SANTORINI CERAMIC FUEL SWITCHING PROJECT

Document Prepared By Sustainable Carbon – Projetos Ambientais Ltda

Project Title	*Santorini* Ceramic Fuel Switching Project
Version	2.0
Date of Issue	06- November - 2012
Project ID	199
Monitoring Period	01- October -2011 to 30-September-2012
Prepared By	Sustainable Carbon – Projetos Ambientais Ltda
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1 PROJECT DETAILS

1.1 Summary Description of Project

This project activity was developed by *Carbono Social Serviços Ambientais LTDA.* (Social Carbon Company), which has changed its company name to *Sustainable Carbon – Projetos Ambientais LTDA*.

The project activity promotes a fuel switch at Santorini Ceramic, which is a small ceramic industry that produces structural ceramic units, like bricks and roof tiles, destined for the regional market of Ituiutaba and its surroundings in state of Minas Gerais, such as the cities in the states of Mato Grosso, Distrito Federal and Goiás.

The objective of the implementation of this project activity in the ceramic is to stop using the native wood, which is a non-renewable fuel, and completely substitute it with renewable biomasses to feed their kilns and fire their ceramic units, so that they can minimize environmental impacts related to the native wood deforestation and consumption.

This fuel switching project is reducing the greenhouse gas (GHG) emissions through the substitution of native wood for renewable biomasses to generate thermal energy. It was concluded that this is feasible when considering the income derived from commercializing the resulting carbon credits. This move was originally unattractive due to the high investment costs of the adaptation of machineries to the new biomass and other barriers.

Therefore, the emissions launched during the combustion of wood were not compensated by the replanting. An opposite scenario occurs with the renewable biomasses employed in this project activity, which have carbon neutral lifecycle.

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

The emission reductions due to the switching of non-renewable fuel (non-renewable wood) to renewable biomasses resulted in **17,345 tCO_2e** during the monitoring period from 01/10/2011 to 30/09/2012. The contribution to sustainability is being monitored applying the SOCIALCARBON® Standard, which is based in six main pointers: Technology; Natural; Financial; Human; Social and Carbon Resources.

1.2 Sectoral Scope and Project Type

The project is associated to the following scope, as per UNFCCC definitions:

1 - Energy industries (renewable - / non-renewable sources);

This is not an AFOLU project. This is not a grouped project.

1.3 Project Proponent

Project Proponents

The project proponents contributed to the current report by assigning the following roles and responsibilities to:

Santorini Ceramic:

Mrs. Nara Rúbia Moraes Pineto, Monitoring data responsibilities: General data, information on inputs and outputs of the ceramic, detailed information and numbers on sales, how output data is handled and how data is stored and kept by the Santorini's office.

Mr. Manoel Augusto de Paula Greimel, Director: Information and visit of the ceramic, detailed information on process and production lines, environmental challenges, technological challenges, research and development history and ceramic devices market challenges.

Other information on the project's proponent:

Address: Avenida dezesseis de setembro, 333 - Ituiutaba.

Postal code: 38308-186

Phone number: +55 (34) 3268-5400

Web site: http://www.santorini.com.br/

Project Developer

Sustainable Carbon – Projetos Ambientais Ltda.: Project developer, Project participant and Project idealizer.

As the project authorized contact, Sustainable Carbon was given the responsibility of preparing the present monitoring report and to accompany the proponents until the end of the crediting period.

The monitoring report was completed on 06/11/2012 by *Marcelo Hector Sabbagh Haddad, Camila Vaccari, Mariana dos Santos Silva, Felipe S. Apostólico Silva, Mariana Fieri, Larissa Tega da Fonseca* and *Thiago de Avila Othero*, from *Sustainable Carbon – Projetos Ambientais LTDA.*

Other information on the project's developer's contact:

Address:
R. Doutor Bacelar, 368 – Conj. 54 – Vila Clementino
Postal Code: 04.026-001
São Paulo – SP, Brazil
Phone number: +55 11 2649 0036

Web site: http://www.sustainablecarbon.com

Emails: marcelo@sustainablecarbon.com; camila@sustainablecarbon.com; marianas@sustainablecarbon.com; mariana@sustainablecarbon.com ; larissa@sustainablecarbon.com; thiago.othero@sustainablecarbon.com; felipe@sustainablecarbon.com

1.4 Other Entities Involved in the Project

No other entity was involved in the project.

1.5 Project Start Date

According to version 06 of the VCS PD[1], project start date was defined as 16/01/2008. On this date, the project began reducing or removing GHG emissions, i.e. the ceramic started using renewable biomass as fuel.

1.6 Project Crediting Period

The crediting period for this project started on 01/04/2008 and ends on 31/03/2018[2].

VCS project crediting period: 10 years, two times renewable.

1.7 Project Location

According to the applied methodology, the project boundaries for the project are the physical, geographical areas of the renewable energy generation, thus, the ceramic limits. The ceramic is located in the Municipality of Ituiutaba in the State of Minas Gerais which is indicated in Figure 01. The project site has the following postal address:

Cerâmica Santorini LTDA

Adress: Avenida Dezesseis de Setembro, 333

Ituiutaba – Minas Gerais - Brasil

Postal Code: 38308-186

Geographical coordinates: 18º57'45.27'' S, 49º29'26.60'' W.

[1] Document available at: <http://mc.markit.com/br-reg/public/project.jsp?project_id=100000000000227>. Last visited on: 20/09/2012.

[2] During the current monitoring period it was verified that there are two different crediting period described at the VCS PD, version 06. Sections 1.3 and 4.2 described the crediting period is from April, 10th 2008 to April 9th, 2018. Sections 1.6 and 7 described it is from April, 1st 2008 to March, 31st 2018. However, the correct crediting period is the one described on sections 1.6 and 7 of the VCS PD, version 06.

Figure 1. Geographic location of the city of the project activity that has the following coordinates: latitude: 18°58′08″S, longitude: 49° 27′ 54″ W[3].

The project site has the following boundaries geographical coordinates:

Figure 2. Ceramic boundaries. Spot A: 18º57'45.27''S 49º29'26.60''W, spot B: 18º57'46.62''S 49º29'16.21''W and C: 18º57'39.32''S 49º29'16.20''W.

[3] Geographic location of Ituiutaba city. According to: http://www.ituiutaba.mg.gov.br/?c=resposta&loc=24&t=Localização&ca=3&i=24. Last visited on: 20/09/2012.

1.8 Title and Reference of Methodology

The project applies a small scale methodology approved under the Clean Development Mechanism, as follows:

Category AMS-I.E.: Switch from Non-Renewable Biomass for Thermal Applications by the User – Version 01, valid from 01/02/2008 to 08/04/2010[4]. This category comprises small thermal appliances that displace the use of non-renewable biomass by introducing new renewable energy end-user technologies.

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

The VCS PD was validated by the Designated Operational Entity TÜV Nord CERT GmbH and this present monitoring report is being verified by Designated Operational Entity TÜV Rheinland (China) Ltd.

The project has maintained the fuel switch since the starting date of the crediting period. This means the ceramic is operating using exclusively renewable biomass since the first monitoring period, thus mitigating their baseline emissions.

As described in the VCS PD version 06, during the validation process, *Santorini* Ceramic operated eight "Round kilns" in order to burn the fuel and fire the ceramic units. However, during the last monitored period, the company concluded the construction of four additional "Round" Kilns[5].

Once the four new kilns were not included in the VCS PD, a financial analysis was made, comparing the total cost of the new kilns with the adaptation cost for the use of renewable biomass. Thus, the inclusion of the four new kilns was approved based on the financial analysis, and their production was included in the last monitoring period.

In the current monitored period, the ceramic production encompasses twelve "Round kilns", fed with sawdust/wood chips.

The ceramic devices that are cooked at the kilns are first dried in a continuous artificial dryer. The dryer reuses the energy generated by the kilns and has a system which controls its temperature and humidity.

No changes were indentified on this period; hence monitoring data was kept according to the monitoring plan described in the project description document. This Monitoring Report refers to the fourth monitoring period of this project, and includes data from 01/10/2011 to 30/09/2012.

2.2 Deviations from the Monitoring Plan

The registered VCS PD version 06 establishes that the project proponent (meaning the ceramic owner) would measure the amount of renewable biomasses used (parameter $Q_{renbiomass}$). However, during the entire monitored period, this parameter was monitored through all the receipts and invoices of biomass

[4] This version of the methodology is available at: <http://cdm.unfccc.int/UserManagement/FileStorage/CDM_AMSP4VBBO5G54RXDE9KQ6FJWMGHZLHFA5>. Last visited on: 20/09/2012.

[5] The "Round Kilns" are intermittent kilns with round shape and lateral furnaces. Its internal diameter is about 9 meters. It is usually employed to fire roof tiles and bricks.

received by the ceramic company. This means the amount of renewable biomass is measured by each provider and controlled by the ceramic owner, by storing receipts and invoices.
This approach was chosen considering that it is the responsibility of the provider to measure the amount of biomass, since this information needs to be available in the sale invoice or receipt. As this information is used for commercial purposes (to calculate due financial compensations), it is considered that data from the suppliers are a reliable source for this parameter.

2.3 Grouped Project

Not applicable. This is not a grouped project.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data Unit / Parameter:	**$EF_{projected\ fossil\ fuel}$**
Data unit:	tCO_2/TJ
Description:	CO_2 Emission factor of residual fuel oil
Source of data:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories. Source: http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf. Page 2.18. Table 2.3. IPCC. Visited on 20/09/2012.
Value applied:	77.4 tCO_2/TJ
Purpose of the data:	This parameter was used to calculate baseline emissions from the use of the fossil fuel that would be used in the baseline scenario, in the absence of non-renewable wood.
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 will be kept for two years after the end of the crediting period or the last issuance of carbon credits income for this project activity, whichever occurs later.

Data Unit / Parameter:	**$NCV_{biomass}$**
Data unit:	TJ/tonne of wood
Description:	Net Calorific Value
Source of data:	Brazilian study carried out with Cerrado wood: VALE, A.T; BRASIL, M.A.M; LEÃO, A.L. Quantificação e caracterização

	energética da madeira e casca de espécies de Cerrado. Ciência Florestal, Santa Maria; v.12, n.1, p. 71-80; 2002. Available at: <http://www.ufsm.br/cienciaflorestal/artigos/v12n1/A8V12N1.pdf>. Visited on 20/09/2012.
Value applied:	0.0186
Purpose of the data:	This parameter will provide 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 Cerrado 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 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 Unit / Parameter:	ρ_{wood}
Data unit:	Tonne/m³
Description:	Specific gravity
Source of data:	Brazilian study carried out with Cerrado wood: Vale, A.T; Brasil, M.A.M; Leão, A.L. Quantificação e caracterização energética da madeira e casca de espécies de Cerrado. Ciência Florestal, Santa Maria; v.12, n.1, p. 71-80; 2002. Available at: http://www.ufsm.br/cienciaflorestal/artigos/v12n1/A8V12N1.pdf. Visited on 02/10/2012.
Value applied:	0.5702
Purpose of the data:	The amount of wood used in the baseline was measured by volume units, so this data was used to the unity conversion.
Any comment:	The species used to calculate the average value are typical trees of *Cerrado* Biome and usually employed as fuel in the ceramic industries of the region. 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 Unit / Parameter:	BF_y

Data unit:	Tonnes of wood per tonnes of product
Description:	Consumption of non renewable biomass per tonnes of product produced in the last 6 months before the start of fuel switching.
Source of data:	Historical data from project proponent
Value applied:	0.482531
Purpose of the data:	The value was acquired through the average consumption and production of tonnes of ceramic product during the last 6 months when the ceramic company used to consume non-renewable wood. This value is in accordance with the data acquired in other ceramics that employ the same type of kilns. The value was employed to calculate the real amount of wood displaced to maintain the ceramic production in the baseline scenario.
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.

3.2 Data and Parameters Monitored

Data Unit / Parameter:	$Q_{renbiomass}$
Data unit:	Tonnes per month
Description:	Amount of renewable biomass
Source of data:	Measured by the biomass providers and controlled by the ceramic owner. The registered VCS PD v.06 establishes that the project proponent would measure this parameter; however, during the entire monitored period, this parameter was monitored through all the receipts and invoices of biomass received by the ceramic industry.
Description of measurement methods and procedures to be applied:	The amount of renewable biomass was monitored in accordance to the weight or volume described in the receipts or invoices from the providers. It was utilized the Specific Gravity in order to convert from m^3 to tonnes. Data applied:

Biomass	**Sawdust / Wood chips**
Specific gravity	0.350

	(tonne/m³)	

Source:

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 02/10/2012.

Frequency of monitoring/recording:	Monthly

Value monitored:

$Q_{renbiomass}$ – Amount of renewable biomass per provider (in tonnes)

Sawdust / Wood chips

	Period	Kavaco	Elvis	Faber Castell	Eko Florestal	Total Sawdust/ wood chips
2011	October	493.50	147.35	0.00	0.00	**640.85**
	November	647.50	114.45	0.00	0.00	**761.95**
	December	399.00	92.30	0.00	0.00	**491.30**
	Total 2011	**1,540.00**	**354.10**	**0.00**	**0.00**	**1,894.10**
2012	January	269.50	0.00	271.32	0.00	**540.82**
	February	491.75	0.00	95.76	0.00	**587.51**
	March	586.25	0.00	131.67	0.00	**717.92**
	April	535.50	0.00	29.05	0.00	**564.55**
	May	571.90	172.20	24.99	76.30	**845.39**
	June	456.75	0.00	233.24	38.50	**728.49**
	July	577.50	124.60	139.86	0.00	**841.96**
	August	490.00	206.85	240.87	0.00	**937.72**
	September	521.50	104.65	202.37	0.00	**828.52**
	Total 2012	**4,500.65**	**608.30**	**1,369.13**	**114.80**	**6,592.88**
Total - Monitoring Period		**6,040.65**	**962.40**	**1,369.13**	**114.80**	**8,486.98**

Monitoring equipment:	No monitoring equipment was used to determine this parameter.
QA/QC procedures to be applied:	Amount of biomass was checked according to receipts of purchase. The energy balance was verified according to the amount of biomass applied.
Calculation method:	Not applicable
Any comment:	Data was measured for each purchase/acquisition of biomass and aggregated monthly.

	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 Unit / Parameter:	**PR_y**
Data unit:	Tonnes of ceramic units per month
Description:	Production of ceramic units
Source of data:	Controlled by the project proponent
Description of measurement methods and procedures to be applied:	The amount was acquired by counting the total production of one period, considering the internal control of ceramic industry.
Frequency of monitoring/recording:	Monthly
Value monitored:	<table><tr><th>Period</th><th>Total - Tonnes of ceramic devices produced per year</th></tr><tr><td>Total 2011</td><td>6,154.82</td></tr><tr><td>Total 2012</td><td>19,316.39</td></tr><tr><td>Total Monitoring Period</td><td>25,471.21</td></tr></table> More detailed information, please see section 05.
Monitoring equipment:	No monitoring equipment was used to determine this parameter. Production was counted by trained personnel on the ceramic.
QA/QC procedures to be applied:	The ceramic has an internal control of the quantity of ceramic units produced. It was rechecked according to the ceramic units produced multiplied by the final product weight.
Calculation method:	The weights of the ceramic units produced in this monitoring period were measured by a calibrated scale from Ceramic's Quality Laboratory. These values were used to convert production from units to tonnes.
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 Unit / Parameter:	**Origin of renewable biomass**
Data unit:	Not applicable
Description:	Renewable origin of the biomass
Source of data:	Controlled by the project developer
Description of measurement methods and procedures to be applied:	This information was given by the biomasses providers. The guarantee of acquiring renewable biomass was verified by invoices from the providers.
Frequency of monitoring/recording:	Each crediting period
Value monitored:	All the renewable biomasses employed in the monitoring period were already described in the project design document.
Monitoring equipment:	No monitoring equipment was used to determine this parameter.
QA/QC procedures to be applied:	The biomasses were considered renewable as they were in accordance with the definition given by the Annex 18, EB 23 of UNFCCC definition[6].
Calculation method:	Not applicable
Any comment:	All the renewable biomasses utilized in the monitoring period are in accordance with definitions of renewable biomass set in the applied methodology. 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 Unit / Parameter:	**Renewable biomass surplus**
Data unit:	Tonnes or m^3
Description:	Amount of renewable biomass available
Source of data:	Monitored
Description of measurement methods and	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

[6] CDM – Executive Board. Annex 18 definition of renewable biomass. EB 23. Available at: < http://cdm.unfccc.int/search?q=Annex+18%2C+EB+23>. Las visited on: 20/09/2012.

<table>
<tr><td>procedures to be applied:</td><td>Activity Categories, were monitored. The measurement of the leakage was based in national and international articles and database every monitoring period. The sources provided information about the biomass availability in the project activity's region.</td></tr>
<tr><td>Frequency of monitoring/recording:</td><td>Annually</td></tr>
<tr><td>Value monitored:</td><td>
<table>
<tr><th>Biomass surplus</th><th>Surplus</th><th>Year</th></tr>
<tr><td>Wood Residues (sawdust/wood chips) in m^3</td><td>8,488,865</td><td>2007</td></tr>
</table>
More detailed information, please see section 4.3 Leakage.
</td></tr>
<tr><td>Monitoring equipment:</td><td>No monitoring equipment was used to determine this parameter.</td></tr>
<tr><td>QA/QC procedures to be applied:</td><td>Data available regarding the ceramic industries fuel consumption was employed to monitor the leakage.</td></tr>
<tr><td>Calculation method:</td><td>The amount of biomass used by the project activity in each year of the crediting period compared to total biomass available, as estimated on the VCS PD.</td></tr>
<tr><td>Any comment:</td><td>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.</td></tr>
</table>

Data Unit / Parameter:	**Leakage of non-renewable biomass**
Data unit:	tCO_2e
Description:	Leakage resulted from the non-renewable biomass[7]
Source of data:	Monitored
Description of measurement methods and procedures to be applied:	The source of leakage predicted in the methodology applied was monitored. More detailed information, please see section 4.3 Leakage.
Frequency of monitoring/recording:	Annually
Value monitored:	0

[7] In the VCS PD version 06, the Description of the parameter *"Leakage of non-renewble biomass"* is incorrect (Leakage resulted from fossil fuel). The correct description is written in the current monitoring report.

Monitoring equipment:	No monitoring equipment was used to determine this parameter.
QA/QC procedures to be applied:	Data available regarding the ceramic industries fuel consumption were utilized to monitor the leakage.
Calculation method:	Not applicable.
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 Unit / Parameter:	$f_{NRB,y}$
Data unit:	Fraction of biomass or percentage
Description:	Fraction of biomass (wood) used in the absence of the project activity in year y.
Source of data:	Survey methods.
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 ceramic owner. Thus, the totality of fuel employed in the baseline scenario is from non-renewable origin. However, according to Klink (2005)[8], Cerrado Biome has only 1.9% of its total area with sustainable use, thus, 98.06% of its forest resources can be considered non-renewable. Also it was added the amount of wood saved by similar projects that were developed by *Sustainable Carbon – Projetos Ambientais Ltda* with the same methodology in the same biome[9].
Frequency of monitoring/recording:	Annually
Value monitored:	98.06%
Monitoring equipment:	No monitoring equipment was used to determine this parameter.
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 *Cerrado* biome.

[8] KLINK, C. A ; MACHADO, R. Conservation of the Brazilian Cerrado, Belo Horizonte, v.1, n. 1, p. 147-155, 2005. Available at:<http://faculty.jsd.claremont.edu/emorhardt/159/pdfs/2006/Klink.pdf>. Last visit on: 20/09/2012.

[9] All projects were validated or are under validation process by an accredited DOE in UNFCCC. Therefore, the values assumed to do the calculations of non-renewable biomass consumption of all projects were taken from the VCS PDs or equivalent documents of these projects.

	Wood saved from projects developed by *Sustainable Carbon* located in the same biome and that have applied the same methodology was considered in this fraction[10]. CDM or VCS registered projects were also included in this fraction if placed in the same region and using the same methodology..
Calculation method:	Not applicable.
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.

3.3 Description of the Monitoring Plan

The monitoring is done with the aim of determining the most approximate quantity of non-renewable wood that, in the absence of the project, would be used in the ceramic's kilns and consequently the amount of GHG that would be emitted in tonnes of CO_2e. Section 3.2 describes data and parameters monitored, as well as the procedures involved on the monitoring plan.

Mr. *Glayton Aparecido Santana Domingos*, ceramic quality laboratory responsible, collects production data and organize according to production forms. Mrs. *Kelly Cristina Medeiros Franco*, ceramic sales and commercial responsible, stores invoices, receipts and other documents related to purchase or acquisition of renewable biomass. Both ceramic's employees report production and renewable biomass data to Mrs. *Nara Rúbia Moraes Pineto*, ceramic administrative manager, responsible for the monitoring plan as well as the administration of ceramic expenses and sales. Mrs. *Nara* reports control of production data, purchase of biomass and ceramic's expenses to Mr. *Manoel Augusto de Paula Greimel*, ceramic owner.

Based on this information, Sustainable Carbon is responsible to assess if the biomasses are from renewable origin, to evaluate if there is a surplus of renewable biomass and to calculate emission reductions, including an assessment of leakage emissions and the determination of parameter $f_{NRB,y}$. Sustainable Carbon also assists the ceramic personnel to double check the monitored data on biomass consumption and ceramic devices production.

Santorini ceramic has internal procedures for auditing and non-conformities following ISO:9001 2008 rules. The internal auditing follows rules described on the procedure named PQ – 005. The auditing is based on an annual schedule and on a checklist of parameters in the ceramic sector to be analyzed. The report of non-conformities leads the ceramic company to identify and correct the errors within a pre-determined period, according to an action plan.

Besides that, during the current monitoring period, Sustainable Carbon performed an internal audit on the parameters $Q_{renbiomass}$ and PR_y. Such audit was performed based on an online monitoring spreadsheet, where ceramic employees input data on both parameters. Sustainable Carbon has an internal auditing tool that identifies inconsistencies on such spreadsheet.

[10] Document available at: <http://mc.markit.com/br-reg/public/index.jsp?s=cp> Last visit on: 28/09/2012. On this website, search for Sustainable Carbon projects.

The responsible for the monitoring plan is *Mrs. Nara Rúbia Moraes Pineto* from *Santorini* ceramic, Sustainable Carbon technical team (including those members described on Section 1.3) was also involved in the project monitoring.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Baseline emissions are estimated following procedures of the applied methodology: AMS-I.E.: Switch from Non-Renewable Biomass for Thermal Applications by the User – Version 01, valid from 01/02/2008 to 08/04/2010[11]. The project activity in this monitoring period (12 months) generated 124.34 TJ. Converting this number to MWh, it was generated 34,539.63 MWh per year, which corresponds to the use of 3.94 MWthermal on average of the kilns capacity during the monitored period, which is less than the limits of 45 MWthermal for Type I Small scale project activities.

Baseline emissions

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

Where:

ER_y: Emission reductions during the year y in tCO_2e

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

$NCV_{biomass}$: Net calorific value of non-renewable biomass in TJ/tonne

$EF_{projected\ fossil\ fuel}$: Emission factor for the projected fossil fuel consumption in the baseline in tCO_2/TJ[12].

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

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

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

Where:

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

[11] Available at: http://cdm.unfccc.int/filestorage/C/D/M/CDM_AMSP4VBBO5G54RXDE9KQ6FJWMGHZLHFA5/AMS_I.E_ver01.pdf?t=YjJ8bHRtdXdtfDDOUFuwm9x424otUA_-niR2. Last visited on 02/10/2012.

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

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/tonne of ceramic device.

PR_y: Amount of product produced in year y in tonnes of ceramic units

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

Where:

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

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

Where:

BF_y: Consumption of non-renewable biomass per tonne of ceramic units produced in year y

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

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

Baseline emissions during the monitored period are summarized in the following table:

Table 1. Baseline emissions for *Santorini* ceramic.

Year	Month	Baseline emissions (tCO_2e)
2011	**October**	1,706
	November	1,451
	December	1,034
	Total 2011	**4,191**
2012	**January**	1,104
	February	1,394
	March	1,695
	April	1,334
	May	1,466
	June	1,588
	July	1,516
	August	1,529
	September	1,528
	Total 2012	**13,154**
	Total Monitoring Period	**17,345**

4.2 Project Emissions

The applied methodology does not include any source of project emissions.

4.3 Leakage

Leakage is estimated as 0 (zero) tCO_2e during the entire monitoring period.

The Category AMS-I.E predicts the following possible three sources of leakage:

A) If the project activity includes substitution of non-renewable biomass by renewable biomass, leakage in the production of renewable biomass must be considered.

The leakage from biomass projects, like this project activity, should also be estimated according to the "General guidance on leakage in biomass project activities" (attachment C of appendix B) of Indicative Simplified Baseline and Monitoring Methodologies for Selected Small-Scale CDM Project Activity Categories, which identifies different emission sources based on the type of biomass considered (described in the table below).

Table 2. Sources of leakage according to the type of the biomass

Biomass Type	Activity/ Source	Shift of pre project activities	Emissions from biomass generation/ cultivation	Competing use of biomass
Biomass from forests	Existing forests	-	-	X
	New forests	X	X	-
Biomass from croplands or grasslands (woody or non-woody)	In the absence of the project the land would be used as a cropland/wetland	X	X	-
	In the absence of the project the land will be abandoned	-	X	-
Biomass residues or waste	Biomass residues or wastes are collected and use.	-	-	X

Observing table 2, the possible sources of leakage of the present project activity is the competing use of biomass residues or waste, once *Santorini* ceramic utilized sawdust/wood chips as renewable biomass.

Woody Residues (Sawdust/ Wood Chips)

The production of wood generates a large amount of residues, which can be reused to generate thermal energy. As can be observed in the Figure 3, the potential of wood residues generation in the state of São Paulo is extremely high; *Minas Gerais* has a great potential too, which means that there is an enormous availability of this kind of fuel to be employed in the project activity. This way, this biomass does not have potential to generate leakage emissions due to its high availability.

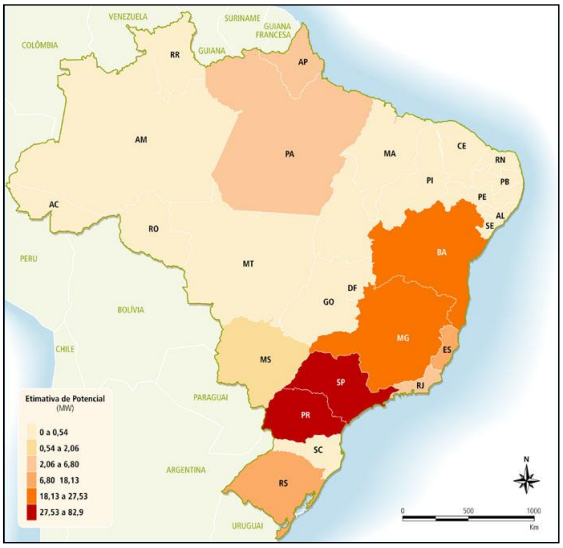

Figure 3. Forest Residues Potential for Energy Generation[13]

According to IBGE 2007, the production of log of wood and firewood in the State of *São Paulo*[14], *Mato Grosso do Sul*[15], and *Minas Gerais*[16] totalizes 45.8 millions of wood which generate more than 10 millions of residues, considering that around 22% of this total will generate sawdust.

Table 3. Production of log of wood and firewood

Production / State	São Paulo	Mato Grosso do Sul	Minas Gerais	**Residues Generated**
Log of wood (m^3)	25,966,464	1,042,639	8,015,219	**7,705,350**
Firewood (m^3)	7,407,385	468,143	3,326,732	**2,371,804**
Total (m^3)	**45,805,251**			**10,077,155**

[13] Source: CENTRO NACIONAL DE REFERÊNCIA EM BIOMASSA - CENBIO. Panorama do potencial de biomassa no Brasil. Brasília; Dupligráfica, 2003. 80 p. Avaiable at: www.aneel.gov.br/aplicacoes/atlas/pdf/05-Biomassa(2).pdf. Last Visited on: 02/10/2012.

[14] IBGE. Produção da Extração Vegetal e da Silvicultura 2007.. Available at: < http://www.sidra.ibge.gov.br/bda/silvi/default.asp?t=2&z=t&o=29&u1=1&u3=1&u4=1&u2=31>. Last visit on 02/10/2012.

[15] IBGE. Produção da Extração Vegetal e da Silvicultura 2007. Available at:< http://www.sidra.ibge.gov.br/bda/silvi/default.asp?t=2&z=t&o=29&u1=1&u3=1&u4=1&u2=38>. Last visit on 02/10/2012.

[16] IBGE. Produção da Extração Vegetal e da Silvicultura 2007.. Available at:<http://www.ibge.gov.br/estadosat/temas.php?sigla=mg&tema=extracaovegetal2007>. Last visit on 02/10/2012.

The project activity utilized approximately 8,486.98 tonnes or 24,249 m^3 of woodchips/sawdust per year which represent 0.24% of the total of residues generated, considering only these three States.

B) Leakage relating to the non-renewable biomass shall be assessed from ex-post surveys of users and areas from where biomass is sourced.

The following potential sources of this type of leakage could be identified:

- Use/diversion of non-renewable biomass saved under the project activity by non-project households/users who previously used renewable energy sources. If this leakage assessment quantifies an increase in the use of non-renewable biomass used by the non-project households/users attributable to the project activity then baseline is adjusted to account for the quantified leakage.

- Use of non-renewable biomass saved under the project activity to justify the baseline of other project activities can also be potential source of leakage. If this leakage assessment quantifies a portion of non-renewable biomass saved under the project activity that is used as the baseline of other project activity then baseline is adjusted to account for the quantified leakage.

- Increase in the use of non-renewable biomass outside the project boundary to create non-renewable biomass baselines can also be potential source of leakage. If this leakage assessment quantifies an increase in use of non-renewable biomass outside the project boundary then baseline is adjusted to account for the quantified leakage

The carbon credits incomes stimulate the use of renewable biomass to other ceramic companies presenting a huge possibility for sustainable development in the region. Therefore, the sources of leakages mentioned above are not applicable as the project activity does not displace the use of renewable biomass of a non-project user, due to the likely decrease in the use of non-renewable biomass in the region and there is current great amount of renewable biomasses available locally as described before. The non-renewable biomass employed which would be employed in this project activity is not being saved for other project activity, since other ceramics were already consuming wood from non-renewable forest management (common practice).

The project is expected to decrease the use of non-renewable biomass by similar users, especially due to the incentive of carbon credits. Therefore, it can be concluded that this source of leakage, until the date of this monitoring report, is not considered in this project activity.

This leakage was monitored in order to guarantee the project conservativeness.

C) If the equipment is transferred from another activity or if the existing equipment is transferred to another activity, leakage is to be considered.

The leakage is not applicable for this project activity as there was no transference of equipment, in spite of new equipments had to be acquired.

Due to all the explanations described above, the present project activity does not encompass any type of leakage.

Table 4. Production – QA/ QC procedure results

$Q_{renbiomass}$ - QA/QC Procedure		
Parameter	**VCS PD**	**Monitoring Period – October 2011 to September 2012**
PR_y (tonnes of product)	21,441.04	25,471.21
$Q_{renbiomass}$ (tonnes)	6,300.00	8,486.98
Thermal Energy (TJ)	92.30	124.34
Thermal energy per tonnes produced (TJ/tonne produced)	0.0043	0.0049
Double Check (QA/QC Procedure)	The thermal energy generated per tonnes of ceramic pieces produced at *Santorini* Ceramic during the monitored period was similar to the VCS PD.	

As can be verified on Table 4, the thermal energy generated with the use of sawdust/wood chip per tonnes of ceramic devices produced during the current monitoring period was similar to the VCS PD version 06. This proves that the ceramic is using renewable biomass on its production process.

Therefore, based on 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) this project activity contributes to sustainable development, once the ceramic company is using renewable biomass and applying the SOCIALCARBON® methodology.

4.4 Summary of GHG Emission Reductions and Removals

Table below summarizes the emission reductions for this monitoring period[17].

Table 5. Emission reductions for the monitoring period.

Year	Month	PR_y - Production (tonnes)	B_y (tonnes)	ER_y (tCO_2e)
2011	October	2,505.00	1,208.74	1,706
	November	2,131.52	1,028.53	1,451
	December	1,518.30	732.63	1,034
	Total 2011	**6,154.82**	**2,969.89**	**4,191**
2012	January	1,620.73	782.05	1,104
	February	2,047.84	988.15	1,394
	March	2,488.95	1,200.99	1,695
	April	1,958.83	945.20	1,334
	May	2,153.57	1,039.16	1,466
	June	2,331.63	1,125.08	1,588
	July	2,225.63	1,073.93	1,516
	August	2,246.04	1,083.78	1,529
	September	2,243.18	1,082.40	1,528
	Total 2012	**19,316.39**	**9,320.76**	**13,154**
	Total Monitoring Period	**25,471.21**	**12,290.65**	**17,345**

[17] Emission reductions are equal to the baseline emissions, since there are no project emissions according to the applied methodology and since leakage emissions are estimated to be zero tCO_2e.

5 ADDITIONAL INFORMATION

5.1 Amount of ceramic devices produced per month - *Santorini* ceramic

	Production in tonnes of ceramic devices								
	Period	**Ceramic Devices**							**Total - Tonnes of ceramic devices**
		Americana	Portuguesa	Acab. Americana	Tijolo	1/2 Tijolo	Romana	Celote	
2011	**October**	1,186.82	802.89	28.18	90.71	5.56	366.33	24.51	2,505.00
	November	923.82	767.67	1.29	98.43	2.45	289.61	48.26	2,131.52
	December	774.52	511.00	0.00	2.55	0.00	229.78	0.45	1,518.30
	Total 2011	**2,885.15**	**2,081.56**	**29.46**	**191.70**	**8.01**	**885.72**	**73.21**	**6,154.82**
2012	**January**	885.92	474.62	0.00	15.77	0.00	244.42	0.00	1,620.73
	February	1,159.85	534.22	0.00	3.79	0.00	307.90	42.08	2,047.84
	March	1,383.69	656.76	26.52	49.58	0.27	371.40	0.72	2,488.95
	April	1,038.69	536.62	0.00	35.52	2.17	302.95	42.88	1,958.83
	May	1,002.75	634.05	71.42	67.17	0.55	314.05	63.58	2,153.57
	June	1,278.89	776.44	0.00	73.02	0.00	201.69	1.59	2,331.63
	July	1,097.53	975.33	0.00	42.65	3.55	106.57	0.00	2,225.63
	August	738.99	1,115.68	0.00	58.77	1.20	306,41	24.98	2,246.04
	September	1,333.98	435.18	0.00	117.39	0.69	303.86	52.08	2,243.18
	Total 2012	**9,920.30**	**6,138.90**	**97.95**	**463.64**	**8.44**	**2,459.24**	**227.92**	**19,316.39**
Total - Monitoring Report		**12,805.44**	**8,220.46**	**127.41**	**655.34**	**16.45**	**3,344.97**	**301.13**	**25,471.21**