



Voluntary Carbon Standard Version 2007
Verification Report Template

19 November 2007

Verification Report: BRAZIL-VER/BR.0981547/2011 – VERSION 02

Name of Verification company:	Date of the issue:
BUREAU VERITAS CERTIFICATION HOLDING – SAS	September 06 th , 2011
Report Title:	Approved by:
Verification Report of “Cenol and Telha Forte Ceramics Switching Fuel Project”	Antonio Daraya – Internal Technical Reviewer
Client:	Project Title:
Sustainable Carbon – Projetos Ambientais LTDA	“Cenol and Telha Forte Ceramics Switching Fuel Project”
Summary:	

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BUREAU VERITAS CERTIFICATION has made the 4th periodic verification of “Cenol and Telha Forte Ceramics Switching Fuel Project”. This project activity was developed by Carbono Social Serviços Ambientais LTDA. (Social Carbon Company), which has recently changed its company name to Sustainable Carbon – Projetos Ambientais LTDA.

The project activity is a grouped project of Cenol Ceramic and Telha Forte Ceramic, which are two enterprises that produce structural ceramic devices such as bricks and roof tiles. Both ceramics are located in the city of São Miguel do Guamá, Pará State, north of Brazil.

The fuel utilized in the baseline scenario to fire the ceramic units was native wood from the Amazonian biome, which is a common practice in the region. This type of wood is considered a non-renewable biomass, once it is not originated in areas with reforestation activities or sustainable management activities.

The project activity consists on utilizing sawdust, açaí pits and other renewable biomasses to feed the kilns instead of using native wood from the Amazonian biome, which is a common practice in the region.

By utilizing renewable biomasses for the generation of thermal energy for industrial use, this project activity directly helps in reducing the Brazilian deforestation rates, the main source of greenhouse gas emissions in Brazil.

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. It consists of the following four phases: i) desk review of the project design, baseline and monitoring plan and monitoring report; ii) follow-up interviews with project stakeholders during site visit; iii) resolution of outstanding issues and iv) 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 at the end of the Verification Report. Taking into account this output, the project proponent revised its Monitoring Report Document (Version 3). In summary, it is BUREAU VERITAS CERTIFICATION's opinion that the project correctly applies the baseline and monitoring methodology AMS.I-E (Switch from Non – Renewable Biomass for Thermal Application by the User) Version 01, valid from February 1st, 2008 to April 8th, 2010 and meets the relevant VCS requirements and local legislation. In the course of the verification, Corrective Action Requests (CAR) and Clarification Requests (CL) were raised and successfully closed.

As the result of the 4th 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: February 1st, 2010 to February 28th, 2011.

ER _y (February 1 st , 2010 to February 28 th , 2011)			
Period	PR _y (ceramic units)	B _y (tons)	ER _y (tCO ₂ e)
Total 2010	28,276,261	28,276	35,531
Total 2011	5,159,042	5,159	6,483
Total period	33,435,303	33,435	42,014

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Work carried out by:	Number of pages:
Marcelo Porto – Lead GHG Verifier Guilherme Lefèvre – GHG Verifier Antonio Daraya – Internal Technical Reviewer	31

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1. Introduction

1.1 Objective

Sustainable Carbon – Projetos Ambientais LTDA has commissioned BUREAU VERITAS CERTIFICATION to verify the emission reductions of its VCS “Cenol and Telha Forte Ceramics Switching Fuel Project”

This report summarizes the findings of the fourth 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.

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 expresses 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 considers 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 and review 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 description, 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

This project activity is a grouped project and was developed by Carbono Social Serviços Ambientais LTDA. (Social Carbon Company), which has recently changed its company name to Sustainable Carbon - Projetos Ambientais LTDA.

The Cenol and the Telha Forte Ceramic Companies are located in the city of São Miguel do Guamá, Pará State, north of Brazil. The Ceramics are enterprises that produce structural ceramic devices such as bricks and roof tiles. The project activity consists on utilizing sawdust and other renewable biomasses, such as açai pits, to feed the kilns instead of using native wood from the Amazonian biome, which is a common practice in the region.

According to the VCS PD, Cenol Ceramic operated with three “Paulista” kilns and seven “Round” kilns, in order to dry and cook their products. During this monitored period, Cenol Ceramic deactivated two “Paulista” kilns, and it is currently operating with seven “Round” kilns and one “Paulista” kiln. These kilns are commonly employed in Brazil to burn bricks and roof tiles.

According to the VCS PD, the Telha Forte Ceramic operated with five “Paulista” kilns and eight “Round” kilns. However, as was observed by the verification team during site visit, three new “Paulista” kilns were installed by the Telha Forte Ceramic during this monitoring period. The Telha Forte Ceramic currently operates with only these eight “Paulista” kilns. All the “Round kilns” have been deactivated. As can be observed in Section B.4 of the Monitoring Report (Version 3) and emission reduction calculation spreadsheet (Version 3), the production of these three new “Paulista” kilns was excluded from the emission reduction calculations. This approach was chosen to guarantee the conservativeness of ER calculations and to ensure that baseline and additionality studies, as described in the VCS PD, are not affected by the implementation of additional equipment.

According to the VCS PD, the two ceramics (Cenol and Telha Forte) used to consume about 44,400 tons of native wood from Amazonian biome per year to feed the kilns and maintain a temperature of 900°C. With this project activity, thermal energy is obtained by using sawdust and açaí pits.

The fuel switching project in Cenol and Telha Forte Ceramics is reducing greenhouse gases by substituting the native firewood by renewable biomasses for thermal energy generation used on the ceramic firing process. The sawdust, originated in legal reforestation areas, is a renewable biomass that presents a shorter renewal cycle when compared to the native firewood cycle, which is a non-renewable biomass and is not being used in the project activity. The açaí pits are residues generated by local industries.

The fuel switch was only feasible when considering the income derived from the commercialization of the carbon credits, since it was unattractive due to the high investments for the adaptation of machineries to the new biomass, and other barriers. Due to the project activity, a set of adaptations were necessary, such as alterations in the furnaces and other machineries, so the ceramics can operate with the renewable biomasses properly. In addition, the climate conditions at the Amazonian biome such as high relative humidity constitute a huge problem for drying the biomasses.

1.4 Level of assurance

During the verification process, the GHG team assessed the monitoring report, the calculation spreadsheets and supporting documents.

Based on this assessment, the verification team can express a reasonable level of assurance, stating that the GHG emission reductions:

- Are materially correct and are a fair representation of the GHG data, and
- Are prepared in accordance with the relevant International Standard on GHG quantification, monitoring and reporting, and with relevant national standards.

2. Methodology

This is the fourth verification and comprises the period from January 1st, 2010 to February 28th, 2011.

Preparations: April 27th, 2011

On-site visit: May 12th, 2011

Draft reporting: June 25th, 2011

Verification reporting version 01: September 06th, 2011

Project Participants – Sustainable Carbon – Projetos Ambientais LTDA:

Marcelo Hector Sabbagh Haddad, Gabriel Fernandes de Toledo Piza, Mariana dos Santos Silva and Thiago de Avila Othero.

Project Proponents – Cenol and Telha Forte Ceramics

Mr. Francisco Valdir.

The verification includes:

- 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 CARs and CLs were closed and no FARs were opened.

3.2 Project Implementation

There are no pending CARs or CLs issued in the course of the verification that still need 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.

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 November 1st, 2007 to October 31st, 2017. According to the VCS PD, the total Emission Reductions forecasted for that period are 577,290 tCO₂e.

The following verification has already been made:

- First Periodic Verification: From November 1st, 2007 to September 30th, 2008. Emission Reductions of 47,508 tCO₂e.

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- Second Periodic Verification: October 1st, 2008 to June 30st, 2009. Emission Reductions of 30,956 tCO₂e.
- Third Periodic Verification: From July 1st, 2009 to January 31st, 2010. Emission Reductions of 30,736 tCO₂e.
- Project start date: March 1st, 2007
- Crediting period start date: November 1st, 2007.

The actual operation of the project activity is the fuel switching in the ceramic facilities, with the replacement of unsustainable native wood by sawdust and açai pits for energy supply to the kilns in the facility.

As presented on the VCS PD (Version 5, on February 2nd, 2009), for sawdust and açai pit, and based on the assessments contained in the Monitoring Report (Version 3), the surplus of renewable biomass is enough to the VCS Project crediting period.

The total production of the monitoring period, considered as input value for emission reductions calculation, was 33,435,303 ceramic units. The 32.8% decrease in the emission reductions per year, compared to estimates in the registered PD, is a direct result of such input value. During this monitored period, the ceramic production was lower than PD expectations (PD: 48,100,000 ceramic units for 13 months, Monitoring Period: 33,435,303 ceramic units for 13 months).

The ceramic production was lower than the estimated by the VCS PD. As this is a monitored parameter, different values are expected to appear.

The production control spreadsheet contains the number of ceramic devices produced, i.e. the number of ceramics devices that comes out of the kilns. During the site visit this fact was verified by analyzing the production data sheets, covering the entire 4th monitoring period.

It is important to note that the production has a limit in the Environmental License, and that the limit has been applied for the emission reductions calculation.

Regarding the conformity of the actual project activity with the registered PD document, the DOE states that the differences (the installation of three new “Paulista” kilns in the Telha Forte Ceramic) do not adversely affect the calculations of emission reductions, since the production of the newly installed kilns was not considered in ERs calculations.

3.3 Completeness of Monitoring

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

The parameters required by the monitoring plan and the way the Verification Team has verified the values in the Monitoring Report (Version 3) are described below:

Data / Parameter:	Q_{renbiomass}
Data unit:	ton per month
Description:	Amount of renewable biomasses utilized in the monitored period from February 1 st , 2010 to February 28 th , 2011.
Source of data to be used:	Measured by the biomass providers and controlled by the ceramic owner. The registered VCS PD v.5 establishes that the ceramic owner would measure this parameter; however, during the entire monitored

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	period, this parameter was monitored through all the receipts and invoices of biomass received by the ceramic industry.				
Value of data		<i>Cenol Ceramic</i>			
	Year	Period	Sawdust (ton)	Açaí pits (ton)	
	2010	February	0.00	56.39	
		March	62.35	0.00	
		April	313.19	0.00	
		May	40.03	0.00	
		June	307.94	169.18	
		July	303.17	413.56	
		August	114.12	2,011.39	
		September	35.25	3,214.46	
		October	24.50	3,684.41	
		November	214.12	695.53	
		December	214.93	300.77	
	Total 2010		1,629.60	10,545.68	
	2011	January	126.26	0.00	
		February	5.40	0.00	
	Total 2011		131.66	0.00	
	Total Renewable Biomass - Monitoring period – Cenol Ceramic			12,306.94	
		<i>Telha Forte Ceramic</i>			
		Year	Period	Sawdust (ton)	Açaí pits (ton)
		2010	February	42.61	26.37
			March	491.80	18.80
			April	33.81	0.00
			May	339.98	0.00
			June	96.26	93.99
	July		115.47	37.60	
	August		106.50	714.32	
	September		45.62	1,522.64	
	October		3.69	1,992.59	
	November		93.15	1,861.00	
	December		65.74	808.31	
	Total 2010		1,434.61	7,075.62	
	11 20	January	42.03	488.75	

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		February	5.40	18.80						
		Total 2011	47.43	507.55						
		Total Renewable Biomass - Monitoring period – Telha Forte Ceramic		9,065.21						
Description of measurement methods and procedures to be applied:	The amount of biomasses was monitored in accordance to the weight described in the receipts or invoices from the providers. The values in the receipts are described in m³, therefore it was necessary the conversion to ton through the specific gravity of each biomass. The specific gravity values of the renewable biomasses utilized in this project are:									
	<table><tr><td>Biomass</td><td>Sawdust</td><td>Açaí Pits</td></tr><tr><td>Specific Gravity (ton/m³)</td><td>0.245</td><td>0.723</td></tr></table>					Biomass	Sawdust	Açaí Pits	Specific Gravity (ton/m³)	0.245
Biomass	Sawdust	Açaí Pits								
Specific Gravity (ton/m³)	0.245	0.723								
	The sources of these data are:									
	Sawdust: Masses and Dead Loads of Concrete and Other Materials. Available at: <http://www.cca.org.nz/pdf/Masses.pdf>. Last visit on: March 10 th , 2010. Açaí pits: PADILHA, J. L.; CANTO, S. A. E.; RENDEIRO, G. Avaliação do potencial dos caroços de açaí para geração de Energia. Biomassa & Energia, v. 2, n. 3, p. 231-239, 2005. Available from: <http://www.renabio.org.br/arquivos/p_avaliacao_energia_8340.pdf>. Last visit on: April 11 th , 2011.									
QA/QC procedures to be applied:	It was monitored through receipts of purchase from the biomass providers. The ceramic industries control the quantity of biomass through an internal spreadsheet, which is fed with the measured values of all the biomass that arrive from the providers. These internal spreadsheets were double checked with all the receipts and invoices of biomass employed.									
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:	PR _y				
Data unit:	Unity of ceramic pieces				
Description:	Production of ceramic devices in the monitored period from February 1 st , 2010 to February 28 th , 2011.				
Source of data to be used:	Controlled by the project proponent				
Value of data		PR _y			
		Year	Period	Cenol Ceramic	

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	2010	February	1,209,315	1,197,675
		March	1,485,495	1,384,275
		April	1,237,755	1,262,231
		May	1,341,690	1,294,781
		June	1,259,940	1,101,344
		July	1,353,345	1,166,681
		August	1,428,675	1,162,763
		September	1,214,076	1,303,031
		October	1,236,000	1,282,594
		November	1,230,666	1,322,419
		December	1,399,854	1,401,656
	Total 2010		14,396,811	13,879,450
	2011	January	1,369,416	1,365,656
		February	1,222,638	1,201,331
	Total 2011		2,592,054	2,566,988
Description of measurement methods and procedures to be applied:	The ceramics have an internal control of the quantity of pieces fired through sheets that are daily fed by an operator inside of each Ceramic company that counts the total of wagons that enter inside the kilns. Each wagon carries a determined number of pieces, which depends on the type of piece produced. This was better detailed on the MR Calculation spreadsheet, in the “<i>Cenol PR_y</i>” and “<i>Telha Forte PR_y</i>” sheets. During this monitored period, <i>Cenol</i> ceramic deactivated two “Paulista” kilns, and it is currently operating with seven “Round” kilns and one “Paulista” kiln. According to the VCS PD, <i>Cenol</i> Ceramic operated with three "Paulista" kilns and seven "Round" kilns. During this monitored period, <i>Telha Forte</i> ceramic constructed three new “Paulista” kilns that were not mentioned in the VCS PD. Thus, the production of these new kilns was excluded from the calculations, as described below. According to the VCS PD, <i>Telha Forte</i> Ceramic operated with five "Paulista" kilns and eight "Round" kilns, producing around 2,500,000 ceramic units per month, or 30,000,000 ceramic units per year. However, nowadays the ceramic is only operating with eight "Paulista" kilns. In order to exclude the production of these three new Paulista kilns, which corresponds to around 37.5% of the total production of this monitored period (3 new kilns/ total kilns (8 kilns) = 37.5%), the total production of <i>Telha Forte</i> ceramic was multiplied by 62.5%.			
	QA/QC procedures to be applied:			
	Any comment:			
		The ceramics have an internal control of the quantity of ceramic units produced. It was rechecked according to the biomass employed and the kiln consumption of 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		

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	occurs later. The production in <i>Telha Forte</i> in this monitored period was lower than estimated in the VCS PD due to the normal oscillation of the market demand.
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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 applied methodology were monitored. Scientific articles, official statistical data, regional and national surveys were provided in order to ensure that there was no leakage from non-renewable biomass (or to estimate the leakage). More information, please see Section B.5 – Leakage, Part B.
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:	Renewable biomass surplus			
Data unit:	ton or m³			
Description:	Amount of renewable biomass available			
Source of data to be used:	Monitored			
Value of data		Biomass surplus	Surplus	Year
		Açaí pits in tons	79,715.5	2007
		Sawdust in m³	1,999,833	2007
Description of measurement methods and procedures to be applied:	It was used to calculate the leakage of renewable biomass. The sources of leakages predicted in “General guidance on leakage in biomass project activities” of Indicative Simplified Baseline and Monitoring Methodologies for Selected Small-Scale CDM Project Activity Categories, were monitored. The measurement of the leakage was based in national and international articles and database every			

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	monitoring period. The sources provided information about the biomass availability in the project activity's region. More information, please see Section B.5 – Leakage, Part A.
QA/QC procedures to be applied :	Data available regarding to the ceramic industry fuel consumption were utilized 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:	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	Not directly applied for the calculation. It is considered that all biomass used is renewable.
Description of measurement methods and procedures to be applied:	This information was given by the biomasses providers. The guarantee of acquiring renewable biomass was achieved by invoices from the providers. As stated in the Section 2.2 of VCS PD version 5, the biomasses (sawdust and <i>açaí</i> pits) are considered renewable as fulfilling the options described in the applied methodology.
QA/QC procedures to be applied :	The biomasses were considered renewable as they are according to the definition given by the applied methodology. Furthermore, documents proving the origin of renewable biomass 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:	$f_{NRB,y}$
Data unit:	Percentage
Description:	Fraction of biomass (wood) used in the absence of the project activity that is established as non-renewable biomass using survey methods
Source of data used:	Survey methods.
Value of applied:	89.23%
Justification of the choice of data or description of measurement	Before the project activity, wood from areas without forest management was offered with low prices and high viability to the ceramic facilities owner. Thus, the totality of fuel employed in the baseline scenario is from

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methods and procedures actually applied :	non-renewable origin. However, according to SOCIOAMBIENTAL (2010)¹, <i>Amazonian</i> Biome has 10.75% (or 53,829,235 ha) of its total area with sustainable use. According to a research made by Brazilian Environmental Ministry, there are around 60m³ of wood per hectare in <i>Amazonian</i> biome². Thus, the amount of non-renewable woody biomass available at <i>Amazonian</i> biome is around 26,808,826,464 m³. Considering that 0.0123% of this biome has been saved by other project activities³, thus, the fraction of non-renewable biomass is around: 100% - (10.75% + 0.0123%) = 89.23%. Two sheets were made in order to calculate the amount of wood consumed. The first one encompasses the amount of wood consumed by the ceramics located at the <i>Amazonian</i> biome. The other sheet calculates the amount of wood consumed regarding only <i>Cenol</i> and <i>Telha Forte</i> Ceramics. Dividing these values by the total of wood available, it was achieved the amount of renewable biomass that has been saved by all the project activities, or only by <i>Cenol</i> and <i>Telha Forte</i> Ceramics Switching Fuel Project, respectively.⁴ Finally, each value was subtracted from the fraction of non-renewable biomass to achieve the $f_{NRB,y}$, in order to be ensured that the proposed project activity is not saving the non-renewable biomass accounted for by the already registered project activities. Therefore, it was taken the smaller value in order to be more conservative. These sheets are available at the VCS MR Calculation spreadsheet.
QA/QC procedures to be applied :	The monitoring of this parameter was based on national and international articles, databases and data monitored by the project developer such as project activities at the same region. The sources provided information about the sustainable use of <i>Amazonian</i> biome. Wood saved from projects to which the same methodology was applied, which are in the same biome and were developed by <i>Sustainable Carbon – Projetos Ambientais Ltda.</i> was considered in this fraction. CDM or VCS registered projects were included in this fraction if placed in the same region and developed with the same methodology.
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 DOE crosschecked all the information above, available on the Monitoring Report (Version 3), with the internal records data related to biomass consumption and ceramic production. The Monitoring of the project activity is implemented in conformity with the Monitoring Plan described in the VCS PD (Version 5). Therefore, the monitoring plan was followed properly.

¹SOCIOAMBIENTAL. Instituto Socioambiental, 2010. *Unidades de Conservação na Amazônia Legal*. Available at: <http://www.socioambiental.org/uc/quadro_geral>. Last visit on: April 11th, 2011.

²Source: Brazilian Environment Ministry, Normative Instruction nº 6 of 2006. Available at: <http://www.carvaomineral.com.br/abcm/meioambiente/legislacoes/bd_carboniferas/geral/in_06-2006_mma_n.pdf>. Last visit on: August 12th, 2009.

³According to data from project activities at Sustainable Carbon Company. Available at: <http://mc.markit.com/br-reg/public/index.jsp?p=&r=1000000000000007&u=&scolumn=project_name&sdir=ASC&s=cp&q=>>. Last visit on: April 14th, 2011.

⁴According to data from project activities at Sustainable Carbon Company. Available at: <http://mc.markit.com/br-reg/public/index.jsp?p=&r=1000000000000007&u=&scolumn=project_name&sdir=ASC&s=cp&q=>>. Last visit on: April 14th, 2011.

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 valid from February 01st, 2008 to April 08th, 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 valid from February 01st, 2008 to April 08th, 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 tCO₂e

B_y: Quantity of biomass that is substituted or displaced in tonnes

f_{NRB,y}: Fraction of non-renewable biomass (wood) used in the absence of the project activity in year y that is established as non-renewable biomass using survey methods

NCV_{biomass}: Net calorific value of non-renewable biomass that is substituted in TJ/ton

EF_{projected fossil fuel}: Emission factor for the projected fossil fuel consumption in the baseline in tCO₂/TJ⁵.

B_y is determined using option (b) of the applied methodology, as follows:

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 technology 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 thousand of ceramic devices in TJ/thousands of ceramic units

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

⁵ The fossil fuel likely to be used by similar consumers is taken the IPCC default value of residual fossil fuel.

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

Where:

SFE: Specific fuel energy needed for the process to produce a thousand of ceramic devices in TJ/ thousands of ceramic units

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

Where:

BF_y: Amount of non-renewable biomass per burning cycle in the kilns and furnace, in tons of wood per thousand of devices

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

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

The value of BF_y was determined through historical consumption of non-renewable biomass by the ceramic. It was calculated by dividing the monthly consumption at the baseline from the monthly production at the baseline, in thousands.

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 by the verification team are available in the item 5 of this report.

Reference Documents:

- Final VCS Project description (Version 5); dated February 20th, 2009;
- Monitoring Report (Version 3) completed on August 23rd, 2011.
- Emission Reduction Calculation spreadsheet (Version 3) completed on August 23th, 2011.
- And other references indicated in the item 5.

3.6 Management and Operational System

The management and operational system was 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.

- The quality management was clearly defined in the VCS PD.

4. Verification conclusion

Sustainable Carbon – Projetos Ambientais LTDA has commissioned the BUREAU VERITAS CERTIFICATION to carry out the 4th periodic verification of the grouped project “Cenol and Telha Forte Ceramics Switching Fuel Project” with regard to the relevant requirements for VCS project activities.

The project reduces GHG emissions by switching from non-renewable to renewable biomass fuel for end-user thermal energy generation. This verification covers the period from January 1st, 2010 to February 28th, 2011.

In the course of the verification, Corrective Action Requests (CAR) and Clarification Requests (CL) were raised and successfully closed. There were 5 CARs and 3 CLs raised. The verification is based on the Monitoring Report (Version 3, completed on August 23rd, 2011), the VCS PD (Version 5, dated February 20th, 2009), Emission Reduction Calculation spreadsheet (Version 3, completed on August 23rd, 2011) and supporting documents made available to 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 Description. 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 described in the validated project description;
- 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 valid from February 01st, 2008 to April 08th, 2010;
- 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 5) dated February 20th, 2009 and Emission Reduction Calculation Spreadsheet (Version 3, on August 23rd, 2011).

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

VCS 2007 Verification Report Template

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

Total Emission Reductions for the project activity

ER _y (February 1 st , 2010 to February 28 th , 2011)			
Period	PR _y (ceramic units)	B _y (tons)	ER _y (tCO ₂ e)
Total 2010	28,276,261	28,276	35,531
Total 2011	5,159,042	5,159	6,483
Total period	33,435,303	33,435	42,014

Reporting period: From February 1st, 2010 to February 28th, 2011.

Verified emission in the above reporting period:

Project emissions: 0 t CO₂ equivalents

Baseline emissions: 42,014 t CO₂ equivalents

Emission reductions: 42,014 t CO₂ equivalents

Vintage data:

In 2010

Project emissions: 0 t CO₂ equivalents

Baseline emissions: 35,531 t CO₂ equivalents

Emission reductions: 35,531 t CO₂ equivalents

In 2011

Project emissions: 0 t CO₂ equivalents

Baseline emissions: 6,483 t CO₂ equivalents

Emission reductions: 6,483 t CO₂ equivalents

São Paulo, September 06th, 2011.



Marcelo Porto
Verification Team Leader



Antonio Daraya
Internal Technical Reviewer

5. References

- Final VCS Project description Version 5; dated February 20th, 2009;
- Monitoring Report Version 1; completed on April 11th, 2011;
- Monitoring Report Version 2; completed on August 18th, 2011;
- Monitoring Report Version 3; completed on August 23rd, 2011;
- Emission Reduction Calculation spreadsheet Version 1; completed on April 11th, 2011;
- Emission Reduction Calculation spreadsheet Version 2; completed on August 18th, 2011;
- Emission Reduction Calculation spreadsheet Version 3; completed on August 23rd, 2011;
- Production data sheets, covering the entire 4th monitoring period;
- Renewable biomasses receipts, covering the entire 4th monitoring period;
- Yearly Environmental Report 2009-2010 – dated August 2010.
- Environmental License – Operation License (L.O) Cenol Ceramic, 4161/2009, dated 15/12/2009 and valid until 15/12/2011.
- Environmental License – Operation License (L.O) Telha Forte Ceramic, 3477/2009, dated 06/08/2009 and valid until 05/08/2013.

6. Verifiers' CVs

BUREAU VERITAS CERTIFICATION - Lead GHG Verifier

Marcelo 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 ISO 14001 and OHSAS 18001 lead auditor. Marcelo is qualified as Lead Verifier GHG – Green House Gases.

BUREAU VERITAS CERTIFICATION - GHG Verifier

Guilherme Lefèvre – is graduated in Law with experience in GHG Programs, both compulsory and voluntary. Guilherme has vast experience in the development and analysis of CDM, VCS, Social Carbon and CCBS projects. He is currently enrolled at the post-graduate environmental science program of the São Paulo University. Guilherme trained as a lead auditor in the fields of environment (ISO 14001) and GHG – Green House Gas.

BUREAU VERITAS CERTIFICATION - Internal Technical Reviewer

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.

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	CAR 01: The VCS PD mentions 5 “Paulistinha” kilns and 8 Round kilns for Telha Forte Ceramic. It also mentions 3 Paulistinha kilns and 7 Round kilns for Cenol Ceramic. During the site visit, there were some changes in the kilns. The Monitoring Report should include <u>all the changes</u> that had happened.	CAR 01	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 proposed CDM project activity as per the registered PDD.	OK	OK
c Was an on-site visit conducted?	VVM	196	Yes, the site visit was conducted on 12 th , May 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	CL01: Please, clearly identify the PRy measurement points (source of data within the process) for each type of product that is manufactured.	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	Refer to CL01.	CL 01	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
g Was a notification or a request for approval of changes from the project activity as described in the registered PDD submitted prior to the conclusion of the verification/certification for the corresponding?	VVM	197	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 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	Yes, the monitoring plan is in accordance with the approved methodology applied.	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	No, the monitoring aspects are in accordance with the methodology.	OK	OK
3 Compliance of monitoring with the monitoring plan					
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	VVM	204			

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
não definido..					
a Have the monitoring plan and the applied methodology been properly implemented and followed by the project participants?	VVM	205	Yes, the monitoring plan and the applied methodology been properly implemented	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			
i Project emission parameters?	VVM	205	Not applicable.	OK	OK
ii Baseline emission parameters?	VVM	205	Yes, they have been sufficiently monitored and updated as applicable.	OK	OK
iii Leakage parameters?	VVM	205	Yes	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, management and operational system are monitored and updated.	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, the accuracy of the equipments used is in accordance with the monitoring plan.	OK	OK
i Are monitoring results consistently recorded as per approved frequency?	VVM	205	Yes, the monitoring results consistently recorded as per approved frequency.	OK	OK
ii Have quality assurance and quality control procedures been applied in accordance with the monitoring plan?	VVM	205	CL02: Please clarify how the amount of Açai consumed by each ceramic were measured / determined.	CL 02	OK
4 Assessment of data and calculation of greenhouse gas emission reductions					

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
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	CAR02: The LO 4161/2009 requires two conditions of vegetation and morphological restoration. Please, send to the validation team the evidence that these two conditions were met. CAR03: Please the evidence that the conditions 1 and 2 of the LO 3477/2009 were met.	CAR 02 CAR 03	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	CL03: Please, clarify how the weight of the new devices was measured (during the validation, this kind of devices was not being produced). CAR04: There are some amounts of $Q_{renbiomass}$ that are not correct. Please correct the wrong values, in the Monitoring Report and in the Calculation Spreadsheet. CAR05: There are some amounts of PR_y that are not correct. Please correct the wrong values, in the Monitoring Report and in the Calculation Spreadsheet.	CL03 CAR04 CAR05	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	VVM	208	Yes, the calculation is correctly applied.	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
plan and the applied methodology document?					
d Have any assumptions used in emission calculations been justified?	VVM	208	Yes, the assumptions are correct.	OK	OK
e Have appropriate emission factors, IPCC default values and other reference values been correctly applied?	VVM	208	Yes, they were correctly applied.	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
CL01: Please, clearly identify the PRy measurement points (source of data within the process) for each type of product that is manufactured.	VVM 197	The ceramics have an internal control of the quantity of pieces fired through sheets that are daily fed by an operator inside of each Ceramic company that counts the total of wagons that enter inside the kilns. Each wagon carries a determined number of pieces, which depends on the type of piece produced. This was detailed in the MR calculation spreadsheet, and it was better explained on the MR, section B.4, table PRy.	In the Monitoring Report version 3 (Section B.4), PP has inserted additional information regarding the source of data for PRy: “The ceramics have an internal control of the quantity of pieces fired through sheets that are daily fed by an operator inside of each Ceramic company that counts the total of wagons that enter inside the kilns. Each wagon carries a determined number of pieces, which depends on the type of piece produced”. PP has presented to the DOE, as evidence, the complete set of its internal control (sheets that are daily

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
			fed by an operator inside of each Ceramic company). The DOE has checked this evidence with data contained in the Monitoring Report (version 3). No discrepancies were found. Seeing the above, this CL was closed.
CL02: Please clarify how the amount of Açaí consumed by each ceramic were measured / determined.	VVM 205	The amount of Açaí consumed by each ceramic was measured by the number of trucks that arrive in each ceramic. Each truck measures 26m³. The number of trucks containing Açaí pits is controlled by both provider and ceramic. The payment is made considering the number of trucks that arrived in the ceramic, thus reducing the chances for errors in the counting of trucks as well as in the quantity provided.	PP has explained how amount of Açaí consumed by each ceramic were measured / determined (please refer also to Section B.4 of the Monitoring Report version 3). To crosschecked the monthly amounts of Açaí pits consumed by the Project during the monitoring period. PP has presented copies of the receipts of purchase from the biomass providers. The DOE has checked this evidence with the values for açaí biomass in the Monitoring Report version 3 and no discrepancies were found. Seeing the above, this CL was closed.

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
CL03: Please, clarify how the weight of the new devices was measured (during the validation, this kind of devices was not being produced).	VVM 208	According to the VCS PD the parameter PR_y – Production of ceramic devices is measured in units of ceramic pieces, so it was not necessary the weight of new devices.	According to the VCS PD (Section 3.3), the parameter PR_y – Production of ceramic devices is measured in units of ceramic pieces. The weight does not need to be monitored. Seeing the above, the CL was closed.
CAR 01: The VCS PD mentions 5 “Paulistinha” kilns and 8 Round kilns for Telha Forte Ceramic. It also mentions 3 Paulistinha kilns and 7 Round kilns for Cenol Ceramic. During the site visit, there were some changes in the kilns. The Monitoring Report should include <u>all the changes</u> that had happened.	VVM 196	All the changes described below were included in the Monitoring Report, section B.4, table PR_y . During this monitored period, <i>Cenol</i> ceramic deactivated two “Paulista” kilns, and it is currently operating with seven “Round” kilns and one “Paulista” kiln. According to the VCS PD, <i>Cenol</i> Ceramic operated with three “Paulista” kilns and seven “Round” kilns. During this monitored period, <i>Telha Forte</i> ceramic constructed three new “Paulista” kilns that were not mentioned in the VCS PD. Thus, the production of these new kilns was excluded from the calculations, which are available at the MR Calculation Spreadsheet. In addition, these	Changes were included in Section B.4 of version 3 of the Monitoring Report. These changes are in conformity with the observations of the DOE during site visit. The current configuration of kilns is: - Cenol: 7 x Round Kilns and 1 x Paulista Kiln. - Telha Forte: 8 x Paulista Kilns. Moreover, Telha Forte has constructed 3 x new Paulista Kilns during this monitored period. The production of these 3 new kilns was excluded from ERs calculation. This approach was chosen by PP to guarantee the validity of the additionality analysis presented in the VCS PD.

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
		calculations are described in the Monitoring Report, section B.4, table PR _y .	Seeing the above, this CAR was closed.
CAR02: The LO 4161/2009 Cenol requires two conditions of vegetation and morphological restoration. Please, send to the validation team the evidence that these two conditions were met.	VVM 208	The evidences of these two conditions will be sent to the validation team.	PP has provided evidences to demonstrate that the conditions of the LO 4161/2009 are being met: - Pictures of the area with vegetation and morphological restoration. Seeing the above, the CAR was closed.
CAR03: Please the evidence that the conditions 1 and 2 of the LO 3477/2009 Telha Forte were met.	VVM 208	Some photos of the local where the sawdust is stored will be sent to the validation team. Moreover, a letter sent by Telha Forte Ceramic registered by the Environmental Agency of the State of Pará stating that Telha Forte Ceramic is according to the Condition 1 of the LO 3477/2009 will be sent to the validation team. The operational procedures and measures for the environmental	- PP presented pictures of the local where the sawdust is stored. With these pictures, the DOE can observe that the sawdust is dully stock up in a storage place. - PP presented a letter send by Telha Forte Ceramic to the Environmental Agency of the State Pará, informing regarding the origin of the biomass

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
		control (as required by the Condition 2 of the LO 3477/2009) is assured by the RIAA (Annual Report of Environmental Information). The RIAA year 2010 of Telha Forte Ceramic will be sent to the validation team. The next RIAA (year 2011) will assure that all the operational procedures and measures for the environmental control were correctly followed.	used in the kiln (sawdust and açai pits). - PP presented a copy of the RIAA (Annual Report of Environmental Information - year 2010) of Telha Forte Ceramic. Seeing the above, the DOE was able to close CAR 3.
CAR04: There are some amounts of $Q_{renbiomass}$ that are not correct. Please correct the wrong values, in the Monitoring Report and in the Calculation Spreadsheet.	VVM 208	The amounts of $Q_{renbiomass}$ were corrected in the Monitoring Report and in the Calculation Spreadsheet according to the invoices and receipts of each biomass. All these documents will be sent to the validation team.	Values were corrected. As evidence, PP has provided the complete set copies of invoices. The DOE has crosschecked the values in the calculation spreadsheet with the invoices. Seeing the above, the CAR was closed.
CAR05: There are some amounts of PR_y that are not correct. Please correct the wrong values, in the Monitoring Report and in the Calculation Spreadsheet.	VVM 208	The PR_y was corrected according to the daily number of wagons that enter inside the kilns of each ceramic. Each wagon carries a determined number of pieces,	Values were corrected in accordance with internal spreadsheets and calculation spreadsheet. The DOE has crosschecked the values

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
		which depends on the type of piece produced. These controls will be sent to the validation team.	in the calculation spreadsheet with the values in the internal spreadsheet. Seeing the above, the CAR was closed.