



Voluntary Carbon Standard Version 2007 Verification Report Template

19 November 2007

Verification Report: BRAZIL-VER/0791/2010 – VERSION 02

Name of Verification company:	Date of the issue:
BUREAU VERITAS CERTIFICATION HOLDING - SAS	04/06/2010
Report Title:	Approved by:
Verification Report for Kamiranga Ceramic Fuel Switching Project	Rubens Ferreira – Internal Technical Reviewer
Client:	Project Title:
Carbono Social Serviços Ambientais LTDA	Kamiranga Ceramic Fuel Switching Project, Brazil
Summary:	

BUREAU VERITAS CERTIFICATION has made the verification of the Kamiranga Ceramic Fuel Switching Project, which is a small industry that produces structural ceramic units, mainly for the market in Belém and for the northeast of the state of Pará. It is located in the state of Pará, in the north region of the country.

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. In summary, it is BUREAU VERITAS CERTIFICATION'S opinion that the project correctly applies the baseline and monitoring AMS.I-E (Switch from Non – Renewable Biomass for Thermal Application by the User) Version 01 from February 01st of 2008 to 8th April, 2010 and meets the relevant VCS requirements, and local legislation.

As the result of the 2nd 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: July 01st, 2009 to January 31th, 2010.

Er_y (July 01st, 2009 to 31th, 2010)			
Period	PR_y	By (tonnes)	ER_y (tCO₂e)
Total 2009	17,150	13,890	18,054
Total 2010	2,858	2,315	3,009
Total period	20,008	16,205	21,063
Work carried out by:		Number of pages:	
Eduardo J. L. Galvão – Leader GHG Verifier Daiany M. Favarato – GHG Specialist Rubens Ferreira – Internal Technical Reviewer		42	

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1 INTRODUCTION

CARBONO SOCIAL SERVIÇOS AMBIENTAIS LTDA has commissioned BUREAU VERITAS Certification to verify the emission reductions of its VCS “Kamiranga Ceramic Fuel Switching Project”.

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

Kamiranga Ceramic is a small industry that produces structural ceramic units (bricks), mainly for the market in Belém and for the northeast of the state of Pará. In the past few years the fuel employed to fire the ceramic units was native wood obtained through deforestation of the Amazon forest, which led to the deforestation of this biome.

The Amazonian Biome has sufficiently diversified fauna and flora, representing 60% of all Brazilian territory. Nowadays, the uncontrolled deforestation is breaking up the firm land forest. Without necessary care, entire regions of fauna and old centers of species have the risk to be completely disappeared.

The switching fuel project will reduce the greenhouse gases emissions, by substituting native wood with sawdust, which may be replaced by elephant grass, açaí pits and rice husk, for thermal energy creation. This fuel exchange could only be feasible when considering the carbon credits incomes, since the adaptation and constructions of kilns to the new biomasses, and the purchase of new equipments required considerable investments.

The main goal of this project activity is to minimize the negative impacts of the deforestation of the Amazonian biome by discouraging the exploitation of the area.

In opposition to the identified baseline, the project activity will generate thermal energy without stimulating deforestation and will use an abundant renewable biomass.

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 and documents provided by the project proponent, as well as information obtained from the on-site visit. The verification opinion is assured provided the credibility of all above.

2 METHODOLOGY

This second Verification comprises the period from July 1st 2009 to January 31th 2010.

Preparations: 29/03/2010 to 02/04/2010

On-site visit: 08/04/2010

Draft Reporting: 02/06/2010

Verification Reporting: 04/06/2010

Project Participants – Carbono Social Serviços ambientais Ltda:

Raul Feldmann – Technical Analyst

Rafael Borgheresi – Technical Coordinator

Project Proponents – Kamiranga Ceramic:

Mr. Glaydson Vieira – Project Developer

The verification consisted of the following steps:

- A desk review of the VCS PD 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) 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 personnel of the project developer;
- Verification reporting (Draft Verification Report and Final Verification Report).

The criteria of this verification include 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

There are not remaining issues from the previous verification, all the CARs and CLs were closed, and no FAR was opened.

There are no pending CARs and CLs issued in the course of the verification that still needs to be properly addressed to get closed. Before issuance of the final verification report, these CARs and CLs were adequately answered by the project proponent, and are closed. There are not remaining issues from the verification.

3.2 PROJECT IMPLEMENTATION

The implementation status of the project is as follows:

The project has a 10 years crediting period, twice renewable.

The first 10 years crediting period is from January 1st, 2008 to December 31st, 2017. The total Emission Reductions forecasted for that period are 351,250 tCO₂e.

The following Verifications have already been made:

- First and Initial Periodic Verification: From January 1st, 2008 to June 30th, 2009. Emission Reductions of 48,068 tCO₂e.
- Second Periodic Verification: From July 1st 2009 to January 31st 2010. Emission Reductions of 21,063 tCO₂e.

Project start date: September 1st, 2007

Crediting period start date: January 1st, 2008

At the VCS PD version 2.3, October 27, 2009 it was listed that *Kamiranga Ceramic* would utilize sawdust as renewable biomass on its burning process. Moreover, as listed at the same VCS PD section 1.9, "in case of lack of this biomass, the project proponent can use *açaí*, rice husk or elephant grass". Generally, the amount of renewable biomass may change depending on the harvest, which may occur shortages depending on natural and economic factors. In the specific case of this Monitoring Report, which includes the period from July 1st, 2009 to January 31st, 2010, *Kamiranga Ceramic* utilized sawdust combined with *açaí* pits as renewable fuel.

The actual operation of the proposed project activity is the fuel switching in the ceramic facility, with the substitution of unsustainable native firewood to sawdust and *Açaí* pits as renewable biomasses for energy supply.

Currently, *Kamiranga Ceramic* operates using two "Paulista" kilns, and one "Hoffman" kiln, producing approximately 2,858 tons of ceramic units fired per month, mainly structural bricks with six holes. By the way, the ceramic company can produce structural bricks with eight holes and roof tiles, but only produced through specialized orders.

Data / Parameter:	PRy
Data unit:	Tons of ceramic units fired per month
Description:	Production of ceramic devices
Source of data to be used:	Controlled by the project proponent.

Value of data applied for the purpose of calculating expected emission reductions

Brick weight used to calculate the production in tons:

1.588 kg (9x14x19).

Year	Month	PRy - Production (tons of ceramic units fired)
2009	July	2,858
	August	2,858
	September	2,858
	October	2,858
	November	2,858
	December	2,858
	Total 2009	17,150
2010	January	2,858
	Total 2010	2,858

Description of measurement methods and procedures to be applied:	The measurement was done by an internal control sheet monitored by the project proponent, which was fed daily. The production was calculated in tons ,through the number of units fired times the average weight of the brick type. For a more conservative calculation the average weight was rounded down. The production is a representative sample to ensure that all appliances are still in operation
QA/QC procedures to be applied:	The ceramic has an internal control of the quantity of pieces produced. It was rechecked according to the biomass employed and the kiln consumption of renewable biomass.
Any comment:	Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.

The Emission Reduction increase is due to the fact that the production was a bit bigger than the estimated. The difference was too small and it is not considered a deviation.

It is important to note that the production increased but did not exceed the production limit of the Environmental License. Despite of that, the project activity during this monitoring period (July 1st 2009 to January 31st 2010) is in accordance with the registered VCS project description. Therefore the project activity was implemented in conformity with the registered VCS PD.

All the new variables referents to the use of the new biomass (açaí pits): consumption and cost (financial barrier), and its properties (NCV and specific gravity) were checked and considered in according with the MR. The site visit, a new financial analysis (it was made a sensitivity analysis for this period, once the Financial Barrier on the Pd version 2.3 did not included açaí pits on its calculation during validation. The sensitivity analysis was made by summing the amount of sawdust and açaí pits that were acquired during the monitored period. This value was compared with the baseline costs, according to VCS PD version 2.3, from October 27th, 2009. As a result of this analysis the project is considered additional) and the cross-checking in the documents received were the means used to validate the actual project activity with the registered project design document.

Despite of that, the actual project activity was implemented in accordance with the validated VCS PD.

3.3 COMPLETENESS OF MONITORING

The monitoring plan is in accordance with the approved methodology applied by the proposed

CDM project activity.

The parameters required by the monitoring plan and the way the Verification Team has verified the values in the monitoring reports are described below:

Data Reported in Monitoring

Parameters	Description	Units	Origin	Frequency
$Q_{\text{renewable biomass}}$	Amount of renewable biomass	tons	Measured by the project proponent	Monthly
Origin of Renewable Biomass	Renewable origin of the biomass	Not applicable	Controlled by the project proponent	Annually
PR_y	Production of ceramic pieces	Tons of units produced	Controlled by the project proponent.	Monthly
Renewable Biomass Surplus	Amount of renewable biomass available	tons or m ³	Monitored by articles and database.	Annually
Leakage of Non-Renewable Biomass	Leakage resulted from the non-renewable biomasses	tCO ₂ e	Monitored by articles and database.	Annually
$EF_{\text{projected fossil fuel}}$	CO ₂ Emission factor of residual fuel oil	tCO ₂ /TJ	IPCC ³⁰	Not monitored
NCV_{biomass}	Net Calorific Value of non-renewable biomass	TJ/ton of Wood	Bibliography	Not monitored
ρ_{wood}	Specific gravity of non-renewable biomass	ton/m ³	Bibliography	Not monitored
$f_{\text{NRB},y}$	Fraction of biomass (wood) used in the absence of the project activity in year y can be established as non-renewable biomass using survey methods	Percentage	Bibliography and Project Developer	Annually
BF_y	Consumption of non-renewable biomass per thousand of ceramic units produced per year	Tons of wood/ tons of ceramic units fired	Data from project proponent	Function of PR_y

Data / Parameter:	$EF_{\text{projected fossil fuel}}$
Data unit:	tCO ₂ /TJ
Description:	CO ₂ Emission factor of residual fuel oil

Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories. Available at: http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf. Page 2.18. Table 2.3. Visited on May 4th, 2009.
Value applied:	77.4
Justification of the choice of data or description of measurement methods and procedures actually applied :	In the baseline scenario, the probable fossil fuel that would be consumed in the absence of native wood without sustainable forest management would be the heavy oil. This fuel is more expensive than wood, however it can be a more plausible of substitute of wood than natural gas due to risks involving natural gas distribution.
Any comment:	Applicable for stationary combustion in the manufacturing industries and construction. The fossil fuel likely to be used by similar consumers is taken the IPCC default value of residual fossil fuel.

Data / Parameter:	NCV_{biomass}
Data unit:	TJ/ton
Description:	Net Calorific Value
Source of data used:	Quirino W. F., Vale A. T.; Andrade A. P. A., Abreu, V. L. S.; Azevedo A. C. S. Calorific Value of Wood and Wood Residues . Biomassa & Energia, v. 1, n. 2, p. 173-182, 2004. Available at: http://www.renabio.org.br/arquivos/p_poder_lignocelulosicos_11107.pdf. Visited on April 27th, 2009.
Value applied:	0.0182

Justification of the choice of data or description of measurement methods and procedures actually applied :	This value provides the energy generated by the amount of wood that would be used in the absence of the project.
Any comment:	The species used to calculate the average value are typical trees of Amazon Biome that are usually employed as fuel in the ceramic industries of the region. IPCC default values shall be used only when country or project specific data are not available or difficult to obtain, according to "Guidance on IPCC default values" (Extract of the report of the twenty-fifth meeting of the Executive Board, paragraph 59).

Data / Parameter:	ρ_{wood}
Data unit:	ton/m ³
Description:	Specific gravity
Source of data used:	Quirino W. F., Vale A. T.; Andrade A. P. A., Abreu, V. L. S.; Azevedo A. C. S. Calorific Value of Wood and Wood Residues . Biomassa & Energia, v. 1, n. 2, p. 173-182, 2004. Available at: < http://www.renabio.org.br/arquivos/p_poder_lignocelulosicos_11107.pdf >. Visited on April 27 th , 2009.
Value applied:	0.67
Justification of the choice of data or description of measurement methods and procedures actually applied :	The amount of wood used in the baseline was measured by volume units, so this data is used to the unity conversion.
Any comment:	The species used to calculate the average value are typical trees of Amazon Biome and usually employed as fuel in the ceramic industries of the region.

Data / Parameter:	BF_y
Data unit:	tons of wood per tons of ceramic units fired
Description:	Baseline consumption of non-renewable biomass per thousand of ceramic devices produced in year y
Source of data used:	Historical data from project proponent
Value of data	0.81
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value was acquired through the average consumption and production of ceramic devices during the years when the ceramic companies used to consume non-sustainable wood. If nowadays the plants still used native firewood their consumption would be around 2.251.8 tons of native firewood per month to produce 2,780 tons of ceramic devices. This value was employed to calculate the real amount of wood displaced to maintain the ceramic production in the baseline scenario.
Any comment:	

Data / Parameter:	PR_y
Data unit:	Tons of ceramic units fired per month
Description:	Production of ceramic devices
Source of data to be used:	Controlled by the project proponent.

Value of data applied for the purpose of calculating expected emission reductions

Brick weight used to calculate the production in tons:

1.588 kg (9x14x19).

Year	Month	PRy - Production (tons of ceramic units fired)
2009	July	2,858
	August	2,858
	September	2,858
	October	2,858
	November	2,858
	December	2,858
	Total 2009	17,150
2010	January	2,858
	Total 2010	2,858

Description of measurement methods and procedures to be applied:	The measurement was done by an internal control sheet monitored by the project proponent, which was fed daily. The production was calculated in tons ,through the number of units fired times the average weight of the brick type. For a more conservative calculation the average weight was rounded down. The production is a representative sample to ensure that all appliances are still in operation
QA/QC procedures to be applied:	The ceramic has an internal control of the quantity of pieces produced. It was rechecked according to the biomass employed and the kiln consumption of renewable biomass.
Any comment:	Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.

Data / Parameter:	$Q_{renbiomass}$
Data unit:	tons per month
Description:	Amount of renewable biomass used
Source of data to be used:	Measured by the project proponent

Value of data applied for the purpose of calculating expected emission reductions

The project proponent preferentially employed açaí in its burning process during the currently crediting period, as can be verified in the table below.

Year	Month	Qrenbiomass (tons)	
		<i>Sawdust/wood chips</i>	<i>Açaí pit</i>
2009	July	43.49	583.46
	August	90.00	733.36
	September	61.89	545.98
	October	87.10	370.42
	November	71.06	527.04
	December	37.60	609.92
	Total 2009	391.15	3493.66
2010	January	46.81	873.24
	Total 2010	46.81	873.24

Description of measurement methods and procedures to be applied:	The amount of renewable biomass was monitored in accordance to the weight described in the receipts or invoices from the providers. It was utilized the Specific Gravity in order to convert from m³ to tons. Data applied were: <table><tr><th>Biomass</th><th>Sawdust/wood chips</th><th>Açaí pit</th></tr><tr><td>Specific gravity (tons/m³)</td><td>0.35</td><td>0.723</td></tr></table>	Biomass	Sawdust/wood chips	Açaí pit	Specific gravity (tons/m³)	0.35	0.723
	Biomass	Sawdust/wood chips	Açaí pit				
	Specific gravity (tons/m³)	0.35	0.723				
	Sawdust: SIMIONE F. J. Análise Diagnóstica E Prospectiva Da Cadeia Produtiva De Energia De Biomassa De Origem Florestal No Planalto Sul De Santa Catarina – Available at: <http://hdl.handle.net/1884/10294>. Visited on April 24th, 2009.						
	Açaí: PADILHA et al. Avaliação do Potencial dos Caroços de Açaí para a geração de energia. Biomassa & Energia, v. 2, n. 3, p. 231-239, 2005. Available at: <http://www.renabio.org.br/publicacoes.php?l=revista&volume=2&numero=3>. Visited on May 15th, 2009.						
QA/QC procedures to be applied:							
Any comment:	The ceramic has spreadsheets of the quantity of biomass acquired. It was rechecked according to the receipts of purchase. Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.						

Data / Parameter:	Origin of Renewable Biomass
Data unit:	Not applicable
Description:	Renewable origin of the biomass
Source of data to be used:	Controlled by the project proponent
Value of data applied for the purpose of calculating expected emission reductions	Renewable biomass
Description of measurement methods and procedures to be applied:	This information was given by the biomasses providers in case of sawdust. As stated in the section 2.2, the biomasses (sawdust, rice husk, elephant grass and açai pits) are considered renewable as fulfilling the options described in the methodology applied.
QA/QC procedures to be applied:	The biomass was considered as renewable if it was according to the definition given by the applied methodology. Furthermore, documents proving the origin of renewable biomass from forested resources were provided.
Any comment:	Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.

Data / Parameter:	Leakage of non-renewable biomass
Data unit:	tCO ₂ e
Description:	Leakage resulted from the non-renewable biomass
Source of data to be used:	Monitored
Value of data	0

Description of measurement methods and procedures to be applied:	The three sources of leakages predicted in methodology applied were monitored. Scientific articles, official statistical data, regional and national surveys were provided in order to ensure that there is no leakage from non-renewable biomass (or to estimate the leakage).
QA/QC procedures to be applied :	Data available regarding the ceramic industry fuel consumption were employed to monitor the leakage.
Any comment:	Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.

Data / Parameter:	Leakage of non-renewable biomass
Data unit:	tCO ₂ e
Description:	Leakage resulted from the non-renewable biomass
Source of data to be used:	Monitored
Value of data	0
Description of measurement methods and procedures to be applied:	The three sources of leakages predicted in methodology applied were monitored. Scientific articles, official statistical data, regional and national surveys were provided in order to ensure that there is no leakage from non-renewable biomass (or to estimate the leakage).
QA/QC procedures to be applied :	Data available regarding the ceramic industry fuel consumption were employed to monitor the leakage.
Any comment:	Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.

Data / Parameter:	$f_{NRB,y}$
Data unit:	Percentage
Description:	Fraction of biomass (wood) used in the absence of the project activity is established as non-renewable biomass using survey methods
Source of data to be used:	Survey methods.
Value of data applied for the purpose of calculating expected emission reductions	92.28
Description of measurement methods and procedures to be applied:	Before the project activity, wood from areas without forest management was offered with low prices and high viability to the ceramics owner. Thus, the totality of fuel employed in the baseline scenario is from non-renewable origin. However, according to Klink (2005), Amazonian Biome has only 7.7% of its total area with sustainable use. Furthermore, considering that 0.014% of this biome has been saved by other project activities, thus, 92.28% is considered as a fraction of non-renewable biomass.
QA/QC procedures to be applied:	The monitoring of this parameter was based in national and international articles and database every monitoring period. The sources provided information about the sustainable use of Amazonian biome. Wood saved from projects with same biome and applied methodology developed by <i>Carbono Social Serviços Ambientais LTDA.</i> was considered in this fraction. CDM or VCS registered projects will also be included in this fraction if placed in the same region and methodology.

Any comment:	It was employed in order to estimate the amount of non renewable biomass. Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.
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Analyzing all the information above provided from the Monitoring Report, with the data relating to consumer of sawdust and acaí pits that were checked during the site visit it is seen that the project activity was implemented in conformity with the Monitoring Plan described in the VCS PD. Therefore, the monitoring plan was followed properly.

3.4 ACCURACY OF EMISSION REDUCTION CALCULATIONS

The approved CDM baseline and monitoring AMS-I.E (Switch from Non – Renewable Biomass for Thermal Application by the User) Version 01 from February 01st of 2008 to 8th April, 2010, is applied to the project activity.

The Category AMS-I.E: Switch from Non – Renewable Biomass for Thermal Application by the User (Version 01 from February 01 of 2008 to 8th April, 2010) comprises small thermal appliances that displace the use of non-renewable biomass by introducing new renewable energy end-user technologies. The project's emissions from the combustion of native wood are accounted in the same way as fossil fuel combustion, once it is not renewable and emits CO₂.

The project activity generates less than the limits of 45 MW_{thermal} for Type I Small scale project activities.

Baseline

$$ER_y = B_y \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected_fossilfuel} \quad (\text{Equation 01})$$

Where:

ER_y :	Emission reductions during the year y in tCO ₂ e
B_y :	Quantity of biomass that is substituted or displaced in tons
$f_{NRB,y}$:	Fraction of non-renewable biomass (wood) used in the absence of the project activity in year y
$NCV_{biomass}$:	Net calorific value of non-renewable biomass in TJ/tons
$EF_{projected\ fossil\ fuel}$:	Emission factor for the projected fossil fuel consumption in the baseline in tCO ₂ /TJ.

B_y is determined using the option b of the Methodology:

Calculated from the thermal energy generated in the project activity as:

$$B_y = \frac{HG_{p,y}}{\eta_{old} \times NCV_{biomass}} \quad (\text{Equation 02})$$

Where:

HG_{p,y} : Quantity of thermal energy generated by the renewable energy in the project in year y in TJ.

η_{old} : Efficiency of the system being replaced

$$HG_{p,y} = SGE \times PR_y \quad (\text{Equation 03})$$

Where:

SGE: Specific energy which has to be generated in the process to produce a certain amount of ceramic devices in TJ/tons of ceramic units

PR_y: Amount of product produced in year y in tons of ceramic units fired

$$\eta_{old} = \frac{SGE}{SFE} \quad (\text{Equation 04})$$

Where:

SFE: Specific fuel energy needed for the process to produce a certain amount of ceramic devices in TJ/ tons of ceramic units

$$SFE = BF_y \times NCV_{biomass} \quad (\text{Equation 05})$$

Where:

BF_y: Consumption of non renewable biomass per tons of ceramic units fired in year y

Using the Equations 3, 4 and 5 in the Equation 2 it results to:

$$B_y = PR_y \times BF_y \quad (\text{Equation 06})$$

It was verified in the course of this verification that the above-mentioned methodology has been correctly and accurately applied in calculating the total emission reductions and the emission reduction calculation is accurate and conservative.

3.5 QUALITY OF EVIDENCE TO DETERMINE EMISSION REDUCTIONS

The project proponent as evidence to determine emission reductions submitted several documents, as following:

The evidences were assessed as of sufficient quantity and appropriate quality by DOE. The other documents and web-sites used to the verification team are available in the item 5 of this report.

Reference Documents:

- Financial assessment evidences;
- Final Monitoring Report Version 04 completed on May 27th, 2010;
- Operation License, Kamiranga Indústria e Comércio LTDA – #2685/2009, on February 10th, 2009 for ceramic material manufacture. Expire in February 10th, 2011;
- Final VCS Project design document Version 2.3 October 27th, 2009;
- Calculation spreadsheet of baseline study and emission reduction in “VCU Estimates” Version 04 – 27/05/2010;
- And other references indicated in the item 5.0.

3.6 MANAGEMENT AND OPERATIONAL SYSTEM

The management and operational system can be checked by Verification team as following:

- The management and operational system of the project is suitable. In accordance with methodologies and procedures indicated.
- An operational structure was established with responsibilities identified. The documents referenced as in the site visit, we confirm the applicability of the structure indicated in the VCS PD.
- Staff training plan was clear; training records were available.
- The quality management were clearly defined in the VCS PD.

4 VERIFICATION CONCLUSION

CARBONO SOCIAL SERVIÇOS AMBIENTAIS Ltda. has commissioned the BUREAU VERITAS Certification to carry out the 2nd periodic verification of the project “Kamiranga Ceramic Fuel Switching Project”, with regard to the relevant requirements for CDM project activities. The project reduces GHG emissions due to switching non-renewable to renewable biomass fuel for end-user thermal energy generation. This verification covers the period from July 01st, 2009 to January 31rd, 2010.

In the course of the verification Corrective Action Requests (CAR) and Clarification Requests (CL) were raised and successfully closed. The verification is based on the monitoring report (Version 04, on May 27th, 2010), the monitoring plan as set out in the VCS PD (version 2.3 on October 27th, 2009), the Verification report (version 01 on May 31th, 2010), emission reduction calculation spreadsheet (version 05 on June 2nd, 2010) 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 conclude, all operations of the project are implemented and installed as planned and described as in the validated project design

document;

- The monitoring plan is in accordance with the applied approved CDM methodology, i.e., AMS-I.E: Switch from non-renewable biomass for thermal applications by the user - Version 01, February 1st 2008 onwards;
- 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 conclude 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 2.3 on October 27th, 2009 and VCS Monitoring Report spreadsheet version 05, on June 2nd, 2010, so we consider correct.

Based on the information we have seen and evaluated, we confirm the following statement:

Total Emission Reductions for the grouped project activity

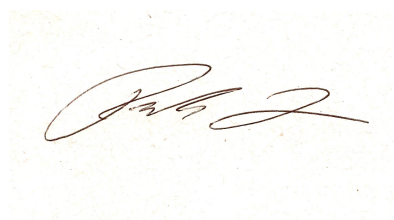
Er_y (July 01 st , 2009 to 31 th , 2010)			
Period	PR_y	By (tonnes)	ER_y (tCO₂e)
Total 2009	17,150	13,890	18,054
Total 2010	2,858	2,315	3,009
Total period	20,008	16,205	21,063

Project Emissions and Leakage: 0,000 tCO₂e

Santos, June 04th, 2010



Eduardo J. L. Galvão
Verification Team Leader



Rubens da Silva Ferreira
Internal Technical Reviewer

5 REFERENCES

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

- i. Final VCS Project design document Version 2.3; dated on October 27th, 2009
- ii. Monitoring Report Version 01 completed on April 7th, 2010
- iii. Monitoring Report Version 02 completed on May 17th, 2010
- iv. Monitoring Report Version 03 completed on May 26th, 2010
- v. Monitoring Report Version 04 completed on May 27th, 2010
- vi. Monitoring Report Version 05 completed on June 2nd, 2010
- vii. Calculation spreadsheet of baseline study and emission reduction in “VCU Estimates” Version 01 – completed on April 7th, 2010
- viii. Calculation spreadsheet of baseline study and emission reduction in “VCU Estimates” Version 02 – completed on May 17th, 2010
- ix. Calculation spreadsheet of baseline study and emission reduction in “VCU Estimates” Version 03 – completed on May 17th, 2010
- x. Calculation spreadsheet of baseline study and emission reduction in “VCU Estimates” Version 04 – completed on May 27th, 2010
- xi. PRAD – November 2007
- xii. RCA – November 2007
- xiii. <http://www.renabio.org.br/publicacoes.php?l=revista&volume=2&numero=3> related to the specific gravity and the NCV of açaí pits;
- xiv. IPCC 2006 Guidelines for National Greenhouse Gas Inventories;
- xv. Control sheet related to the monitoring of Pry during the reporting period;
- xvi. <http://www.renabio.org.br/arquivos/p_poder_lignocelulosicos_11107.pdf> related to NCV_{biomass} and p biomass;
- xvii. LORENZI, H. Árvores Brasileiras: Manual de Identificação e Cultivo de Plantas Arbóreas Nativas do Brasil, vol.1. 4.ed. Nova Odessa, SP: Instituto Plantarum, 2002 - related

to $NCV_{biomass}$ and $p_{biomass}$;

- xviii. SIMIONI, F. J. Análise diagnóstica e Prospectiva da cadeia produtiva de energia de biomassa de origem florestal no planalto sul de Santa Catarina. Curitiba, 2007. Available at: <http://hdl.handle.net/1884/10294> - related to $Q_{renbiomass} - sawdust$;

6 VERIFIERS' CV'S

Bureau Veritas Certification Leader GHG Verifier

Eduardo J. L. Galvão – Is graduated in Mechanical engineer production with experience in Quality and Environmental management in mechanical, plastic and chemical industries. He is ISO 9001:2008 and ISO 14001:2004 Lead Auditor and has also experience in the implementation of Environmental Management Systems. Eduardo is qualified as Lead Verifier GHG – Green House Gases.

Bureau Veritas Certification Internal Technical Reviewer

Rubens da Silva Ferreira – Is graduated in Chemical Engineering with experience in Quality and Environmental management in glass industries. He is ISO 9001:2008, ISO 14001:2004 and OHSAS 18001:2007 Lead Auditor and has also experience in the implementation of Environmental Management Systems. Rubens is qualified as Lead Verifier GHG – Green House Gases.

Bureau Veritas Certification Specialist

Daiany Mandato Favarato – Is graduated in Environmental Engineering with experience in renewable energy sector. She is becoming qualified as Lead Verifier GHG – Green House Gases and ISO 14001:2004 Lead Auditor.

7 VCS VERIFICATION PROTOCOL

Table 1 **Verification requirements based on the Validation and Verification Manual (EB44 Annex 3)**

Obs.: Although the Verification Protocol used was based on the VVM version 01 (EB44/Annex 3) it satisfies all requirements relating to the version 1.1 (EB 51 / Annex 3)

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
1 Project implementation in accordance with the registered project design document					
It is assessed if the CDM project activity has been implemented and operated as per the registered PDD¹	VVM	187			
a Are all physical features of the proposed CDM project activity, proposed in the registered PDD, in place?	VVM	188	Yes, they were in place.	OK	OK
b Have the project participants operated the proposed CDM project activity as per the registered PDD?	VVM	188	Yes, the project was operated as per the registered VCS PD. CL01: Please, clarify considering the actual legislation who is supposed to approve the operation charter of the ceramic. Provide evidences of the legislation proving it.	CL01	OK
c Is the proposed CDM project implemented against the description in the PDD?	VVM	188	Yes, it was implemented against the VCS PD.	OK	OK
d Was an on-site visit conducted?	VVM	188	Yes, the on Site visit was conducted on 2010-04-07 to 2010-04-09	OK	OK

¹ This Q is 'Requirement to be verified in VVM.

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
e If not, justify the rationale of the decision.	VVM	188	Not applicable.	OK	OK
2 Compliance of the monitoring plan with the monitoring methodology					
It is assessed if the monitoring plan of the proposed CDM project activity is in accordance with the applied methodology	VVM	190			
a Is the validated monitoring plan in accordance with the approved methodology applied by the proposed CDM project activity?	VVM	191	Yes, it is in accordance. CL02: Please, clarify the reason why, in “Barro Forte” and “Bandeira e Capelli” projects, the option chosen for emission reduction calculation of the methodology was option “a” and for this project the chosen one was “b”, regarding the fact that, for this kind of project, issues of the option “a” is considered, such as amount of biomass and production.	CL02	
b If no, was a request for revision of the monitoring plan done? (The DOE may request for revision of the monitoring plan covering the monitoring period under verification, for approval by the Board)	VVM	192	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	193	Yes. The methodology does not specify the frequency of calibration and maintenance.	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 ¹ .	VVM	195	Yes		
a Have the monitoring plan and the applied methodology been properly implemented and followed by the project participants?	VVM	196	No. CAR01 : According to the PD, the parameter B _y is calculated using the option “b” of the Methodology. Although, the MR shows assumptions deducting the formulae and leading it to option “a”. This is not correct. Therefore, the parameter B _y must be calculated using option “b” previously chosen in the VCS PD, or the project participant must request a revision of the monitoring plan.	CAR01	
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	196			
i Project emission parameters?	VVM	196	OK – The project emissions are considered to be none, since it is very small and can be neglected.	OK	OK
ii Baseline emission parameters?	VVM	196	CL03 : Please, indicate the value of the weight of the bricks used to calculate tons of ceramic units fired per month.	CL03	
iii Leakage parameters?	VVM	196	The leakage parameter are in accordance with the VCS PD and they are considered to be zero.	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	196	The monitoring report was completed by Raul Feldmann. The responsible for the monitoring of the project was Mr. Glaydson Vieira.	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
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	196	Yes, it was in accordance and the equipment are controlled.	OK	OK
i Are monitoring results consistently recorded as per approved frequency?	VVM	196	Yes. The monitoring frequency are in accordance with the VCS PD and the Methodology.	OK	OK
ii Have quality assurance and quality control procedures been applied in accordance with the monitoring plan ?	VVM	196	CL04: We have noticed that in the VCS PD there are 2 different kind of kilns in each Ceramic. Consequently, 2 different efficiency and 2 different amount of biomass consume. How have you considered this point in the compilation of the results?	CL04	
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	198			
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 if appropriate).	VVM	199	Yes, the documentation related to the Monitoring period was available. CAR02: Some documents necessary to the environmental legislation were not available, therefore, please send environmental documentation, such as Degraded Area Recuperation Project and Environmental Control Report (PRAD and RCA).	CAR02	

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
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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	199	The following references sources was cross-checked: (all checked on April 23rd 2010). 1. Page not found.	CAR03	Page 33 of 42
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CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
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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	199	CAR04: During the Site Visit, the invoices available contained were cross checked with the values used in the Monitoring Report. The table below shows that only one value were different. Please correct it.	CAR04 CL05
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CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
d Have any assumptions used in emission calculations been justified?	VVM	199	CL06: Justify the assumptions made in the Monitoring Report.	CL06	
e Have appropriate emission factors, IPCC default values and other reference values been correctly applied?	VVM	199	Yes. Default values were correctly applied in the calculations.	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
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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
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CL01: Please, clarify considering the actual legislation who is supposed to approve the operation charter of the ceramic. Provide evidences of the legislation proving it.	VVM 188	The Ministry of Environment, in exercise of its powers conferred on State Law n° 5457 from May 11th, 1988, as amended by laws n° 5752 from July 26th. 1993 and	Ok, the evidences are correct. CL01 is closed out.
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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
CL02: Please, indicate the value of the weight of the bricks used to calculate tons of ceramic units fired per month.	VVM196	The value used for the calculation is demonstrated at PRy in section B.4. Evidences will be sent to the validation team.	Ok, the evidences of the weight are sufficient. CL02 is closed out.
CL03: We have noticed that in the VCS PD there are 2 different kind of kilns in each Ceramic. Consequently, 2 different efficiency and 2 different amount of biomass consume. How have you considered this point in the compilation of the results?	VVM 196	In order to calculate the values for the quantity of renewable-biomass necessary to keep the production level, it was utilized data from TAPIA for the new kilns, this way we obtained the real quantity consumed of renewable-biomass. For the calculation of the emission reductions it was utilized the efficiency from the baseline (old kilns), once the baseline should not be changed	The baseline should be the same during the crediting period. Therefore, CL03 is closed out.

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
CAR01: Some documents necessary to the environmental legislation were not available, therefore, please send environmental documentation, such as Degraded Area Recuperation Project and Environmental Control Report (PRAD and RCA).	VVM 199	Both documents required (PRAD and RCA) will be sent to the validation team.	It was sent some parts of these documents that do not allow a complete assessment. Please send the entire document and provide evidences that these documents are filed in the environmental agency. <u>Second response: The entire document was sent. Therefore CAR01 is closed out.</u>
CAR02: All the sources that are not available on the internet should be sent to the Verification Team in order to check it.		The sources will be sent to the validation team.	OK, the sources sent are in accordance with the references. CAR02 is closed out.

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
CAR03: During the Site Visit, the invoices available contained were cross checked with the values used in the Monitoring Report. The table below shows that only one value were different. Please, correct it.					VVM 199	As required, the spreadsheet was updated with the invoices values. Also all tables and information related to the biomass value change were also revised and changed according to the new values.	OK, the different value was changed and the table is now in accordance with the invoices. Therefore, CAR03 is closed out.

