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:

Project title: Baguari Hydropower Plant CDM Project Activity (hereafter referred to simply as "Baguari Project").

PDD version number: 6

Date (DD/MM/YYYY): 22/09/2009

A.2. Description of the project activity:

The primary objective of the Baguari Hydropower Plant CDM Project Activity is to help meet Brazil's rising demand for energy due to economic growth and to improve the supply of electricity, while contributing to the environmental, social and economic sustainability by increasing renewable energy's share of the total Brazilian (and the Latin America and the Caribbean region's) electricity consumption.

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

The privatization process initiated in 1995 arrived with an expectation of adequate tariffs and better prices for generators. It drew the attention of investors to possible alternatives not available in the centrally planned electricity market. At the end of the 1990's a strong increase in demand in contrast with an under-average increase in installed capacity caused the supply crisis/rationing from 2001/2002. One of the solutions the government provided was flexible legislation favoring smaller independent energy producers. Furthermore the possible eligibility under the Clean Development Mechanism of the Kyoto Protocol drew the attention of investors in hydropower projects.

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

Baguari Project improves the supply of electricity with clean, renewable hydroelectric power while contributing to the regional/local economic development. Hydropower run-of-river plants provide local distributed generation and provide site-specific reliability and transmission and distribution benefits including:

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[1] WSSD Plan of Implementation, Paragraph 19 (e): "Diversify energy supply by developing advanced, cleaner, more efficient, affordable and cost-effective energy technologies, including fossil fuel technologies and renewable energy technologies, hydro included, and their transfer to developing countries on concessional terms as mutually agreed. With a sense of urgency, substantially increase the global share of renewable energy sources with the objective of increasing its contribution to total energy supply, recognizing the role of national and voluntary regional targets as well as initiatives, where they exist, and ensuring that energy policies are supportive to developing countries' efforts to eradicate poverty, and regularly evaluate available data to review progress to this end."

- Increased reliability, shorter and less extensive outages;
- Lower reserve margin requirements;
- Improved power quality;
- Reduced lines losses;
- Mitigation of transmission and distribution congestion, and;
- Increased system capacity with reduced T&D investment.

It can be said that fair income distribution is achieved from job creation and an increase in people's wages, however better income distribution in the region where the Baguari Project is located is obtained from less expenditures and more income in the local municipalities. The surplus of capital that these municipalities will have could be translated into investments in education and health which will directly benefit the local population and indirectly impact a more equitable income distribution. This money would stay in the region and be used for providing the population better services which would improve the availability of basic needs. A greater income comes from the local investment on the local economy, and a greater tax payment, which will benefit the local population.

The project activity is a run-of-river hydropower plant with a total installed capacity of 140 MW, located in Fernandes Tourinho, Sobrália, Governador Valadares, Periquito, Iapu and Alpercata cities, state of Minas Gerais, Southeast region of Brazil. The turbines are scheduled to become operational as follows:

Table 1 – Operation schedule of the plant.

Power Generation Unit	Installed Capacity (MW)	Date scheduled to start the operation
1	35.9	30/09/2009
2	35.9	30/12/2009
3	35.9	28/02/2010
4	35.9	30/04/2010

The Project is owned by Consórcio UHE Baguari, which is a consortium formed by the shareholders presented below:

- Baguari I Geração de Energia Elétrica S.A.: 51%, it is Special Purpose Company owned by Neoenergia;
- CEMIG Geração e Transmissão S.A: 34%;
- Furnas Centrais Elétricas: 15%

A.3. Project participants:

Table 2 - Party(ies) and private/public entities involved in the project 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 whishes to be considered as project participant (Yes/No)
Brazil (host)	Consórcio UHE Baguari (private entity)	No
	Ecopart Assessoria em Negócios Empresariais Ltda.	

	(private entity)	
(*) 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 contact information on party(ies) and private/public entities involved in the project activity is listed 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.:

State of Minas Gerais.

A.4.1.3. City/Town/Community etc:

Fernandes Tourinho, Sobrália, Governador Valadares, Periquito, Iapu and Alpercata cities.

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

Baguari CDM Project is located between the intersection of the following geographic coordinates:

Latitude: 19° 01’ 20’’S

Longitude: 42° 07’ 26’’W

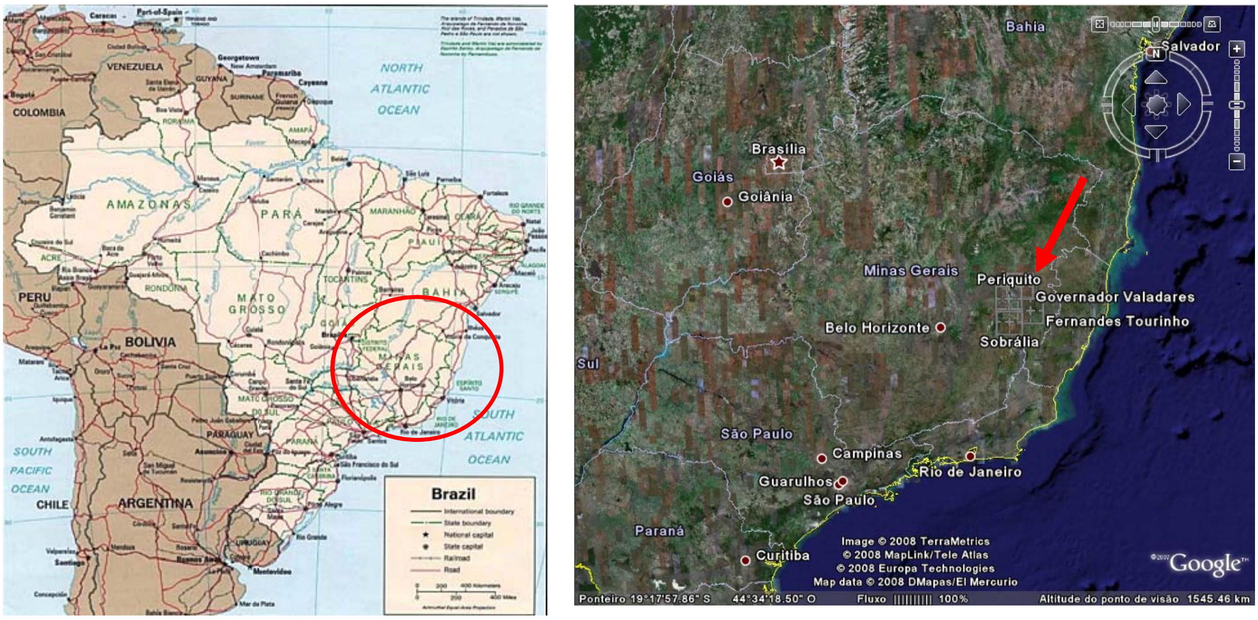

Figure 1 - Political division of Brazil showing the state of Minas Gerais on the left and a Google Earth image showing the cities involved in the project activity
(Sources: City Brazil website and Google Earth)

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

Renewable electricity generation for a grid.

Sectoral Scope: 1 – Energy industries (renewable - / non-renewable sources)

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

Prior to the implementation of the project activity no electricity was generated in the place the project is located. Therefore, the electricity was generated by the plants connected to the Brazilian National Interconnected Grid.

The facility description follows:

- 140 MW total installed capacity (4 × 35.9 MW Bulb turbines and 4 × 35.136 MW generators). Both turbines and generators are manufactured by Voith Siemens. The turbines are scheduled to become operational accordingly to the table in section A.2. The assured energy of the plant is equal to 80.2 $MW_{average}$/year as established by the Ministry of Mines and Energy and described in the public concession contract. Therefore, the plant load factor[2] - defined as the ratio between the assured energy and total installed capacity of the plant - is 0.57.
- Reservoir size of 16.06 km² and power density of 8.72 W/m^2.

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[2] Following the requirements of the "*Guidelines for the reporting and validation of plant load factors*" (version 1, EB48), Baguari's load factor was defined *ex-ante* considering the value that was provided in the financing contract. This figure can be confirmed trough an official source of information. In Brazil, according to § 2nd , 2nd article of Federal Ordinance #5.163, large hydropower plants' assured energy is determined by the Ministry of Mines and Energy and is referred to in the public concession contract of the each plant. UHE Baguari's public concession contract is publicly available at the Brazilian Electricity Regulatory Agency website at http://www.aneel.gov.br/aplicacoes/Contrato/Documentos_Aplicacao/CG06001Baguari.pdf.

Baguari Hydropower Plant uses water from Doce River to generate electricity with 140 MW of total installed capacity. The facility contains a dam which forms a reservoir with a total area of 16.06 km^2 with the purpose of storing water to generate electricity. Nevertheless, it can be considered a run-of-river plant since it does not include significant water storage, and must therefore make complete use of the water flow. A typical run-of-river scheme involves a low-level diversion dam and is usually located on swift flowing streams (Figure 2).

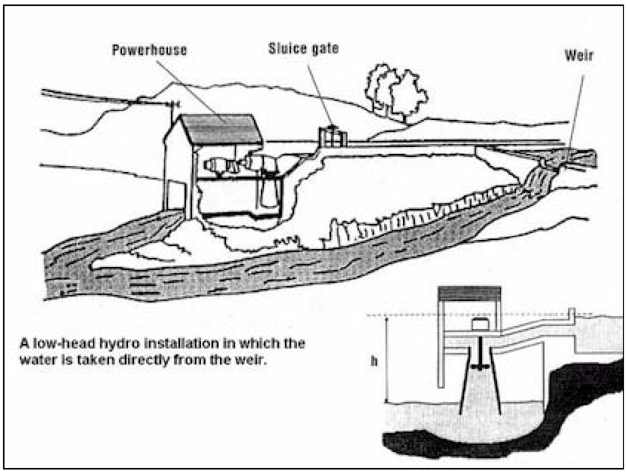

Figure 2- Schematic view of run-of-river power plant

According to Eletrobrás (2000), run-of-river projects are defined as “the projects where the river’s dry season flow rate is the same or higher than the minimum required for the turbines,” as it is the case of the Baguari Hydro Power Plant Project. A low-level diversion dam raises the water level in the river sufficiently to enable an intake structure to be located on the side of the river. The intake consists of a trash screen and a submerged opening with an intake gate. Water from the intake is normally taken through a pipe (called a penstock) downhill to a power station constructed downstream of the intake and at as low a level as possible to gain the maximum head on the turbine.

To determine the river’s dry season flow rate, data provided to Aneel indicating monthly average river flow at the project activity location from 1931 to 2004 was used (Table 3).

Table 3 - Doce’s river monthly average flow at the project location

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average 1931 to 2004 (m^3/s)	942.8	771.9	699.3	535.9	412.6	352.3	314.2	280.8	276.8	327.9	523.8	793

The dry season in the region is from May to October. With the numbers in the above table the average dry season flow rate is *327.43 m^3/s*.

Another way to characterize run-of-river power plants comes from the definition of the World Commission of Dams (WCD, 2000):

“Run-of-river dams. *Dams that create a hydraulic head in the river to divert some portion of the river flows. They have no storage reservoir or limited daily poundage. Within these general classifications there is considerable diversity in scale, design, operation and potential for adverse impacts.”*

- Maximum volume of the dam: 3,491,000 m^3
- Dry season average flow rate: 327.43 m^3/s

- Days of poundage at maximum volume of the dam: 1.23 days

Then, to the understanding or the project participants, the Baguari Hydropower Plant can be considered a run-of-river power plant according to all the presented criteria.

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

Considering the baseline emission factor equal to 0.1842 tCO_2e/MWh, which is applicable to grid-connected renewable power generation project activities in Brazil, the full implementation of the hydropower plant connected to the Brazilian Interconnected System will generate the estimated annual reduction as in Table 4 below.

Table 4 - Project Emission Reductions Estimation

Years	Annual estimation of emission reductions in tonnes of CO2e
2010 (Starting January 1st)	57,419
1011	65,532
2012	65,532
2013	65,532
2014	65,532
2015	65,532
2016 (Until December 31st)	65,532
Total Estimated Emissions Reductions (tonnes of CO2e)	450,613
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO2e)	64,373

A.4.5. Public funding of the project activity:

No public funding, including official development assistance, was or will be used in Baguari Hydropower Plant CDM Project Activity.

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:

ACM0002 - “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” (Version 10, EB47).

The following tools, as per the methodology mentioned above, are used:

- "*Tool for the demonstration and assessment of additionality*" (version 5.2, EB39)
- "*Tool to calculate the emission factor for an electricity system*" (version 1.1., EB35)

The "*Combined tool to identify the baseline scenario and demonstrate additionality*" is also mentioned in the methodology. However, the proposed project activity neither consists of a retrofit nor in the replacement of an existing grid-connected renewable power plant/unit(s) at the project site. Hence, this tool isn't going to be used.

Also the "*Tool to calculate project or leakage CO2 emissions from fossil fuel combustion*" is not used once it is only applicable for geothermal and solar thermal projects using fossil fuels for electricity generation, which is not the case of the proposed project activity.

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

ACM0002 was chosen once the proposed project activity consists of "*a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity*" (case a). Besides, the methodology is applicable once UHE Baguari is a new hydro power plant with power density greater than 4 W/m^2. Details about the power density calculation are presented in the below sections.

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

The project boundary is defined by the emissions targeted or directly affected by the project activities, construction and operation. It encompasses the physical, geographical site of the hydropower generation source, which is represented by the respective river basin of the project close to the power plant facility, as well as the interconnected grid (Figure 3). On May 26th, 2008, the Brazilian Designated Authority published Resolution nr 8 defining the Brazilian Interconnected Grid as a single system comprising the fifth regions of the country[3].

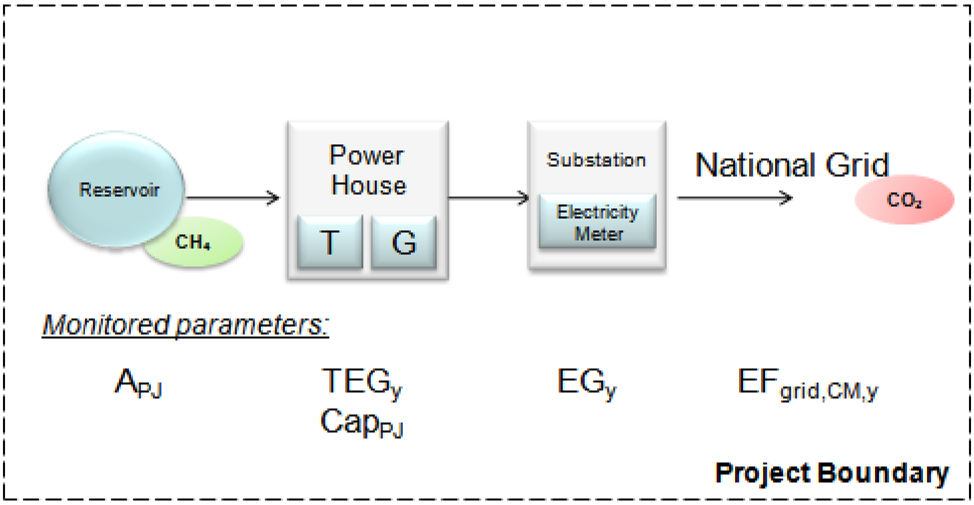

Figure 3 - Project Boundary of the project activity.

[3] CIMGC's Resolution nr 8 from May 26th, 2008 available at: <http://www.mct.gov.br/upd_blob/0024/24719.pdf>.

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

Table 5 - Emission sources and gases related to the project activity

Source		Gás	Included?	Justification / Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that are 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	Emission of CH_4 from the reservoir.	CO_2	No	Minor emission source.
		CH_4	Yes	Main emission source. Emissions from reservoir are accounted as project emissions once power density of the plant is between 4 and 10 W/m^2.
		N_2O	No	Minor emission source.

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

The project activity is the installation of a new grid-connected renewable power plant. Hence, accordingly to ACM0002 the baseline scenario is the following:

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

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):

According to the *Guidance on the Demonstration and Assessment of Prior Consideration of the CDM* (Annex 46, EB 41) "*project activities with a start date before 2 August 2008, for which the start date is prior to the date of publication of the PDD for global stakeholder consultation, are required to demonstrate that the CDM was seriously considered in the decision to implement the project activity*".

The starting date of the proposed project activity, as identified in section C.1., is August 15th, 2006 and the first version of the PDD was published for GSP on November 2nd, 2007. Hence, as required by the Executive Board, the demonstration that the CDM was considered in the decision to implement the project has to be provided.

On June, 2006, the board of the consortium held a meeting and from the minute of this meeting it can be seen that the CDM incentives were being considered at that time. Also considerations of CDM incentives for the implementation of Baguari HPP can be evidenced through internal documents from

Neoenergia, the owner of Baguari I Energia Elétrica S.A, which is the major shareholder of Consórcio UHE Baguari.

A Board Meeting was held by Neoenergia Group on July 14th, 2006, demonstrating a preliminary analysis of Neoenergia carbon credits projects, identifying partners, next steps and financial benefits in the context of CDM and voluntary markets. An Ecopart (formally Ecoinvest) commercial proposal was prepared and sent to Neoenergia on August 23rd, 2006, before the PPA was signed. Ecopart proposal, minutes of meeting and the presentation held in this meeting were sent to DOE.

There are many other evidences that Neoenergia always has belief in carbon credits and CDM market:

- Contact with Det Norske Veritas – DNV's representative in June 2006 to discuss CDM projects and meeting carried out on July 10th, 2006 with Flávia Mesquita Antunes (Neoenergia) and Raphael de Souza Tavares (DNV);
- Participation of Neoenergia in CDM market training carried out by Fundação Educacional Charles Darwin at Neoenergia office on July 6th and 7th, 2006. This training was divided in two parts: theoretical and practical and included how to make the: feasibility analysis of a CDM project, how to make a PIN, PDD and carbon credits commercialization;
- E-mails about the opportunities of CDM between Neoenergia and Ecoinvest.

All evidence mentioned above was presented to DOE and is available upon request.

For the purpose of assessing the additionality of the project activity, ACM0002 methodology includes a "Tool for the demonstration and assessment of additionality" (version 05.2) agreed by the CDM Executive Board, which is available on the UNFCCC CDM web site[4].

Following are the necessary steps for the demonstration and assessment of Baguari Project additionality.

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

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

Ecopart Assessoria em Negócios Empresariais Ltda. is the CDM project developer and do not invest in the construction and operation of Power Plants. Consórcio UHE Baguari is a special purpose company set up specifically to construct and operate HPP Baguari. Hence, based on the nature of these two companies, namely the project participants, the only realistic alternatives to the project activity identified are:

- Continuation of the present scenario, with the supply of electricity from the Brazilian interconnected grid.
- The implementation of the project without incentives from the CDM.

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

[4] Tool for the demonstration and assessment of additionality. UNFCCC, CDM Executive Board 36th Meeting Report, 26-30 November 2007, Annex 13. Web-site: http://cdm.unfccc.int/.

Both the project activity and the alternatives scenarios are in compliance with all regulations according the following entities: National Electric System Operator (ONS from the Portuguese *Operador Nacional do Sistema Elétrico*), Electricity Regulatory Agency (ANEEL from the Portuguese *Agência Nacional de Energia Elétrica*), Minas Gerais Environmental Agency (from the Portuguese *Fundação do Meio Ambiente de Minas Gerais - FEAM)* and the CDM Executive Board.

SATISFIED/PASS – Proceed to Step 2

Step 2. Investment analysis

Sub-step 2a. Determine appropriate analysis method

Additionality is demonstrated through an investment benchmark analysis; option III of the Additionality Tool. Options I and II are not applicable to the proposed project activity. All evidence supporting the discussion presented below was supplied to the DOE.

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

In this sense, the financial indicator identified for *Baguari Project* is the project IRR. The IRR here presented is compared to the appropriate benchmark of the energy sector in Brazil, which is the Weighted Average Cost of Capital - WACC.

Weighted Average Cost of Capital (WACC)

The weighted-average cost of capital (WACC) is a rate used to discount business cash flows and takes into consideration the cost of debt and the cost of equity of a typical investor in the sector of the project activity. The benchmark can be applied to the cash flow of the project as a discount rate when calculating the net present value (NPV) of the same, or simply by comparing its value to the internal rate of return (IRR) of the project. The WACC considers that shareholders expect compensation towards the projected risk of investing resources in a specific sector or industry in a particular country.

The WACC calculation is based on parameters that are standard in the market, considers the specific characteristics of the project type, and is not linked to the subjective profitability expectation or risk profile of this particular project developer. The WACC of the sector as of the project's financial analysis decision date was of 12.41%.

Each assumption made and all data used in estimating the benchmark have been presented to the DOE. The spreadsheet used for calculation of the WACC has also been provided to the DOE.

WACC = Wd*Kd + We*Ke, where:

We and Wd are, respectively, the weightings of equity and debt typically observed in the sector. We is 35%, and Wd is 65%. These numbers derive from the typical leverage of similar projects in the sector in Brazil, based on the rules for available long term loans from Brazilian Development Bank (BNDES).

Kd is the cost of debt, which is observed in the market related to the project activity, and which already accounts for the tax benefits of contracting debts. Kd is of 10.34%, and also derives from long term loans applied to the sector in Brazil, and therefore is based on BNDES financing endeavour credit line's interest rates.

Ke is the cost of equity, estimated through the Capital Asset Pricing Model (CAPM). Ke is 16.24%. Ke derives from a risk free rate plus the market risk premium adjusted to the sector through Beta. The risk-free rate, the market risk premium, and the Beta have been calculated based on publicly available data and presented to the DOE.

Plugging these numbers into WACC formula:

WACC = 65%*10.34% + 35%*16.24% = 12.41%

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

The cash flow of the project activity, containing the calculation of the IRR of the project activity was provided to the DOE in a separate annex to this CDM-PDD. The relevant assumptions made are in accordance with the *Guidance on the Assessment of Investment Analysis*.

Project IRR, as presented to the DOE, is 10.95%. This number shows that the IRR of the project without considering CERs revenues is lower than the WACC of the sector – 12.41% - the benchmark. Hence, it is evident that the project activity is not financially attractive to the investor (Table 6).

Table 6 – Comparison between Project IRR and the Weighted Average Cost of Capital

	IRR (%)	WACC(%)
Baguari Project	10.95%	12.41%

Sub-step 2d: Sensitivity analysis

The sensitivity analysis, as established by the "*Guidance on the Assessment of Investment Analysis*" (EB 41, Annex 45), is to be conducted considering variables that constitute more than 20% of either total project costs or total project revenues, including initial investment costs. Hence, variations will be done increasing project's revenues (sale of electricity), increasing energy generation by the plant (load factor variation), reducing investment expenses, and reducing operation and maintenance costs.

The results are presented below.

Table 7 – Results of the sensitivity analysis.

Baguari Project	**IRR (%)**	**WACC (%)**
Original IRR	10.95	12.41
Tariff increase	12.33	
Energy Generation/load factor increase	12.28	
Cost reduction	11.18	
Investment reduction	12.16	

From the results presented above, a typical investor of the sector would not be attracted in investing in the project since the IRR is lower than the benchmark in all of the considered scenarios. Also, although these figures unequivocally show that the scenario where the equity IRR passes the benchmark isn't possible, project participants (PPs) believe some additional information can contribute to reinforce this outcome.

Revenues related to the sale of electricity in the original cash flow were calculated based on the following assumptions:

i. Energy price equal to BRL 115,10/MWh;

ii. Amount of electricity equivalent to 77 MW-average. Although this is not the total assured energy of the plant (i.e. 80 MW average), this is in line with the sector's good practice. UHE Baguari was defined by ANEEL as being participant in the apportionment of the losses which occur within the basic network. The difference between the total assured energy and the energy considered in the cash flow, which corresponds to the total amount of energy already negotiated in the PPA, is the quantity of energy Baguari will be discounted due to these losses[5].

Project revenues can be increased in two ways: by increasing the quantity of electricity generated/load factor by the plant or increasing electricity price. An increase in energy generation is definitely not possible to happen because the electricity generation estimative is based on the assured energy as established in the public concession contract which is calculated by the Ministry of Mines and Energy and based in over 70 years historic monthly river flow data. Therefore, an increase in energy generation by the plant is not expected.

The price mentioned above is established in the project's CCEAR – Contract on Energy Commercialization in Regulated Market[6] which was signed after the companies of the consortium participated of the public auction conducted by the Chamber of Electrical Energy Commercialization (CCEE – *Câmara de Comercialização de Energia Elétrica*). According to CCEE *the criterion of the least tariff is used to define the winners of a given auction, that is, the winners of the auction shall be those bidders which offer electric power for the least price per Mega-Watt Hour to supply the demand envisaged by the Distributors.*

CCEAR's will remain fixed throughout the years, and will only be adjusted accordingly to the Amplified Consumers Price Index (from the Portuguese *Índice de Preços ao Consumidor Amipliado*), which is the official index that measures the inflation in Brazil. However, the cash flow was done without considering any variation due to inflation over the considered years. Hence, no variation in the project IRR can be associated to an increase in the price of electricity.

The total investment necessary to build the plant as it is presented in the cash flow corresponds to the estimated investment cost made by the project owner. Specifically for this project activity the project owner signed an EPC contract. This type of contract fixes the price to build the plant and any variation

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[5] For details about the Accounting Commensuration please refer to the explanation available at CCEE's website http://www.ccee.org.br/cceeinterdsm/v/index.jsp?vgnextoid=bdb92338daa8a010VgnVCM100000aa01a8c0RCRD.

[6] According to CCEE *the new model for the electric sector states that the commercialization of electric power is accomplished in two market ambiences: the Regulated Contracting Ambience – ACR (Ambiente de Contratação Regulada) and the Free Contracting Ambience –ACL (Ambiente de Contratação Livre). Contracting in the ACR is formalized by means of regulated, bilateral agreements, called Electric Power Commercialization Agreements within the Regulated Ambience (CCEAR – Contratos de Comercialização de Energia Elétrica no Ambiente Regulado) entered into between Selling Agents (sellers, generators, independent producers or self-producers) and Purchasing Agents (distributors) which participate of electric power purchase and sale auctions.*

either in favor or against the project is in charge of the construction company which means that no variation in project IRR can be attributed to a variation in the investment costs.

Outcome: From the above information, the project is not attractive to investor even with a 10% variation in the scenarios above, and therefore the project is additional.

SATISFIED/PASS – Proceed to Step 3

Step 3. Barrier analysis

Not applicable.

SATISFIED/PASS – Proceed to Step 4

Step 4. Common practice analysis

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

According to the additionality tool (version 5.2), "*projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc*". Thus, the following criteria were considered in order to choose the projects that can be considered similar to UHE Baguari:

i. **Country/region:** Brazil has an extension of 8,514,876.599 square kilometres[7] (with over 4,000 km distance in the north-south as well as in the east-west axis) and 6 distinct climate regions: sub-tropical, semi-arid, equatorial, tropical, highland-tropical and Atlantic-tropical (humid tropical). These varieties of climate obviously have strong influence in the technical aspects related to a hydropower projects.

In addition, hydroelectric projects also can differ significantly from each other considering the region to be implemented, climate, topography, availability of transmissions lines, river flow regularity, etc. For those reasons alone it is extremely difficult and not reasonable to compare different hydropower potential and plants. Moreover, hydro-power plants cannot be optimally placed (close to load centers and transmission lines) and easily transferred (moved to a new region where a better tariff is offered) as, for example, modular fossil-fuel-fired (diesel, natural gas) power plants. Differences may be even larger if no big water storage is possible, as in the case of the proposed project activity.

Considering information above, only the plants located in the same region of UHE Baguari – Minas Gerais state – were analyzed.

ii. **Scale:** According to the Brazilian regulations, large scale hydropower plants are defined as plants with an installed greater than 30MW[8]. Therefore, no small scale hydropower plant (e.g. installed capacity under 30MW) was considered. Furthermore, only plants with installed capacity 50% lower and 50% higher than UHE Baguari project were analyzed (i.e. between 70 and 210 MW).

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[7] Available at: http://www.ibge.gov.br/english/geociencias/cartografia/default_territ_area.shtm.

[8] *ANEEL – Agência Nacional de Energia Elétrica. Resolution # 652, issued on December 9th, 2003.*

iii. **Same environment with respect to regulatory framework:** Until the beginning of the 1990's, the energy sector was composed almost exclusively of state-owned companies. From 1995 onwards, due to the increase in international interest rates and the lack of state investment capacity, the government started the privatization process. However, by the end of 2000 results were still modest. Although further initiatives, aiming to improve electric generation in the country, were taken between the 1990's and 2003, they did not attract new investments to the sector. In 2003, the recently elected government decided to fully review the electricity market institutional framework in order to boost investments in the electric energy sector. Market rules were changed and new institutions were created such as Energetic Research Company (in a free translation from the Portuguese *Empresa de Pesquisa Energética – EPE*) – an institution responsible for the long term planning of the electricity sector with the role of evaluating, on a perennial basis, the safety of the electric power supply– and Chamber for the Commercialization of Electric Power (from the Portuguese *Câmara de Comercialização de Energia Elétrica* - CCEE) – an institution responsible for the management of electric power commercialization within the Brazilian interconnected system. This new structure was approved by the House of Representatives and published in March of 2004[9].

Taking into account this new regulatory framework, it is only reasonable to consider projects for which the decision making process happened after March of 2004. As further explained below in section C.1.1., the construction of large hydro power plants in Brazil is authorized by the government trough a public service concession contract and once this contract is signed it is very unlikely that the project developer quit the plant's construction. Hence, with the purpose of determining the date in which the decision to build the plants being considered in the common practice analysis was made, these contracts are going to be used. This information is publicly available at the Electricity Regulatory Agency ANEEL's website.

iv. **Same environment with respect to investment climate, access to technology and financing:** As mentioned in item "country/region" above, depending on the project location, differences related to the technical aspects of small hydropower plant projects have influence in their implementation, even if small hydro projects are located in the same region. Considering that these technical differences obviously have an influence in the investment/financing of a project and project sponsors have different investment capacity, financial information should be considered when small hydro projects were analyzed. As financial information of similar projects is not accessible for PPs, these projects should be excluded from this analysis following the additionality tool. However, PPs decided to do their upmost in making a reasonable comparison for the purpose of common practice analysis even without investment information available.

Considering the criteria mentioned above, PPs researched all large hydro power plants in Minas Gerais (criterion *i*) with an installed capacity between 70 an 210 MW (criterion *ii*) for which the concession contracts signed after March 2004 (criterion *iii*).

The information used in this analysis was taken from the Brazilian Electricity Information Database also publicly available at ANEEL's website. The below figure shows the Brazilian states' installed capacity considering all sources of electricity generation.

[9] http://www.planalto.gov.br/CCIVIL/_Ato2004-2006/2004/Lei/L10.848.htm.

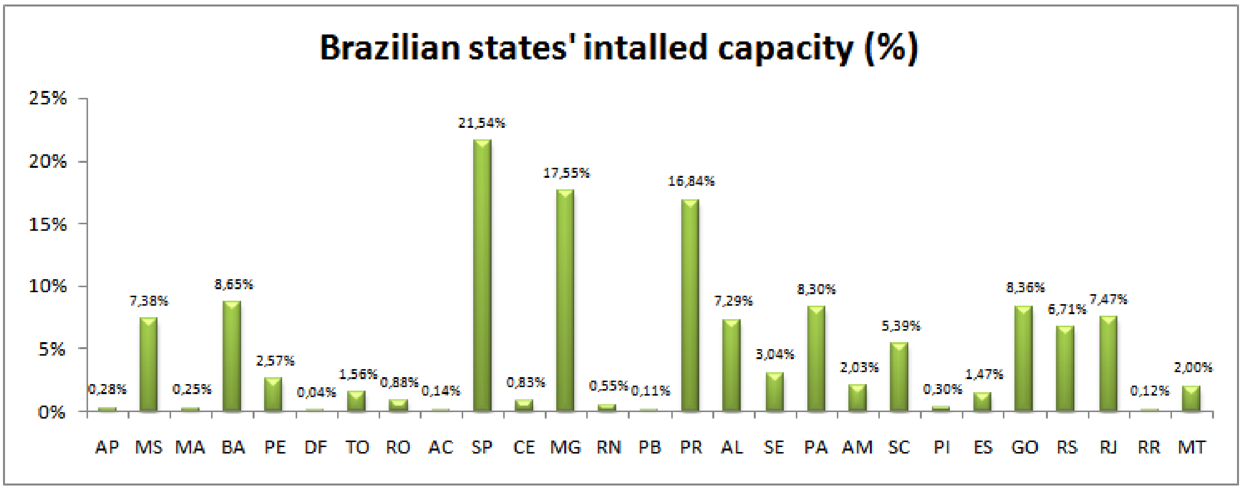

Figure 4 – Brazilian States generation installed capacity (Source: ANEEL / Banco de Informações de Geração. Available at <http://www.aneel.gov.br/area.cfm?idArea=15&idPerfil=2>)

As it can be seen, Minas Gerais State (MG) is significantly representative when compared to other states of the nation representing 17.55% of electric generation in the country. When only information of Minas Gerais is considered, it can be seen that large hydropower plants represents the majority of the installed capacity of this region (Figure 5).

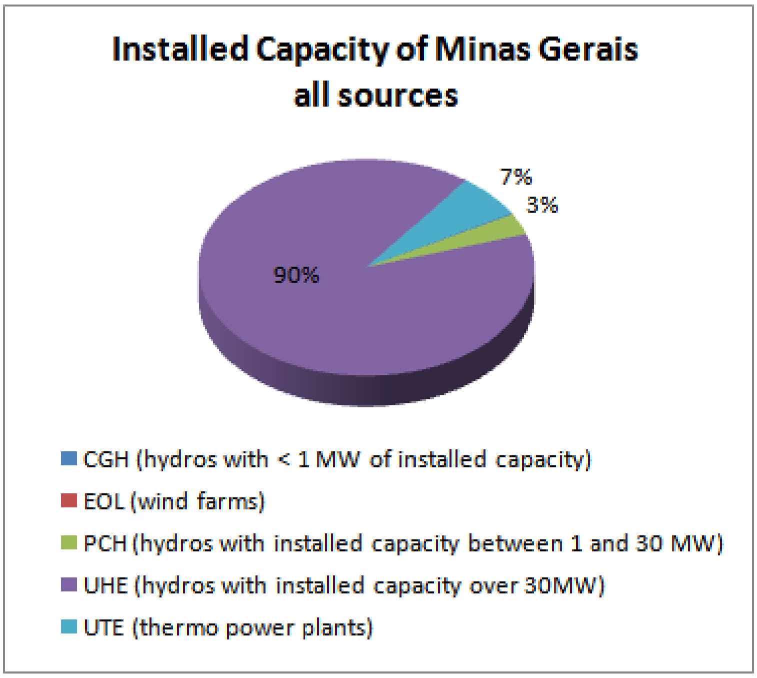

Figure 5 – Installed capacity in Minas Gerais for all electric generation sources (Source: ANEEL / Banco de Informações de Geração. Available at http://www.aneel.gov.br/area.cfm?idArea=15&idPerfil=2).

The below table presents all operational large hydropower plants in Minas Gerais that meets criteria *i* and *ii* discussed above.

Table 8 – Hydro power plants located in Minas Gerais with installed capacity between 70 MW and 210 MW.

Hydro Power Plant	Installed Capacity (kW)	Year of the concession contract
Risoleta Neves (Ex-Candonga)	140.000	mai/2000
Funil	180.000	dez/2000
Guilman-Amorim	140.040	mai/1998
Igarapava	210.000	set/1995
Ilha dos Pombos	187.169	jun/1996
Mascarenhas	180.500	jul/1995
Queimado	105.000	dez/1997
Sá Carvalho	78.000	jan/2004
Porto Estrela	112.000	jul/1997
Salto Grande	102.000	jul/1997
Amador Aguiar II (Ex - Capim Branco II)	210.000	ago/2001

Source: Brazilian Electricity Regulatory Agency - ANEEL

Applying criterion *iii* to the results presented in the table above (e.g. concession contract signature after March 2004) the conclusion is that none hydropower plant is to be considered similar to the one included in the proposed project activity.

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

Considering the above research, there are no other similar options occurring in the same region of the proposed project activity. Therefore, Baguari Project Activity cannot be considered the business-as-usual scenario in the country.

SATISFIED/PASS – Project is ADDITIONAL

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

<u>*Baseline Emissions*</u>

Baseline emissions are calculated using the annual electricity dispatched to the grid (EG_y) times the CO_2 baseline emission factor (EF_y), as follows:

$$BE_y = EG_{PJ,y} \cdot EF_{grid,CM,y}$$ **Equation 1**

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).

For Greenfield projects installed at a site where no electricity generation occurred previously, as it is the case of the proposed project activity, the calculation of $EG_{PJ,y}$ is as follows:

$$EG_{\mathrm{PJ,\,y}} = EG_{facility,y}$$ **Equation 2**

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)

The baseline emission factor of the grid ($EF_{grid,CM,y}$) is calculated using the methodological tool "*Tool to calculate the emission factor for an electricity system*". According to this tool Project Participants shall apply the following six steps to the baseline calculation:

STEP 1 - Identify the relevant electric power system.

STEP 2 - Select an operating margin (OM) method.

STEP 3 - Calculate the operating margin emission factor according to the selected method.

STEP 4 - Identify the cohort of power units to be included in the build margin (BM).

STEP 5 - Calculate the build margin emission factor.

STEP 6 - Calculate the combined margin (CM) emissions factor.

- **STEP 1 -** Identify the relevant electric power system

According to the tool, "*If the DNA of the host country has published a delineation of the project electricity system and connected electricity systems, these delineations should be used. If such delineations are not available, project participants should define the project electricity system and any connected electricity system and justify and document their assumptions in the CDM-PDD*".

Brazilian DNA has published the Resolution nr. 8 issued on 26th May, 2008 that defines the Brazilian Interconnected Grid as a single system that covers all the five macro-geographical regions of the country (North, Northeast, South, Southeast and Midwest). Hence, this figure will be used to calculate the baseline emission factor of the grid.

- **STEP 2 -** Select an operating margin (OM) method

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 Brazilian DNA made available the operating margin emission factor calculated using option c – Dispatch data analysis OM. More information of the methods applied can be obtained in the DNA's website (http://www.mct.gov.br/index.php/content/view/4016.html) and vintage will be used in the project activity.

- **STEP 3 -** Calculate the operating margin emission factor according to the selected method

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

It will be calculated using the below formulae:

$$EF_{grid,OM-DD,y} = \frac{\sum_h EG_{PJ,h} \cdot EF_{EL,DD,h}}{EG_{PJ,y}}$$ **Equation 3**

Where,

$EF_{grid,OM-DD,y}$ = Dispatch data analysis operating margin CO_2 emission factor in year y (tCO_2/MWh);

$EG_{PJ,h}$ = Electricity displaced by the project activity in hour h of the year y (MWh);

$EF_{EL,DD,h}$ = CO_2 emission factor for power units in the top of the dispatch order in hour h in year y (tCO_2/MWh);

$EG_{PJ,y}$ = Total electricity displaced by the project activity in year y (MWh);

h = Hours in year y in which the project activity is displacing grid electricity;

y = Year in which the project activity is displacing grid electricity.

As mentioned above, the host country's DNA will provide $EF_{EL,DD,h}$ in order to Project Participants to calculate the operating margin emission factor. Hence, this data will be updated annually applying the number published by the Brazilian DNA. For estimative purposes, the data of the most recent year available in the DNA website will be used.

- **STEP 4 -** Identify the cohort of power units to be included in the build margin (BM)

The build margin will also be calculated by the DNA. The number is published in the website and for estimative purposes the data for the most recent year will be used.

- **STEP 5** – Calculate the build margin mission factor ($EF_{BM,y}$)

The build margin will also be calculated by the DNA. The number is published in the website and for estimative purposes the data for the most recent year will be used.

- **STEP 6** – Calculate the combined margin (CM) emissions factor EF_{y}.

The combined margin is calculated as follows:

$$EF_y = w_{OM} \cdot EF_{OM,y} + w_{BM} \cdot EF_{BM,y}$$ **Equation 4**

Where the weights w_{OM} and w_{BM}, by default, are 50% (i.e., $w_{OM} = w_{OM} = 0.5$).

Project Emissions

The proposed project activity may involve project emissions that can be significant. In this sense, according to the selected CDM methodology these emissions shall be accounted for as project emissions by using the following equation:

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y}$$ **Equation 5**

Where,

PE_y = Project emissions in year y (tCO2e/yr);

$PE_{FF,y}$ = Project emissions from fossil fuel consumption in year y (tCO2/yr);

$PE_{GP,y}$ = Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year y (tCO2e/yr);

$PE_{HP,y}$ = Project emissions from water reservoirs of hydro power plants in year y (tCO2e/yr)

Emissions from Fossil Fuel Combustion ($PE_{FF,y}$)

The calculation of this source of emission is not applicable. In accordance with the methodology only geothermal and solar thermal project activities must consider this source of emission.

Emissions of non-condensable gases from the operation of geothermal power plants ($PE_{GP,y}$)

The calculation of this source of emission is not applicable. This source of emissions is only considered for geothermal project activities.

Emissions from water reservoirs of hydro power plants ($PE_{HP,y}$)

New hydro electric power projects resulting in new reservoirs, shall account for CH4 and CO2 emissions from reservoirs, estimated as follows:

a) if the power density (*PD*) of power plant is greater than 4 W/m^2 and less than or equal to 10 W/m^2:

$$PE_y = \frac{EF_{Res} \times TEG_y}{1000}$$	**Equation 6**

Where,

PE_y = Emission from reservoir expressed as tCO_2e/year.

EF_{Res} = is the default emission factor for emissions from reservoirs, and the default value as perEB23 is 90 Kg CO_2e/MWh.

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

b) If power density (*PD*) of the project is greater than 10W/m^2, PEy = 0.

The power density of the project activity is calculated as follows:

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}}$$ **Equation 7**

Where,

PD = Power density of the project activity, in W/m^2.

Cap_{PJ} = Installed capacity of the hydro power plant after the implementation of the project activity (W).

Cap_{BL} = Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero.

A_{PJ} = Area of the 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.

Leakage

According to the methodology, "*no leakage emissions are 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 (e.g. extraction, processing, and transport). These emissions sources are neglected”*

<u>*Emission Reductions*</u>

Finally, emission reductions by the project activity are calculated as follows:

$$ER_y = BE_y - PE_y$$ **Equation 8**

Where,

ER_y = Emission reductions in year y (t CO_2e/yr);

BE_y = Baseline emissions in year y (t CO_2e/yr);

PE_y = Project emissions in year y (t CO_2e/yr);

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

This section shall include a compilation of information on the data and parameters that are not monitored throughout the crediting period but that are determined only once and thus remain fixed throughout the crediting period and that are available when validation is undertaken.

Data / Parameter:	GWP_{CH4}
Data unit:	tCO_2e/tCH_4
Description:	Global warming potential of methane valid for the relevant commitment period
Source of data used:	IPCC
Value applied:	For the first commitment period: 21 tCO_2e/tCH_4
Justification of the choice of data or description of measurement methods and procedures actually applied :	This data was chosen following what is established in the applicable methodology.
Any comment:	

Data / Parameter:	Cap_{BL}
Data unit:	W
Description:	Installed capacity of the hydro power plants before the implementation of the project activity.
Source of data used:	Project site
Value applied:	0
Justification of the choice of data or description of measurement methods	The methodology that this value shall be applied for new hydro power plants.

and procedures actually applied :	
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.
Source of data used:	Project site
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied:	The methodology that this value shall be applied for new hydro power plants.
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

Baseline emissions calculation

As described in section B.6.1, baseline emissions (BE_y) are calculated directly from electricity supplied by the project to the grid ($EG_{PJ,y}$) multiplied by the emission factor ($EF_{grid,CM,y}$).

The estimative of the net electricity generated by the plant, equivalent to the total amount of energy effectively dispatched to the national grid, is based on the assured energy determined for the plant. The assured energy already considers the discount of the electricity consumption by the auxiliary systems of the plant as well as the transmission losses and was established been equal to 80.2 $MW_{average}$.

Considering the plant is expected to be operational 8760 hours/year the total energy generated by the plant is 702,552 MWh/year.

For estimation purposes, data provided by the Brazilian DNA for the year 2007 were applied for estimating the emission factor. When applying the published numbers in the formula presented in step 3 of section B.6.1., the $EF_{grid,OM\text{-}DD,y}$ obtained was:

$$EF_{grid,OM\text{-}DD,\ 2007} = 0.2909\ tCO_2e/MWh.$$

The building margin for the year of 2007 published by the DNA is:

$$EF_{BM,2007} = 0.0775\ tCO_2e/MWh.$$

With these numbers, applying in the formula presented in step 6 of section B.6.1., we have:

$$EF_y = 0.5 \times 0.2909 + 0.5 \times 0.0775$$

EF_y = 0.1842 tCO_2e/MWh.

For more details please refer to section B.6.1.

Applying the numbers above in Equation 2 described in section B.6.1., we have:

$$BE_y = EG_{\mathrm{PJ,\,y}} \cdot EF_{grid,CM,y}$$

$$BE_y = 702{,}552 \cdot 0.1842 = 129{,}410 tCO_e / year$$

Project emissions calculation

The installed capacity of UHE Baguari is 140 MW and its reservoir area is equal to 16.06 km^2. In the baseline no electricity was generated at the project site, consequently there wasn't reservoir. Applying these numbers on Equation 7, the result is:

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

$$PD = \frac{140MW - 0}{16.06km^2 - 0} = 8.72MW / km^2$$

Therefore, once the project's power density is above 4W/m^2 and below 10W/m^2, emissions are to be estimated using Equation 6. This calculation is done considering the total energy produced by the plant (TEG_y). Considering data available at the time of this PDD was developed, this was estimated by adding to the total amount of electricity dispatched to the grid ($EG_{PJ,y}$) energy that is going to be consumed by the auxiliary systems. This last one was estimated considering project owner experience based in other similar projects.

The result is as follows:

$$PE_y = \frac{EF_{\mathrm{Res}} \times TEG_y}{1000}$$

$$PE_y = \frac{90kgCO_2e / MWh \times 709{,}752MWh / year}{1000} = 63{,}878tCO_2 / year$$

Leakage emissions

As explained above in section B.6.1. no leakage is to be considered. Hence, ***LE* = 0**.

Emission reductions calculation

Finally emission reductions are calculated as follows:

$$ER_y = BE_y - PE_{\mathrm{y}}$$

$$ER_y = 129{,}410 - 63{,}878 = 65{,}532 tCO_e / year$$

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

Table 9 - tCO2 total estimation reduction of the project

Year	Estimation of project activity emissions (tones of CO_2e)	Estimation of baseline emissions (tones of CO_2e)	Estimation of leakage (tones of CO_2e)	Estimation of overall emission reductions (tones of CO_2e)
2010	56,126	113,544	0	57,419
2011	63,878	129,410	0	65,532
2012	63,878	129,410	0	65,532
2013	63,878	129,410	0	65,532
2014	63,878	129,410	0	65,532
2015	63,878	129,410	0	65,532
2016	63,878	129,410	0	65,532
Total (tonnes of CO_2e)	**439,392**	**890,005**	**0**	**450,613**

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

B.7.1 Data and parameters monitored:

Data monitored and required for verification and issuance will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later. The parameters chosen for the calculation of the emissions factor were ex-ante (see Section B.6.2).

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	702,552
Description of measurement methods and procedures to be applied:	The measurement of this parameter will be carried out by energy meters installed at the substation.
QA/QC procedures to be applied:	Energy metering QA/QC procedures are explained in section B.7.2. The equipment used to meter electricity production by the plant have by legal requirements extremely low level of uncertainty. Energy will be measured each 15 minutes and will be monthly consolidated. Electricity generation by the plant as published by the Electric Power Commercialization Chamber (from the Portuguese *Câmara de Comercialização de Energia Elétrica* – CCEE) will be

	used to cross check project participant's information.
Any comment:	

Data / Parameter:	***TEGy***
Data unit:	MWh/yr
Description:	Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year *y*.
Source of data to be used:	Project activity site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	709,752
Description of measurement methods and procedures to be applied:	All generating units of the plant are equipped with a gross electricity meters, *i.e.* these meters monitor the total electricity produced by the project activity. Hourly measurements are taken and monthly recording will be done.
QA/QC procedures to be applied:	Energy metering QA/QC procedures are explained in section B.7.2 (the equipments used have by legal requirements extremely low level of uncertainty). The gross electricity meters will be calibrated in the same periodicity as the net electricity meters are going to be.
Any comment:	-

Data / Parameter:	Cap_{PJ}
Data unit:	W
Description:	Installed capacity of the hydro power plant after the implementation of the project activity.
Source of data to be used:	Project site.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	140,000
Description of measurement methods and procedures to be applied:	Modifications of the installed capacity of the plant are to be made by the manufacturer of the equipment and if this is done the description of the equipment's tag will be up-dated.
QA/QC procedures to be applied:	In Brazil the installed capacity of hydropower plant is determined and authorized by the competent regulatory agency. In addition, any modification also has to be authorized and be publicly available. Hence, on a yearly basis, any new authorization to increase the installed capacity of the plant will be monitored.
Any comment:	-

Data / Parameter:	A_{PJ}
Data unit:	km^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	Project site.

used:	
Value of data applied for the purpose of calculating expected emission reductions in section B.5	16.06
Description of measurement methods and procedures to be applied:	Measured from topographical surveys, maps, satellite pictures, etc. The area of the reservoir can be determined depending on the reservoir level. Hydropower plants dispatched by ONS have to monitor their reservoir level. Data used with this purpose will be used to determine the area of the reservoir.
QA/QC procedures to be applied:	In Brazil, every modification at hydropower plants has to be authorized and be publicly available by the competent regulatory agency. Hence, on a yearly basis, any new authorization related to a modification in the reservoir area will be tracked.
Any comment:	-

Data / Parameter:	$EF_{grid,CM,y}$
Data unit:	tCO_2/MWh
Description:	Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using the applicable tool.
Source of data to be used:	Brazilian DNA website (http://www.mct.gov.br/index.php/content/view/4016.html)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	For the purpose of the emission reductions estimation the value used is 0.1842 tCO_2/MWh based on 2007 data published by the Brazilian DNA.
Description of measurement methods and procedures to be applied:	The selected option to calculate the operating margin made by the Brazilian DNA was the dispatch analysis which does not permit the vintage of *ex-ante* calculation of the emission factor. Hence, this value will be calculated annually applying the numbers published by the Brazilian DNA and following the steps provided in 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*".
Any comment:	-

B.7.2 Description of the monitoring plan:

The monitoring plan of the emission reductions by the project activity is in accordance with the procedures set by the methodology "ACM0002 – Consolidated baseline methodology for grid-connected electricity generation from renewable sources", Version 10.

The project will proceed with the necessary measures for the power control and monitoring. Together with the information produced by both ANEEL and CCEE, it will be possible to monitor the power generation of the project and the grid power mix. Information about power generation and energy supplied to the grid are controlled by the Chamber of Electric Energy Commercialization CCEE (from the Portuguese *Câmara de Comercialização de Energia Elétrica*). CCEE makes feasible and regulates the electricity energy commercialization.

There will be two energy meters (principal and backup) specified by ONS and, before the operations start, ONS demands that these meters are calibrated by an entity with *Rede Brasileira de Calibração* (RBC) credential. According ONS, these meters have to be calibrated every two years after operation starts. HPP Baguari will be responsible for these calibrations. In order to confirm and to give more credibility about the energy generated, it will be controlled in real time by the plant and CCEE.

At the time of verification, the HPP will provide all the necessary documents as evidence of the energy exported to the grid.

Consórcio UHE Baguari will also be responsible for the maintenance of the equipments' monitoring, for dealing with possible monitoring data adjustments and uncertainties, for review of reported results/data, for internal audits of GHG project compliance with operational requirements and for corrective actions. Yet, it is also responsible for the project management, as well as for organising and training of the staff in the appropriate monitoring, measurement and reporting techniques.

ANEEL can visit the plant to inspect the operation and maintenance of the facilities.

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)

Date of completing the final draft of this baseline section and the monitoring methodology (DD/MM/YYYY): 30/07/2007.

Ecopart Assessoria em Negócios Empresariais Ltda.
Rua Padre João Manoel 222
01411-000 São Paulo – SP
Brazil

Ana Paula Beber Veiga
ana.veiga@ecopart.com.br
Phone: +55 +11 3063-9068
Fax: +55 +11 3063-9069

Ecopart is the Project Advisor and also a Project Participant.

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:

(DD/MM/YYYY) 15/08/2006

According to the CDM Glossary of Terms the starting date of a CDM project activity is "*the earliest date at which either the implementation or construction or real action of a project activity begins*". Furthermore the guidance also clarifies that "*the start date shall be considered to be the date on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity (…), for example, the date on which contracts have been signed for equipment or construction/operation services required for the project activity*".

Considering the above information, in order to determine project activity's starting date the following events were considered: **financial closure, major equipment orders, construction permit awards, and start of construction**. These dates were identified as below:

- **Financial closure:** 20/December/2007. This is the date when the major shareholder signed the contract with the financing institution. The others shareholders didn't obtain the financing yet but on 31/05/2007 BNDES already stated that they had the possibility to get it.
- **Major equipment orders:** 26/02/2007. This is the date when the supply contract was signed.
- **Construction permit awards:** 15/12/2006. On this date the construction permit was issued by the environmental agency.
- **Start of construction:** 15/05/2007. The civil works started on this date.

In Brazil, companies willing to get the rights to explore hydroelectric potentials above 30MW have to participate in a public tender which results in the concession to build the plant to explore it. In the case of this CDM project activity, the public service concession contract by which the Brazilian government allows the consortium to operate, maintain and carry out the investment in the plant during the next 35 years was signed on **August, 15th, 2006**.

Several necessary steps to build the plant, such as financing contract, Power Purchase Agreement, are only obtained after the signature of the concession contract. Additionally, if the company decides not to build the plant after the signature of the concession contract there would be relevant penalties.

Hence, although this event does not represent the financial closure, the companies participating on the consortium committed themselves to the terms of the contract assuming that the hydro was in fact going to be implemented. Therefore, this must be considered the project starting date.

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

35y-0m

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

C.2.1. Renewable crediting period

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

(DD/MM/YYYY) 01/01/2010 or on the date of registration whichever occurs later.

C.2.1.2. Length of the first crediting period:

7y-0m

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

Not applicable.

C.2.2.2. Length:

Not applicable.

SECTION D. Environmental impacts

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

The growing global concern on sustainable use of resources is driving a requirement for more sensitive environmental management practices. Increasingly this is being reflected in countries' policies and legislation. In Brazil the situation is not different. Environmental rules and licensing policies are very demanding in line with the best international practices.

In Brazil, the sponsor of any project that involves construction, installation, expansion or operation of any polluting or potentially polluting activity or any other capable to cause environmental degradation is obliged to secure a series of permits from the relevant environmental agency (federal and/or local, depending on the project).

Project sponsors have to obtain all licenses required by the Brazilian environmental regulation (Resolution CONAMA - *Conselho Nacional do Meio Ambiente* (National Environmental Council) n° 237/97):

- The preliminary license (*Licença Prévia* or LP),
- The construction license (*Licença de Instalação* or LI); and
- The operating license (*Licenca de Operação* or LO).

The environmental permit process has an administrative nature and was implemented by the National Environmental Policy, established by the Law n. 6938 dated on October 31st, 1981. Additionally, other norms and laws were issued by CONAMA and local state agencies.

In order to obtain all environmental licenses every small hydro projects shall mitigate the following impacts:

- Inundation of Indian lands and slaves historical areas – the authorization for that depends on National Congress decision;
- Inundation of environmental preservation areas, legally formed as National Parks and Conservation Units;
- Inundation of urban areas or country communities;
- Reservoirs where there will be urban expansion in the future;
- Elimination of natural patrimony;
- Expressive losses for other water uses;
- Inundation of protected historic areas; and
- Inundation of cemeteries and other sacred places.

The process starts with a previous analysis (preliminary studies) by the local environmental department. After that, if the project is considered environmentally feasible, the sponsors have to prepare the Environmental Assessment, which is basically composed by the following information:

- Reasons for project implementation;
- Project description, including information regarding the reservoir;

- Preliminary Environmental Diagnosis, mentioning main biotic, and anthropic aspects;
- Preliminary estimation of project impacts; e
- Possible mitigating measures and environmental programs.

The result of those assessments is the Preliminary License (LP), which reflects the environmental local agency positive understanding about the environmental project concepts.

In order to obtain the Construction License (LI) it is necessary to present (a) additional information about previous assessment; (b) a new simplified assessment; or (c) the Environmental Basic Project, according to the environmental agency decision informed at the LP.

The Operation License (LO) is a result of pre-operational tests during the construction phase to verify if all exigencies made by environmental local agency were completed.

The plant possesses the preliminary and the construction issued by Minas Gerais Environmental Agency (FEAM - *Fundação Estadual do Meio Ambiente do Estado de Minas Gerais*). Given that, the project does not imply in negative transboundary environmental impacts, on the contrary, the licenses would not be issued.

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 plant possesses the preliminary and the construction issued by Minas Gerais Environmental Agency (FEAM - *Fundação Estadual do Meio Ambiente do Estado de Minas Gerais*). Given that, the project does not imply in negative transboundary environmental impacts, on the contrary, the licenses would not be issued.
All licenses for the project are available for consultation under request, as well as the environmental studies.

SECTION E. Stakeholders' comments

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

According to the federal and local state legislation, the environmental licensing process requests public hearings with the local community. Also, the same legislation requests the announcement of the issuance of the licenses (LP, LI and LO) in the local state official journal (*Diário Oficial do Estado*) and in the regional newspapers. The announcements for the project are available for consultation under request.

Besides the stakeholders comments requested for the environmental licenses, the Brazilian Designated National Authority, "*Comissão Interministerial de Mudanças Globais do Clima*", requests comments from local stakeholders, and the validation report issued by an authorized DOE according to the Resolution no. 1, issued on 11th September 2003, in order to provide the letter of approval.

This Resolution determines that copies of the invitations for comments sent by the project proponents to the following agents involved in and affected by project activities:

- Municipal governments and City Councils;

- State and Municipal Environmental Agencies;
- Brazilian Forum of NGOs and Social Movements for Environment and Development;
- Community associations;
- State Attorney for the Public Interest;

On October 30th, 2007 invitation letters were sent to the following agents[10]:

- City Hall of Fernandes Tourinho, Sobrália, Governador Valadares, Periquito, Iapu and Alpercata;
- Municipal Assemblies of Fernandes Tourinho, Sobrália, Governador Valadares, Periquito, Iapu and Alpercata;
- Environmental Agency of Fernandes Tourinho, Sobrália, Governador Valadares, Periquito, Iapu and Alpercata;
- Minas Gerais State Environmental Agency
- Communitarian Association of Fernandes Tourinho (Sindicato dos Trabalhadores Rurais de Fernandes Tourinho), Sobrália (Sindicato dos Trabalhadores Rurais de Sobrália), Governador Valadares (Sindicato dos Trabalhadores Rurais de Governador Valadares), Periquito (Associação dos Atingidos pela Usina Hidrelétrica de Baguari do Município de Periquito), Iapu (Sindicato dos Trabalhadores Rurais de Iapu) and Alpercata (Sindicato dos Trabalhadores Rurais de Governadores Valadares e Região[11]);
- Minas Gerais State Attorney for the Public Interest;
- Fórum Brasileiro de ONGs e Movimentos Sociais para o Desenvolvimento e Meio Ambiente (Brazilian Forum of NGOs and Social Movements for the Development and Environment).

Copies of the letters and post office confirmation of receipt communication were supplied to the DOE validating the project and are available upon request.

E.2. Summary of the comments received:

Attending Brazilian DNA Resolution, two comments were received:

Comment 1: FBOMS - Fórum Brasileiro de ONGs e Movimentos Sociais para o Desenvolvimento e Meio Ambiente suggesting the use of Gold Standard or similar tools;

Comment 2: Minas Gerais State Attorney for the Public Interest asked for a description of the project; what would be the expected schedule for its development; and whether the company possessed other similar projects being developed in the region.

Copies of the letters received from the local stakeholders mentioned above were supplied to the DOE validating the project and are available upon request.

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

Considering comments of Section E.2, the following actions were taken:

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[10] The communitarian association letters were sent on February 20th, 2009.

[11] This association also represents the local community of Alpercata.

Comment 1: Project Participants consider that requests made by the Brazilian Government are sufficient to be used as sustainable indicators which are attended by this CDM project activity;

Comment 2: Project Participants responded that the project consisted in the construction of an hydroelectric power plant that had the right to claim for carbon credits once it is a renewable source of energy that displaces energy that would be generated by fossil fuel sources; project participants expected that the CDM project activity would be registered by the end of 2009; and that neither of the project participants had other similar projects being developed in the region.

Copies of the letters sent to the local stakeholders mentioned above were supplied to the DOE validating the project and are available upon request.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Consórcio UHE Baguari
Street/P.O.Box:	Rua Afonso Pena, 2590
Building:	
City:	Governador Valadores
State/Region:	Minas Gerais
Postcode/ZIP:	35010-000
Country:	Brazil
Telephone:	
FAX:	
E-Mail:	
URL:	
Represented by:	Mr. Marcos Siqueira
Title:	
Salutation:	Mr.
Last name:	Siqueira
Middle name:	
First name:	Marcos
Department:	
Mobile:	
Direct FAX:	
Direct tel:	+55 (33) 3271-3017
Personal e-Mail:	marcos@consorciouhebaguari.com.br

Organization:	Ecopart Assessoria em Negócios Empresariais Ltda.
Street/P.O.Box:	Rua Padre João Manoel 222
Building:	
City:	São Paulo
State/Region:	São Paulo
Postfix/ZIP:	01411-000
Country:	Brazil
Telephone:	+55 (11) 3063-9068
FAX:	+55 (11) 3063-9069
E-Mail:	focalpoint@ecopart.com.br
URL:	www.ecopart.com.br
Represented by:	Mrs. Melissa Sawaya Hirschheimer
Title:	
Salutation:	Mrs.
Last name:	Hirschheimer
Middle name:	Sawaya
First name:	Melissa
Department:	
Mobile:	
Direct FAX:	+55 (11) 3063-9069
Direct tel:	+55 (11) 3063-9068
Personal e-Mail:	Melissa.hirschheimer@ecopart.com.br

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding is involved in the present project.
This project is not a diverted ODA from an Annex 1 country.

Annex 3

BASELINE INFORMATION

The Brazilian electricity system, for the purpose of CDM activities, was delineated as a single interconnected system comprehending the five geographical regions of the country (North, Northeast, South, Southeast and Midwest). This was determined by the Brazilian DNA through its Resolution nr. 8 dated 26th May, 2008. More information on how the Interconnected System is delineated and the emission factor values is available at the Brazilian DNA's website <http://www.mct.gov.br/index.php/content/view/3881.html>.

Annex 4

MONITORING INFORMATION

This section was intentionally left in blank. For details please refer to section B.7.2.

Annex 5

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