CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
VERSION 03 - IN EFFECT AS OF: 28 JULY 2006

CONTENTS

Annexes

SECTION A. General description of project activity

A.1 Title of the project activity:

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Passos Maia CDM Project.

PDD Version number: 03

Date: July, 25th 2011.

A.2. Description of the project activity:

The Passos Maia CDM Project (hereafter called Passos Maia Project) consists on the supply of clean hydroelectric energy to the Brazilian National Interconnected System (SIN) through the implantation and operation of the Small Hydro Power Plant (SHP) Victor Baptista Adami[1], with 25MW of installed capacity, located in the state of Santa Catarina, Southern Region of Brazil, using a small reservoir of 1.75km², with low environmental impact.

The main objective of the Passos Maia project is helping to attend the growing demand for energy in Brazil, due to the country's economical and population growth, supplying clean and renewable energy, contributing, thus, to the environmental, social and economical sustainability, by increasing the participation of renewable energy towards the national energetic matrix.

The baseline scenario is the same scenario existing before starting the project activity implementation because the electricity delivered to the 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 calculations described in the "Tool to calculate the emission factor for an electric system".

The project activity reduces the emissions of greenhouse gases (GHG), avoiding the generation of electricity through sources of fossil fuels with consequent CO_2 emissions, which would be produced if the project would not exist. In the absence of the project activity, the presence of thermoelectric plants in the National Interconnected System would cause GHG emissions. The supply of clean and renewable electricity will bring an important contribution to environmental sustainability, reducing the emissions of carbon dioxide taking place in the absence of this project.

Through the following actions, Passos Maia project contributes to the sustainable development once contributing to the economic growth without compromising the future generations, respecting the concept of Sustainable Development, established by Brundtland Report, elaborated by the World Commission on Environment and Development, which defines the term "sustainable development" as "the development that satisfies the present necessities, without compromising the capacity of future generations of supplying their own necessities"

(a) Through the Project, clean and renewable energy will be dispatched to the Brazilian National Interconnected System, promoting immediate electricity supply for the Brazilian South Region and for the whole country, displacing possible entrepreneurships that would generate energy through the burning of fossil fuels, avoiding, thus, the emission of pollutant gases to the atmosphere and preserving the environment to future generations. The improvement of the supply system as a whole is necessary due to the growing energy demand that is being registered in the country, due to the increase of the domestic consumption and the necessity to expand the industrial park. This improvement will contribute for regional development raising better conditions for, for example, service sector and industry implementation, reflecting in job creation and expansion of the population income.

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[1] During the validation process, on June 03th 2011, National Agency of Electric Energy (ANEEL) approved changes in the name of the SHP. The former name was Small Hydropower Plant Passos Maia. From June 03th, 2011, SHP started to be named as SHP Victor Baptista Adami.

(b)During the infrastructure works planning and mobilization, it begins the expansion process of jobs and income creation linked to the enterprise, with the increase of more financial resources to the local economy. Consequently, the enterprise will trigger employment generation in direct and indirect ways. The direct ways are related to the implementation and operation phase of the SHP, towards the immediate absorption of the local workforce. In indirect ways, by the increase of the purchasing power and consequent increase of the goods and services consumption, stimulating the regional and local economy. The implementation jobs of the PCH are going to take approximately 18 months, and will demand, an average of 180 workers of which approximately 85% will be local workers.

(c) Besides Passos Maia project presents low environmental impacts, with the formation of a small reservoir and elevated power density, Passos Maia Energética S.A. will make the reforestation of the adjacent areas to the water collection. This Permanent Preservation Areas (APP) will have at least 30 meters length and will be responsibility of the entrepreneur, ensuring thus, an important place for the development and protection of the flora and fauna. There will be cultivated around 50.000 seedlings with native species, with priority to species at risk of extinction, for the creation of the APP around the reservoir.

(d) For partial or total use of the existent roads and accesses, there will be provided the necessary improvements to ensure the permanent traffic by these roads, including alterations on the engineering, conformation on the platform and drainage works. Thus, local population will be beneficiated with the improvements achieved on the road system due to the easier access to the properties or by enabling the production flow.

(e) In this scenario, the enterprise insertion will be relevant to push the local and regional tourism because the reservoir will offer new leisure and recreation options for the region population. This impact contributes for the life quality improvement of the people of the region.

A.3. Project participants:

Passos Maia S.A. is the owner of Small Hydropower Plant Victor Baptista Adami and is responsible for all activities related to the plant`s implementation and operation. Passos Maia S.A is a specific purpose company, constituted to build and operate the Small Hydropower Plant Victor Baptista Adami. Passos Maia Energética S.A has as shareholders the companies Desenvix S.A and Adami S.A Madeiras. Desenvix is a subsidiary company from Engevix Engineering S.A, created in 1995 to develop new business, particularly in the energy generation area.

Enerbio Consultoria Ltda-ME advises Passos Maia Energética S.A. to develop CDM Project and to monitor the CERs to be generated from the Passos Maia Project.

The table 1 below represents the parties and entities involved in the Passos Maia Project.

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

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Brazil (host)	Private Entity: Passos Maia Energética S.A. Private Entity: Enerbio Consultoria Ltda-ME	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		

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

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party (ies):

Brazil.

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

Region: South of Brazil

State: Santa Catarina.

A.4.1.3. City/Town/Community etc:

Municipality of Passos Maia.

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

The powerhouse of SHP Victor Baptista Adami is located on Chapecó River, on the Uruguai River Basin, in the municipality of Passos Maia, State of Santa Catarina, South Region of Brazil, on coordinates 26° 42' 12" South Latitude and 51° 55' 7" West Longitude. The table below shows some socio-economic indicators of the municipalities where the SHP Victor Baptista Adami is located:

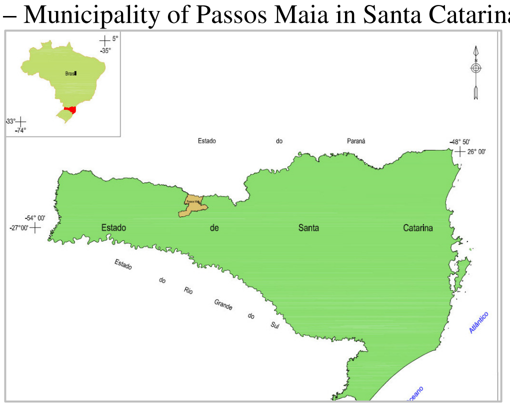
Table 2 – Socio-Economic indicators of municipalities where the SHP Victor Baptista Adami is located

Municipality	Total Population (2006)	Area (km^2)	Anual GDP per capita (2004)
Passos Maia	4,555	614	R$ 8,993

*Data Source: Instituto Brasileiro de Geografia e Estatística (IBGE)
Available at: http://www.ibge.gov.br/cidadesat/topwindow.htm?1

The map below shows the localization of SHP Victor Baptista Adami in Santa Catarina State, and the small map at the superior left corner shows the localization of Santa Catarina State in Brazil.

Map 1 – Municipality of Passos Maia in Santa Catarina State



The satellite picture above shows the localization of SHP Victor Baptista Adami in Chapecó River:

Map 2 - Localization of SHP Victor Baptista Adami in Chapecó River.

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

Sectorial Scope 1 – Energy Industries (Renewable Source)

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

SHP Victor Baptista Adami will use the Chapecó River's hydraulic potential to supply electricity. The SHP Victor Baptista Adami is a run-of-river hydroelectric power plant with a small reservoir of 1.75 km^2.

According to the methodology ACM0002, version 12.1.0, 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 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 table below shows the summary of the technical parameters of SHP Victor Baptista Adami.

Table 3: Technical characters of SHP Victor Baptista Adami

Technical Characters	SHP Victor Baptista Adami
Installed Capacity (MW)	25
Reservoir Area (km^2)	1.75
Assured Energy (MW)	14.3
Plant Load Factor	0.57
Expected yearly energy generation (MWh)	125,268
Turbines	
Quantity	2
Type	Francis –Horizontal Axle
Nominal Unitary Capacity	12.886
Embankment	
Type	RCC/ Rockfill with argil nucleus
Power House	
Type	Half-sheltered

According to "Guidelines for the reporting and validation of plant load factors – version 1": The plant load factor shall be defined ex-ante in the CDM-PDD according to one of the following three options:

(a) The plant load factor provided to banks and/or equity financiers while applying the project activity for project financing, or to the government while applying the project activity for implementation approval;

(b) The plant load factor determined by a third party contracted by the project participants (e.g. an engineering company).

The plant load factor was calculated by third party engineering company contracted by Project Owner. Plant load factor was defined by assured energy (MW) divided by installed capacity (MW).This number is available at page 96 of the Engineering Consolidated Basic Project.

The baseline scenario is the same scenario that existed before the beginning of the project activity implementation. As it will be described in B.5 section (step 4), there are, according to ANEEL[2], the following number of energy generation enterprises in operation in Brazil (country where the Passos Maia Project is located):

- *328 Hydro Power Plant Central Generation (CGH) (Installed capacity less than 1 MW);*
- *388 Small Hydro Power Plant (PCH) (Hydro Power Plants with Installed Capacity higher than 1 MW and less than 30 MW);*
- *173 Hydro Power Plants (installed capacity higher than 30 MW);*
- *50 Wind Power Plant (EOL);*
- *04 Solar Power Plant (SOL);*
- *1,399 Thermal Power Plant (UTE);*
- *02 Thermonuclear power plant (UTN).*

In the plant, there is one meter for different physical magnitudes including energy measurement that measures the gross energy generated every hour and it is possible to access it to rescue the present and the old generation registers.

For measuring the net energy there are two meters, one principal and other back-end (in case the principal meter fails), located in the substation Palma, owned by COPEL (Energy company from Paraná state), located in the municipality of Palmas in Paraná state.

CO_2 is a greenhouse gas involved in the project activity. The CO_2 emissions arising from electricity generation in fossil fuel power plants are the emissions sources that will be replaced due to the project activity.

Equipments and technologies to be employed in the project will be developed in Brazil and have already been successfully applied to similar projects in the country and around the world. The technology applied is well established in the sector. Francis turbine is widely used in Small Hydropower Plant (SHP)[3]. The average lifetime of this equipment is thirty years, according to manufacturer's specification. Passos Maia will have two generators with nominal unit capacity of 13.900 kVA; nominal performance of 97.3% and rotor weight of 350 kN.

The caracteristics of generators used in SHP Victor Baptista Adami is synchronous, three phases, horizontal axis, used according standards NBR 5117 and NBR 5052.25/14,3.

The enterprise implantation will also be responsibility of national companies, providing, therefore, development and employment of national workforce. The engineering project was approved by regulatory agents of Brazil (ANEEL and MME). It was also approved by environmental agents through environmental licensing. This process avoids project avoids the risks to different ecosystems. The whole process of approval that this project activity was submitted assures that Passos Maia Project comprises the application of environmentally safe and sound technology and knowhow.

No technology or know-how will be transferred to the Host Party.

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[2] Source: http://www.aneel.gov.br/aplicacoes/capacidadebrasil/capacidadebrasil.asp . Accessed in 31/01/2011.

[3] Atlas Electric Power in Brazil. 1rd Edition, ANEEL, 2002. Page 23 and 24.

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

Using the baseline emission factor calculated as presented on the item B.6.1, the complete implementation of the Passos Maia Project will generate a annual average reduction estimated in **20,479 tCO_{2e}** and a total reduction of **143,153 tCO_{2e}** during the first 7-year-period, described in the table below:

Table 4: Estimation of Passos Maia Project's emissions reduction

Year	Annual estimation of emission reductions (tCO_2e)e
2012	20,479
2013	20,479
2014	20,479
2015	20,479
2016	20,479
2017	20,479
2018	20,479
Total Estimated Reductions (tCO_2e)	143,353
Total Number of Crediting Years	7
Annual average over the crediting period of estimated reductions (tonnes of CO2e)	20,479

Notes:

- EGy and EGbaseline projections were made assuming power plant operation during 8,760 hour per year;
- The electricity generation is projected according to SHP Victor Baptista Adami' s assured energy of 14.3 MW;
- The projection assumed as the starting date of the first crediting period the date of registration on CDM EB, projected to be 01/2012.

A.4.5. Public funding of the project activity:

No public funding for the CDM's project activities was requested from parties involved in Annex I.

SECTION B. Application of a baseline and monitoring methodology

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

- Approved consolidated baseline and monitoring methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources", version 12.1.0.

- Tool for the Demonstration and Assessment of Additionality, Version 5.2.1

- Tool to calculate the emission factor for an electricity system, version 2.1

For more information about the methodology consult the following link:

http://cdm.unfccc.int/methodologies/DB/C505BVV9P8VSNNV3LTK1BP3OR24Y5L

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

The ACM0002, version 12.1.0 "consolidated baseline methodology for grid connected electricity generation from renewable sources" is applicable to grid-connected renewable power generation project activities that install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity.

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

- The project activity is implemented in an existing reservoir, with no change in the volume of reservoir;

- The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emission section, is greater than 4 W/m^2.

- The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m^2.

The ACM0002, version 12.1.0, methodology can be applicable to Passos Maia Project due to the following aspects:

- SHP Victor Baptista Adami is an installation of a new hydro power plant/unit;

- SHP Victor Baptista Adami is a project activity which result in a new reservoir and the power density of the power plant is greater than 4 W/m^2 (and it is also greater than 10 W/m^2), as described in the table 5;

- SHP Victor Baptista Adami does not 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;

- SHP Victor Baptista Adami is not a Biomass fired power plant.

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

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

Where:

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

The table 5 below evidences that SHP Victor Baptista Adami has a power density greater than 4 W/m^2 and also greater than 10 W/m^2.

Table 5: Power Density of SHP Victor Baptista Adami

Item	SHP Victor Baptista Adami
Cap_{PJ}	25,000,000 W
Cap_{BL}	0
A_{PJ}	1,750,000 m²
A_{BL}	0
PD	**14.3 W/m²**

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

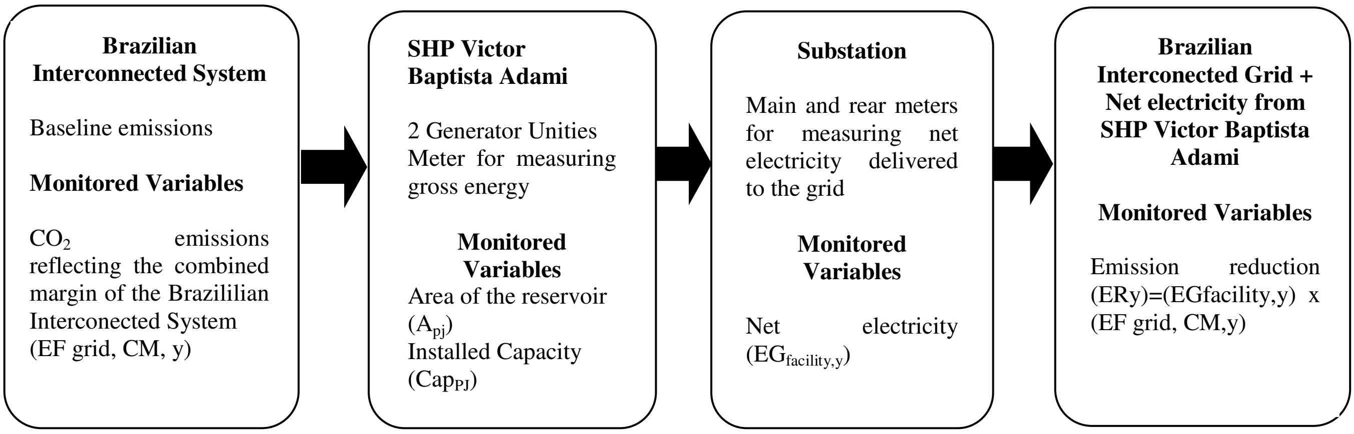
The National Interconnected System (from Portuguese Sistema Interligado Nacional - SIN) is managed by ONS, which is responsible for all activities related to the operation's planning. The ONS traditionally subdivides the National Interconnected System into four subsystems interconnected: the South, Southeast/Midwest,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

Northeast Subsystem. These Subsystems are related to the Brazilian geographic regions: South, Southeast, Midwest, North and the Northeast Region.[4]

Due to the offer's real availability and the consumption behavior in each region, ONS establishes inter-regional energy exchange politics, besides exceptional attitudes to thermal generation dispatch, in case the storage levels of water significantly reduce and tend to violate the security curves. These conditions are permanently monitored and available to the electric industry agents.[5]

According to ACM0002, version 12.1.0, the spatial extension of the project boundary includes the project power plant and all power plants physically connected to the electricity system that the CDM project power plant is connected to. The SHP Victor Baptista Adami is connected to National Interconnected System.

The flow diagram of the project boundaries is the following:



4 Source: Plano Decenal de Expansão de Energia 2019. Ministério de Minas e Energia. Empresa de Pesquisa Energética. 2010. Page 61.

For more information: http://www.ons.org.br/atuacao/index.aspx

5 Source: http://www.ons.org.br/historico/index.aspx. Accessed on February 2011.

For more information: http://www.ons.org.br/home

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

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

Source		Gas	Included?	Justification / Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that is displaced due to the project activity	CO_2	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	No	As described on the item B.2, the SHP Victor Baptista Adami's power density is greater than 10W/m^2, so emissions of CH_4 from the reservoir of this project activity are zero (PE_y=0).
		N_20	No	Minor emission source

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

According to the methodology ACM0002, version 12.1.0, 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 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 combined margin emission factor of National Interconnected System will be calculated, according to the "Tool to calculate the emission factor for an electricity system" approved by the CDM Executive Board.

The CO_2 emission factors for power generation in the National Interconnected System, necessary to Combined Margin (CM) calculation, are calculated based on the generation record of plants centrally dispatched by the **National Operator of the System** (From the Portuguese: Operador Nacional do Sistema - ONS).

It will be, therefore, used the combined margin emission factor for the National Interconnected System to calculate the emission reduction of the project.

This baseline scenario is perfectly applicable to SHP Victor Baptista Adami.

As additional information, it can be noticed, through the projection established by the Ministry of Mines and Energy (MME) in the Decennial Plan of Electrical Energy Expansion[6] for the period of 2010-2019, that other activities and technologies that propitiate a higher emission of greenhouse gases would occur in the absence of this project.

<u>Brazilian Decennial Plan for Electric Energy Expansion (2010-2019)</u>

In 2010, the Ministry of Mines and Energy (MME) elaborated the Decennial Plan for Electric Energy Expansion to the period of 2010-2019. The MME foresees a significant increase in the renewable energy offers, and shows concern to

[6] Source: Ministério de Minas e Energia (MME) [Ministry of Mines and Energy] – Plano Decenal de Expansão de Energia Elétrica 2010-2019 [Decennial Plan for Energy Expansion 2010 - 2019]

implement them. However the Decennial Plan for Electric Energy Expansion for the period 2010-2019[7] projects an increase of approximately 81% in the offer of electric energy based on the mineral coal and 162% based on the oil fuel for the country. The increase predicted for thermoelectric power plant that use fossil fuel is approximately 49%.

Is important to point out that, nowadays in Brazil, there are 10 thermoelectric central generators, operating from mineral coal, totalizing an installed capacity of 1,944 MW, according to the following table[8]:

Table 7: Mineral Coal Thermoelectric Power Plants in Brazil

Usina	**Potência (MW)**	**Estado**
Figueira	20	Paraná
Charqueadas	72	Rio Grande do Sul
Pres. Médici A e B	446	Rio Grande do Sul
São Jerônimo	20	Rio Grande do Sul
Jorge Lacerda I e II	232	Santa Catarina
Jorge Lacerda III	262	Santa Catarina
Jorge Lacerda IV	363	Santa Catarina
Alunorte	103.854	Pará
Alumar	75.2	Maranhão
Candiota III	350	Rio Grande do Sul
Total	**1,944**	

As shows the table below, only two thermoelectric enterprises that generate energy from burning mineral coal are not located in Brazil´s south region (Alumar and Alunorte), where the Passos Maia Project is located.

So, there is the real possibility for thermoelectric power plants to be activated in case the hydropower plants do not fulfill the energy demand, for energy spikes reasons or periods of low raining. Thus, Passos Maia Project can be a collaborator to avoid the construction of thermoelectric power plants and also that one of the thermoelectric power plants to be achieved.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality):

This item is elaborated based on “Tool for the demonstration an assessment of additionality”. This tool describes some steps to be followed to demonstrate and assess the additionality of the project.

The beginning date of the Passos Maia Project is December 21th 2009, when the company responsible for the construction of the project was contracted.

In April 13th 2010, Enerbio Consultoria, company hired by Passos Maia Energética SA to develop the CDM project , informed to UNFCCC and to Brazilian DNA the intention of the project to become a CDM project activity, demonstrating that the CDM was seriously considered in the decision to proceed with the project activity.

[7] Source: Ministério de Minas e Energia (MME) [Ministry of Mines and Energy] – Plano Decenal de Expansão de Energia Elétrica 2010-2019 [Decennial Plan for Energy Expansion 2010 - 2019], Page 82, table 54

[8] Source: Aneel http://www.aneel.gov.br/aplicacoes/capacidadebrasil/OperacaoGeracaoTipo.asp?tipo=4&ger=Combustivel&principal=Carvão Mineral. Acessed in 31/01/2011.

Evidence	Date	Subject
Proposal to develop CDM project submitted by the company Enerbio Consultoria	29th September 2009	Commercial and Technical proposal for Passos Maia CDM Project development sent by Enerbio Consultoria to Desenvix SA
Construction Contract	21th December 2009	Contract for construction of SHP Victor Baptista Adami Project.
Contract established between Desenvix SA and Enerbio Consultoria.	11th January 2010	Signature of the contract established between Desenvix S.A. and Enerbio Consultoria for CDM project development.
E-mails sent to the UNFCCC Secretariat about the intention of SHP Victor Baptista Adami to become CDM project activity.	13th April 2010	SHP Victor Baptista Adami communication of the intention to become a CDM project activity.
Letter sent to the Brazilian DNA about the intention of SHP Victor Baptista Adami to become CDM project activity	13th April 2010	SHP Victor Baptista Adami communication of the intention to become a CDM project activity.
SHP Victor Baptista Adami Schedule	01th January 2012	SHP Victor Baptista Adami commercial operation prevision.

The following requirements are necessary to demonstrate and assess the additionality of the Passos Maia Project:

Step 1. Identification of alternatives to the project activity according to the effective laws and rules:

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

1. The realistic alternatives to the project activity are:

- The continuity of the present scenario, with electricity generation happening according to the current generation composition of the National Interconnected System;
- The construction of a new electricity enterprises, as oil fuel thermal power plants or coal thermal power plants, with similar installed capacity of the SHP Victor Baptista Adami;
- The project activity undertaken without being registered as a CDM Project Activity.

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

Both the project activity and the alternative scenarios are in accordance to the applicable laws and regulamentations. As exposed in item B.4 of this PDD, is in south region were 77% of the mineral coal thermoelectric are located. Particularly, in Santa Catarina, there are approximately 33% of the thermo electrical coal plants of the country.

It is also remarkable that according to what was exposed in item B.4, the Ministry of Mines and Energy projects a growth in the offer of energy generation from mineral coal thermoelectric centrals and that this projection indicates that, until 2019, the capacity to generate energy of the entrepreneurships that dispatch energy from fossil fuels in the country will grow approximately 49%.

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

According to MME [9], "it is the agents of distribution that decide and compromise themselves to pay, through contracts resulting from auctions, amounts of electrical energy coming from new installations of electric energy generation to be delivered (…). With the distributors' information, the generators may then decide which new entrepreneurships of generation they wish to build, presenting in the auctions proposals of selling prices of their electric energy, competing

[9] Ministério de Minas e Energia (MME) [Ministry of Mines and Energy] – Plano Decenal de Expansão de Energia Elétrica 2006-2015 [Decennial Plan for Energy Expansion 2006-2015].

for contracts of energy purchase from distributors. Additionally, the generators may also hire direct and freely with free consumers”.

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

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

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

Step 2. Investment analysis

Determine whether the proposed project activity is not:

(a) The most economically attractive; or

(b) Economically or financially feasible, without the revenue from the sale of certified emission reductions (CERs);

To conduct the investment analysis, the following steps must be used:

Sub-step 2a. To Determine appropriate analysis method

The project generates financial and economic benefits, other than CDM related income, then, it will be used the benchmark analysis to analyse the project activity of Passos Maia Project.

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

It will be used the equity internal rate of return (IRR) as a project financial indicator, because it is one of the most commonly and appropriate indicator used to analyse equity return in infrastructure projects. As a benchmark, it will be the cost of equity.

Cost of Equity

The Cost of Equity has been calculated as risk free rate plus the country´s risk premium plus a global risk premium for equity investment. This calculation form followed the recommendations for the calculation of the equity cost present in *“Draft tool to determine the weighted average cost of capital (WACC)*” that, although is not approved at the time of preparing the PDD, it shows UNFCCC expects for this project indicator.

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

Passos Maia Energética S.A. considers the project’s cash flow a confidential information and, thus, it will be presented entirely to the Designated Operational Entity which will perform the validation and to any entity linked to the CDM that ask it for the purpose of proving the project’s additionality. However, it will not be available in the PDD.

Adami S.A Madeiras, one of the partners of Passos Maia Energética S.A, received an authorization from ANEEL to explore the hydraulic potential in March 2nd, 2004. The seventh clause of this authorization establishes a concession term of 30 years until March 2nd, 2034. The project became reality from the day when the company responsible for building the project has been hired, in December 21th , 2009 and the investment was initiated only in 2010. This way, the cash flow begins in 2010 and finishes in the end of the conceding period, March 2034.

The assumptions for the cash flow are available for the project validation by the DOE. The following assumptions has been used:

- Electricity price –It has been estimated according to the Power Purchase Agreement – PPA established with CEMIG. The prices are variable in the contract period. This way, the cash flow considers three price ranges in R$/MWh: 160.00/MWh between 2010 and 2015; R$159.00/ MWh in 2016 and R$ 140.00MWh for the rest of the concession period.
- Total gross energy generated yearly: The result of multiplying 8,760 hours (one year) and the hourly average energy generated of 14.3 MW;
- Total amount of investment = **R$ 127,500,000**, as Eletrobras Standard Budget.
- Financing: The company estimates that 70% of the necessary amount for the total investment will be financed by the BNDES, National Bank of Social and Economic Development .The rate estimated for the financing is 9,90% yearly with an amortization term of 14 years according to the information in the BNDES website and previously experienced from the company. The rate interest was based in the Long Term Interest Rate plus 0.9% of basic spread of risk of BNDES plus 3.0% of project risk spread. The maximal risk spread charged by BNDES to this kind of project is 3.57%.
- It was considered that the Bank that will provide the loan will require that project owners keep in a Reserve Account a value equivalent to the sum of the debit service parcel (including principal, interest and other obligations of the contract) to be paid during the next three months. This is a common practice in project finance for electricity projects in Brazil. It was also considered that the Banks will require that during the period when project owners is paying the debt, project owners will not pay more than 25% of the net profits as dividends (which is the minimum dividend obliged by Brazilian regulation). This is also a common practice in the project finance for infra-structure projects. Project owners can demonstrate that with Loan Agreements with BNDES for other projects developed by them in the past and also with minutes of Board Meetings for other renewable energy projects.
- The operational insurance was budget in R$ 100 thousand yearly, based in prior experiences.
- The yearly O&M (Operation and Maintenance) and management cost has been estimated by the company in 2.0% of the project initial investment, according to guidelines for SHP projects elaborated by Eletrobrás. This handbook elaborated by Eletrobrás recommends that this yearly expenses to be estimated in 5% of the total investment amount. Conservatively, this cost has been estimated as 2% of the total yearly investment.
- TUSD (Rate for the distribution system use): R$ 336 thousand per year, evidenced by the ANEEL resolution 826 of 2009 that recommends the payment to the responsible distributor (COPEL) of 50% from the TUSD with a value estimated in R$ 2,24/kW. The CDM Executive Board established in the EB 22 meeting (Annex 03) specific rules to classify and to treat national and/or sectorial policies or regulations that give comparative advantages to less emissions-intensive technologies over more emissions-intensive technologies (e.g. public subsidies to promote the diffusion of renewable energy or to finance energy efficiency programs). Such policies were classified as E- policies. The CDM Executive Board defines that national and/or sectorial policies or regulations under paragraph 6 (b) that have been implemented since the adoption by the COP of the CDM M&P (decision 17/CP.7,11 November 2001) need not be taken into account in developing a baseline scenario (i.e. the baseline scenario could refer to a hypothetical situation without the national and/or sectorial policies or regulations being in place). Through the Resolution 77, of August 18 2004[10] , National Agency of Electric Energy (ANEEL) decided the Distribution System Usage Rate (TUSD) should be reduced by 50% the following type of renewable energy projects: (i) hydro power plants with installed capacity less that 1 MW and (i) wind power plants, solar, biomass, cogeneration and small hydropower plants with installed capacity less or equal to 30 MW. This sectorial policy was established in August 18th, 2004, therefore, it was implemented after 11th November 2001. This financial incentive for small hydropower plants must be excluded from the financial analysis, being adopted the hypothetical situation without the sectorial policies being in place.
- ANEEL Supervision Tax: R$ 42 thousand per year (R$ 335,42/kW installed, according to ANEEL Dispatch 4.778 of December 2008)

[10] ANEEL (2004). Resolução Normativa n° 77, de 18 de Agosto de 2004. Disponível em: http://www.aneel.gov.br/cedoc/ren2004077.pdf. Acesso 27 de Julho 2011.

- ONS Rate: it depends on the necessity of the ONS that changes per year and that are shared by the electric agents. It was estimated, based on previously experiences, in 25% of the ANEEL Supervision Tax, resulting in R$ 10 thousand per year;
- Taxes (PIS/COFINS/CSLL/IR): it follows the Brazilian taxation regime of presumed profit, with the following aliquots:
  - Taxation system: Presumed Profit;
  - PIS: 3% of the gross operational revenue
  - COFINS: 0.65% of the gross operational revenue
  - Income taxes: 25% of 8% of the gross operational revenue
  - Social contribution: 9% of 12% of the gross operational revenue
- Equity IRR calculation follows what it is recommended by the Guidelines for the Assessment of Investment Analysis present in the Tool for this Demonstration and Assessment of Additionality.

Equity internal rate of return resulting from the cash flow elaborated based in the assumptions above is 8,82% per year.

Cost of Equity

Equation 03 of the option 04B of the "Draft tool to determine the weighted average cost of capital (WACC)" was followed:

$K_e = GB + PE_g$ **Equation 2**

Where:
- Ke = Cost of equity.
- GB = Risk Free Rate (Rf) + Country Risk Premium (ERP)
- PE_g = Global Equity Risk Premium

To calculate the cost of equity using equation 2, the parameters used were as follows:

- GB = 3.36% +7.50% = 10.86%.
  - R*f* = 3.36% => Average Rate of Return on U.S. Treasury bond (T-Bond) of 30 years[11] in the past 03 years (2007, 2008 and 2009) prior to preparation of the PDD;
  - ERP = 7.50% => Risk Premium in Brazil, based on data from Moody's, as calculated by Professor Aswath Damodaran[12].
- PE_g = 4.1% => Global Equity Risk Premium is provided by the article "The worldwide equity premium: A smaller puzzle Elroy Dimson, Paul Marsh and Mike Stautun of London Business School[13].

The nominal cost of equity of SHP Victor Baptista Adami is 14.96%. Discounted inflation rate of 2.70%[14], the cost of equity is 11.93%.

On 03th June 2011, after the validation beginning, UNFCCC published new version of the guidance of the investment analysis where an approximate expected return on equity for different project types and host countries is published. These values can also be used as default values. The expected return on equity for electricity projects in Brazil, in real terms, is 11.75% accordingly this guidance. As this is an indication provided by UNFCCC, it was also added to the PDD, despite being published after the PDD publication.

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[11] Based on data from Standard & Poors. Available at http://pages.stern.nyu.edu/~adamodar/. To access it, you should enter the link Updated Date and thereafter on the link "Updated Data and the option "Historical Returns on Stocks, Bonds and Bills – United States". Accessed in July, 19th 2010.

[12] Available at: http://www.stern.nyu.edu/~adamodar/pc/datasets/ctryprem.xls . Accessed in July, 19th 2010.

[13] This article is indicated in Draft tool to determine the weighted average cost of capital (WACC).

[14] Measured by Consumer Price Index (CPI). Available at: ftp://ftp.bls.gov/pub/special.requests/cpi/cpiai.txt . Accessed in July, 19th 2010.

The following table shows a summary comparison between the project financial indicators and the benchmarking:

Table 8: Equity IRR x Cost of Equity

Equity IRR	Cost of Equity	Expected Return on Equity – UNFCCC
8.82%	11.93%	11.75%

The benchmark analysis was used (Option III) and it showed that project's indicator are less favourable than benchmark, then, it can be said that the CDM Project Activity cannot be considered as financially attractive.

Sub-step 2d. Sensitivity analysis

The main variables that might affect the project's finance are (i) the electricity price, (ii) the total amount of investment (iii) the O&M and administration Cost; (iv) assured energy (plant load factor) and (v) the financial cost. Variation on the assured energy reflects the variation of the plant load factor of the plant.

These parameters were chosen to be used in the sensitivity analysis because they are the most important variables that affect the revenues (electricity price and the plant load factor) and the outflows (total amount of investment; O&M and Administrative Cost and the financial cost). In the case of the revenues, these are the unique parameters that can affect it. In the case of the outflows, parameters used represent the higher expenses. Therefore, they can provide higher impact in the cash flow.

The sensitivity analysis considers just the scenarios which contribute to increase the project's financial and economic attractiveness with the objective to confirm how solid the sub-step 2b and 2c's analysis are.

The electricity price and the assured energy (or plant load factor) are the unique parameters that can influence the project revenues. The assured energy has been determined according to the Engineering Basic Project and the electricity price has been defined according to the Power Purchase Agreement. On the electricity price sensitivity analysis, it was considered the increment for the three price ranges. The prices are already defined, but they were included in the sensitivity analysis to avoid any doubt.

The project operational expenses are, in general, taxes and expenses defined by regulators. The O&M and administrative costs can suffer some changes, but, its variation does not influence significantly the IRR. Although it is the higher operational expense, sensitivity analysis proves that this item cannot affect significantly the IRR.

The total investment value represents the most important project cash out flow. In general, SHPs constructions are more costly than what was initially planned due to unpredictable events.

The loan cost is budget as indicated by BNDES, in the website. BNDES is the most used and one of the cheapest financing sources of infrastructure projects in Brazil. Scenario with loan cost minor that what it was budget is very unlikely. All evidences related to these values are supplied to the DOE during the process validation. So, it is unlikely that these items can suffer alterations that contribute with an increase in the financial and economical attractiveness that is not covered by the variation range between 0 and 10%. So, the variation range between 0 and 10% covers more than the probable scenarios.

The table below shows the results for the variation of the principal parameters that may affect the equity cash flow.

Table 09: Sensitivity analysis of the Passos Maia Project

VARIATION ON THE PERCENTAGE OF ELECTRICITY CONTRACTED PRICE		
Projected Situation	**Percentage of the Contracted Price**	**Equity IRR**
0%	**100%**	**8.82%**
+10%	110%	**10.51%**

INVESTMENT VARIATION		
Projected Situation	**Investment (R$ Thousnd)**	**Equity IRR**
0%	**R$ 127,500**	**8.82%**
-10%	R$ 114,750	**10.60%**

O&M AND MANAGEMENT COST VARIATION		
Projected Situation	**Management and O&M cost**	**Equity IRR**
0%	**100%**	**8.82%**
-10%	90%	**9.13%**

ASSURED ENERGY (PLANT LOAD FACTOR)		
Projected Situation	**Assured energy (MW)**	**Equity IRR**
0%	**14.30**	**8.82%**
+10%	15.73	**10.51%**

LOAN COST		
Projected Situation	**Loan cost**	**Equity IRR**
0%	**9.90%**	**8.82%**
-10%	8.91%	**9.09%**

The sensitivity analysis demonstrates that the Passos Maia Project is not financially attractive once the equity's internal rate of return is lower than the reference indicators in all scenarios analyzed.

The tool for demonstration an assessment of additionality indicates that:

"If after the sensitivity analysis is concluded that the proposed CDM project activity is unlike to be the most financially attractive (as per step 2c -8a) or is unlikely to be financially attractive (as per step 2c – 8b), then proceed to Step 4 (Common practice analysis)."

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

Step 3. Barrier analysis

This step will not be considered. **Continue to Step 4**

Step 4. Common practice analysis

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

It is observed that there are in Brazil, country where SHP Victor Baptista Adami is located, entrepreneurships with activities similar to those of the project being proposed.

It follows a summary of the numbers of electricity generation's entrepreneurships in operation in Brazil , according information presented in ANEEL's website:

Table 10 – **Number of electricity generation's entrepreneurships in operation in Brazil.** (Source: ANEEL[15] – Jan/2011)

Type	Quantity
Hydro Power Plant Central Generation (Installed Capacity smaller than 1 MW)	328
Wind Power Plant	50
Small Hydro Power Plant (Installed Capacity Greater than 1 MW and Smaller than 30 MW)	388
Hydro Power Plant (Installed Capacity Greater than 30 MW)	173
Thermal Power Plant	1,399
Total	**2,338**

The table shows that there are similar activities occurring in Brazil, however, this project activity is not prevalent in the country's energy matrix, only 3.03% of installed power of the current electricity matrix (enterprises in operation) in Brazil is small hydroelectric plants, as well as the enterprises of this project.

Differences of installed capacity requires different amount of investments and requires different risks profile. Therefore, the range of installed capacity considered for this analysis is from 12.5 MW (less 50% than the installed capacity of the project) and 30 MW (the threshold for small hydropower plants technology in Brazil).

Among these 388 small hydropower plants existing in Brazil, there are 104 with installed capacity between 12.5 MW and 30 MW. Enterprises with the operation starting date prior June 2004 were also excluded from analysis because they become operational in a different institutional framework.

The law 10,438 of 26th April 2002[16] created PROINFA. PROINFA is a governmental program that seeks to motivate, through the financial point of view, the development of entrepreneurships that make use of renewable technologies, due to the difficulties in financing, in offering guarantees to the finance suppliers and in the necessity of investments considered reasonable to small organizations. This way, the Federal Government tries to motivate projects through differentiated lines of finance, besides the guarantees of minimal revenues through the compromise of establishing Power Purchase Agreements (PPAs), to be firmed with a mixed economy society, Eletrobrás, which will secure to the entrepreneur a minimal revenue of 70% of the energy purchased during the financing period and complete protection to the risks of exposure in the short-term market. The contracts have duration of 20 years and involve selected projects that should start operating until December 2006. Small hydropower plants projects are one of the types eligible to participate in the PROINFA.

Proinfa predicted that all plants that participate in the program should celebrate its contracts with Eletrobrás until June 2004. After that, Small Hydropower Plants, Wind Power Plants and Biomass Plants lost the benefits offered by this program. The end of this program changed the institutional framework for renewable electricity in Brazil. The CDM created in 1997 got into operation in 2005 and it brought financial revenues that can replace part of the benefits created by PROINFA that ceased to exist.

Therefore, project participants considered in the common practice analysis just Small Hydropower Plants that gets into operation after June 2004, because these enterprises were developed under the same institutional framework of the Small Hydropower Plants of this project.

Among these 104 SHPs with installed capacity between 12.5MW and 30 MW, there are only 99 SHPs in the country that had the starting date after June 2004.

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[15] http://www.aneel.gov.br/aplicacoes/capacidadebrasil/capacidadebrasil.asp. Accessed in 31 January 2011.

[16] http://www.planalto.gov.br/ccivil_03/Leis/2002/L10438.htm

As recommended by the sub-step 4.a of the "Tool for demonstration and assessment of additionality", other CDM project activities (Registered project activities and project activities that have been published on the UNFCCC website for stakeholder's comments as part of validation process) should not be included in this analysis.

Among these 99 SHPs, 56 SHPs shall be excluded from the analysis because they are CDM project activities (or they are registered or they have been submitted for stakeholders consultation).

From the 43 SHPs remainder, 38 received financial incentives from PROINFA, therefore these SHPs had accessed to a different to finance and they operated with less risks due to the guarantees of the Federal Government. Passos Maia Projet did not take part into PROINFA and consider, this way, the revenues from the commercialization of certified emission reductions as an important factor to make the investment.

2 other SHPs are self-producers and they don't dispatch energy to the grid, only provide electricity for its investors, or own consumption. They have different characteristics and therefore they cannot be considered similar to the activity of Passos Maia Project.

Therefore, there are just 3 small hydropower plants similar to the project activities.

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

In spite of the existence of projects similar to Passos Maia Project activity in Brazil, it is necessary to establish peculiar characteristics of these entrepreneurships that do not allow them to be configured as a common business scenario in the country.

There are three small hydro plants with similar characteristics to the Project: SHP Sacre 2, SHP Ernesto Jorge Dreher and SHP Salto Três de Maio. The small number of similar activities to the small hydropower plants of this project already shows that without financial incentives these kind of enterprises are not common practice in the country.

SHP Engenheiro Ernesto Jorge Dreher

SHP Engenheiro Ernesto Jorge Dreher has a capacity of 17.47 MW and it is owned by BME – Rincão do Ivaí Energia S / A. This company was founded in 2006 and it is constituted by eight individual investors and three companies, Construtora Metropolitana SA in Rio de Janeiro, Cooperative and Rural Electrification, COPREL in Rio Grande do Sul and Rischbieter Eng. Ind. Ind. Com. Ltda in the state of Santa Catarina. Having a lot of shareholders dilutes financial risk of the project, facilitates credit access and shares the necessity for investment from various investors. This is a different situation of Passos Maia which has two medium companies as shareholders.

SHP Sacre II

SHP Sacre II is property of big private group called "Bertin Group". Bertin Group has 28 productive units in several economic sectors. The group is active in farming, food, biodiesel, cosmetic, leather, dog toy, individual protection equipments, industrial hygiene and cleaning, energy, transport, sanitation and construction. With participation in different economic sectors, the group can mitigate investments risks and also can have access to higher and better financial sources and conditions, comparing to the project owners of this CDM Project.

SHP Sacre II was submitted for CDM (http://cdm.unfccc.int/Projects/DB/TUEV-SUED1188909182.16/view). The project was validated and approved by Brazilian DNA. However, it was rejected by UNFCCC in 28th June 2008. Despite the project had been rejected, the fact that the project was submitted for CDM Cycle shows that project owners were also considering the CDM.

SHP Salto Três de Maio

Project Participants looked for information about this Small Hydropower Plant. The unique information that it was found about the Small Hydropower Plant was that it is located in the North Region of Brazil (Altamira/ Pará) and its installed capacity is 20 MW. The power plant owner is the company Eletricidade Paraense Ltda. The investor and the enterprise does not have website and ANEEL does not provide more information about the project, so it was impossible to find more information about them. As it is expressed in the Tool for the demonstration and assessment of additionality if necessary data/information of similar projects is not accessible for PPs to conduct this analysis, such project can be excluded. Therefore, this project will be excluded from common practice analyses.

As it was exposed, there are just three Small Hydro Power Plants similar to the project activities that are not (I) CDM Project Activities; (II) do not participate in the PROINFA Programa and (III) do not produce electricity to self-consumption. One of this small hydropower plants was excluded of the analysis because PPs did not have access to its information. For the other two SHPs, PPs described essential distinctions between them and small hydropower plants of this project.

The analysis showed that similar activities are not widely observed and commonly carried out without incentives as CDM or PROINFA.

According the "Tool for demonstration and assessment of additionality", "if Sub-steps 4a and 4b are satisfied, i.e. (i) similar activities cannot be observed or (ii) similar activities are observed, but essential distinctions between the project activity and similar activities can reasonably be explained, then the proposed project activity is additional."

"If Sub- steps 4a and 4b are satisfied, i.e.(i) similar activities cannot be observed or (ii) similar activities are observed, but essential distinctions between the project activity and similar activities can reasonably be explained, then the proposed project activity is additional".

SATISFIED/APPROVED – Project is ADDITIONAL

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

According to ACM0002 methodology (version 12.1.0), the emission reduction are calculated as follows:

$ER_y = BE_y – PE_y$ **Equation 3**

Where:

ER_y = Emission reductions in year *y* (t CO_2e/yr)
BE_y = Baseline emissions in year *y* (t CO_2/yr)
PE_y = Project emissions in year *y* (t CO_2e/yr)

<u>BEy Calculation (Baseline emissions in year y (t CO_2/yr)</u>

The baseline methodology ACM0002, version 12.1.0 establishes that baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emission is calculated as follows:

$BEy = EG_{PJ,y} * EF_{grid,CM,y}$ **Equation 4**

Where:

BE_y = Baseline emissions in year y (tCO_2/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)

If the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfield renewable energy power plants), then:

$EG_{PJ,y}$ = EGfacility,y **Equation 5**

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 plant/unit to the grid in year *y* (MWh/yr)

For the ex-ante estimation, it was considered for the variable $EG_{facility,y}$ the SHP Victor Baptista Adami `s assured energy.

To calculate EFgrid,CM,y, it will be used the data supplied by the Brazilian DNA which makes available the data of Dispatch Data analysis operating margin emission factor and the build margin emission factor through using the steps suggested by the tool to calculate the emission factor for an electricity system .

Step 1: Identify the relevant electricity systems

The Interconnected National System is defined as the relevant electric system of the Project Activity, as recommended by Brazilian DNA[17] through the resolution number 08 of 05/2008.

Step 2: Choose whether to include off-grid power plants in the project electricity systems

Project Participants may choose between two options to calculate the operating margin and build margin emission factor:

Option I: Only grid power plants are included in the calculation.
Option II: Both grid power plants and off-grid power plants are included in the calculation.

The option I was chosen, once the OM and BM emission factor is calculated by the Brazilian DNA based in the data from power plants connected to the grid.

Step 3: Select a method to determine the operating margin (OM)

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

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

The method chosen to calculate Passos Maia Project's emission factor was the Dispatch Data analysis OM ($EF_{grid,OM-DD,y}$). This method was chosen following the recommendation of resolution number 8[18] to Brazilian DNA (Designated National Authority). Thus, the data vintage that was chosen to calculate operating margin (OM) for Passos Maia Project is ex-post (mandatory for Dispatch data Analysis).

Step 4: Calculate the operating margin emission factor according to the selected method

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[17] http://www.mct.gov.br/upd_blob/0024/24719.pdf

[18] Source: Designated National Authority. http://www.mct.gov.br/upd_blob/0024/24719.pdf. Accessed on January 2011

The calculation of the operation margin emission factor follows the dispatch data analysis OM emission factor ($EF_{grid,OM-DD,y}$) and it is calculated and defined by the Brazilian Designated National Authority in accordance with the dispatch data of the ONS - National System Operator.

The CO_2 emission factors resulting from the power generation in the Brazilian National Interconnected System (SIN) are calculated based on the generation record of plants centrally dispatched by ONS. The procedures for calculation were elaborated in cooperation between ONS, Ministry of Mines and Energy (MME) and the Ministry of Science and Technology (MCT). For the calculation of the operation and build margin emission factors only plants of the grid are included in the calculation.

Until the moment of preparation of this PDD, it is available information about dispatch data OM emission factor, related to the whole year of 2009 and some months of 2010.

The dispatch data OM emission factor for 2009 will be used for an ex-ante estimation of CERs generation, because they are the most recent data available. All data used to calculate the ex-ante operating margin emission factor are available in the Annex 3 of this PDD.

Step 5: Identify the group of power units to be included in the build margin

The group of power units included in the build margin is based on the generation record of the last plants built, centrally dispatched by ONS.

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

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

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

The option that was chosen by project participants was Option 2 therefore, the build margin emission factor will be updated annually *ex-post*.

Step 6: Calculate the build margin emission factor

The build margin emission factor is calculated by the Brazilian DNA. The procedure for calculation was elaborated in cooperation between ONS, MME and MCT and follows the "Tool to calculate the emission factor for an electricity system"[19]

Data of build margin emission factor for the year 2009 was used for an ex-ante estimation of CERs generation, since they are the latest data available. The data used to calculate the ex-ante build margin emission factor are available in the Annex 3 of this PDD.

Step 7: Calculate the combined margin emission factor

[19] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.pdf. Acessed on January 2011.

The combined margin emission factor is calculated as follows:

$EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}$ **Equation 6**

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

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

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

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

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

According to the methodology adopted, for most renewable power generation project activities, PE_y = 0. However some project activities may involve project emissions that can be significant. These emissions shall be accounted as project emissions by using the following equation:

$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y}$ **Equation 7**

Where:

PE_y = Project emissions in year *y* (tCO_2e/yr)
$PE_{FF,y}$ = Project emissions from fossil fuel consumption in year *y* (tCO_2/yr)
$PE_{GP,y}$ = Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year (tCO_2e/yr)
$PE_{HP,y}$ = Project emissions from water reservoirs of hydro power plants in year *y* (tCO_2e/yr)

For Passos Maia Project $P_{FF,y,}$ $PE_{GP,y}$ and $PE_{HP,y}$ are zero.

Emissions from water reservoir

For hydro power project activities that result in new reservoirs and hydro power project activities that result in the increase of existing 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 project activity (PD) is greater than 4 W/m² and less than or equal to 10 W/m²:

$$PE_{HP,y} = \frac{EF_{Res} * TEG_y}{1000}$$ **Equation 8**

Where:

$PE_{HP,y}$ = Project emissions from water reservoir (tCO_2e/yr);
EF_{Res} = Default emission factor for emissions from reservoirs of hydro power plants in year *y* ($kgCO_2e$/MWh);

TEGy = Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year y (MWh)

(b) If the power density of the project activity is greater than 10 W/m², $PE_{HP,y} = 0$.

As described on the item B.2, the power density is calculated as equation below:

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

Where:

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

As exposed on table 05 of item, B.2, Power density of SHP Victor Baptista Adami is higher than 10 W/m² and $P_{HP,y}$ = 0. Therefore for Passos Maia Project, PEy = 0.

Leakage

No leakage is considered. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (extraction. processing. and transport). These emissions sources are neglected.

Project Emissions Reductions

To summarize, the project emission reductions are calculated based on equation 3 of this PDD, in which PEy is zero (0). Therefore, the project emission reductions are calculated according to equation 4 of this PDD, where
ERy = BEy = $EG_{PJ,y}$ * EFgrid,CM,y

As SHP Victor Baptista Adami is a new power plant, the emission reductions are calculated as the simple product between the quantity of net electricity supplied by the project activity to the grid times the combined margin emission factor, where the operating margin emission factor will be calculated according to the Dispatch Data analysis OM, and the build margin emission factor will be calculated through the option 2 which considers that this emission factor must be updated ex-post. Besides it will be considered 50% for the weights that forms the combined margin emission factor.

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

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

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

B.6.3 Ex-ante calculation of emission reductions:

As described on the item B.6.1, the project emissions reduction will be calculated based on equation 3, where it must be considered PEy as 0 (zero) and Leakage as 0 (zero). Therefore, the project emissions reduction will be calculated according equation 4, as follows:

BEy = $EG_{PJ,y} * EF_{grid,CM,y}$ **Equation 04**

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).

It follows below the description about Passos Maia Project’s emissions reduction calculation.

Calculation of $EG_{PJ,y}$

Table 11 – $EG_{PJ,y}$ Calculation

Period	Passos Maia EGPJ,y
2012	125,268
2013	125,268
2014	125,268
2015	125,268
2016	125,268
2017	125,268
2018	125,268
Total	**876,876**

Assumptions:

- $EG_{PJ,y}$ projections were made assuming power plant operation during 8,760 hour per year;
- The electricity generation is projected according to SHP Victor Baptista Adami' s assured energy of 14.30 MW;
- The projection assumed as the starting date of the first crediting period the date of registration on CDM EB, projected to be 1st January 2012.

Emission Factor Calculation

The table below shows a summary of the main parameters involved on the emission factor calculation:

Table 12: EFgrid,CM,2009 Calculation

Values	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec
$EF_{grid,OM}$	0.2813	0.2531	0.2639	0.2451	0.4051	0.3664	0.2407	0.1988	0.1622	0.1792	0.1810	0.1940
$EF_{grid,BM}$	0.0794											
W_{OM}	0.50											
W_{BM}	0.50											
$EF_{grid,CM}$	0.1635											

The emission factor which will be used for *ex-ante* estimation of emission reduction of Passos Maia Project is 0.1635; which was obtained from data of National Interconnected System supplied by Brazilian DNA.

Observations:

- The most recent information available by Brazilian Designated National Authority for complete years refers to the year 2009;
- The daily data for Operating Margin Emission Factor is available on Annex 3;
- The hourly data for Operating Margin Emission Factor are available on the links: http://www.mct.gov.br/index.php/content/view/303076.html#ancora

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

Table 13 – Ex-ante estimation of Passos Maia Project's Emissions Reduction (tCO_2e)

Year	Total (tCO_2e)
2012	20,479
2013	20,479
2014	20,479
2015	20,479
2016	20,479
2017	20,479
2018	20,479
Total	**143,353**

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

Table 14 – Summary of the ex-ante estimation of emission reduction

Year	Estimation of project activity emissions (tCO_2 e)	Estimation of baseline emissions (tCO_2 e)	Estimation of Leakage (tCO_2 e)	Estimation of overall emission reductions (t CO_2 e)
2012	0	20,479	0	20,479
2013	0	20,479	0	20,479
2014	0	20,479	0	20,479
2015	0	20,479	0	20,479
2016	0	20,479	0	20,479
2017	0	20,479	0	20,479
2018	0	20,479	0	20,479
Total (tonnes of CO2e)	**0**	**143,353**	**0**	**143,353**

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

B.7.1 Data and parameters monitored:

The consolidated baseline methodology for grid-connected electricity generation from renewable sources, version 12.1, must be applied together with the monitoring methodology present into that methodology.

Based on the applied methodology and on what was described on the item B.6.1, there are neither leakage nor project emissions to be monitored. Therefore, the parameters to be monitored are just the parameters presented in this section.

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

All data collected as part of monitoring will be archived and be kept at least for 2 years after the end of the last crediting period. All measurements will be conducted with calibrated measurement equipment according to Brazilian industry standards. 100% of the data will be monitored. The following data and parameters will be monitored:

Data/ Parameter:	**$EG_{facility,y}$**
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 to be used:	Project Activity Site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	The value used was assured energy multiplied by the number of total hours per year 125,268 MWh/yr (14.3 MW * 8760).
Description of measurement methods and procedures to be applied:	Spreadsheets will be used, obtained directly from the electricity meters with information generated hourly. Monthly, the information of generation can be checked by receipt of sales, if it is necessary to do so. Continuous measurement and at least monthly recording will be the monitoring frequency. National standard established by National Operator of the Brazilian Electric System (ONS) for measuring and calibration will be used. ONS Procedures 12.2 and 12.3 will be

	followed. The measurements will be undertaken by measurement area or by outsourced agent. The measurement method is established by ONS; therefore, the accuracy is under Brazilian Standards. Meters are directly connected to the generator unities; therefore, it is expected a high accuracy of the measurement method. Information of net electricity will be cross-checked with reports supplied by CCEE, entity responsible for settlement of power purchase agreements in Brazil. If necessary, the information of electricity generation can also be checked with the sales invoices.
QA/QC procedures to be applied:	The uncertainty level for these data is low. They will be used to calculate the emission reductions and it will be monitored continuously.
Any comment:	

Data/ Parameter:	$\mathbf{EF_{grid,CM,y}}$
Data unit	tCO_2/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 to be used:	*Ex-post* emission factor will be calculated by Enerbio Consultoria through ONS data supplied by Brazilian DNA. The variables $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$ necessary for $EF_{grid,CM,y}$ calculation, will also be monitored and calculated through the Dispatch Data of the National Interconnected System.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	The values of ($EF_{grid,CM,y}$) Combined Margin CO_2 Emission Factor which were used for *ex-ante* estimation of emission reduction of Passos Maia Project is 0.1635 which was obtained from data of the National Interconnected System supplied by Brazilian DNA as described on table 12 on the item B.6.3 and as described on the Annex 3.
Description of measurement methods and procedures to be applied:	As per the "Tool to calculate the emission factor for an electricity system".
QA/QC procedures to be applied:	As per the "Tool to calculate the emission factor for an electricity system". The uncertainty level for these data is low.
Any comment:	

Data/ Parameter:	$\mathbf{Cap_{PJ}}$
Data unit:	W
Description:	Installed capacity of the hydro power plant after the implementation of the project activity.
Source of data to be used:	Installation license emitted by the environmental agency.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	This data was not used to calculate the expected emission reduction. But it can be considered the value of 25,000 W, according the Installation License (LAI n° 011/2010/GELRH) issued by FATMA – Environmental Foundation.
Description of measurement methods and procedures to be applied:	The installed capacity will be monitored annually by ANEEL, environment regulators or by sub-hired companies, according recognized standards. It will be monitored yearly.
QA/QC procedures to be applied:	The uncertainty level for these data is low. The installed capacity is determined on the project's beginning and it will be monitored by the Regulator Agent.
Any comment:	

Data/Parameter:	**A_{PJ}**
Data unit:	m^2
Description:	Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full.
Source of data to be used:	Project Site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	The reservoir area of the SHP Victor Baptista Adami was not used to calculate emission reductions, because the power density of this project is greater than 10 W/m^2. As expressed in the section A.4.3, the value of reservoir area is 1,750,000 m^2.
Description of measurement methods and procedures to be applied:	The reservoir flooded area is monitored by local environmental entities during the licensing process. Operation Licences necessary for the project operation may be used yearly to prove the value adopted in the project. Reservoir is measured by topographical survey. The reservoir area is defined during the engineering studies and this area is suitable to the technical characteristics of the power plant. Modifications of the reservoir could bring damages to the power plant. The reservoir flooded area is monitored by local environmental entities during the licensing process. Environmental Installation License of the Enterprise – LAI nº 011/2010/GELRH can prove the value of the reservoir area of the project. The increase of the reservoir area is impossible. The percentage of the maximum level of the reservoir is set at the inventory studies as a major dimension that brings economic benefits to the project, noting also the technical and environmental questions. Thus, there are no economic, technical and environmental reasons to increase (or decrease) the maximum level of the dam.
QA/QC procedures to be applied:	The uncertainty level for these data is low. The reservoir area is monitored by environment regulators. Any changes in this area must be approved by regulators. It will be monitored yearly.
Any comment:	This data will be monitored accordingly the license issued by environmental entities and it can be proved by environmental licenses for monitoring issues.

B.7.2 Description of the monitoring plan:

The Monitoring Plan is elaborated according to the Monitoring Methodology included in the consolidated baseline methodology for grid-connected electricity generation from renewable sources ACM0002, version 12.1.0.

<u>Responsibilities</u>

- Operation and Maintenance Board: responsible for activities related to the plant's operation and maintenance.

- Measurement Area, linked to Operation and Maintenance Board: responsible for collecting information directly from the SHP Victor Baptista Adami's meters. The Measurement Area is also responsible for the consolidation and analysis of monthly generation spreadsheets.

- Measurement Outsourced Agent: Part of the Measurement Area's responsibility can be outsourced with a Measurement Agent's hiring. In this case, the Special Measurement Area is responsible for supervising the work performed by the Measurement Outsourced Agent.

Process Description

I – Procedure of Generation Data Collection

In the plant, there is one meter for different physical magnitudes including energy measurement For net electricity measurement there are two meters, one principal and other rear (in case the principal meter fails), located in the substation Palma, owned by COPEL (Electricity company of Paraná State - COPEL), located in the municipality of Palmas in Paraná state. Monthly, the net energy generation information will be analyzed and filed by the measurement team.

The procedure quoted above might be outsourced through a Measurement Agent's hiring. In this case, the Special Measurement Area is responsible for supervising the work performed by the Measurement Outsourced Agent.

II – Data Storage:

The information of generation is electronically stored by the Operation and Maintenance Board.

Periodically, the Information Technology Area accomplishes a insurance backup for all company`s data through a Data Server *backup.*

III – Calibration of Meters:

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

(a) The periodicity for the responsible agent's preventive maintenance for Measurement System for Billing (SMF) is of 2 (two) years at the most. That periodicity can be altered due to the occurrence history observed for all facilities.

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

IV – Procedure to cross-check electricity generation data

Spreadsheets will be used, obtained directly from the electricity meters with information generated hourly. Monthly, information of net electricity will be cross-checked with reports supplied by CCEE, entity responsible for settlement of power purchase agreements in Brazil. Information of generation can be also checked by sales invoice, if it is necessary to do so.

Continuous measurement and at least monthly recording will be the monitoring frequency. National standard established by National Operator of the Brazilian Electric System (ONS) for measuring and calibration will be used. The measurements will be undertaken by measurement area or by outsourced agent. The measurement method is established by ONS; therefore, the accuracy is under Brazilian Standards. Meters are directly connected to the generator unities; therefore, it is expected a high accuracy of the measurement method.

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

The baseline study and monitoring methodology for the project activity were elaborated by Enerbio Consultoria and they were completed on 27/09/2010. Enerbio Consultoria is also a project participant.

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

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SECTION C. Duration of the project activity / crediting period

C.1 DURATION OF THE PROJECT ACTIVITY:

C.1.1. Starting date of the project activity:

21/12/2009. This date corresponds to the date when the company that will build SHP Victor Baptista Adami was hired.

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

22 years and 2 months

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

The project activity will use renewable crediting period.

C.2.1. Renewable crediting period

7 years and it can be renewed at most two times

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

- 01/01/2012 (Prevision for operations beginning and project Registration)

C.2.1.2. Length of the first crediting period:

7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

Not applicable.

C.2.2.2. Length:

Not applicable.

SECTION D. Environmental impacts

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

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

Once the extraction activities of natural resources can represent some risk to the different ecological systems equilibrium, the Brazilian legislation demands from the companies the environmental license, in a way that the activity is not avoided, but also do not affect the ecosystems. In Santa Catarina state the Environmental Foundation (FATMA-Fundação do Meio Ambiente) is the legal responsible for the licenses.

FATMA demands three different licenses. The Previous Environmental License (LAP) is the formal way to the enterpriser evaluate with FATMA if it's possible to build some kind of construction activities in some area. When this is approved, the entrepreneur needs to show the physical and operational project of the construction, demonstrating how it will attempt to the conditions imposed by the LAP. When the LAP is analyzed, FATMA can demand an Environmental Impact Study (EIA) that gives the details about the environmental conditions of the project influence area and the consequences of its implementation. It's also presented a summary version in an accessible language for all community (Environmental Impact Report - RIMA).

With that, is obtained Installation Environmental License (LAI) that allows the entrepreneur to start the construction. When the construction is finished, FATMA makes an inspection, and if everything is according to the previous licenses, the entrepreneur receives the Operation Environmental License (LAO) and is allowed to start to operate.

Below, it is presented the dates of issuance and validity of the installation license:

- Installation Environmental License (LAI) - nº 011/2010/GELRH

Signed on: 24/08/2010
Valid for 16 months.

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

The environmental impact of the project activity is considered small. Passos Maia Project presents little necessity of reservoir's flooded area and satisfies the several demands of the state's environment legislation and of the Brazilian electric system, having the necessary licenses for its implantation.

The Environmental Impact Study (EIA) will be available to the DOE that will validate the project. Following it is presented a brief description of the programs that will be developed during the SHP´s implementation.

Environment management program

The environmental management program of SHP Victor Baptista Adami aims to create an organizational structure that makes possible for the entrepreneur and for the environmental supervision organ, to verify at any time the implementation and the efficacy of the proposed actions to mitigate the environmental impacts, to verify the environmental prognostic elaborated in the Simplified Environmental Report, to diagnose deviations and to propose corrective measurements necessary during the construction. It has the function to work as communication channel between the society and the entrepreneur, receiving the society's manifestations and coordinating the activities from the Social Communication Program. It plays also an important part in the articulation with the different partner institutions, with the supervision organs and with the population interested in the process, regarding the environmental integration aspects from the enterprise.

Monitoring Program of Water Quality and Limnological conditions

The adoption of the monitoring program of water quality and limnological conditions assumes a preventive profile, while the physical, chemical, bacteriological, and ecological modifications in the water´s quality are diagnosed during the enterprises implementation period and in the limnological dynamics deriving from the environmental transformations from lotic to lentic. Such a diagnosis will permit an adoption of control measurements for eventual problems.

Environmental Program for ictiofauna rescue

The Environmental Program for rescue the ictiofauna comprehends a set of actions during the execution of the river deviation and flood-gate closing during the campaigns that will occur during the construction that aims to minimize the different environmental impacts from these engineering events and also attempt to the environmental law. The main objective of it will be to rescue fishes in the part of the river where the flow is lower and or interrupted.

Fauna rescue program

The use of ecological data from fowls and mammals is very common in studies. Because they are complex animals of the top of the chain, they allow inferring about habitats quality and, consequently, we can propose necessary changes. The Fauna rescue and salvation program aims to (i) monitors the wild fauna (flows and mammals); (ii) minimize and/or compensate the impacts over the fauna. (iii) proportionate the rescue of the wild fauna; (iv) subsidize environmental education programs, between other benefits.

Flora Rescue and Monitoring program

This project aims to consolidate the set of information, procedures and devices to be obtained since before the construction beginning in a way to make possible the formation of a database about the local flora, permitting the follow-up of its evolution before and after the enterprises implementation and operation, in a way to define the corrective or compensatory measurements in the reservoir scope. The importance of the botanical diversity analysis is to register the occurrence of the plants variety in the study region, identifying its composition, distribution and participation in each ecosystem.

Degraded Areas Recuperation Program

The degraded areas recuperation program aims to minimize the negative effects of the enterprises implementation by inserting it in the context of the adjacent environmental. The recuperations techniques indicated should to proportionate the maintenance and the improvement of the ecological functions in the environment. It is indispensable the implementation of environmental recuperation actions integrated to the construction activities. All of them should be coordinated by an environmental management center. That will centralize the information obtained during the projects elaboration. The predicted actions for the recuperation of the areas to be impacted by the enterprise obey the nowadays and the future uses predicted for the enterprise area.

Workers Orientation Program

In the implementation process of the SHP Victor Baptista Adami´s Environmental Basic Program, it will be developed the Workers Behavior Program, aiming the conservation of the environmental surrounding and the divulgation and orientation of habits and practices about the workers health directly linked to the construction activities, in a way to ensure the suitable sanitary and hygiene conditions, as well as cares related to the environmental maintenance.

Social communication program

The social communication program will serve as a communication and interaction channel between the entrepreneur and the society, characterizing as a program of higher coverage in relation to the affected public and the impacts associated to them. The communication social program will have to articulate a set of social communication actions in a way to avoid conflicts between the workforce of the project and the local population. The target of the program are the population directly affected, the municipal authorities, political and communitarian leaderships, syndicates, the workforce, non-governmental organizations and other associations interested.

Environmental education program

The environmental education program aims the improvement of the environmental management process of the enterprise, spreading environmental knowledge to the society. The implementation of the environmental education program is important to involve different social actors in the environmental management process and in the understanding of their function as multiplier agents and responsible citizens by the improvement of the individual and common life. Social sectors to be prioritized in the environmental education program are those directly affected by the enterprise, the scholar population and the workforce hired to build the enterprise. The environmental education program will be executed joined to the social communication program.

SECTION E. Stakeholders' comments

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

According to the resolution nº 7, from March the 5th, 2008 [20]published by Brazilian Designated National Authority and consolidated in the Handbook for Project Activities Submission under the CDM, developed by the Brazilian Designated National Authority, local stakeholders should be invited to perform comments about CDM project activities.

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

1. Passos Maia City Hall
2. Passos Maia City Assembly
3. Passos Maia Commercial and Industrial Association
4. FATMA- Santa Catarina Environmental Foundation
5. Agriculture Municipal Secretary
6. State of Santa Catarina Attorney of Public Interest
7. Federal Attorney of Public Interest
8. Brazilian Forum of NGO´s and Social Movements for the Environmental and Development – FBOMS

Besides the letters sent to local stakeholders, the PDD was available to public comments for the local stakeholders at the website www.enerbio-rs.com.br.

E.2. Summary of the comments received:

Not applicable, because no commentary has been received by now.

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

No applicable, because no commentary has been received by now.

[20] Source: http://www.mct.gov.br/upd_blob/0023/23744.pdf. Accessed on January.2011.

Annex 1

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

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

Annex 3

BASELINE INFORMATION

Since 2006, the MCT in cooperation with the MME and ONS, started to make available the calculation methodology for CO_2 emission factor for grid-connected electricity generation in the Brazilian National Interconnected System using dispatch data analysis. The emission factor started to be widespread for each Subsystem of Brazilian Interconnected System.

In May 2008, the Designated National Authority of CDM in Brazil defined that the National Interconnected System must be considered as a unique System and this way, this configuration started to be valid for calculating the emission factor of CO_2 used to calculate the emission reduction of greenhouse gases for CDM Projects of electricity generation connected to the grid.

The calculation of emission factor of $CO_{2.}$ published by Brazilian DNA, follows the methodological tool "Tool to calculate the emission factor for an electricity system", version 02, approved by the CDM Executive Board..

The tables below present the values considered to calculate the operating margin emission factor ($EF_{grid,OM,y}$) and the build margin emission factor ($EF_{grid,BM,y}$) which was used for Passos Maia Project *ex-ante* estimation of emission reductions. All of these data were provided by the Brazilian DNA.

Table 15 – Monthly Medium Operating Margin Emission Factor of the year of 2009 - Brazilian Interconnected System

Medium Emission Factor (tCO_2/MWh) – Monthly												
2009	**Month**											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0. 2813	0. 2531	0.2639	0.2451	0.4051	0.3664	0.2407	0.1988	0.1622	0.1792	0.1810	0.1940

Table 16 – Daily Medium Operating Margin Emission Factor of the year of 2009 - Brazilian Interconnected System

Medium Emission Factor (tCO_2/MWh) – Monthly												
2009	Month											
Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dez
1	0.2746	0.3036	0.2409	0.2665	0.2744	0.3277	0.3077	0.2361	0.1627	0.2058	0.2333	0.1720
2	0.2262	0.2531	0.1960	0.2705	0.4220	0.3511	0.2790	0.2619	0.1612	0.2137	0.2118	0.1784
3	0.1969	0.2507	0.1868	0.2726	0.4894	0.3029	0.2729	0.2563	0.1580	0.2157	0.1821	0.1843
4	0.2367	0.2346	0.2073	0.2003	0.4338	0.2941	0.2915	0.2373	0.1549	0.2484	0.1800	0.1815
5	0.2669	0.2401	0.2237	0.2272	0.4887	0.2856	0.3846	0.2042	0.1306	0.2017	0.1856	0.1955
6	0.2006	0.2511	0.2222	0.2023	0.4813	0.2401	0.3354	0.1960	0.1527	0.1728	0.1832	0.2208
7	0.1749	0.2596	0.2348	0.1846	0.4570	0.3098	0.3460	0.1875	0.1540	0.1240	0.2069	0.1924
8	0.1549	0.2158	0.3071	0.1639	0.4898	0.2960	0.3155	0.2124	0.1220	0.0970	0.2370	0.2014
9	0.1606	0.1996	0.2627	0.1548	0.4128	0.2975	0.3087	0.2418	0.1660	0.1123	0.1604	0.2054
10	0.1672	0.2033	0.2584	0.1586	0.4305	0.2562	0.2837	0.1859	0.1727	0.2240	0.1602	0.2023
11	0.2368	0.1980	0.2523	0.1581	0.4487	0.2466	0.2780	0.1958	0.1477	0.2503	0.1896	0.1923
12	0.2476	0.1953	0.2621	0.2023	0.4252	0.2330	0.3245	0.1498	0.1473	0.2410	0.1686	0.1844
13	0.2513	0.2106	0.2772	0.2005	0.4280	0.3392	0.2858	0.1970	0.1424	0.1735	0.1658	0.2219
14	0.2503	0.2102	0.2913	0.2015	0.4306	0.3783	0.2736	0.2195	0.1287	0.1574	0.1668	0.1875
15	0.2656	0.2072	0.3130	0.1696	0.4332	0.3602	0.2858	0.1728	0.1235	0.1673	0.1883	0.1763
16	0.2223	0.1787	0.2952	0.2275	0.3552	0.3851	0.2545	0.2075	0.1334	0.1534	0.1705	0.1760
17	0.3490	0.2139	0.3247	0.2888	0.3945	0.4041	0.2124	0.1885	0.1444	0.1821	0.2010	0.1723
18	0.4460	0.2027	0.2945	0.2905	0.4455	0.4334	0.1672	0.1743	0.1661	0.2021	0.1536	0.2045
19	0.4214	0.2093	0.2823	0.3188	0.4198	0.4287	0.1596	0.1803	0.1949	0.1700	0.1668	0.2061
20	0.4369	0.2509	0.2761	0.2648	0.4093	0.5456	0.1063	0.1631	0.2236	0.1291	0.1676	0.2289
21	0.4243	0.3033	0.3020	0.2823	0.3492	0.5636	0.1264	0.1605	0.1590	0.1796	0.1859	0.1708
22	0.4353	0.4380	0.3371	0.3089	0.3650	0.5236	0.1494	0.1708	0.1607	0.1504	0.1989	0.1644
23	0.3837	0.4572	0.2944	0.2978	0.3284	0.5156	0.1474	0.2085	0.1454	0.1545	0.1709	0.1687
24	0.3246	0.4502	0.2592	0.2873	0.3320	0.4446	0.1645	0.1775	0.1609	0.1812	0.1795	0.2097
25	0.3960	0.3402	0.2467	0.2848	0.3577	0.4312	0.2018	0.1839	0.1602	0.2004	0.1642	0.2536
26	0.3145	0.2683	0.2478	0.3208	0.3576	0.4155	0.1933	0.2100	0.1897	0.1923	0.1612	0.2324
27	0.2582	0.2149	0.2405	0.2846	0.3934	0.3240	0.1581	0.2105	0.2546	0.1975	0.1709	0.2281
28	0.2380	0.2288	0.2644	0.2944	0.3722	0.3945	0.1672	0.2083	0.2003	0.1913	0.1862	0.1847
29	0.2367		0.3023	0.2845	0.3951	0.3469	0.2174	0.1928	0.1896	0.1752	0.2056	0.1699
30	0.2622		0.2453	0.2904	0.3431	0.3294	0.2462	0.2239	0.1776	0.1671	0.1675	0.1928
31	0.2588		0.2820		0.3566		0.2463	0.1771		0.1795		0.2004

The hourly average emission factors are also available at the following link: http://www.mct.gov.br/index.php/content/view/303076.html#ancora (accessed on July 2010). The operating margin emission factor is calculated for Brazilian National Interconnected System for each hour based on the value of energy dispatched by each plant, generation cost of each plant (dispatch priority), hourly exchange with neighboring subsystem and emission factors for thermoelectric plants.

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

The tables below present the data concerned to the build margin emission factor ($EF_{grid,BM,y}$) used for project ex-ante emission reduction estimation.

Table 17 – Build Margin Emission Factor of the year 2009 – National Interconnected System

Average Emission Factor (tCO_2/MWh) - Annual	
2009	
	0.0794

Source: Designated National Authority. http://www.mct.gov.br/index.php/content/view/303076.html#ancora. Accessed on July 2010.

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

Other information about the baseline scenario and baseline emissions is presented on item B of this PDD.

Annex 4

MONITORING PLAN

Information about monitoring plan is described on item B.7.2 from this PDD.