapo” for electricity generation by the water gravitational energy , which is used to move turbines and trigger generators that enable the electricity generation. This is a clean and renewable energy source that presents minimal environment impact .
The project activity's plants are ventures classified as Small Hydro Power Plant according to Brazilian Resolution n°. 652, 09/12/2003, issued by National Electric Energy Agency (ANEEL), which states that to be considered a SHP, its reservoir area must be smaller than 3 km^2 (300 ha) and its total installed capacity must be between 1 MW to 30 MW. As can be checked in the tables 1 to 3, the three plants meets these requirements.

The **SHP Tambaú** will dispatch generated energy through its lift substation (6.9/69 kV) located 18 km from the “Frederico Westphalen Substation” (belongs to the RGE[10] company), point where the electricity shall be delivered to the national interconnected grid[11].

The **SHP das Pedras** will dispatch generated energy until “Palmas Substation” (belongs to the COPEL[12] company) through the SHP Coronel Araújo' Substation (34.5 kV - located 3.5 Km from the power plant), which is already linked to Palmas Substation.

The **SHP Rio do Sapo** will dispatch generated energy through its lift substation (6.9/34.5 kV) and monitoring equipments located 5.32 km far in the intersection of the distribution line to Itanorte (belongs to the CEMAT[13] company)[14].

[8] See the weblink: http://pt.wikipedia.org/wiki/Tangar%C3%A1_da_Serra

[9] http://www.aneel.gov.br/aplicacoes/capacidadebrasil/operacaocapacidadebrasil.asp

[10] Local Energy Distribution Company: http://www.rge-rs.com.br

[11] ANEEL Dispatch Nº 498, 10.02.2012 http://www.aneel.gov.br/cedoc/dsp2012498.pdf

[12] Local Energy Distribution Company: http://www.copel.com/hpcopel/root/index.jsp

The technology and equipment used in the project activity are developed and manufactured in Brazil and is not expected know-how or technology transference to the host country. All the equipments should be new with expected lifetime of 30 years[15] (turbines and generators). The three ventures similarities (small hydro power plants, installed capacity under 10 MW, same project sponsors, etc) made the project proponent to undertake as large scale project activity[16].

The technical characteristics of equipment that will be implemented in SHPs can be seen in tables below (also a general diagram is presented in the Section B.3) :

Table 1: Technical characteristics of main equipment installed at **SHP Tambaú**

Generator	**Characteristics**
Type	Synchronous
Quantity	2
Power (kW)	2 x 4,410
Nominal Power (kVA)	2 x 4,900
Voltage (kV)	6.9
Frequency (Hz)	60
Cos φ	0.9
Turbines	**Characteristics**
Type	Francis
Quantity	2
Power (kW)	2 x 4,601
Nominal Flow (m^3/s)	16.40
Water head (m)	31.35
Other Information	**Characteristics**
Reservoir Area (km^2)	0.2060
Power Density (W / m^2)	42.8
Assured Energy (MWaverage)	4.90[17]

[13] Local Energy Distribution Company: http://www.redenergia.com/cemat/

[14] Installation License 59022/2011

[15] There are statements from equipments' manufacturers guaranteeing 30 years of technical lifetime

[16] Since the Prior Consideration decision (to be developed as one single CDM Project Activity).

[17] ANEEL Ordinance No- 51, of 04.07.2012

Table 2: Technical characteristics of main equipment to be installed at **SHP das Pedras**

Generator	**Characteristics**
Quantity	2
Power (kW)	2 x 2,835
Nominal Power (kVA)	2 x 3,150
Voltage (kV)	6.9
Frequency (Hz)	60
Cos φ	0.9
Turbines	**Characteristics**
Type	Vertical Saxo
Quantity	2
Power (kW)	2 x 2,926
Nominal Flow (m3/s)	16.12
Water head (m)	20.00
Other Information	**Characteristics**
Reservoir Area (km²)	0.46
Power Density (W / m²)	12.3
Assured Energy (MWaverage)	3.00[18]

Table 3: Technical characteristics of main equipment to be installed at **SHP Rio do Sapo**.

Generator	**Characteristics**
Type	Synchronous
Quantity	2
Power (kW)	2 x 2,880
Nominal Power (kVA)	2 x 3,200
Voltage (kV)	6.9
Frequency (Hz)	60

[18] ANEEL Ordinance 165 of 26.11.12 (http://www.aneel.gov.br/cedoc/prt2012165spde.pdf)

Cos φ	0.9
Turbines	**Characteristics**
Type	Francis
Quantity	2
Power (kW)	2 x 3,020
Nominal Flow (m^3/s)	14.545
Water head (m)	23.01
Other Information	**Characteristics**
Reservoir Area (Km^2)	1.005
Power Density (W / m^2)	5.7
Assured Energy (MWaverage)	3.297

For SHP Tambaú the monitoring equipments are located in a panel inside the Frederico Westpahlen Substation (two meters responsible for the commercial generation electricity, one main and a backup meter). Both of them are bidirectionals, class 0.2. More details in B.71 and B.7.3 Sections.

The monitoring equipments for SHPs das Pedras and Rio do Sapo should be located in a panel inside the powerhouse (two meters, one main and a backup for each SHP) or should be located inside a panel in Palmas and intersection of transmission line to Itanorte substations (the grid connection point, responsible for the net generation electricity delivered to the SIN)[19]. Both of them should be bidirectionals, class 0.2. More details in B.71 and B.7.3 Sections.

The energy and mass flows and balances of the systems and equipment relevant to the project activity are described in the Section B.3.

A.4. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Brazil (Host Country) …	Tambaú Energética S.A (private entity)	No
	Rio do Sapo Energia S.A (private entity)	
	Euclides Maciel Energética S.A (private entity)	
	Carbotrader Assessoria e Consultoria em Energia Eireli. (private entity)	

[19] To be defined during the construction phase.

A.5. Public funding of project activity

There is no public funding provided by Annex I parts, so the carbon credits revenue are the option chosen.

A.6. History of project activity

We confirm that:

1.
   (a) The proposed CDM project activity is neither registered as a CDM project activity nor included as a component project activity (CPA) in a registered CDM programme of activities (PoA);
   (b) The proposed CDM project activity is not a project activity that has been deregistered.

2. Declare whether:
   (a) The proposed CDM project activity was a CPA that has been excluded from a registered CDM PoA **– Not applicable;**
   (b) A registered CDM project activity or a CPA under a registered CDM PoA whose crediting period has or has not expired (hereinafter referred to as former project) exists in the same geographical location as the proposed CDM project activity - **– Not applicable.**

A.7. Debundling

Not applicable (large-scale project activity).

SECTION B. Application of selected methodologies and standardized baselines

B.1. Reference to methodologies and standardized baselines

The Project uses the methodology ACM0002: "*Consolidated baseline methodology for grid-connected electricity generation from renewable sources*" - version 14.0.

The ACM0002 also refers to the following tools:

- Tool to calculate the emission factor for an electricity system (version 04.0.0);
- Tool for the demonstration and assessment of additionality (version 07.0.0);

Available in the link: http://cdm.unfccc.int/methodologies/DB/UB3431UT9I5KN2MUL2FGZXZ6CV71LT

B.2. Applicability of methodologies and standardized baselines

As per UNFCCC`s (*United Nations Framework Convention on Climate Change*) definitions, the project activity is according to Scope 1 that refers to energy industries (renewable or non renewable sources).
The ACM0002 methodology is applicable to grid-connected renewable power generation project activities that:

(a) install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s).

In this case is the alternative (a) the installation of new power plants at sites where no renewable power plants was operated prior to the implementation of the project activity (Greenfield plants)

In case of hydro power plants, at least one of the following conditions must apply:

• The project activity is implemented in an existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or

Not applicable to the project activity.

• The project activity is implemented in an existing single or multiple reservoirs, where the volume of any of reservoirs is increased and the power density of each reservoir the project activity, as per the definitions given in the Project Emissions section, is greater than 4 W/m2; or

Not applicable to the project activity.

• The project activity results in new single or multiple reservoirs and the power density of each reservoir the power plant, as per the definitions given in the Project Emissions section, is greater than 4 W/m2.

The project activity results in new reservoirs and the power density are above 4W/m2, as described in the calculations in section B.6.

In case of hydro power plants using multiple reservoirs where the power density of any of the reservoirs is lower than 4 W/m2 all of the following conditions must apply:

• The power density calculated for the entire project activity using equation 5 is greater than 4 W/m2;
• Multiple reservoirs and hydro power plants are located at the same river and were designed together to function as an integrated project that collectively constitutes the generation capacity of the combined power plant;
• Water flow between the multiple reservoirs is not used by any other hydropower unit which is not a part of the project activity;
• The total installed capacity of the power units, which are driven using water from the reservoirs with a power density lower than 4 W/m2, is lower than 15 MW;
• Total installed capacity of the power units, which are driven using water from reservoirs with a power density lower than 4 W/m2, is less than 10% of the total installed capacity of the project activity from multiple reservoirs.

Not applicable to this project activity (not multiple reservoirs)

The methodology is not applicable to the following:

• Project activities that involve switching from fossil fuels to renewable energy sources at the site
of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site **(not applicable);**
• Biomass fired power plants **(not applicable);**
• Hydro power plants that result in in the creation of a new single reservoir or in the increase in an existing single reservoir where the power density of the power plant is less than 4 W/m2 **(not applicable).**

The small hydro power plants Tambaú, das Pedras and Rio do Sapo are considered electric generation by renewable source with new reservoirs (Greenfields power plants), which have power densities of 42.8 W/m^2, 12.3 W/m^2 and 5.7 W/m^2 respectively.

Also, the sum of three plants installed capacity is 20.25 MW, greater than 15 MW (as can be verified in the tables 1, 2 and 3), thus the project activity can be included in the large scale project category considering the CDM standards.

So the ACM0002 methodology is applicable.

B.3. Project boundary, sources and greenhouse gases (GHGs)

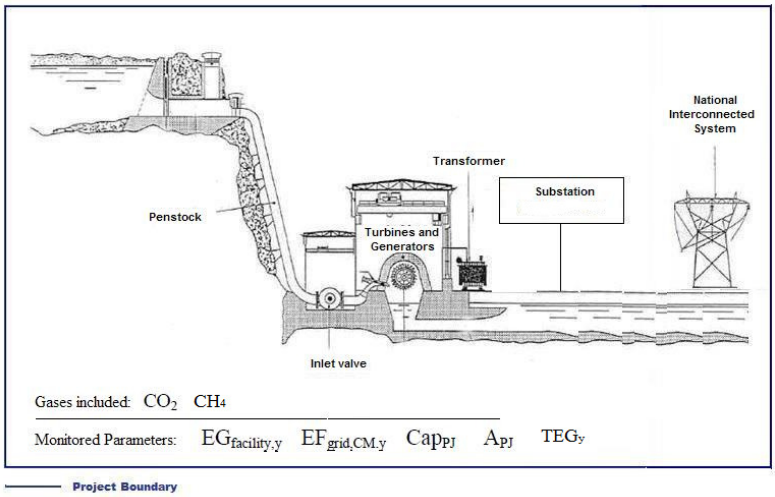
According to ACM0002 the space extension of the project's boundaries includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected. In this case, the SHPs will be connected with the SIN.

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

Table 4: Description of the sources and gases included in or excluded from the project boundary:

Source		GHGs	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	Yes	Main emission source.
		CH_4	No	Minor emission source.
		N_2O	No	Minor emission source.
Project activity	For hydro power plants, emissions of CH_4 from the reservoir.	CO_2	No	Minor emission source.
		CH_4	Yes	The methane emissions of project activity in tCO_2e will be quantified since the SHP Rio do Sapo has power density of 5.7 W/m^2.
		N_2O	No	Minor emission source.

The diagram below shows the project boundary, main equipments, monitored parameters and included gases, per each SHP:



B.4. Establishment and description of baseline scenario

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

"*Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generating sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".*

Then, the baseline emissions are the MWh produced by the renewable power unit multiplied by an emission coefficient (quantified in tCO_2e/MWh), calculated in a conservative and transparent manner.

In the project activity absence (baseline scenario), the electricity would be being generated for other grid-connected power plants, included fossil fuel based power plants (more details about the baseline scenario and Brazilian National Interconnected Grid - SIN in B.5. Steps 1a and 4 respectively).

The electricity generation from the SHPs will provide the necessary MWh to the calculation of baseline GHGs.

Also, the project activity uses as source for the Emission Factor calculation of SIN the operating margin and build margin coefficients provided by the Designated National Authority (DNA) of this host country (publicly available).

The CO_2 Emission Factor resulting from the electric energy generation verified in the SIN in Brazil is calculated based on generating records from plants centrally operated by the National Electric System Operator (from Portuguese *Operador Nacional do Sistema Elétrico - ONS*).

The method used to make this calculation is the dispatch analysis method. These informations are necessary for renewable energy projects connected to electric grid and implanted in Brazil under the CDM.

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

Further details of the project baseline development can be viewed through the link: http://www.mct.gov.br/index.php/content/view/307492.html .

B.5. Demonstration of additionality

This item was elaborated based on the latest version of "ACM0002 - **Consolidated baseline methodology for grid connected electricity generation from renewable sources**" and the "**Tool for the demonstration and assessment of additionality**" prevailing the Methodology since this supersedes the Tool.

Step 0: Demonstration whether the proposed project activity is the first-of-its-kind

Not used, the proposed project activity isn´t the first of kind in Brazil.

Step 1: Identification of alternatives to the project activity consistent with current laws and Regulations

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

The Project is the installation of a new grid connected hydro power plants, the baseline scenario, according to the methodology ACM0002 version 14.0, is the following:

Electricity delivered to the grid by the project activity 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 the Tool to calculate the emission factor for an electricity system.

The selected methodology ACM0002 describes the baseline scenario, thus alternatives to the Project aren´t needed to be further identified as per paragraph 115 of *Clean Development Mechanism Validation and Verification Standard*(VVS).

Outcome of Sub-step 1a: Not necessary to identify realistic and credible alternative scenario(s) to the project activity.

Sub-step 1b: Consistency with mandatory laws and regulations

The project activity SHPs are in compliance with all regulations according to the following entities: National Electric System Operator – *ONS* (from Portuguese *Operador Nacional do Sistema Elétrico*) and National Electricity Regulatory Agency – *ANEEL* (from Portuguese *Agência Nacional de Energia Elétrica*), agencies that regulates the Brazilian energy sector. Also with the State Agencies as: Environment State Foundation – FATMA in Santa Catarina State, the Environment Secretary of the Mato Grosso – SEMA and Henrique Luiz Roessler Foundation for Environment Protection– FEPAM in Rio Grande do Sul State, which are responsible for energy generation projects verification and to issue the environmental licenses or authorizations[20] when they are in accordance with the state and federal rules.
Is it possible to check the authorizations issued to the SHPs that compose this project activity in Section D.1.

Outcome of Sub_step 1b: The project activity is in compliance with mandatory legislation and regulations taking into account the enforcement in the region or country and EB decisions on national and/or sectoral policies and regulations.

Step 2: Investment analysis

The investment analysis shall be performed in order to determine whether the proposed project activity is not:

(a) The most economically or financially attractive; or
(b) Economically or financially feasible, without the revenue from the sale of certified emission reductions (CERs).

For the proposed project activity, the investment analysis determinates if the proposed project activity is not economically/financially feasible without the revenues from the Certified Emission Reductions (CERs).

Sub-step 2a: Determine appropriate analysis method

In order to determine the appropriate analysis method, the following options are available to be used in the additionality analysis:

- Option I - Apply simple cost analysis,
- Option II - Apply investment comparison analysis,
- Option III - Apply benchmark analysis

[20] The consistency with mandatory laws can be easily assessed in Brazil checking the licenses issued for the SHP during the phase of the project (pre construction phase, construction or operation phase).

According to the Tool, if the CDM project activity and the alternatives identified in Step 1 generate financial or economic benefits other than CDM related income, then the investment comparison analysis (Option II) or the benchmark analysis (Option III) shall be used. The benchmark analysis (Option III) will be applied, because it is the most appropriated for this type of project activity that generates financial benefits other than CDM related income (and, the Option II shall be applied when there are credible alternative scenarios for the project activity. As there are no alternative to compare with the project's indicator (Internal Rate of Return) the Option III is the most appropriate.

Therefore, the Option III was chosen.

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

The financial indicator most appropriate for this type of project is the Internal Rate of Return (Equity IRRs), because it is the compound rate of return annualized effective that can be obtained on invested capital.

The financial/economic indicator analysis is based on parameters that are standard in energy market and around the world, considering the project type specific characteristics – investments in energy projects.

The benchmark analysis is performed comparing the equity IRR with a benchmark. The established benchmark for this comparison is the Cost of Equity (K_e), based on the Capital Asset Pricing Model, in line with the accountable rules generally accepted. The details are described below:

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

K_e – Cost of Equity

The cost of equity was calculated in line with the "*Guidelines on the assessment of investment analysis*" published in 62 meeting of the CDM Executive Board (Annex 5) making use of reliable sources and the Equity IRR can be comparable with Cost of Equity because required/expected returns on equity are appropriate benchmarks for an equity IRR, as described in item 12 of this Guideline.

Cost of Equity calculation

The cost of equity was calculated as follows:

K_e = Rf + Beta * (US Premium + Country ERP)[21]

Where:

K_e = Cost of equity (also referred as Equity Return);
Rf = Risk free rate;
US Premium = United States risk premium;
Country ERP = Brazilian Equity Risk Premium;
Beta = adjustment factor to reflect the risk of projects, this value is the average of energy companies in Brazil, leveraged to the capital structure of the project activity.

In our case the risk free rate of return is the average rate of return of American Bond (T-Bond) corresponding to years 1997 to 2006. Value to be applied 3.91%[22] .

[21] A. Damodaran on presentation "Estimating Discounting Rates" - slide 16 - approach 2 (assuming that a company's exposure to country risk is similar to its exposure to other markets risk.

[22] http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/histret.html Average rate of return of T-Bonds = 6.36% - 2.45% (to be in real terms is discounted the projected inflation rate based on CPI index

US Premium and also the Country ERP (for Brazil) are available in the A. Damodaran reference available in http://www.stern.nyu.edu/~adamodar/pc/archives/ctryprem06.xls . Values Applied 4.91% and 3.75% respectively.

For Beta establishment was made use of the A. Damodaran reference available for Brazilian Companies (average Betas from Electric - Generation Industry[23] levered for the proposed project activity capital structure[24]). Value Applied 1.47.

It is important to observe that this project activity make use of the reliable and also conservative sources for the benchmark calculation in accordance with the references presented in the "*Guidelines on the assessment of investment analysis*".

Therefore:

K_e = 3.91% + 1.47 * (4.91% + 3.75%)

So

K_e = 16.64%[25]

Below, the table 5 summarizes the reference values to the project activity IRR and the equity value used as benchmark.

Table 5: Comparative table between project activity IRR and the project benchmark

Benchmark Cost of Equity	SHP Tambaú Equity IRR	SHP das Pedras Equity IRR	SHP Rio do Sapo Equity IRR
16.64%	8.54%	8.95%	11.68%

The cash-flow was elaborated for 20 years operation[26].

The cash flow of project activity will be integrally presented to the validation entities in a separated worksheet. In the worksheet are also identified all the reference sources to the applied values.

The cash flow has as main input values the following:

Table 6: Main Inputs Values of cash flow

ftp://ftp.bls.gov/pub/special.requests/cpi/cpiai.txt) from the page: http://pages.stern.nyu.edu/~adamodar/New_Home_Page/data.html

[23] http://www.stern.nyu.edu/~adamodar/pc/archives/emergcompfirm06.xls (Country: Brazil, Industry: Electric-Generation) **results in 0.89** - from the page: http://pages.stern.nyu.edu/~adamodar/New_Home_Page/data.html

[24] Beta $_{unlevered}$ = Beta $_{levered}$ / 1+D/E (1-T) where D= Debt, E = Equity, T = Interest and Taxes - so 1.47 = 0.89 * 1 + 50% / 50% (1-34%) source: BNDES, Camacho

[25] Please, check the worksheet "Ke_Calculation_v1" provided for more details about the calculation performed.

[26] As per *Applicability of the "Guidelines on the assessment of investment analysis" version 01.0* since technical lifetime of the CDM project activity is more than 20 years. Also was kept the Ke value applicable for the SHPs Tambaú and das Pedras since the Ke to be considered on investment decision date of Tambaú and das Pedras has value of 18.91% (calculated in the spreadsheet " *Ke_Calculation_v1_justificativa-a*"). So the Ke considered for Rio do Sapo (2007) has value of 16.64% (lower and more conservative)

Parameter	SHP Tambaú	SHP das Pedras	SHP Rio do Sapo
Investment (R$)	48,023,229.89	32,218,742.76	20,817,565.00
Assured Energy (MWaverage)	5.35[27]	3.59[28]	3.297
Energy Price (R$/MWh)	144.00	154.49	135.00
Operation and Maintenance (R$/MWh)	961,748.95	923,064	742,880

The equity's IRRs have stayed below of the project proponent`s equity value. The analysis shows that the projects are destroying capital of the investor considering the parameters that compose the calculation of SHP's equity, facing therefore investment barriers because there are more attractive alternatives.

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

Sub-step 2d: Sensitivity analysis

To better understand the investment barrier was also performed a **sensitivity analysis** in which were varied the following parameters: (1) Investment, (2) Assured Energy, (3) Energy Price and (4) Operation and Maintenance costs, in order to check the financial impact of these on the project.

A **Breakeven Point Analysis** was performed in order to discuss the likelihood of occurrence of these scenarios.

The table 7 presents the main results of the analysis.

Table 7: SHPs sensitivity analysis

SHP Tambaú:

Parameter	Original Value	Equity IRR (Parameter +- 10%)	Breakeven point	% of deviation
Investment (R$)	48,023,229.89	10.26	31,407,192.35	- 34.60%
Assured Energy (MWaverage)	5.35	10.44	7.64	+ 42.80%
Energy Price (R$/MWh)	144.00	10.56	201.96	+ 40.25%
Operation and Maintenance (R$/MWh)	961,748.95	8.94	Not sensible enough to reach the benchmark	- 100%

SHP das Pedras:

Parameter	Original Value	IRR (Parameter +- 10%)	Breakeven point	% of deviation
Investment (R$)	32,218,742.76	10.61	21,528,563.91	- 33.18%
Assured Energy (MWaverage)	3.59	10.90	4.95	+ 38.00%
Energy Price (R$/MWh)	154.49	11.01	210.08	+ 35.98%
Operation and Maintenance (R$/MWh)	923,064	9.37	Not sensible enough to reach the benchmark	- 100%

SHP Rio do Sapo:

Parameter	Original Value	IRR (Parameter +- 10%)	Breakeven point	% of deviation
Investment (R$)	20,817,565.00	13.72	16,450,039.86	- 20.98%

[27] This is the value available at the moment of investment decision (which was based on the Project Design studies made by "Rischbieter Engenharia Ltda" company)

[28] This is the value available at the moment of investment decision (which was based on ANEEL´s Card Specification that belongs to the SHP das Pedras)

Assured Energy (MWaverage)	3.297	14.18	3.94	+ 19.55%
Energy Price (R$/MWh)	135.00	14.34	159.84	+ 18.40%
Operation and Maintenance (R$/MWh)	742,880	12.23	88,402.72	- 88.10%

Facing the above described, it is possible to verify that for all analyzed parameters the variation margin of 10% determined by CDM as sensitivity indicator do not lead the SHPs' Equity IRRs to reach the benchmark in 16.64% (in fact to reach the benchmark value the parameters variations should be above 18.40%). Therefore, fluctuations of this amplitude would not lead the IRR of project activity to reach or overcome the considered benchmark.
The project activity has taken in consideration the revenues of CERs sales for the implantation. These financial benefits generated in strong currency (euro or dollar) bring to the project a better security against monetary depreciations.
Facing the explanations, information and evidences provided by the PPs, the project activity IRRs are below than the established benchmark (cost of equity), evidencing that project activity is destroying capital, not being therefore the most financially attractive investment option. The CDM benefits were the key point to go ahead and to implement the project activity, improving its financial attractiveness.

Therefore, the project activity is financially additional.

Outcome of Step 2: After the sensitivity analysis it is concluded that the proposed CDM project activity is unlikely to be financially/economically attractive (as per Step 2c).

Step 3: Barrier analysis

Not necessary. As concluded in the sensitivity analysis the project activity is not financially attractive.

Step 4: Common practice analysis

The following stepwise approach clearly demonstrates that the project activity is not representing common practice.

The list of hydropower plants operating in the country is made available by ANEEL[29].

Step 1: Calculate applicable capacity or output range as +/-50% of the total design capacity or output of the proposed project activity.

The projects to be considered in the analyses must have installed capacity between 10.09 MW (50% below the proposed project activity with 20.18 MW of total installed capacity) and 30.27 MW (50% above).

Step 2: Identify similar projects (both CDM and non-CDM) which fulfill all of the following conditions:

(a) The projects are located in the applicable geographical area;
(b) The projects apply the same measure as the proposed project activity;
(c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;
(d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant;
(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;

[29] http://www.aneel.gov.br/area.cfm?idArea=37&idPerfil=2

(f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity.

The similar projects are listed below:

Table 8: similar projects (both CDM and non-CDM)

Power Plant	State	Incentive / Type (if no hydro)	MW
Ivan Botelho III	MG	CDM	24.4
Ombreiras	MT	CDM	26
Porto Góes	SP	Hydro Retrofit	14.3
Salto Corgão	MT	CDM	27
Caeté	AL	Thermoelectric	16.8
Canoa Quebrada	MT	CDM Proinfa	28
Esmeralda	RS	Proinfa	22.2
Garganta da Jararaca	MT	CDM	29.3
Mosquitão	GO	Proinfa	30
Piranhas	GO	Proinfa	18
Sacre 2	MT	CDM	30
Santa Edwiges I	GO	CDM	10.1
Santa Edwiges II	GO	CDM	13
São Bernardo	RS	Proinfa	15
Contagem	MG	Thermoelectric	19.3
Água Bonita	SP	Thermoelectric	17
Coruripe	AL	Thermoelectric	16
Fartura	SP	Thermoelectric	17.4
Giasa II	PB	Thermoelectric	20
Jalles Machado	GO	Thermoelectric	12
Mandu	SP	Thermoelectric	25
Ruette	SP	Thermoelectric	28
Volta Grande	MG	Thermoelectric	30
Winimport	PR	Thermoelectric	11.5
Buriti	MS	Proinfa	30
Flor do Sertão	SC	Proinfa	16.5
José Gelásio da Rocha	MT	Proinfa Retrofit	23.7
Ludesa	SC	Proinfa	30
Ponte Alta	MS	Proinfa	13
Primavera	RO	CDM	18.2
São João (Castelo)	ES	CDM	25
UTE REFAP	RS	Thermoelectric	27.12
Bunge Araxá	MG	Thermoelectric	11.5
Itaenga	PE	Biomass	22
Fartura	SP	Thermoelectric	22
USI Santo Inácio	PR	Thermoelectric	30

Step 3: Within plants identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation.

The power plants that are neither registered CDM nor undergoing validation are:

Power Plant	State	Incentive / Type (if no hydro)	MW
Porto Góes	SP	Hydro Retrofit	14.30
Caeté	AL	Thermoelectric	16.80
Esmeralda	RS	Proinfa	22.20
Mosquitão	GO	Proinfa	30.00
Piranhas	GO	Proinfa	18.00
São Bernardo	RS	Proinfa	15.00
Contagem	MG	Thermoelectric	19.30
Água Bonita	SP	Thermoelectric	17.00
Coruripe	AL	Thermoelectric	16.00
Fartura	SP	Thermoelectric	17.40
Giasa II	PB	Thermoelectric	20.00
Jalles Machado	GO	Thermoelectric	12.00
Mandu	SP	Thermoelectric	25.00
Ruette	SP	Thermoelectric	28.00
Volta Grande	MG	Thermoelectric	30.00
Winimport	PR	Thermoelectric	11.50
Buriti	MS	Proinfa	30.00
Flor do Sertão	SC	Proinfa	16.50
José Gelásio da Rocha	MT	Proinfa Retrofit	23.70
Ludesa	SC	Proinfa	30.00
Ponte Alta	MS	Proinfa	13.00
UTE REFAP	RS	Thermoelectric	27.12
Bunge Araxá	MG	Thermoelectric	11.50
Itaenga	PE	Biomass	22.00
Fartura	SP	Thermoelectric	22.00
USI Santo Inácio	PR	Thermoelectric	30.00

So, N_{all} = 26

Step 4: Within similar projects identified in Step 3, identify those that apply Technologies that are different to the technology applied in the proposed project activity.

To the common practice analysis, it was done a survey about the activities which became operational between January 2005 (when the CDM become available to the projects sponsors) and August 2007 (before the project activity starting date), in order to establish a range of projects that can be considered similar to the project activity, like the definition of item 4, in the *"Guidelines on Common Practice"*, version 02.0.

Were considered in the analysis the project activities that are similar to the proposed project activity and have or not financial incentives or other promotional policies. This is related to the Investment climate in the date of the investment decision: Subsidies or other financial flows, Promotional Policies and Legal regulations.

Subsidies or other financial flows and promotional policies

It is important to consider that, in the incentive and investment matters, Brazil has two main foment lines to renewable energy projects: the Clean Development Mechanism (CDM), established by the Kyoto Protocol, and the Alternative Electrical Energy Sources Incentive Program (PROINFA), established for the Decree nº 5,025/2004[30].

The PROINFA is a governmental incentives program which was implemented to increase the renewable energy participation in the SIN. Its target is to diversify the Brazilian Electrical Matrix, creating alternatives to improve the security in the electrical energy supply e to allow the appreciation of local and regional characteristics and potentialities.

The Ministry of Mines and Energy (MME) is the responsible to define the rules, elaborates the Program planning and defines the economical value of each source. The Eletrobrás (Electrical Brazilian Centrals - from Portuguese *Centrais Elétricas Brasileiras S.A.*) is the executor agent, with the mission to do the Contracts of Purchase and Sale of Energy (from Portuguese *Contratos de Compra e Venda de Energia – CCVE)*[31] or, in English, Power Purchase Agreement – PPA.

In PROINFA, the financial incentives provided by the Federal Government are based on differentiated lines of finance, guarantees of minimal revenues through of the PPAs (CCVEs) to be firmed with entrepreneur and Eletrobrás, which assures to the entrepreneur a minimal revenue through the purchase of 70% of the generated energy during the financing period. The PROINFA gives also protection against the risks of exposure in the short-term market besides other benefits of adhesion in the program.

Projects qualified by the PROINFA are eligible to participate in the CDM, agreeing to the decision of the UNFCCC regarding eligibility of project derived from public policies. The legislation that created the PROINFA considered the possible CDM revenues to implement the program.

In Brazil regulatory environments, all the projects of generation, transmission, distribution and commercialization of electric energy are supervised and regulated by ANEEL in compliance with the law 9,427 of 26 of December of 1996, guaranteeing, then, the same regulatory requirements to the similar activities of the proposed project activity.

In the light of SHP performance was considered also the parameter small size of installation[32] for the hydroelectric **Retrofited** within the similar projects, since the proposed project activity is related to greenfield power plants only and also large size. Excluded also the thermoelectric (biomass included) power plants since they are different technology not comparable to the technology proposed in this project activity - hydro as energy source or feedstock.

From the SHPs listed in the Step 3, considering the explanation above and the "Guidelines on Common Practice" which states that CDM project activities are not be included in the analysis, from January 2005 to August 2007, none similar projects became operational.

Then, N_{diff} = 26 (9 PROINFA + 15 Thermo electrics + 1 Retrofit (small size of installation) + 1 Biomass)

[30] Decree 5,025 of 2004 that establishes the PROINFA http://www.planalto.gov.br/ccivil_03/_Ato2004-2006/2004/Decreto/D5025.htm

[31] Definition available in the MME page http://www.mme.gov.br/programas/proinfa

[32] as defined in paragraph 28 of decision 1/CMP.2

Step 5: Calculate factor $F=1-N_{diff}/N_{all}$ representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.

According the *"Guidelines on Common Practice"* requirements , the factor F that represents "*the share of plants using technology similar to the technology used in the proposed project activity in all plants that deliver the same output or capacity as the proposed project activity*" must be calculated as follows:

$$F=1-N_{diff}/N_{all}$$

$$F=1-26/26$$

$$F=0$$

$$N_{all}-N_{diff}=0$$

In the light of all the explanation provided above and considering the values of factor "F" and "N_{all} - N_{diff}", it is possible to conclude that the implantation of hydropower plants similar to the project activity is not a common practice in Brazil, being therefore eligible to CDM according its requirements.

Outcome of Step 4: The proposed project activity is not regarded as "common practice", then the proposed project activity is additional

Table 9: Timeline with major events

SHP Tambaú

2008			
30/04/2008	Project Activity Implementation	Issuance of the Instalation License	Document "LI Nº 431 2008-DL Tambaú"
2009			
10/03/2009	Project Activity Implementation	ANEEL Authorization for the SHP	Document "TAB_rea20091832_PIE"
16/09/2009	**CDM Prior Consideration**	Form to the UNFCCC and CIMGC	E-mail "Re ENC SHPs Tambaú e das Pedras CDM prior consideration (Brazilian CDM Projects)"
2010			
27/01/2010	**Project Activity Starting Date**	Civil contraction	Document "Const.Hill_Tambaú"
03/03/2010	Project Activity Implementation	Civil contraction	Document "Comax Tambaú"
01/11/2010	Project Activity Implementation	Turbines and Generators aquisition	Document "Contrato Tambaú WEG-HISA"
2011			
19/04/2011	Project Activity Implementation	PPA signed	Document "PPA_KLABIN_TAMBAU"
27/10/2011	Keeping CDM Status	Local Stakeholders consultation	
2012			
14/09/2012	Keeping CDM Status	Notification of Progress	https://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html
01/10/2012	Project Activity Implementation	Forecasted Operation Start	
2013			
01/05/2013	Keeping CDM Status	Publication of the PDD for global stakeholders	Forecasted

SHP das Pedras

2008			
02/07/2008	Project Activity Implementation	Issuance of the Previous License	Document "LAP_PEDRAS_FRENTE"
24/07/2008	Project Activity Implementation	Issuance of the Instalation License	Document "LAI0001"
2009			
16/09/2009	**CDM Prior Consideration**	Form to the UNFCCC and CIMGC	E-mail "Re ENC SHPs Tambaú e das Pedras CDM prior consideration (Brazilian CDM Projects)"
18/11/2009	Project Activity Implementation	ANEEL aproves the project design	Document "PED_dsp20094267_Aprova Proj Bas"
2010			
26/05/2010	Project Activity Implementation	Instalation Licence renewed	Document "Ofício 1250 FATMA_LAI_prorrog"
2011			
07/06/2011	Project Activity Implementation	ANEEL aproves the SHP exploration	Document "rea_20112952_PIE"
27/10/2011	Keeping CDM Status	Local Stakeholders consultation	
2012			
14/09/2012	Keeping CDM Status	Notification of Progress	https://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html
2013			
01/01/2013	**Project Activity Starting Date**	Forecasted	SHP Schedule
01/05/2013	Keeping CDM Status	Publication of the PDD for global stakeholders	Forecasted

SHP Rio do Sapo

2006			
19/10/2006	Project Activity Implementation	Issuance of the Previous License	Document "LP09092006_Rio do Sapo_4,10MW"
2007			
06/03/2007	Project Activity Implementation	Renew of the Previous License with 5.8 MW (Installed Power)	Document "LP12722007_Rio do Sapo_5,8MW"
24/07/2007	**Prior Consideration**	Minute from the Board	Minute of the Board on 24/07/2007
22/08/2007	**Project Start Date**	Contract with the generator supplier	Document "Contrato WEG"
21/11/2007	Project Activity Implementation	Aceptance of the new shareholders	Document " Instrumento partic. de cessão de direito" 21/11/2007
2008			
01/02/2008	Project Activity Implementation	Issuance of the Instalation License	Document "LI00272008_Rio do Sapo_5,8MW"
20/06/2008	Keeping CDM Status	Minute from the Board	Minute of the Board on 20/06/2008
11/07/2008	Keeping CDM Status	Quotation for PDD Development services	Letter "solicit_prop"
26/09/2008	Project Activity Implementation	Project Design aproved with 5.8 MW (Installed Power)	Document "RSP_dsp20083608_anui aceite Proj Bas_fins de analise" from ANEEL
2009			
27/03/2009	Keeping CDM Status	Minute from the Board	Minute of the Board on 27/03/2009
18/06/2009	Keeping CDM Status	Contract with PDD Consultant	Document "Contrato"
2010			
25/02/2010	Keeping CDM Status	Minute from the Board	Minute of the Board on 25/02/2010
16/11/2010	Project Activity Implementation	Autorization from ANEEL (as Independent Generator)	Document "RSP_rea20102619_resol autorizativa PIE"
2011			
21/02/2011	Project Activity Implementation	Renew of the Instalation License	Document "LI_59022-2011 PCH Rio do Sapo"
10/05/2011	Keeping CDM Status	Minute from the Board	Minute of the Board on 10/05/2011
25/05/2011	Keeping CDM Status	Quotation with DOE for validation services	Offer from DNV, document "Proposta DNV"
2012			
14/09/2012	Keeping CDM Status	Notification of Progress	https://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html
2013			
01/05/2013	Keeping CDM Status	Publication of the PDD for global stakeholders	Forecasted

The events listed above demonstrate that the CDM was known and that its benefits were considered during the decision process to implement the project activity.

B.6. Estimation of emission reductions

B.6.1. Explanation of methodological choices

The emission reductions of project activity (ER_y) are quantified through the subtraction of project emissions ($PE_{HP,y}$) from baseline emissions (BE_y).

$$ER_y = BE_y - PE_y$$

Where:
ER_y = Emission reduction in year y (tCO_2e/year);
BE_y = Baseline emissions in year y (tCO_2e/year);
PE_y = Project emission from water reservoirs for hydro power plants in year y (tCO_2e/year)

Project emissions *($PE_{HP,y}$)*

According to the methodology ACM0002, for hydro power project activities that result in new reservoirs, project proponents shall account for CH_4 and CO_2 emissions from the reservoir, estimated as follows:

a) If the power density of the single or multiple reservoirs (PD) is higher than 4W/m^2 and lower than or equal to 10W/m^2:

$$PE_{HP,y} = \frac{EF_{Res} \cdot TEG_y}{1000}$$

Where:

$PE_{HP,y}$ Emission from water reservoirs (tCO_2e/yr);
EF_{Res} Default emission factor for emissions from reservoirs of hydro power plants in year y (kgCO2e/MWh).
TEG_y 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 power density of project is greater than 10 W/m^2:

$PE_{HP,y} = 0$

The power densities of the project activity are calculated as follows:

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

Where:

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

Among the three power plants of project activity, “Tambaú” and “das Pedras” have power densities greater than 10W/m^2 and the “Rio do Sapo” has power density greater than 4W/m^2 and smaller than 10W/m^2, as below:

SHP Tambaú, $PD = \frac{8{,}820{,}000 - 0}{206{,}000 - 0} = 42.80$ W/m^2

SHP das Pedras, $PD = \frac{5{,}670{,}000 - 0}{460{,}000 - 0} = 12.32$ W/m^2

SHP Rio do Sapo, $PD = \frac{5{,}760{,}000 - 0}{1{,}005{,}000 - 0} = 5.7$ W/m^2

The reservoir emissions of the SHPs Tambaú and das Pedras are zero. Then, PPs shall estimate the project emissions ($PE_{HP,y}$) due to emissions from the SHP Rio do Sapo reservoir. It is estimated as follows:

$$PE_{HP,y} = \frac{90 \cdot TEG_y}{1000}$$

$$PE_{HP,y} = \frac{90 \cdot 28{,}882}{1000}$$

$PE_{Rio\ do\ Sapo} = PE_{HP,y} =$ 2,599 tCO_2/year

Baseline Emissions *(BE_y)*

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

$$BE_y = EG_{PJ,y} * EF_{grid,CM,y}$$

Where:
BE_y Baseline emissions in year y (tCO_2e/yr);
$EG_{PJ,y}$ Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr);
$EF_{grid,CM,y}$ 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" (tCO_2/MWh).

Energy Generated ($EG_{PJ,y}$)

The project activity is the installation of three new grid-connected renewable power plants/units at sites where no renewable power plants were operated prior to the project activity implementation , thus classified as a Greenfield renewable energy power plants.

The $EG_{PJ,y}$ is based on energy estimative to be annually inputted into the grid by the Project activity, which considers the net electricity generation from the power plants, information provided by ANEEL and Brazilian Mines and Energy Ministry. Then:

$$EG_{PJ,y} = EG_{facility,y}$$

Where:
$EG_{PJ,y}$ Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr);
$EG_{facility,y}$ Quantity of net electricity generation supplied by the project plants/units to the grid in year y (MWh/yr).

$$EG_{PJ,y} = EG_{Tambaú} + EG_{dasPedras} + EG_{Rio\ do\ Sapo}$$

$EG_{PJ,y} =$ 42,924 + 26,280 + 28,882

$EG_{PJ,y} =$98,086 MWh/yr

B.6.2. Data and parameters fixed ex ante

Data/Parameter	$Cap_{BL(Tambaú, das Pedras and Rio do Sapo)}$
Data unit	W
Description	Installed capacity of the hydro power plant before the implementation of the project activity. For new hydro power plants, this value is zero.
Source of data	Project site.
Value(s) applied	0
Choice of data or measurement methods and procedures	Not applicable.
Purpose of data	Calculation of project emissions.
Additional comment	

Data/Parameter	$A_{BL(Tambaú, das Pedras and Rio do Sapo)}$
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	Project site.
Value(s) applied	0
Choice of data or measurement methods and procedures	Not applicable.
Purpose of data	Calculation of project emissions.
Additional comment	

Data/Parameter	EF_{res}
Data unit	kgCO2e/MWh
Description	Default emission factor for emission from reservoirs of hydro power plants.
Source of data	Decision by EB 23, annex 5.
Value(s) applied	90
Choice of data or measurement methods and procedures	Standard value.
Purpose of data	Calculation of project emissions.
Additional comment	Applicable if the power densities of project activity become greater than 4 W/m2 and less than or equal to 10 W/m2.

B.6.3. Ex ante calculation of emission reductions

The baseline methodology considers the determination of the grid emissions factor which the project activity is connected to as the core data to be determined in the baseline scenario. In Brazil, the grid is interconnected though the SIN in a single system[33].

[33] http://www.mct.gov.br/upd_blob/0024/24562.pdf

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

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

STEP 1. Identify the relevant electricity system.

Considering the stated by the "Tool to calculate the emission factor for an electricity system", and the fact that the Brazilian DNA has published the Resolution nº 8 issued on May 26th, 2008, which defines Brazilian Interconnected Grid as a single system that covers all five macro-geographical regions of the country (North, Northeast, South, Southeast and Midwest), the Brazilian electricity system boundaries are clearly defined.

STEP 2. Choose whether to include off-grid power plants in the project electricity system (optional).

Since the Brazilian DNA has made available the emission factor calculation based on information of the grid power plants only, the off-grid power plants are not considered.

STEP 3. Select a method to determine the operating margin (OM).

The method adopted to calculate the operating margin is "Dispatch data analysis OM". The calculation is performed by the Brazilian DNA and made publicly available.

The Dispatch Data emission factor (OM), is summarized as follows:

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

Where:

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

STEP 4. Calculate the operating margin emission factor according to the selected method.

For effect of ex-ante estimation to $EF_{grid,OM-DD,y}$ value, was calculated the arithmetic average of 12 months emission factors of the operating margin, published by the DNA (data available to year 2012)[34].

Table 10: Emission Factor of Operating Margin for year 2012

OPERATING MARGIN	
Average Emission Factor (tCO_2 / MWh)	
	MONTH

[34] http://www.mct.gov.br/index.php/content/view/74689.html

2012	January	February	March	April	May	June	July	August	September	October	November	December
	0.2935	0.3218	0.4050	0.6236	0.5943	0.5056	0.3942	0.4490	0.6433	0.6573	0.6641	0.6597

Thus, the Emission Factor of Operating Margin is:

$$EF_{grid,OM\text{-}DD,y} = 0.5176$$

STEP 5. Calculate the build margin (BM) emission factor.

The power units included in the build margin are defined by the Brazilian DNA who is responsible for the operating margin and build margin calculations. The results of these are made publicly available in its web site to consultation.

According to the used methodology, the build margin emission factor (BM) is calculated as follows:

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

For the build margin emission factor $EF_{grid,BM,y}$ also will be adopted the 2012 year value published by the DNA (ultimate data available)[35].

Table 11: Latest data from Brazilian DNA to Emission Factor Build Margin (2012)

BUILD MARGIN	
Average Emission Factor (tCO_2/MWh) - **ANNUAL**	
2012	
	0.2010

So, we have that the Build Margin Emission Factor is:

$$EF_{grid,BM,y} = 0.2010$$

STEP 6. Calculate the combined margin (CM) emission factor.

To calculation of combined margin emission factor (combination of operation and build margins) is used a weighted-average formula, considering both w_{OM} and w_{BM} = 0.5. As a conservative approach, below is presented the emission factor calculated using four decimal places, rounded down. Thus, the result is:

$$EF_{grid,CM,y} = 0.5176 \cdot 0.5 + 0.2010 \cdot 0.5 = 0.3593 \ (tCO_2/MWh)$$

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

$$BE_y = EG_{PJ,y} * EF_{grid,CM,y}$$

[35] http://www.mct.gov.br/index.php/content/view/338049.html#ancora

$$BE_y = 98,086 * 0.3593 = 35,242\ tCO_2/yr$$

Moving back to the emission reductions of project activity (*ER*), we have the annual ex-ante estimated CO_2 reductions as:

$$ER_y = BE_y - PE_{HP,y}$$

Where:
ER = Emission reductions in year y (tCO_{2e}/yr)
BE = Baseline emissions in year y (tCO_2/yr)
PE = Project emissions in year y (tCO_{2e}/yr)

Considerening the emissions related to the SHP Rio do Sapo reservoir, the Project activity emissions reductions are calculated as below:

$$ER_y = 35,242 - 2,599 = 32,643\ (tCO_2/yr)$$

B.6.4. Summary of ex ante estimates of emission reductions

To the estimative below was considered the SHP Tambaú generation in 2014 and 2015 (emission reductions from their generation shall be 15,423 tCO_2e/year) and from 2016 the inclusion of SHP das Pedras (reductions of 9,442 tCO_2e/year) and Rio do Sapo (reductions of 7,778 tCO_2e/year). Project emissions are related only to SHP Rio Sapo which has power density below 10 W/m2 (more details in Section B.6.1).

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
2014	15,423	0	0	15,423
2015	15,423	0	0	15,423
2016	35,242	2,599	0	32,643
2017	35,242	2,599	0	32,643
2018	35,242	2,599	0	32,643
2019	35,242	2,599	0	32,643
2020	35,242	2,599	0	32,643
Total	**207,056**	**12,997**	0	**194,059**
Total number of crediting years	7 years, renewable for more 2 periods of 7 years each one.			
Annual average over the crediting period	29,579	1,857	0	27,723

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data/Parameter	$EG_{Tambaú,y}$
Data unit	MWh/yr
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y.
Source of data	Project site - Energy Meters located in a panel inside the Frederico Westphalen substation (one main and one backup)
Value(s) applied	42,924
Measurement methods and procedures	The net electricity delivered to the grid will be checked through the electricity meters (one main and one back-up). Also the electricity delivered from the grid shall be checked through the same meters since they are bidirectionals, class accuracy 0.2. For safety, the meters were sealed after calibration.
Monitoring frequency	Continuous measurement and at least monthly recording
QA/QC procedures	The meters must comply with national standards stated by ONS module 12.2 (which can be viewed through the link http://extranet.ons.org.br/operacao/prdocme.nsf/principalPRedeweb?openframeset), and industry regulation to ensure the accuracy. These data will be used to calculate the emission reductions. The data will be archived monthly (electronic) and kept archived during the credit period and two years after. The data from the energy meters will be cross checked with the CCEE databank in order to verify the coherency of the data. The periodicity of the calibration will follow the Procedure 12.3[36] of ONS.
Purpose of data	Calculation of baseline emissions.
Additional comment	PP is the responsible for the measurements (check and/or cross check readings)

Data/Parameter	$EG_{das\ Pedras,y}$
Data unit	MWh/yr
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y.
Source of data	Project site - Energy Meters (one main and one backup that shall be located in a panel inside the powerhouse or inside the Palmas substation)
Value(s) applied	26,280
Measurement methods and procedures	The net electricity delivered to the grid will be checked through the electricity meters (one main and one back-up). Also the electricity delivered from the grid shall be checked through the same meters since they are bidirectionals, class accuracy 0.2. For safety, the meters were sealed after calibration.
Monitoring frequency	Continuous measurement and at least monthly recording

[36] http://extranet.ons.org.br/operacao/prdocme.nsf/principalPRedeweb?openframeset

QA/QC procedures	The meters must comply with national standards stated by ONS module 12.2 (which can be viewed through the link http://extranet.ons.org.br/operacao/prdocme.nsf/principalPRedeweb?openframeset), and industry regulation to ensure the accuracy.These data will be used to calculate the emission reductions. The data will be archived monthly (electronic) and kept archived during the credit period and two years after. The data from the energy meters will be cross checked with the CCEE databank in order to verify the coherency of the data. The periodicity of the calibration will follow the Procedure 12.3[37] of ONS.
Purpose of data	Calculation of baseline emissions.
Additional comment	PP is the responsible for the measurements (check and/or cross check readings)

Data/Parameter	$EG_{Rio\ do\ Sapo,y}$
Data unit	MWh/yr
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y.
Source of data	Project site - Energy Meters (one main and one backup installed in an exclusive panel located in the intersection of the transmission line to Itanorte substation)
Value(s) applied	28,882
Measurement methods and procedures	The net electricity delivered to the grid will be checked through the electricity meters (one main and one back-up). Also the electricity delivered from the grid shall be checked through the same meters since they are bidirectionals, class accuracy 0.2. For safety, the meters were sealed after calibration.
Monitoring frequency	Continuous measurement and at least monthly recording
QA/QC procedures	The meters must comply with national standards stated by ONS module 12.2 (which can be viewed through the link http://extranet.ons.org.br/operacao/prdocme.nsf/principalPRedeweb?openframeset), and industry regulation to ensure the accuracy. These data will be used to calculate the emission reductions. The data will be archived monthly (electronic) and kept archived during the credit period and two years after. The data from the energy meters will be cross checked with the CCEE databank in order to verify the coherency of the data. The periodicity of the calibration will follow the Procedure 12.3[38] of ONS.
Purpose of data	Calculation of baseline emissions.
Additional comment	PP is the responsible for the measurements (check and/or cross check readings)

Data/Parameter	$TEG_{Rio\ do\ Sapo,y}$
Data unit	MWh/yr
Description	Quantity of total electricity generation supplied by the project plant/unit to the grid in year y.
Source of data	Project site - Energy Meters (one main and one backup that shall be located in a panel inside the powerhouse)

[37] http://extranet.ons.org.br/operacao/prdocme.nsf/principalPRedeweb?openframeset

[38] http://extranet.ons.org.br/operacao/prdocme.nsf/principalPRedeweb?openframeset

Value(s) applied	28,882[39]
Measurement methods and procedures	The total electricity delivered to the grid and auto consumed in the power plant will be checked through the electricity meter or through the internal loads consumption calculation. The electricity meters (one main and one back-up) can be bidirectionals, class accuracy 0.2.
Monitoring frequency	Continuous measurement and at least monthly recording
QA/QC procedures	These data will be used to calculate the emission reductions. The data will be archived monthly (electronic) and kept archived during the credit period and two years after
Purpose of data	Calculation of project emissions.
Additional comment	PP is the responsible for the measurements (check and/or cross check readings)

Data/Parameter	$EF_{grid,CM,y}$
Data unit	tCO_2e/MWh
Description	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".
Source of data	Based on data provided by DNA (Designated National Authority).
Value(s) applied	0.3593
Measurement methods and procedures	The Combined Margin is calculated through a weighted-average formula, considering the $EF_{grid,OM-DD,y}$ and the $EF_{grid,BM,y}$ and the weights w_{OM} and w_{BM} default 0.5. As per the "Tool to calculate the emission factor for an electricity system".
Monitoring frequency	Annually.
QA/QC procedures	As per the "Tool to calculate the emission factor for an electricity system".
Purpose of data	Calculation of baseline emissions.
Additional comment	To the *ex-ante* estimative of the emission reductions, were used the datas related to the year 2012 (ultimate available datas).

Data/Parameter	$EF_{grid,OM-DD,y}$
Data unit	tCO_2e/MWh
Description	CO_2 Operating Margin emission factor of the grid, in a year y
Source of data	Data provided by DNA (Designated National Authority) to the year y.
Value(s) applied	0.5176
Measurement methods and procedures	According procedures established by the most recent version of "Tool to calculate the emission factor for an electricity system".
Monitoring frequency	Annually.
QA/QC procedures	This data will be annually updated to be applied in ex-post calculation of the Emission Factor of Combined Margin.
Purpose of data	Calculation of baseline emissions.
Additional comment	To the *ex-ante* estimative of the emission reductions, were used the datas related to the year 2012 (ultimate available datas).

Data/Parameter	$EF_{grid,BM,y}$
Data unit	tCO_2e/MWh
Description	CO_2 Build Margin emission factor of the grid, in a year *y*

[39] For ex-ante estimation the TEG is considered equal to the EGfacility.

Source of data	Data provided by DNA (Designated National Authority) to the year *y*.
Value(s) applied	0.2010
Measurement methods and procedures	According procedures established by the most recent version of "Tool to calculate the emission factor for an electricity system".
Monitoring frequency	Annually.
QA/QC procedures	This data will be annually updated to be applied in ex-post calculation of the Emission Factor of Combined Margin.
Purpose of data	Calculation of baseline emissions.
Additional comment	To the *ex-ante* estimative of the emission reductions, were used the datas related to the year 2012 (ultimate available datas).

Data/Parameter	$Cap_{PJ\ –\ SHP\ Tambaú}$
Data unit	W
Description	Installed capacity of the hydro power plant after the implementation of the project activity.
Source of data	Equipments plaques
Value(s) applied	8,820,000
Measurement methods and procedures	Technical specifications on the installed equipments (plaques).
Monitoring frequency	Annual.
QA/QC procedures	Determined based on recognized standards. This data will be applied for the Power Density calculation.
Purpose of data	Calculation of project emissions
Additional comment	

Data/Parameter	$Cap_{PJ\ –\ SHP\ das\ Pedras}$
Data unit	W
Description	Installed capacity of the hydro power plant after the implementation of the project activity.
Source of data	Project Design aproved by the ANEEL through the Dispatch #4267 from 2009.
Value(s) applied	5,670,000
Measurement methods and procedures	Technical specifications on the installed equipments (plaques).
Monitoring frequency	Annual.
QA/QC procedures	Determined based on recognized standards. This data will be applied for the Power Density calculation.
Purpose of data	Calculation of project emissions
Additional comment	

Data/Parameter	$Cap_{PJ\ –\ SHP\ Rio\ do\ Sapo}$
Data unit	W
Description	Installed capacity of the hydro power plant after the implementation of the project activity.
Source of data	Equipments plaques.
Value(s) applied	5,760,000
Measurement methods and procedures	Technical specifications on the installed equipments (plaques).
Monitoring frequency	Annual.
QA/QC procedures	This data will be applied for the Power Density calculation. Determined based on recognized standards.
Purpose of data	Calculation of project emissions
Additional comment	-

Data/Parameter	$A_{PJ\ –\ SHP\ Tambaú}$

Data unit	m^2
Description	Area of the reservoir measured in the water surface, after the implementation of the project activity, when the reservoir is full.
Source of data	Dispatch 2,359 issued by ANEEL on 10 October 2006.
Value(s) applied	206,000
Measurement methods and procedures	Third party companies will be hired for the development of topographic surveys and/or satellite image processing.
Monitoring frequency	Annual.
QA/QC procedures	
Purpose of data	Calculation of the project emissions
Additional comment	This data is applied for the Power Density calculation.

Data/Parameter	$A_{PJ - SHP\ das\ Pedras}$
Data unit	m^2
Description	Area of the reservoir measured in the water surface, after the implementation of the project activity, when the reservoir is full.
Source of data	Installation License 476 issued by Environmental Foundation of Santa Catarina state on 24 July 2008.
Value(s) applied	460,000
Measurement methods and procedures	Third party companies will be hired for the development of topographic surveys and/or satellite image processing.
Monitoring frequency	Annual.
QA/QC procedures	
Purpose of data	Calculation of the project emissions
Additional comment	This data is applied for the Power Density calculation.

Data/Parameter	$A_{PJ - SHP\ Rio\ do\ Sapo}$
Data unit	m^2
Description	Area of the reservoir measured in the water surface, after the implementation of the project activity, when the reservoir is full.
Source of data	Installation License Nº 027 issued by Environmental Secretary of Mato Grosso state on 01 February 2008.
Value(s) applied	1,005,000
Measurement methods and procedures	Third party companies will be hired for the development of topographic surveys and/or satellite image processing.
Monitoring frequency	Annual.
QA/QC procedures	
Purpose of data	Calculation of the project emissions
Additional comment	This data is applied for the Power Density calculation.

B.7.2. Sampling plan

Not applicable.

B.7.3. Other elements of monitoring plan

The monitoring plan for the project activity is based on the latest version of the CDM methodology ACM0002 - "*Consolidated baseline methodology for grid-connected electricity generation from renewable sources*", and consists of the monitoring of the electricity generation from the proposed

project activity, the surface area of the reservoirs at their full levels, their CO_2 emissions, the installed capacities of the plants and CO_2 emission factors of the Brazilian grid.

1) Power generation and measurement system - $EG_{facility,y}$ (= $EG_{PJ,y}$):

General characteristics of the measurement system:

The procedures designed for monitoring electricity generation by the project activity follows the parameters and regulations of the Brazilian energy sector. The National Grid Operator (ONS) and the Electric Power Commercialization Chamber - *CCEE* (from portuguese *Câmara de Comércialização de Energia Elétrica*) are the entities responsible for specification of technical requirements for energy measurement system for billing, i.e, these entities monitor and approves projects for accurate accounting of energy.

The agent responsible for the measurement system for billing - *SMF* (from the Portuguese *Sistema de Medição para Faturamento*) develops the project in accordance with technical specifications of the measurements for billing, which should include the location of measurement points, measurement panels , meters and systems for local and remote measurement.

As stated by the sub-module 12.1 of Grid Procedures[40], the SMF is a system composed of main and back-up meters, by the transformers for instrument, communication channels between the agents and CCEE and data collecting systems for billing measures.

"The data stored in the meters are collected by the Energy Data Collecting System – *SCDE* (from Portuguese *Sistema de Coleta de Dados de Energia*) of the CCEE, remotely and automatically, through direct access to agent's meters or intermediated by the Meter Collecting Unit – UCM of the agent."

The measurement system records the energy generated. In this project activity there are six meters to register the generation data (three main meters and three back up). They are installed in panels (one main meter and one back up in each power house or concessionaire's substation). The meters installed will allow PPs to check the energy generated and fed to the grid by each plant. To this system is guaranteed the data inviolability. After the calibration, it is sealed for safety.

Besides electricity measurements performed by PPs, all energy generated by the project activity will be monitored online by the CCEE. The measurement system contains a communication system to send the dispatched electricity data to the CCEE.
CCEE is responsible for monthly readings and keeping the records of the energy dispatched. If any problem happens at the local meter level, the reading lecture corresponding to the amount of energy generated during the time of the problem will not be lost because of the online reading performed by CCEE.

Data monitoring:

The meters readings are used to calculate emission reductions and project emissions. The monitoring steps are as follow:

(1) The data will be measured hourly and recorded monthly;
(2) Spreadsheets containing the electricity dispatched to the grid and consumed by the plant will be generated; CCEE data measured (from CCEE databank – SINERCOM - third part) will be used to cross check the monitored data;
(3) The project owner will provide the generation and consume measurement data and the SINERCOM (restricted access website) generation spreadsheets to the DOE, so it can check the authenticity of declared information.

[40] http://extranet.ons.org.br/operacao/prdocme.nsf/principalPRedeweb?openframeset (access *Módulo 12 -> Sub Módulo 12.1*) from http://www.ons.org.br/procedimentos/index.aspx

(4) The emission reductions, and any project emissions, should be managed by the project manager responsible at Carbotrader;

Quality control:

(1) Calibration of meters:

The calibration of meters shall be conducted by a qualified organization that must comply with national standards and industrial regulations to ensure the system accuracy. After calibration, the meters are sealed for safety and the calibration certificates are archived with other monitoring records. The class of accuracy of the equipment that will be used in the project activity is under the national standards (class 0.2) stated in "*Grid Procedures*" from the National Grid Operator: Module 12, submodule12.2[41].

(2) Emergency treatment

In case of unavailability of measures from any point of measurement, due to maintenance, commissioning or for any other reason, will be used the methodology to estimate data as the item 7.1 of the Procedure of Energy Commercialization – Module 2[42].

Data Management:

All the project activity issues regarding the SHP construction will be treated by the responsible Managers / Directors from Tambaú Energética, Euclides Maciel Energética and Rio do Sapo Energética.

All data gathered in the monitoring range will be electronically filled and kept for at least 2 years after the last crediting period. The emission reductions to be generated will be calculated regularly by the project proponents and kept for the verification phase.

Training Procedures:

All training necessary for the plants operational team shall be provided by the equipments suppliers, during the installation and pre operational phases, and by the PPs during the project lifecycle.
The emergency procedures related to the project activity operation (for instance: workers' safety and health, dam safety related emergency drills/exercises, etc, according to the Brazilian legislation), are included in the training courses that the third party company is supposed to offer.

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

2) **Total electricity produced by the project activity** – ***TEG:***

Total electricity produced by the project activity, considering the electricity supplied to the grid and the electricity supplied to internal loads, in year y. Applicable to hydro power project activities with a power density of the project activity (PD) greater than 4 W/m^2 and less than or equal to 10 W/m^2. As SHP Rio do Sapo has PD of 5.7 W/m^2, this parameter must be monitored to be used at project emission reductions calculation.

3) Emission Factors - $EF_{grid,CM,y}$, $EF_{grid,OM\text{-}DD,y}$ and $EF_{grid,BM,y}$**:**

[41] http://extranet.ons.org.br/operacao/prdocme.nsf/principalPRedeweb?openframeset

[42] http://www.ccee.org.br/portal/wcm/idc/groups/regrasprocedlegis/documents/conteudoccee/ccee_058269.pdf

The CO_2 emission factors related to estimation ex-ante of GHG reductions of this project activity ($EF_{grid,OM-DD,y}$ and $EF_{grid,BM,y}$) as mentioned previously, are the values correspondent to the year 2012 (made available by the Brazilian DNA). It can be viewed at DNA website (http://www.mct.gov.br/index.php/content/view/307492.html). Thus, the monitoring of this data will be ex-post through periodic access to data provided by DNA.

4) Installed capacity – Cap_{PJ}:

The installed capacity of the hydro power plant after the implementation of the project activity will be monitored yearly through one of the following options:

- Technical specifications on the installed equipments;
- Installed plaques in the equipments;
- Factsheets.

In Brazil, the installed capacity of hydropower plants is determined and authorized by the competent regulatory agency. Furthermore, any modification must also be authorized and made available to the public. Thus, any new authorization to increase the installed capacity of the plants will be monitored. It will be used to installed capacity, which is also a recognized standard, to assure the project technical characteristics.

It is also important to highlight that according the ANEEL resolution number 407, issued on 19th October 2000[43], if the present/real installed capacity is greater than +/- 5 % of the authorized (granted) capacity, a revision of the authorized installed capacity should be requested. It must be considered after the total capacity of the plant be installed.

5) Area of the reservoir – A_{PJ}:

After the implementation of the project activity, the area of the reservoir will be measured yearly in the surface of the water, when the reservoir is full. For this purpose, will be used measures from topographical surveys or satellite pictures.

Authority and Responsibility:

The Tambaú Energética S.A, Euclides Maciel Energética S.A and Rio do Sapo Energética S.A are responsible for monitoring equipments maintenance and calibration , compliance to operational requirements and corrective actions related to the functionality of SHP Tambaú, SHP das Pedras and SHP Rio do Sapo respectively. Moreover, the companies have authority and responsibility for registration, monitoring and measurements as well as managing all the issues related to the project activity and to organize staff training to use appropriated techniques in those procedures.

The baseline project emissions and Emissions Reductions calculations will be performed by Carbotrader Assessoria e Consultoria em Energia Eireli which should report the results in a proper way to the entities related with CDM process.

SECTION C. Start date, crediting period type and duration

C.1. Start date of project activity

The start date of the project activity is the first event from the three SHPs implementation timeline. Being the start date of project activity the oldest event that can demonstrate the date at which the implementation or construction or real action of a project activity begins.

Due this the start date of project activity is 22/08/2007 referred to the SHP Rio do Sapo.

[43] http://www.aneel.gov.br/cedoc/res2000407.pdf

This is evidenced through the signature date of the contract to generators equipments supply between Rio do Sapo Energia S.A and WEG company (the first construction event from the 3 SHPs involved in this proposed project activity, more details in the table 9 section B.5).

The other real actions are described below (but they are after the main event cited above):

27/01/2010 is the start date for the SHP Tambaú (evidenced though signature date of the civil contract supply, more details in table 9 section B.5).

01/01/2013 is the start date for the SHP das Pedras (as per SHP construction schedule, more details in table 9 section B.5).

C.2. Expected operational lifetime of project activity

30 years and 0 months.

C.3. Crediting period of project activity

C.3.1. Type of crediting period

Renewable being:
01/01/2014 until 31/12/2020 the First crediting Period.
01/01/2021 until 31/12/2027 the Second crediting Period.
01/01/2028 until 31/12/2034 the Third crediting Period.

C.3.2. Start date of crediting period

The starting date of the first crediting period of the project activity is 01/01/2014 or in the CDM registration date, whichever occur later.

C.3.3. Duration of crediting period

7 years and 0 months renewable for more 2 periods of 7 years and 0 months.

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

The environmental impacts of the project activities as well their mitigation/neutralization actions were studied by the PPs and were delivered to the following entities responsible for the environmental plan auditing with relation to the impacts addressed:

SHP Tambaú – FEPAM – Environmental Agency of the Rio Grande do Sul State
SHP das Pedras – FATMA – Environmental Agency of Santa Catarina State
SHP Rio do Sapo – SEMA – Environmental Agency of Mato Grosso State

The project activity is in compliance with all the laws and regulations required. Thus, the permissions and licenses were issued by the regulatory agencies. The environmental protection agencies of the states where the plants will be installed, on the basis of the environmental legislation and other pertinent norms, forwarded the following environmental licenses to the small hydro power plants of project activity:

SHP Tambaú

- LP N° 0889/2001-DL - Previous License issued on 23 November 2001;
- LI N° 431/2008-DL - Installation License issued on 30 April 2008;
- LO Nº 280/2013-DL-Operation License issued on 14 January 2013.[44]

SHP das Pedras

- LAP 070/08 – Previous Licence issued on 02 July 2008;
- LAI 476/08/CRO – Installation License issued on 24 July 2008.

SHP Rio do Sapo

- LP 1272/2007 – Previous License issued on 06 March 2007;
- LI 59022/2011 – Installation License issued on 21 February 2011.

Moreover, the Electrical Regulatory Agency - *ANEEL* issued the relevant following documents which demonstrate that the regulations have been being obeyed, allowing the process progress of plants installation.

SHP Tambaú

- Dispatch nº 2,359 dated 10 October 2006 – Approves the SHP basic project design;
- Authorizing Resolution nº 1832 dated 10 March 2019 – Authorizes Tambaú Energética S.A to establish itself as independent energy producer.

SHP das Pedras

- Dispatch nº 4,267 dated 18 November 2009 – Approves the SHP basic project design;
- Authorizing Resolution nº 2952 dated 07 June 2011 – Authorizes Euclides Maciel Energética S.A to establish itself as independent energy producer.

SHP Rio do Sapo

- Dispatch nº 1,298 dated 11 May 2010 – Approves the SHP basic project design;
- Authorizing Resolution nº 2619 dated 16 November 2010 – Authorizes to establish as independent energy producer.

There are more details about the environmental impacts in the section D.2 below.

D.2. Environmental impact assessment

The Small Hydro Power plants (SHPs) are considered an alternative for the Brazilian electric matrix diversification. One of its characteristics is to present low negative impacts to the place of installation, when compared to the business as usual in Brazil (large hydro power plants), due mainly to the fact of do not require the flood of large land area.

Studies related to the promoted impacts were carried out as part of the process of environmental licenses issuance. Its results are comprised in the reports of prior and installation licenses request.

[44] Also available in: http://www.fepam.rs.gov.br/licenciamento/area3/detalheDocProc.asp?area=3&buscar=2&tipoBusca=processo&processo=195160567117

Its results are comprised in the Environmental Simplified Report - *RAS* (from portuguese *Relatório Ambiental Simplificado*), or correspondent of each plant. Moreover, it has contained a group of activities and programs which have as main goal to minimize the negative effects and to monitor the influences of the plant installation on local water resources.

As stated by the National Environmental Council - *CONAMA (*from Portuguese *Conselho Nacional do Meio Ambiente*) on its resolution number 279 dated of 27th June 2001, the *RAS* must be performed by ventures that present low potential of environmental impacts. It is performed previously the issuance of the Previous License – LP, and only if the enterprise are in accordance to all legal and environmental requirements, the process of licensing carries on, proceeding the necessary steps to acquiring further licenses (Installation License – LI and Operation License – LO).

As the three plants of project activity already have the Previous and the Installation licenses (LP and LI), it is understood that by now, all the constraints necessary were met, and all the impacts caused by project activities were satisfactorily raised and treated, in order to minimize negative effects.

SHP Tambaú

To the SHP Tambaú, the following negative potential impacts were raised: enlargement of natural erosion rates, soil characteristics alterations, forest habitats and faunal habits alterations and people health alterations. As measures to mitigate and monitor these impacts, were implanted the following programs which some of them will be kept permanently running under the project activity: program of ichthyofauna monitoring on in the reservoir area, program of erosion processes control, environmental education program to workers of civil works of the plant and terrestrial fauna monitoring program.

The main impacts of the plant are related to the tunnel excavation which will generate impacts of medium amplitude. The residual material generated for this operations shall be used to dam construction and slopes stabilization and access roads improvement as measures to avoid the need of a waste disposal area.

SHP das Pedras

During the plant implementation phase were raised some environmental impacts which were classified from negligible to medium (relative their importance class). The more significant ones (classified as medium) were the removal of vegetation and the waste generation, which were compensable and mitigable according the RAS of SHP das Pedras. Likewise, in its operation phase were raised some impacts classified as having medium impact potential. They are removal of vegetation, the waste generation and the ichthyofauna alteration. Also in the reservoir filling phase, some medium potential impacts were raised. They are the removal of vegetation, the macrophytes proliferation and the ichthyofauna alteration.

To all these impacts raised (also to the lower potential impacts) were purposed mitigation actions and programs. They are the program of monitoring and control of aquatic ecosystems, the program of terrestrial ecosystems alterations control, the program of degraded areas rehabilitation, the program of waste management, among others.

SHP Rio do Sapo

In the implementation phase, the relevant negative impacts are due to the following main activities: removal of vegetation on the area of reservoir, power house area and part of the region of dam axis, natural topography conditions alterations, river diversification and reservoir filling.

To prevent, to mitigate and to compensate the negative impacts that could occur during the installation works of SHP Rio do Sapo are indicated measures of environmental education,

environmental control during the civil works and rehabilitation of degraded areas, monitoring of water quality, monitoring and rescue of fauna, maintenance of ecologic flow of the river, epidemiologic and environmental vigilance activities at the civil work sites and archaeological prospection.

These measures which will allow to prevent and to monitor the environmental impacts identified during the diagnosis phase, are organized in 12 programs. Some of them are the Environmental management and civil works protection, limnological and water quality monitoring, Erosion control, environmental education of civil workers, Social communication, faunal rescue, among others.

All the environmental control and impact mitigation measures highlighted to the three plants are constraints to issuance of Operation License and its maintenance. The impacts raised during the studies phase must be monitored and reported periodically to the environmental agency of the state where the venture is installed on, which is responsible for the regulation of the activities that involve natural resources exploitation. The attendance of requirements of these regulation agencies are documented at the licenses issued and its compliment are revised before the renewal of the licenses (installation or operation licenses).

SECTION E. Local stakeholder consultation

E.1. Modalities for local stakeholder consultation

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

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

- Government of each State or Federal District involved;
- Legislative Assembly of each state involved, or, in the case of the Federal District Legislative Assembly;
- Federal environmental agency;
- State environmental agencies involved;
- Brazilian Forum of NGOs and Environmental and Development Social Movements;
- State Prosecutors Office;
- National Prosecutors Office;
- Community associations;
- State environmental body;

And additionally was delivered to the entities below:

- City Hall and City Councils;
- Municipal environmental bodies.

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

1) City Hall of Erval Seco
2) City Hall of Redentora
3) Environmental Secretary of Erval Seco
4) Environmental and Agricola Secretary of Redentora
5) City Council of Erval Seco
6) City Council of Redentora
7) FEPAM – Environmental Agency of Rio Grande do Sul State

8) Rural Workers Union of Redentora
9) Rural Workers Union of Erval Seco
10) State Public Attorney of Rio Grande do Sul
11) Federal Public Attorney of Rio Grande do Sul
12) Prosecutor's Rio Grande do Sul
13) Government of Rio Grande do Sul
14) Environmental Secretary of Rio Grande do Sul State
15) Legislative Assembly of Rio Grande do Sul
16) City Hall of Água Doce
17) City Council of Agua Doce
18) Department of Industry, Trade and Urbanism of Água Doce
19) FATMA – Environmental Agency of Santa Catarina State
20) Chamber of Shopkeepers of Água Doce
21) Rural Workers Union of Água Doce
22) Federal Public Attorney of Santa Catarina
23) Prosecutor's Santa Catarina
24) State Public Attorney of Santa Catarina
25) Government of Santa Catarina
26) Santa Catarina Secretariat for Sustainable Economic and Development
27) Legislative Assembly of Santa Catarina
28) City Hall of Tangará da Serra
29) City Council of Tangará da Serra
30) Environmental Secretary of Tangará da Serra
31) Industrial and Enterprise Association of Tangará da Serra - ACTIS
32) Rural Union of Tangará da Serra
33) Federal Public Attorney of Mato Grosso
34) Government of Mato Grosso
35) State Public Attorney of Mato Grosso – Procuradoria Geral
36) SEMA – Environmental Agency of Mato Grosso State
37) Legislative Assembly of Mato Groso
38) Brazilian Forum of NGOs and Environmental and Development Social Movements (FBOMS)
39) Ministry of Environment - Climate Change and Environmental Quality Department
40) Ministry of Environment - Environment Minister

The above stakeholders were invited to present their concerns and provide comments on the project activity during a period of 30 days after receipt of the invitation letter .

E.2. Summary of comments received

One comment was received during the Global Stakeholder consultation. In fact was listed 13 recommendations that is generally valid for any other proposed project activity, being:

1) DOE to ensure that the PDD values are consistent and ensure that the CDM project is a genuine project.
2) DOE to check the Detailed Project Report and Feasibility Report which is submitted to the other agencies and Banks by Project owner and ensure that the values match with the DPR/FR submitted to DOE also.
3) Careful study must be done so that the DPR/FR is not in different versions made and submitted with different purposes to different agencies, which is totally unacceptable, illegal and unethical.
4) Project owner should show some undertaking letter from bank manager to DOE stating that both DPR's are same. These kinds of letters should not be accepted and entertained by DOE at face value, but must be checked independently. While collecting the DPR/FR from banks and other agencies, all DPR/FR pages should be counter signed by Banks and other agencies so that the real DPR/FR given to other parties by the PP/Consultant is same as the one submitted to DOE.
5) DPR/FR values must be probed fully. DOE must take a written undertaking from the PP/Consultant about the list of parties to whom this DPR/FR is submitted and for what purposes. Then DOE should cross

check with all the parties and confirm that the same DPR/FR is submitted to all the parties correctly without any changes. DOE must not accept any reports and undertakings from PP/Consultant. DOE must make independent evaluation and use totally different parties without informing the PP or Consultant to cross check the facts.

6) DOE to write to the party who prepared the DPR/FR which is submitted to the banks and other agencies and the same is verified against the one submitted to the DOE by PP/Consultant.

7) DOE must not entertain this project any more if found the DPR/FR is tampered with at any point in time. PP cannot give different DPR's and FR's. They must submit only the one given to Banks and other agencies while obtaining loans and decision making time.

8) Has the PP considered the CDM revenues while envisaging the project? Without CDM the project was not viable, is it right? This project is having a debt component? Then how bankers or lenders gave the loan? Have the bankers or lenders considered the CDM revenues while agreeing to give loan to this projects? If not this project should be rejected right away by DOE by terminating the contract forthwith. If yes, where is the proof? What is the date of the evidence document from bank? Is this document printed now a days or earlier. DOE to independently check the same. If the document is available from Bank it must be checked from all angles so that it is genuine and not forged and date changed by putting back dated. This is normally done, DOE to be aware of this please. Please check the communication the PP had during that time with banks, emails and postal receipts and the weights and dates mentioned on the receipts. Do not believe in courier bills and receipts since these can be cooked up easily. Insist on government owned postal service receipts only. If the project is fully equity project then on what basis the PP has invested full equity in to the project while considering the CDM revenue? DOE to check the same in detail and bring out the facts. Is there any past record of this PP to invest or not to invest at returns what he is talking about in this project? Proper evidences must be reviewed and digged out by the DOE and take decision on the project based on established facts. Do not ask documents from PP, DOE to collect the same from different sources to do independent evaluation.

9) Is the project equipment purchased second hand equipment or sourced from cheap foreign sources? If yes, the issue must be probed by DOE since invoices will invariably be inflated and forged. Total project costs mentioned by PP will not be the same as originals. Hence no additionality. These facts must be probed in full by DOE by checking all documents and money transactions along with bank statements and certified accounts by a legally acceptable financial analyst.

10) From DOE side which auditor has done marketing and business development for acquiring this business of validating this project? With whom he or she was co-ordinating at PP or CER buyer? The same person who has done the marketing and business development to acquire the business do validation or participate in any manner what so ever in the validation process? One cannot do like that. It is against the accreditation rules and norms followed since ages. DOE should send auditors from different offices or countries to do this validation audit. DOE must take care of impartiality and accreditation rules. Due to the targets set by the DOE managements auditors are doing marketing and meeting clients and giving promises that the project will be taken care. Is it acceptable and fair? This must be stopped. No auditor should do marketing. Only non-auditing staff should do marketing. DOE to ensure the same please.

11) If applicable only: Is these machines, equipment was a part of any bundle of CDM activity envisaged and developed earlier. DOE to check the same through independent sources also. Once some bundles are non-additional and getting negative validation from a DOE, PP is rolling out the same project as an individual project which is not a CDM project at all. DOE to verify the same from independent sources and also take undertaking in the form of an affidavit from the PP's that any misrepresentation or false statement with respect this would attract strict legal action from UNFCCC and DOE. Furthermore the registered project must be de-registered in case of any future findings contradicting the submissions made by the project owner.

12) DOE to be more careful so that this is a genuine CDM project. What is the exact project cost? The project cost is covering what? Each value considered must be validated with proof. The machinery is second hand purchased or fresh and new from an OEM? In either case DOE to check all the quotations, proposals, purchase orders, invoices, way bills, transport bills, proof of payments like bank statements. DOE to check with banks by way of written confirmation the amount transacted, to whom the money is paid, when the money is paid, is the party paid is the correct party as shown in the purchase orders. It may so happen that the values, party names, dates are fabricated and misrepresented in this project. DOE should terminate their contract for this project immediately. This is the only way out to protect the value of CDM process. If the PP is purchasing second hand or second quality equipment and inflating the purchase order values and invoices, this must be probed thoroughly and real values to taken for additionality calculation. Then I'm sure the additionality is not there at all in such a situation.

13) How is the base line defined in this project? Is Base line hypothetically defined with no proper evidences and proper justification? In such case, DOE cannot take the base line as suggested by the PDD. Please check that there are real emission reductions beyond the real and factual base line. It may so happen that this project qualifies for no CER's. DOE cannot assume values and things as giving by this PP. Whatever values are considered throughout the project in all documents including the real DPR (not the one prepared for CDM, the one given to the banks and others), they must be validated, verified and double

checked. Do not ask PP for DPR. Ask the parties who have been given DPR by the PP. Get directly from the bank and others by each page of the DPR and Feasibility report signed. Such document can be considered as a real DPR or FR. UNFCCC CDM process cannot be degraded by fabricating and misinterpreting the project base line and additionality.

E.3. Consideration of comments received

The PPs accepted the recommendations and delivered to the DOE the applicable evidences that fulfil accordingly the suggestions provided. Also delivered to the DOE 13 answer over the recommendation provided, being:

1) The DOE assessment over this recommendation shall be done during the validation phase. Also be informed that the PDD (included all the information contained and support documents) is based on the CDM rules and references.
2) The DOE assessment over this recommendation shall be done during the validation phase. Also be informed that the PDD (included all the information contained and support documents) is based on the CDM rules and references. Additionally the DPR/FR already fulfil this recommendation.
3) The DOE assessment over this recommendation shall be done during the validation phase.
4) The DOE assessment over this recommendation shall be done during the validation phase. Also be informed that the PDD (included all the information contained and support documents) is based on the CDM rules and references. Additionally the DPR/FR already fulfil this recommendation.
5) The DOE assessment over this recommendation shall be done during the validation phase.
6) The DOE assessment over this recommendation shall be done during the validation phase.
7) The DOE assessment over this recommendation shall be done during the validation phase.
8) The DOE assessment over this recommendation shall be done during the validation phase. In this project activity the CDM Prior Consideration is fulfilled according to the CDM guidelines. Also the PP considered the CDM revenues for the project activity implementation.
9) The equipments were purchased as new, the evidences will be provided to the DOE. Also a local visit shall be done.
10) The DOE is a foreign company included the auditors responsible. Also is accredited by the UNFCCC and by our DNA to do this kind of validation.
11) The machines and equipments aren´t part of any bundle of CDM activity. We agree about de-registration in case of no fulfilment of this requirement.
12) All of the suggestions above shall be addressed by the DOE during the validation phase.
13) All of the suggestions above shall be addressed by the DOE during the validation phase.

By this way is granted that the DOE assessment over the recommendation received will be followed during the validation phase. Also was informed to them that the PDD and all the information contained / support documents was already based on the CDM rules and references (pointed that the proposed project activity is a genuine project, was detailed the feasibility and baseline, the equipments are new).

SECTION F. Approval and authorization

The Letter of Approval was obtained before the CDM Executive Board project request for registration on 13/02/2014 (issued by Brazilian Host Party).

Appendix 1. Contact information of project participants

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Appendix 2. Affirmation regarding public funding

There is no Kyoto Protocol Annex 1 country public fund financing this project activity

Appendix 3. Applicability of methodologies and standardized baselines

No further information.

Appendix 4. Further background information on ex ante calculation of emission reductions

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

The ex ante emission reductions are calculated according to the "**Tool to calculate the emission factor for an electricity system**". With this methodology the National Grid Operator (ONS) is tasked with explaining the SIN (National Interconnected System) operational practices regulated by the ANEEL (Brazilian Electricity Regulatory Agency) to the work group made up by the Ministry of Science and Technology (MCT) and Ministry of Mines and Energy (MME). According to this system, the CO2 Emission Factors applicable to the project activity will be calculated by the National Grid Operator (ONS) for the single system since 27th May 2008.
The latest available data of the Brazilian grid emission factor used on emissions reductions calculations is available in the link: http://www.mct.gov.br/index.php/content/view/338047.html#ancora

Appendix 5. Further background information on monitoring plan

The monitoring of the project activity is based on the baseline methodology and monitoring applicable to this project and, as described in items B 7.1 and B 7.3., the metering equipments of generated energy is used for verification of renewable energy generated by the project activity.

After energy generation data has been collected, there will be a reconciliation of this data with the reports/data issued by the CCEE. We emphasize that the energy data from CCEE are audited by this entity and must not contain errors. This procedure will be adopted in order to give consistency to the data.

It should be noted that all collected data in the monitoring scope will be electronically filed and kept for at least 2 years after the last credit period or the last issuance of CERs for this project activity, whichever occurs later.

This monitoring plan is based on the Large Scale Methodology ACM0002 – **"Consolidated baseline methodology for grid-connected electricity generation from renewable sources"**, as well as on the "**Tool to calculate the emission factor for an electricity system"**.

Appendix 6. Summary report of comments received from local stakeholders

Not applicable.

Appendix 7. Summary of post-registration changes

The turbines installed for SHPs Tambaú, das Pedras and Rio do Sapo has characteristics different from the originally specified in the registered PDD. Due this the current turbines characteristics were adjusted accordingly in the Section A.3. Tables 1, 2 and 3.
Also the installed power capacity of SHP das Pedras was adjusted from 5.60 to 5.67 kW.
And the meters localization ($EG_{riodosapo,\ y}$) of the SHP Rio do Sapo was described accordingly (meters located in an exclusive panel located in the intersection of the transmission line to Itanorte substation).
The calibration frequency was updated to be in accordance with the national regulations.

Document information

Version	*Date*	*Description*
10.1	28 June 2017	Revision to make editorial improvement.
10.0	7 June 2017	Revision to: • Improve consistency with the "CDM project standard for project activities" and with the PoA-DD and CPA-DD forms; • Make editorial improvement.
09.0	24 May 2017	Revision to: • Ensure consistency with the "CDM project standard for project activities" (CDM-EB93-A04-STAN) (version 01.0); • Incorporate the "Project design document form for small-scale CDM project activities" (CDM-SSC-PDD-FORM); • Make editorial improvement.
08.0	22 July 2016	EB 90, Annex 1 Revision to include provisions related to automatically additional project activities.
07.0	15 April 2016	Revision to ensure consistency with the "Standard: Applicability of sectoral scopes" (CDM-EB88-A04-STAN) (version 01.0).
06.0	9 March 2015	Revision to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Make editorial improvement.

Version	*Date*	*Description*
05.0	25 June 2014	Revision to: • Include the Attachment: Instructions for filling out the project design document form for CDM project activities (these instructions supersede the "Guidelines for completing the project design document form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from F-CDM-PDD to CDM-PDD-FORM; • Make editorial improvement.
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b.
04.0	13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03.0	26 July 2006	EB 25, Annex 15
02.0	14 June 2004	EB 14, Annex 06b
01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.

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