



Voluntary Carbon Standard Version 2007
Verification Report Template

19 November 2007

Verification Report:

BRAZIL-VER/BR.0970220 – REVISION 03

Name of Verification company:	Date of the issue:
Bureau Veritas Certification Holding SAS	15/07/2011
	Approved by:
Verification Report – Salto Pilão Hydropower Plant Project Activity	Marcelo Antoniazzi Porto – Internal Technical Reviewer
Client:	Project Title:
Consórcio Empresarial Salto Pilão – CESAP	Salto Pilão Hydropower Plant Project Activity
Summary:	

Consórcio Empresarial Salto Pilão has commissioned BUREAU VERITAS CERTIFICATION to carry out the 1st periodic verification of the Salto Pilão Hydropower Plant Project Activity (UHESP)

The project activity consists of the construction of a hydropower plant with a reservoir of 0.15 km² and an installed capacity of 182.3 MW. The plant is located between the cities of Lontras, Ibirama and Apiúna, state of Santa Catarina, Southern Region of Brazil.

The Salto Pilão Hydropower Plant is owned by Consórcio Empresarial Salto Pilão.

The primary objective of UHESP is to help Brazil meet its rising demand for energy due to economic growth and to improve the supply of electricity, while contributing to environmental, social and economical sustainability by increasing the share of renewable energy in the total energy consumption in Brazil and Latin America. The current structure of Consórcio Empresarial Salto Pilão is:

- Companhia Brasileira de Alumínio (CBA) – 60%,
- Camargo Corrêa Geração de Energia S/A(CCGE) – 20%, and
- DME Energética Ltda. (DMEE) – 20%.

The verification scope is defined as a periodic independent and objective review and an ex-post determination of the monitored reductions in GHG emissions during defined verification period and consisted of the following three phases: i) desk review of the project design, baseline and monitoring plan; ii) follow-up interviews with project stakeholders; iii) resolution of outstanding issues and the issuance of the final verification report and opinion. The overall verification, from Contract Review to verification Report & Opinion, was conducted using BUREAU VERITAS CERTIFICATION internal procedures.

The first output of the verification process is a list of Clarification and Corrective Actions Requests (CL and CAR), presented in the Verification Report. Taking into account this output, the project proponent revised its Monitoring Report Document (Version 03). In summary, it is BUREAU VERITAS CERTIFICATION's opinion that the project correctly applies the "Consolidated baseline methodology for grid-connected electricity generation from renewable sources – ACM0002, version 11", and meets the relevant VCS requirements and local legislation.

During the Verification, 03 Corrective Action Requests (CAR) and 02 Clarification Requests (CL) were raised and successfully closed.

As the result of the 1st periodic verification, the verifier confirms that the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner. BUREAU VERITAS CERTIFICATION herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as follows:

Reporting period: 19 January 2010 to 28 February, 2011:

203,408 tCO₂e

Work carried out by:	Number of pages:
Antonio Daraya – Lead GHG Verifier – Team Leader Roberval Kaminski – Specialist – Team Member Marcelo Antoniazzi Porto – ITR	33

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1 Introduction

Consórcio Empresarial Salto Pilão has commissioned BUREAU VERITAS CERTIFICATION to carry out the 1st periodic verification of the Salto Pilão Hydropower Plant Project Activity (UHESP)

This report summarizes the findings of the first periodic verification of the project, performed on the basis of VCS – Voluntary Carbon Standard version 2007.1 criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

1.1 Objective

Verification is the periodic independent review and ex-post determination of the monitored reductions in GHG emissions during defined verification period.

The objective of the periodic verification is to verify that actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan; furthermore, the periodic verification evaluates the GHG emission reductions data and express a conclusion with a high, but not absolute, level of assurance about whether the reported GHG emission data is free of material misstatements; and verifies that the reported GHG emission reductions data is sufficiently supported by evidence, i.e. monitoring records.

The verification shall consider both, quantitative and qualitative information on emission reductions.

Quantitative data comprises the monitoring reports submitted to the verifier by the project entity.

Qualitative data comprises information on internal management controls, calculation procedures and procedures for transfer, frequency of emissions reports, review and internal audit of calculations/data transfers.

The verification is based on criteria set by VCS – Voluntary Carbon Standard version 2007.1.

1.2 Scope and Criteria

The verification scope is defined as an independent and objective review of the project design document, the project's baseline study and monitoring plan and other relevant documents. The information in these documents is reviewed against VCS – Voluntary Carbon Standard version 2007.1.

The verification is not meant to provide any consulting towards the Client. However, stated requests for forward actions and/or corrective actions may provide input for improvement of the project monitoring towards reductions in the GHG emissions.

1.3 VCS project Description

The project activity consists of the construction of a hydropower plant with two generating units of 91.17 MW each, totalizing an installed capacity of 182.3 MW, with a reservoir of 0.15 km². The plant is located between the cities of Lontras, Ibirama and Apiúna, state of Santa Catarina, Southern Region of Brazil.

The Salto Pilão Hydropower Plant is owned by Consórcio Empresarial Salto Pilão.

The current structure of Consórcio Empresarial Salto Pilão is:

- Companhia Brasileira de Alumínio (CBA) – 60%,
- Camargo Corrêa Geração de Energia S/A(CCGE) – 20%, and
- DME Energética Ltda. (DMEE) – 20%.

The primary objective of UHESP is to help Brazil meet its rising demand for energy due to economic growth and to improve the supply of electricity, while contributing to environmental (run-of-river power plant), social (job creation about 1000 workers in the construction phase, and infra-structure enhancements in surrounded municipalities) and economical sustainability by increasing the share of renewable energy in the total energy consumption in Brazil and Latin America.

This indigenous and cleaner source of electricity has also 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 CO₂ emissions), which would be generated (and emitted) in its absence.

1.4 Level of assurance

With basis in the assessment of this project, a verification statement expressing a reasonable level of assurance is expressed as follows:

- Is materially correct and is a fair representation of the GHG data and,
- Was prepared in accordance with the related International Standard on GHG quantification, monitoring and reporting, and to relevant national standards.

The verification report is based on VCS PD version 06, of 22/06/2010, and other documents provided by the project proponent, as well as, on information obtained from the on-site visit. The verification opinion is assured by the credibility of all the statements above.

2 Methodology

This first verification comprises the period from 19 January 2010 to 28 February 2011.

- On-site visit: 26 and 27 April 2011.

Participants:

- | | |
|---------------------------------|------------------------------|
| - Renata Oliveira Freitas | EQAO (CESAP' s Consultant) |
| - Renato Pellicer de Oliveira | EQAO (CESAP' s Consultant) |
| - Antonio Daraya | Bureau Veritas Certification |
| - Roberval Kaminski | Bureau Veritas Certification |
| - José Vilson Novack Cantarelli | Project Operator |
| - Fernando Pedrassani C. Neves | Project Operator |
| - Clóvis Ollé Fischer Santos | Project Operator |
| - Joaquim Humberto D. Marçal | Project Operator |
| - Pedro Lomonaco N. de Oliveira | Project Operator |
| - Evânio T. Padro Lopes | Project Operator |

- | | |
|-------------------------|----------------------------|
| - Elizabeth Sucupira | Ciclo21 (Environment) |
| - Rafael da Cruz | Geoambiente (Environment) |
| - Jair Fabrick | AGL (Social Communication) |
| - Paulo Henrique Müller | CESAP |

- Verification Report revision 03: 13 July 2011.

Project Participants

- Consórcio Empresarial Salto Pilão - (CESAP)
- Ecoart Assessoria em Negócios Empresariais Ltda. (EQAO).

The verification consisted of the following steps:

- A desk review of the VCS PD v06 and supporting documents, with the use of the relevant sections of a customized protocol according to the VCS 2007.1;
- A desk review of the Monitoring Report (MR) version 1, revised to version 2, revised to version 3 and additional supporting documents which the client submitted. The relevant sections of the above-mentioned customized protocol according to the VCS 2007.1 were used;
- On-Site assessment,
- Background investigation and follow-up interviews with representatives of Project Participants CESAP and EQAO.
- Verification Report, revision 03.

The criteria of this verification included the relevant rules and steps as set out in the VCS.

3 Verification Findings

3.1 Remaining issues, including any material discrepancy, from previous Validation

This is the first verification. No FAR was opened in the validation of this project activity. So there are no remaining issues.

3.2 Project Implementation

The implementation status of the project is as follows:

The project has a 10 year-crediting period, twice renewable.

The first 10 year-crediting period is from 19 January 2010 to 18 January 2020. According to the registered PD, the total Emission Reductions forecasted for that period are **2,908,762 tCO₂e**.

As mentioned in the registered PD, the starting date of the crediting period is considered as the date on which both generating units of UHESP started operations, i.e. 19 January 2010, information confirmed as per ANEEL Resolution nº 102, dated 18 January 2010.

The first periodic verification of the project covered the period from 19 January 2010 to 28 February 2011, resulting in Emission Reductions of **203,408 tCO₂e**.

The actual operation of the proposed project activity, which consists of the construction of a hydropower plant with a reservoir of 0.15 km² and an installed capacity of 182.3 MW, is according to the registered PD, version 6, of 22 June 2010.

Specifications of the equipment used at UHESP

Turbines	
Type	Francis
Quantity	2
Power (MW)	93 (each)
Nominal flow (m ³ /s)	52.90
Water head (meters)	194.9
Generators	
Type	Vertical-shaft
Quantity	2
Nominal Power (MVA)	101.3 (91.17 MW)
Tension (kV)	13.8
Frequency (Hz)	60

The project is neither associated with leakage effects nor with new emissions of pollutants. According to the Project Design (PD), registered under VCS of UHESP project, the parameters that have to be monitored are:

- EG_{facility,y} - Quantity of net electricity generation supplied by the project plant/unit to the grid in year y.
- Cap_{PJ} - Installed capacity of the hydro power plant after the implementation of the project activity.
- 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.

- $EF_{grid,CM,y}$ - Combined margin CO₂ 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”.
- $EF_{grid,OM,y}$ - Operating Margin CO₂ 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”.
- $EF_{grid,BM,y}$ - Build margin CO₂ 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”.

All other pertinent data were analyzed and presented at the time of the VCS project validation.

3.3 Completeness of Monitoring

The monitoring plan is in accordance with the approved methodology applicable to the project activity, ACM0002 – “Consolidated methodology for grid-connected electricity generation from renewable sources” (version 11).

The DOE verified the practice and confirms it is in place and in accordance with approved methodology.

The parameters required by the monitoring plan and the way the Verification Team verified the values in the Monitoring Report Version 03 are described below:

Table below shows the monitored parameters to calculate VCUs.

Data / Parameter:	$EG_{facility,y}$
Data unit:	MWh/year
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 sponsor and the power utility/CCEE.
Value of data applied for the purpose of calculating expected emission reductions	1,244,086
Description of measurement methods and procedures to be applied:	Electricity supplied by the project activity to the grid. Double checked by Project Sponsors internal control and documents from the power utility/CCEE. CCEE is a Brazilian government entity which monitors the electricity on the national interconnected grid. Hourly measurement and monthly recording. For information on the energy meters, please, refer to Section 3.4.
‘QA/QC procedures to be applied:	The equipments used have by legal requirements extremely low level of uncertainty.
Any comment:	-

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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 and official data source.
Value of data applied for the purpose of calculating expected emission reductions	182,300,000
Description of measurement methods and procedures to be applied:	Installed capacity determined by official entities and confirmed during on-site visit verifications.
QA/QC procedures to be applied:	Determined based on recognized standards with no possibility of uncertainty.
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 and official data source.
Value of data applied for the purpose of calculating expected emission reductions	150,000 The reservoir area of the project is based on the Operation License nr. 202/2009, issued on July 13 th , 2009 by the Environmental Agency of Santa Catarina State (FATMA).
Description of measurement methods and procedures to be applied:	Measured from topographical surveys, maps, satellite pictures, etc. (once at the time of the project conception) and water levels (during the project crediting period). Monthly measurement and recording.
QA/QC procedures to be applied:	Determined based on recognized standards with extremely low level of uncertainty.
Any comment:	-

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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 latest version of the “ <i>Tool to calculate the emission factor for an electricity system</i> ”.
Source of data to be used:	Brazilian DNA (Comissão Interministerial de Mudança Global do Clima – CIMGC)
Value of data applied for the purpose of calculating expected emission reductions	0.1635 Calculated based on an average of the operating and build margin emission factors for the year of 2009 published by the Brazilian DNA: < http://www.mct.gov.br/index.php/content/view/4016.html >.
Description of measurement methods and procedures to be applied:	Since option C) for the calculation of the operating margin was chosen, this value will be up-dated annually according to data from the Brazilian DNA and following the prescription of the emission factor tool.
QA/QC procedures:	Official source of data.
Any comment:	-

Data / Parameter:	$EF_{grid.OM,y}$
Data unit:	tCO ₂ /MWh
Description:	Operating Margin CO ₂ emission factor for grid connected power generation in year y calculated using the latest version of the “ <i>Tool to calculate the emission factor for an electricity system</i> ”.
Source of data to be used:	<u>Brazilian</u> DNA (Comissão Interministerial de Mudança Global do Clima – CIMGC)
Value of data applied for the purpose of calculating expected emission reductions	0.2476 Calculated based on an average of the operating margin emission factor for the year of 2009 published by the Brazilian DNA: < http://www.mct.gov.br/index.php/content/view/4016.html >.
Description of measurement methods and procedures to be applied:	Option C) was chosen to calculate the operating margin. This option does not permit the <i>ex-ante</i> vintage for the calculation of the emission factor. Therefore, the emission factor will be calculated <i>ex-post</i> applying the numbers provided by the Brazilian

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	DNA.
QA/QC procedures to be applied:	Official source of data.
Any comment:	-

Data / Parameter:	$EF_{grid,BM,y}$
Data unit:	tCO ₂ /MWh
Description:	Build 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:	Brazilian DNA (Comissão Interministerial de Mudança Global do Clima – CIMGC)
Value of data applied for the purpose of calculating expected emission reductions	0.0794 Calculated based on an average of the build margin emission factor for the year of 2009 published by the Brazilian DNA: < http://www.mct.gov.br/index.php/content/view/4016.html >.
Description of measurement methods and procedures to be applied:	Option 2 was chosen to calculate the build margin. Therefore, the emission factor will be calculated <i>ex-post</i> applying the numbers provided by the Brazilian DNA. Numbers provided by the Brazilian DNA will be applied during the project verification.
QA/QC procedures to be applied:	Official source of data.
Any comment:	-

As the CO₂ build margin emission factor of the grid ($EF_{grid,BM,y}$) for the year 2010 was not yet available at the site of the Brazilian DNA (Comissão Interministerial de Mudança Global do Clima – CIMGC), the last information available at that site was referring to the year of 2009, which then has been used.

All the necessary information for the calculation of the emission reductions during the monitored period was available to the DOE.

3.4 Accuracy of Emission Reduction Calculations

Project sponsor proceeded with the necessary measures for the power control and monitoring. Together with the information produced by both project sponsor and the power utility/Electric Energy Commercialization Chamber (CCEE), it was possible to monitor the power generation of the project (in MWh/year). CCEE makes feasible and regulates the electricity energy commercialization in Brazil.

There are six energy meters (principal and backup) specified by CCEE: 2 installed at the power plants (which measure the gross energy) and 4 installed at the local

substation (which measure the net energy). CCEE has on-line access to the energy readings from meters located at the substation.

Energy data is measured by the meters in real time. Monthly, consolidations are made for payment purposes. Cross check is made between reports from CCEE/power utility and power plant. However, energy data from meters located at the power plant is higher than data from meters at the substation, considering transmission losses from the power plant to the substation. The table below presents the meters description:

Model	Manufacturer	Quantity	Location
ION 8600B	Schneider Electric	2	Power plant
ION 8600A		4	Substation

According to ONS procedures (Submodulo 12.3 “Manutenção do sistema de medição para faturamento”, revision 1), these meters have to be calibrated every two years after operation starts. All meters calibration was made following the necessary requirements.

The table below presents the dates in which the meters mentioned above were last calibrated as well as the correspondent calibration certificates number. All the meters have a precision class of 0.2%.

Calibration dates of the energy meters

<i>Description</i>		<i>Number</i>	<i>Last Calibration Certificate # - Date</i>
Salto Pilão	Power Plant	PT-0811A790-01	003/2009 - 08/06/2009
		PT-0903A301-01	
	Substation	PT-0903A346-01	
		PT-0902A536-01	
		PT-0903A335-01	
		PT-0812A276-01	

As it can be seen from data presented in the above table, both the calibration of the principal and back-up meters occurred on June 08th, 2009 – *i.e.* before the monitoring period. Therefore, the meters are deemed calibrated and their re-calibration will be done in June, 2011.

Electricity from CCEE/power utility reports were considered for emission reduction purposes. Therefore, these monthly reports were available during the project verification (estimated to happen yearly) as well as the calibration certificates from meters involved in the project activity.

Salto Pilão Consortium is 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. Salto Pilão Consortium is also responsible for the project management, as well as for organizing and training of the staff in the appropriate monitoring, measurement and reporting techniques.

In addition, the Brazilian Power Regulatory Agency (ANEEL) can visit the plant to inspect the operation and maintenance of the facility assuring that project sponsors are carrying out the necessary procedures for the project operation.

Calculation of Emission Reductions

According to the selected approved methodology ACM0002, emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

Where:

ER_y = Emission reductions in year y (tCO₂e/yr);

BE_y = Baseline emissions in year y (tCO₂e/yr);

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

Baseline emissions (BE_y)

Baseline emissions are calculated using the annual electricity dispatched to the grid ($EG_{\text{facility},y}$) times the CO₂ baseline emission factor (EF_y), as follows:

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

Where:

BE_y = Baseline emissions in year y (tCO₂/yr);

$EG_{\text{PJ},y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year y (MWh/yr);

$EF_{\text{grid},\text{CM},y}$ = Combined margin CO₂ 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" (tCO₂/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 $EG_{\text{PJ},y}$ is as follows:

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

Where:

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the 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).

Electricity generation of the project delivered to the grid ($EG_{facility,y}$)

UHESP started to export electricity to the grid since 11 December 2009 but, as defined in the registered PD, the starting date of the crediting period is considered as the date on which both generating units of UHESP started operations, i.e., 19 January 2010. This information is confirmed as per ANEEL's Ordinance #102, dated 18 January 2010.

The first verification of the project covers the period from 19 January 2010 to 28 February 2011. The energy exported to the grid in the above mentioned period is as follows:

Energy exported to the grid of UHESP in MWh

Month	2010	2011
January*	40,292	115,828
February	103,318	121,339
March	76,009	-
April	83,520	-
May	111,503	-
June	96,620	-
July	69,341	-
August	65,592	-
September	52,041	-
October	111,451	-
November	66,626	-
December	130,606	-
Total	1,006,919	237,167

* Since January, 19th when both generating units of UHESP started operations.

CO₂ emission factor of the grid (EF_y)

As mentioned in the registered PD, the Baseline Emission Factor is defined as EF_y and is calculated as a Combined Margin Emission Factor (CM) of the Operating

Margin Emission Factor (OM) and of the Build Margin Emission Factor (BM), following the “*Tool to calculate the emission factor for an electricity system*”. Following this tool, UHESP Project utilizes the “delineation of the project electricity system and connected electricity systems” published by the Brazilian DNA in its Resolution nº 8, which defines a single system for the Brazilian Interconnected Grid, covering all the five geographical regions of the country (North, Northeast, South, Southeast and Midwest).

The Brazilian DNA made available the emission factor calculation based on information of the grid power plants only.

As the Build Margin Emission Factor (BM) for the year 2010 is not yet available, it was used the information corresponding to the year 2009 to calculate the Combined Margin Emission Factor (CM). The Build Margin Emission Factor for 2009 is 0.0794 tCO₂/MWh and the Operating Margin Emission Factor for 2009 is 0.2476 tCO₂/MWh resulting on a Combined Margin Emission Factor of 0.1635 tCO₂/MWh, which was used in this report to calculate the Emission Reductions in the monitored period.

Considering **Erro! Fonte de referência não encontrada.**, the Baseline Emissions are as follows:

Baseline emissions for 2010 year

Month	EG_{facility.v} (MWh)	BE_y (tCO₂)
January	40,292	6,588
February	103,318	16,892
March	76,009	12,427
April	83,520	13,656
May	111,503	18,231
June	96,620	15,797
July	69,341	11,337
August	65,592	10,724
September	52,041	8,509
October	111,451	18,222
November	66,626	10,893
December	130,606	21,354
TOTAL	1,006,919	164,631

Baseline emissions for 2011 year

Month	EG_{facility.v} (MWh)	BE_y (tCO₂)
January	115,828	18,938
February	121,339	19,839
TOTAL	237,167	38,777

Calculation of project emissions

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/m² and less than or equal to 10 W/m²:

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

Where:

PE_y = Emission from reservoir expressed as tCO₂e/year;

EF_{Res} = Default emission factor for emissions from reservoirs = 90 Kg CO₂e/MWh, as per EB23.

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 the power density (*PD*) of the project is greater than 10W/m², *PE_y* = 0.

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

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

Where:

PD = Power density of the project activity, in W/m².

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 (m²).

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 (m²). For new reservoirs, this value is zero.

For Salto Pilão HPP:

Capacity of the project = 182.3 MW = 182,300,000 W

Reservoir area = 0.15 km² = 150,000 m²

Power density = 182,300,000 / 150,000 = 1,215.3 W/m²

PE_y = 0.

Calculation of leakage

There is not any leakage emissions involved in the project.

Emission reductions due to the project activity during a given period

According to the selected approved methodology ACM0002, emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

Where:

ER_y = Emission reductions in year y (tCO₂e/yr);

BE_y = Baseline emissions in year y (tCO₂e/yr);

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

Emission reductions in 2010

Month	BE _y (tCO ₂ e)	PE _y (tCO ₂ e)	ER _y (tCO ₂ e)
January	6,588	0	6,588
February	16,892	0	16,892
March	12,427	0	12,427
April	13,656	0	13,656
May	18,231	0	18,231
June	15,797	0	15,797
July	11,337	0	11,337
August	10,724	0	10,724
September	8,509	0	8,509
October	18,222	0	18,222
November	10,893	0	10,893
December	21,354	0	21,354
Total	164,631	0	164,631

Emission reductions in 2011

Month	BE _y (tCO ₂)	PE _y (tCO ₂)	ER _y (tCO ₂)
January	18,938	0	18,938
February	19,839	0	19,839
Total	38,777	0	38,777

The total Emission Reductions in the monitored period are:

$$164,631 + 38,777 = 203,408 \text{ tCO}_2\text{e}$$

Emission Reductions = 203,408 tCO₂e

The discussion, findings and conclusion regarding spreadsheet formulas and connections, conversions, aggregations, consistent use of factors are in line with the monitoring plan. There were not any manual transposition errors between data sets, uncertainty of technology and appropriateness of default data and no specific source data is lacking.

3.5 Quality of Evidence to Determine Emission Reductions

The project proponent submitted, as evidences to determine emission reductions, several documents as listed below.

The evidences were assessed and considered as of sufficient quantity and appropriate quality by the DOE.

Reference Documents:

- Final VCS Project Design document Version 06; dated on 22 June 2010;
- Monitoring Report Version 01, completed on 21/03/2011;
- Monitoring Report Version 02, completed on 31/05/2011;
- Monitoring Report Version 03, completed on 08/07/2011;
- Calculation spreadsheet Salto Pilão_VER_2011.03.21_v01;
- Calculation spreadsheet Salto Pilão_VER_2011.05.31_v02;
- Calculation spreadsheet Salto Pilão_VER_2011.07.08_v03;
- Excel Files ug1_liquida and ug2_liquida, January 2010, from CCEE via SCDE;
- Operation License LAO nº 202/2009, from FATMA – Fundação do Meio Ambiente of the State of Santa Catarina, Brazil, from 13/07/2009 – Valid until 13/07/2012;
- ANEEL Resolution nº 4597, of 10/12/2009, giving authorization for the Commercial Operation of the UG 1, with the installed capacity of 91,170 kW, from 11/12/2009 on;
- ANEEL Resolution nº 102, of 18/01/2010, giving authorization for the Commercial Operation of the UG 2, with the installed capacity of 91,170 kW, from 19/01/2010 on;
- Initial Verification Report – Electronic Measurement Equipments – (Relatório de Verificação inicial em medidores eletrônicos de Energia Elétrica) – ION 8600 - INMETRO/IPEM – RJ – 08 June 2009.
- And other references indicated in the item 5.0.

The external/internal, oral and documented evidences submitted by the project proponent to determine the emission reductions, their source and nature are reliable, of sufficient quantity and appropriate quality.

3.6 Management and Operational System

The management and operational system were checked by Verification team as follows:

- The management and operational system of the project is suitable for monitoring and reporting. It is in accordance with the methodologies and procedures indicated.

- An operational structure was established with responsibilities identified. We confirm the applicability of the structure indicated in Section 3.2 of the VCS PD ver 06.
- Staff training plan was clear; training records were available.
- The quality management is according to what was defined in the VCS PD ver 06.

4 Verification conclusion

Consórcio Empresarial Salto Pilão has commissioned BUREAU VERITAS CERTIFICATION to carry out the 1st periodic verification of the Salto Pilão Hydropower Plant Project Activity (UHESP) with regard to the relevant requirements for CDM project activities. The project reduces GHG emissions by avoiding electricity generation by fossil fuel sources, which would be generated in its absence.

This verification covers the period from 19 January 2010 to 28 February 2011.

During the Verification, 03 Corrective Action Requests (CARs) and 02 Clarification Requests (CLs) were raised and successfully closed. No FARs were raised.

The verification is based on the Monitoring Report version 03, completed on 08 July 2011, the registered VCS PD version 06, of 22 June 2010, Emission reduction calculation spreadsheet version 03, completed on 08 July 2011 and supporting documents made available to the BUREAU VERITAS CERTIFICATION by the project participant.

As a result of this verification, the DOE confirms that:

- BUREAU VERITAS CERTIFICATION confirms that the project is implemented as planned and described in the Project Design Document. The monitoring plan is in place and the project is generating GHG emission reductions. The DOE concludes that all operations of the project are implemented and installed as planned and described in the validated project design document;
- The monitoring plan is in accordance with the applied approved CDM methodology, “Consolidated baseline methodology for grid-connected electricity generation from renewable sources – ACM0002, version 11”;
- The monitoring system is in place and functional. The project has generated GHG emission reductions.

BUREAU VERITAS CERTIFICATION can confirm that the GHG emission reductions are calculated without material misstatements. The DOE concludes that in relation to the project's GHG emissions, resulting GHG emission reductions are consistent with the monitoring plan contained in the VCS PD version 06 of 22 June 2010 and emission reductions calculation spreadsheet Version 03, completed on 08 July 2011.

All the data and information used to elaborate this Verification Report are treated confidentially by BUREAU VERITAS CERTIFICATION.

As the result of the 1st periodic verification, BUREAU VERITAS CERTIFICATION herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as follows:

Reporting period: From 19-01-2010 to 28-02-2011

Verified emission in the above reporting period:

Project emissions	0	t CO ₂ equivalents
Baseline emissions	203,408	t CO ₂ equivalents
Emission reductions	203,408	t CO ₂ equivalents

Rio de Janeiro, 15/07/2011



Antonio Daraya
Lead GHG Verifier – Team Leader



Marcelo Antoniazzi Porto
Internal Technical Reviewer



Roberval Kaminski
Specialist – Team Member

5 References

Documents provided by the company that relate directly to the GHG components of the project:

- Final VCS Project Design document Version 06; dated on 22 June 2010;
- Validation Report Version 01, dated on 21/06/2010;
- Monitoring Report Version 01, completed on 21/03/2011;
- Monitoring Report Version 02, completed on 31/05/2011;
- Monitoring Report Version 03, completed on 08/07/2011;
- Calculation spreadsheet Salto Pilão_VER_2011.03.21_v01;
- Calculation spreadsheet Salto Pilão_VER_2011.05.31_v02;
- Calculation spreadsheet Salto Pilão_VER_2011.07.08_v03;
- Excel Files ug1_liquida and ug2_liquida, January 2010, from CCEE via SCDE;
- Operation License LAO nº 202/2009, from FATMA – Fundação do Meio Ambiente of the State of Santa Catarina, Brazil, from 13/07/2009 – Valid until 13/07/2012;
- ANEEL Resolution nº 4597, of 10/12/2009, giving authorization for the Commercial Operation of the UG 1, with the installed capacity of 91,170 kW, from 11/12/2009 on;
- ANEEL Resolution nº 102, of 18/01/2010, giving authorization for the Commercial Operation of the UG 2, with the installed capacity of 91,170 kW, from 19/01/2010 on;
- Initial Verification Report – Electronic Measurement Equipments nº 003/2009 – (Relatório de Verificação inicial em medidores eletrônicos de Energia Elétrica) – ION 8600 - INMETRO/IPEM – RJ – 08/06/2009;
- ANA Resolution nº 131, of 11/03/2003;
- Concession Contract nº 15/2002 between ANEEL and AHE Salto Pilão;
- Training Records.

6 VERIFIERS' CV

Bureau Veritas Certification - Lead GHG Verifier – Team Leader

Antonio Daraya is graduated in Chemical Engineering with a very large experience in Industrial and Environmental management in several industrial fields. He is ISO 9001:2000, ISO 14001:2004 and OHSAS 18001 Lead Auditor and has also experience in the implementation of Quality and Environmental Management Systems. Antonio is qualified as Lead Verifier GHG – Green House Gases.

Bureau Veritas Certification – Specialist – Team Member

Roberval Kaminski is an electrical engineer with over 20 years of experience working in activities related to generation, transmission and distribution of electricity. Their main specialties are: management and loss control techniques and trade in electrical power systems, establishment of guidelines, criteria and procedures for connection to the transmission system, to be used for cogeneration systems and power distribution analysis; and implementing energy efficiency practices in industrial and commercial tariff analysis, analysis of power quality for customers and suppliers of electric energy; quality management services, including commercial distributors of electricity.

Bureau Veritas Certification - Internal Technical Reviewer

Marcelo A. Porto is graduated in Electrical Engineering, with a graduate specialization in Quality Engineering and a Master's degree in Industrial Engineering. Quality management expert and auditor, he worked in the electro-electronic, mechanical, medical devices, leather and shoes industries. ISO 9001 and SA8000 auditor, he is also trained as a lead auditor in the fields of environment (ISO 14001), and organizational health and safety (OHSAS 18001).

7 VCS VERIFICATION PROTOCOL

Table 1 Verification requirements based on the Clean Development Mechanism Validation and Verification Manual (Version 01.2)

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
1 Project implementation in accordance with the registered project design document					
It is assessed if there are any concerns related to the conformity of the actual project activity and its operation with the registered project design document	VVM	195			
a Are all physical features of the proposed CDM project activity proposed in the registered PDD in place?	VVM	196	Yes, all the physical features are in place.	OK	OK
b Have the project participants operated the proposed CDM project activity as per the registered PDD?	VVM	196	Yes, the project participants have operated the project as per the registered VCS PD.	OK	OK
c Was an on-site visit conducted?	VVM	196	Yes, an on-site visit was conducted on 26 and 27/04/2011.	OK	OK
d If not, justify the rationale of the decision.	VVM	196	Not applicable.	OK	OK
e Does the implementation or operation of CDM project activity conform with the description contained in the registered PDD?	VVM	197	Yes, the implementation and the operation of the project activity is in compliance with the description contained in the registered PD. The project has an LAO – Licença Ambiental de Operação (Operation Environmental License) nº 202/209, from 13/07/2009, valid until 13/07/2012. CL 01 – Please, provide a copy of the “Outorga” (water use authorization) for the existing well(s).	CL 01	OK
f If not, which are the potential impacts due to these changes, according to the relevant guidelines established by the Executive Board (EB48-§73)?	VVM	197	Not applicable.	OK	OK
g Was a notification or a request for approval of changes from the project activity as described in the registered PDD submitted prior the conclusion	VVM	197	Not applicable.	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
of the verification/certification for the corresponding?					
2 Compliance of the monitoring plan with the monitoring methodology					
It is assessed if the monitoring plan of the proposed CDM project activity complies with the applied methodology	VVM	199			
a Is the validated monitoring plan in accordance with the approved methodology applied by the proposed CDM project activity?	VVM	200	The methodology applicable to this project is ACM0002 – “Consolidated methodology for grid-connected electricity generation from renewable sources” (version 11). The validated monitoring plan is in accordance with the approved methodology applied by the project activity.	OK	OK
b If no, was a request for revision of the monitoring plan was done? (The DOE may request for revision of the monitoring plan covering the monitoring period under verification, for approval by the CDM Executive Board)	VVM	201	Not applicable.	OK	OK
c Are there any monitoring aspects of the project activity that are not specified in the methodology, particularly in the case of small-scale methodologies (e.g. additional monitoring parameters, monitoring frequency and calibration frequency)?	VVM	202	There are not any monitoring aspects of the project activity that are not specified in the methodology.	OK	OK
3 Compliance of monitoring with the monitoring plan					

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
It is assessed if monitoring of reductions in GHG emissions to result from the proposed CDM project activity is implemented in accordance with the monitoring plan contained in the registered PDD or the accepted revised monitoring plan ^{Erro! Indicador não definido.}	VVM	204			
a Have the monitoring plan and the applied methodology been properly implemented and followed by the project participants?	VVM	205	Yes.	OK	OK
b Have all parameters stated in the monitoring plan, the applied methodology and relevant CDM Executive Board decisions been sufficiently monitored and updated as applicable, including:	VVM	205	Yes.	OK	OK
i Project emission parameters?	VVM	205	According to section 4.1 of the registered PD, there are not project emissions from fossil fuel consumption and from the operation of geothermal power plants. Also, according to section 4.3 of the registered PD, as the project has a power density of 1,215.3 W/m ² , there are not project emissions due to the water reservoir.	OK	OK
ii Baseline emission parameters?	VVM	205	CAR 01 – According to the last paragraph of section 1.6 of the registered PD, “The starting date of the crediting period is considered as the date on which both generating units of UHESP started operations, <i>i.e.</i> January 19 th , 2010”, but in the Monitoring Report, version 1, the beginning of the 1 st crediting period was considered to be January 1 st , 2010. CAR 02 – During the site visit, the information of the energy exported to the grid informed in the	CAR 01 CAR 02 CAR 03	OK OK OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
			<p>Monitoring Report, version 1, was checked based on the CCEE's report available via SCDE and it was evidenced that it was not correct. Please, refer also to the CAR 01, when informing the energy generate during the month of January 2010.</p> <p>CAR 03 – The emission factor of the grid to be used to calculate the baseline emissions is the one corresponding to the year 2010, but the calculation was made based on the year 2009.</p>		

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
iii dLeakage parameters?	VVM	205	According to the section 4.1 of the registered PD, no leakage emissions are considered.	OK	OK
iv Management and operational system: the responsibilities and authorities for monitoring and reporting are in accordance with the responsibilities and authorities stated in the monitoring plan?	VVM	205	Yes, the responsibilities and authorities for monitoring and reporting are in accordance with the responsibilities and authorities stated in the monitoring plan.	OK	OK
c Is the accuracy of equipment used for monitoring in accordance with the relevant guidance provided by the CDM Executive Board and are equipment controlled and calibrated in accordance with the monitoring plan?	VVM	205	Yes.	OK	OK
i Are monitoring results consistently recorded as per approved frequency?	VVM	205	<p>Yes.</p> <ul style="list-style-type: none"> - The electrical energy produced by the hydropower plant it is hourly measured and monthly recorded. - The Installed capacity was determined by ANEEL and is confirmed during on-site verifications. - The Combined Margin Emission Factor of the grid is calculated annually using the latest version of the "Tool to calculate the emission factor for an electricity system". The Operating Margin and the Build Margin Emission Factors of the Grid, used for the calculation of the Combined Margin Emission Factor of the Grid, are supplied by the Brazilian DNA – Comissão Interministerial de Mudança Global do Clima – CIMGC. <p>CL 02 – According to the section B.2 of the Monitoring Report, APJ = Area of the reservoir is measured and recorded monthly. Please, inform how this monitoring is made and recorded for</p>	CL 02	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
			monitoring.		

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
ii Have quality assurance and quality control procedures been applied in accordance with the monitoring plan?	VVM	205	Yes, they are in accordance with the monitoring plan.	OK	OK
4 Assessment of data and calculation of greenhouse gas emission reductions					
It is assessed if GHG emission reductions achieved by / resulting from the proposed CDM project activity are calculated applying the selected methodology	VVM	207			
a Is a complete set of data for the specified monitoring period is available? (If no, i.e., only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, the DOE shall opt to either make the most conservative assumption theoretically possible in finalizing the verification report, or raise a request for deviation prior to submitting request for issuance, if appropriate).	VVM	208	Yes, all the data for the specified monitoring period was available to the DOE. Please, refer to CAR 02 , CAR 03 and to CL 01 .	CAR 02 CAR 03 CL 01	OK OK OK
b Has information provided in the monitoring report been cross-checked with other sources such as plant log books, inventories, purchase records, laboratory analysis?	VVM	208	Yes, the electricity supplied to the Grid has been cross-checked with CCEE reports. CCEE is a Brazilian Government entity which monitors the electricity on the National Interconnected Grid. The Combined Margin Emission Factor information has been cross-checked in the DNA's site. Please, refer to CAR 01 , CAR 02 , and CAR 03 .	CAR 01 CAR 02 CAR 03	OK OK OK
c Have calculations of baseline emissions, proposed CDM project activity emissions and leakage, as appropriate, been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology document?	VVM	208	Yes, all the calculations have been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology document.	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
d Have any assumptions used in emission calculations been justified?	VVM	208	There were no assumptions used in the emission calculations.	OK	OK
e Have appropriate emission factors, IPCC default values and other reference values been correctly applied?	VVM	208	Yes.	OK	OK

Table 2 Resolution of Corrective Action / Forward Action / Clarification Requests.

Draft report clarifications and corrective action requests by verification team	Reference to checklist question in Periodic Verification Checklist	Summary of project owner response	Verification team conclusion
CAR 01 – According to the last paragraph of section 1.6 of the registered PD, “The starting date of the crediting period is considered as the date on which both generating units of UHESP started operations, <i>i.e.</i> January 19 th , 2010”, but in the Monitoring Report, version 1, the beginning of the 1 st crediting period was considered to be January 1 st , 2010.	VVM 205	The starting date of the crediting period was corrected. In addition, the amount of energy was corrected considered the starting date. Please refer to the second version of the monitoring report and spreadsheet calculation.	The correction of the starting date was made and the amount of energy was corrected. <u>CAR 01 was closed.</u> <u>OK</u>
CAR 02 – During the site visit, the information of the energy exported to the grid informed in the Monitoring Report, version 1, was checked based on the CCEE’s report available via SCDE and it was evidenced that it was not correct. Please, refer also to the CAR 01, when informing the energy generate during the month of January 2010.	VVM 205	The energy generation for the monitored period was corrected. Furthermore, CCEE’s reports were available to the DOE during the site visit. Please refer to the second version of the monitoring report and spreadsheet calculation.	The energy generation for the monitored period was corrected during the site visit. The Monitoring Report version 2 was also corrected accordingly. <u>CAR 02 was closed.</u> <u>OK</u>

Draft report clarifications and corrective action requests by verification team	Reference to checklist question in Periodic Verification Checklist	Summary of project owner response	Verification team conclusion
CAR 03 – The emission factor of the grid to be used to calculate the baseline emissions is the one corresponding to the year 2010, but the calculation was made based on the year 2009.	VVM 205	The emission factor for 2010 has not been published by the Brazilian DNA. This data will be updated as soon as available.	Due to the unavailability of the build margin emission factor for 2010, the emission factor for 2009 was used for the calculation of the emission reductions. <u>CAR 03 was closed.</u> <u>OK</u>
CL 01 – Please, provide a copy of the “Outorga” (water use authorization) for the existing well(s).	VVM 197	According to the Article 7 of ANA Resolution #131 issued on 11/03/2003, concessions granted until the publication of this resolution are exempt of authorization for water use. Please refer to the ANA Resolution and concession contract attached to this response.	The information was checked and accepted. <u>CL 01 was closed.</u> <u>OK</u>
CL 02 – According to the section B.2 of the Monitoring Report, APJ = Area of the reservoir is measured and recorded monthly. Please, inform how this monitoring is made and recorded for monitoring.	VVM 205	The monitoring of the reservoir area is made through the water level recorder installed at the dam. The level sensors present in this tool allow the data to be read online in the digital system of the plant. The data is collected every 5 minutes and calculations are performed every hour,	The information was checked and accepted. <u>CL 02 was closed.</u> <u>OK</u>

Draft report clarifications and corrective action requests by verification team	Reference to checklist question in Periodic Verification Checklist	Summary of project owner response	Verification team conclusion
		consolidated in spreadsheets and sent to ONS (from the Portuguese <i>Operador Nacional do Sistema</i>). Please refer to the spreadsheets for the month of February/2011 attached to this response.	