CDM – Executive Board

MONITORING REPORT FORM (CDM-SCC -MR)
Version 01 - in effect as of: 28/09/2010

CONTENTS

MONITORING REPORT
Version 03 – 06/06/2014
Ceará Renewable Energy Bundled Project
GS1042 Third monitoring period from 01/05/2013 - 28/02/2014 (days included)

SECTION A. General description of the project activity

A.1. Brief description of the project activity:

The project activity is the bundled project of five red ceramic factories belonging to Grupo Tavares, a family business that owns several ceramic factories in the State of Ceará, Brazil. The following ceramic factories are included in this project: Antônio Ceramic, Ceará Ceramic, Ceagra Ceramic, Eliane Ceramic and Santa Rita Ceramic. Antônio Ceramic and Eliane Ceramic are located at Itaitinga, in the state of Ceará, northeast region of Brazil. Ceará Ceramic and Ceagra Ceramic are located at Aquiraz, also in the State of Ceará. Santa Rita Ceramic is located at São Gonçalo do Amarante, also in the State of Ceará. The ceramic factories produce ceramic bricks, tiles and construction blocks, destined mainly for the regional market in the metropolitan area of Fortaleza.
All ceramics used to utilize predominantly wood without sustainable forest management as fuel. The use of this type of non-renewable biomass is a common practice in the ceramic industry. Firewood used to be the most employed source of primary energy until 1970's, when the petroleum started to supply the majority of Brazilian´s energy needs[1]. Moreover, the Brazilian Energy and Mine Ministry has been monitoring every energy sector of Brazil since 1970, and firewood appears over the years monitored as a significant source of thermal energy for ceramic sector[2].

This project activity reduces the greenhouse gases (GHG) emissions through the substitution of non-renewable biomass for renewable biomasses to generate thermal energy. As renewable biomasses, the project activity utilizes mostly biomass residues (such as cashew nut shells, residues from cashew tree, coconut residues, sawdust) and wood from sustainable forest management plan areas to feed the ceramic's kilns. The project also involves energy efficiency measures, such as improved fuel handling and kilns improvement to reduce the necessary energy per production output[3].

This project points out the possibility for switching from non-renewable biomass to renewable biomasses, which is unattractive due some barriers, including higher fuel costs, uncertainties associated to the fuel switch and the lack of knowledge to operate with renewable biomass. The ceramic owners have considered the income from the commercialization of the carbon credits to make the project activity viable.

The main goal of this project activity is to minimize the negative impacts of deforestation to obtain firewood, whose consumption also leads to GHG emissions that contribute to climate change. Moreover, in opposition to the identified baseline, the project activity generates thermal energy exclusively from renewable sources, by using abundant renewable biomasses in the region. All these measures contribute to sustainable development by promoting renewable energy, mitigating atmospheric pollution and improving the quality of employment for the ceramic workers.

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[1] *BRITO, J.O. "The use of wood as energy". Available at: <http://www.scielo.br/scielo.php?pid=S0103-40142007000100015&script=sci_arttext&tlng=ES>. Last visited on 27/02/2014.*
[2] *Energy Research Company. National Energy Balance - energy consumption per sector. Available at: <https://ben.epe.gov.br/BEN2007_Capitulo3.aspx>. Last visited on 27/02/2014.*
[3] *No emission reductions are claimed for energy efficiency measures, since these are applied after the complete fuel switch to renewable biomass.*

By the beginning of 2010, Grupo Tavares initiated tests with renewable biomass in the five ceramic factories included in the current project. The start date of the project activity is considered 02/07/2010, when Grupo Tavares and Sustainable Carbon signed contracts for the development of a GHG emission reduction project in the five ceramic factories included in the current project. All ceramics have operated exclusively with demonstrably renewable biomass since the beginning of the crediting period, which is defined as 01/09/2010.

The emission reductions due to the switching of non-renewable fuel (non-renewable wood) to renewable biomasses resulted in 50,265 tCO_2e during the monitoring period from 01/05/2013 to 28/02/2014. The contribution to sustainability is being monitored applying the **Sustainability Monitoring Plan, described on Section G of the Gold Standard Passport, version 05.**

A.2. Project Participants

Table 01. Project participants

Name of the party involved(*) (host) indicates a host party	**Private and/or public entity(ies) project participants (*) (as applicable)**	**Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)**
Brazil (host)	Sustainable Carbon - Projetos Ambientais Ltda	No
	Antônio Cavalcante de Souza Olaria-ME	No
	Ceará Cerâmica Ltda	No
	Ceagra – Cerâmica e Agropecuária Assunção Ltda	No
	Eliane Cavalcante de Souza EPP	No
	Cerâmica Santa Rita Ltda	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required. However, this is a voluntary project. Hence, no approval from the Host Party is needed.		

A.3. Location of the project activity:

The ceramics are located in Brazil, in the state of Ceará in the northeast region of the country. The geographic location is illustrated in Figure 01.

Table 02. Location of the ceramics

Ceramic	Latitude	Longitude	Postal Adress
Antônio Ceramic	4° 0'42.01"S	38°31'15.00"W	Rodovia BR 116, Km 28, s/n°, Riachão CEP 61.880-000 – City of Itaitinga, State of Ceará
	4° 0'35.76"S	38°31'9.81"W	
	4° 0'38.71"S	38°31'5.94"W	
	4° 0'45.04"S	38°31'10.28"W	
Ceará Ceramic	4° 1'26.94"S	38°29'42.65"W	Rodovia BR 116, Km 32, s/n°, Sítio Terra do Sol CEP 61.700-000 – City of Aquiraz, State of Ceará
	4° 1'19.36"S	38°29'50.76"W	
	4° 1'14.27"S	38°29'46.78"W	
	4° 1'21.63"S	38°29'36.64"W	
Ceagra Ceramic	3°59'38.63"S	38°30'57.44"W	Rodovia BR 116, Km 28, s/n°, Riachão CEP 61.880-000 – City of Aquiraz, State of Ceará
	3°59'27.09"S	38°30'56.27"W	
	3°59'32.55"S	38°30'49.93"W	
	3°59'39.20"S	38°30'53.34"W	
Eliane Ceramic	3°58'36.08"S	38°30'52.04"W	Rodovia BR 116, Km 26, s/n° CEP 61.880-000 - City of Itaitinga, State of Ceará
	3°58'38.07"S	38°31'0.01"W	
	3°58'32.51"S	38°31'0.85"W	
	3°58'31.87"S	38°30'52.57"W	
Santa Rita Ceramic Site 1	3°40'31.53"S	38°58'53.80"W	Rodovia BR 222, Km 47, s/n° - Railway station unit CEP 62.670-000 – City of São Gonçalo do Amarante, State of Ceará
Santa Rita Ceramic Site 2	3°40'3.78"S	38°58'43.83"W	Rodovia BR 222, Km 47, s/n° -Gas station unit CEP 62.670-000 – City of São Gonçalo do Amarante, State of Ceará

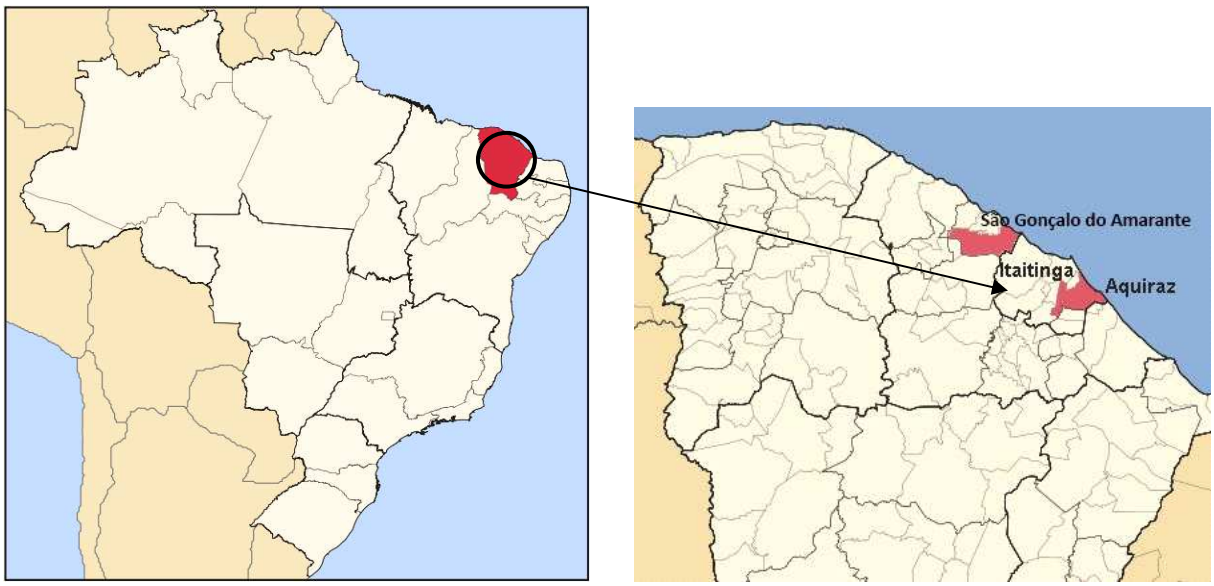

Figure 01. Geographic location of the cities of the project activity.

A.4. Technical description of the project

A brief description of the situation on each ceramic before and after the initiation of the project activity follows:

Antônio Ceramic: The ceramic has two Hoffmann[4] kilns. In the baseline scenario, the kilns operated predominantly using native firewood (wood without sustainable forest management) as fuel. A fraction of wood from areas with sustainable forest management plan was also used, representing around 6% of total fuel usage[5]. Based on the project activity, the proponent switched its fuel to renewable biomasses such as cashew nut shell, residues from cashew tree, coconut husk and increased amounts of wood from areas with sustainable forest management plan. The ceramic also acquired new equipments, including automatic feeders, to allow an efficient use of renewable biomass as fuel.

Before being cooked in the kilns, the pieces must be dried. At Antônio Ceramic, the ceramic pieces are dried naturally, so no fuel is used for the drying process. During 2009, Antônio Ceramic produced 7,921 thousands of ceramic pieces. The identified baseline for this ceramic was the utilization of a total of approximately 5,407 tonnes of non-renewable woody biomass per year to provide thermal energy to the ceramics' kilns.

[4] *"Hoffman" is a very old type of kiln, which has parallel chambers where the heat from one chamber is used in the next, therefore recycling the generated heat in the previous chambers.*

[5] *The amount of wood from sustainable forest management areas utilized in the baseline scenario was updated in the current monitoring period, as its unit of measure is stereo meter (mst). A conversion factor from stereo meter (mst) to cubic meter (m^3) was applied.*

Figure 02. Hoffmann kiln being fed with renewable biomass in Antônio Ceramic.

Ceará Ceramic:

This ceramic has two Hoffmann kilns and three round[6] kilns. In the baseline scenario, the kilns operated using predominantly native firewood as fuel. A fraction of wood from areas with sustainable forest management plan was also used, representing around 16% of total fuel usage[7]. Following the project activity, the proponent switched its fuel to renewable biomasses such as cashew nut shell, residues from cashew tree, coconut husk and increased amounts of wood from areas with sustainable forest management plan. The ceramic also acquired new equipments, including automatic feeders, to allow an efficient use of renewable biomass as fuel.

Before being cooked in the kilns, the pieces must be dried. At Ceará Ceramic, the ceramic pieces are dried naturally, so no fuel is used for the drying process. During 2009, Ceará Ceramic produced 11,453 thousands of ceramic pieces. The identified baseline for this ceramic was the utilization of a total of approximately 7,252 tonnes of non-renewable biomass per year on average to provide thermal energy to the ceramics' kilns.

Figure 03. Round and Hoffman kilns at Ceará Ceramic.

Ceagra Ceramic

[6] *Round kilns are intermittent kilns with round shape and lateral furnaces. Intermittent kilns do not allow the continuous operation, as the fuel needs to be added and the kiln cleaned between each burning cycle. Intermittent kilns are not as efficient as continuous kilns (such as tunnel or Hoffmann kilns) because continuous kilns allow the better distribution of heat.*

[7] *The amount of wood from sustainable forest management areas utilized in the baseline scenario was updated in the current monitoring period, as its unit of measure is stereo meter (mst). A conversion factor from stereo meter (mst) to cubic meter (m^3) was applied.*

This ceramic has two Hoffmann kilns. In the baseline scenario, the kilns operated predominantly using native firewood (wood without sustainable forest management) as fuel. A fraction of wood from areas with sustainable forest management plan was also used, representing around 13% of total fuel usage[8]. Based on the project activity, the proponent switched its fuel to renewable biomasses such as cashew nut shells, residues from cashew tree, coconut husk and increased amounts of wood from areas with sustainable forest management plan. The ceramic also acquired new equipments, including automatic feeders, to allow an efficient use of renewable biomass as fuel.

Before being cooked in the kilns, the pieces must be dried. At Ceagra Ceramic, the ceramic pieces are dried naturally, so no fuel is used for the drying process. During 2009, Ceagra Ceramic produced 14,862 thousands of ceramic pieces. The identified baseline for this ceramic was the utilization of a total of approximately 9,424 tonnes of non-renewable woody biomass per year to provide thermal energy to the ceramics' kilns.

Figure 04. Cashew nut shells stored prior to use as fuel in Ceagra Ceramic.

Eliane Ceramic:

This ceramic has one Hoffmann kiln and one chamber kiln. In the baseline scenario, the kilns operated predominantly using native firewood (wood without sustainable forest management) as fuel. A fraction of wood from areas with sustainable forest management plan was also used, though representing around 11% of total fuel usage[9]. Following the project activity, the proponent switched its fuel to renewable biomasses such as cashew nut husk, residues from cashew tree, coconut residues and increased amounts of wood from areas with sustainable forest management plan. The ceramic also acquired new equipments, including automatic feeders, to allow an efficient use of renewable biomass as fuel.

In Eliane Ceramic biomass is processed to be used as fuel by several Ceramics from Grupo Tavares. Different types of biomass (such as cashew nut shells, coconut residues and wood residues) are chopped and mixed into a single product. Machinery to process biomass includes electric shredders and screeners.

Before being cooked in the kilns, the pieces must be dried. At Eliane Ceramic, the ceramic pieces are dried naturally, so no fuel is used for the drying process. During 2009, Eliane Ceramic produced 8,186 thousands of ceramic pieces. The identified baseline for this ceramic was the utilization of a total of

[8] *The amount of wood from sustainable forest management areas utilized in the baseline scenario was updated in the current monitoring period, as its unit of measure is stereo meter (mst). A conversion factor from stereo meter (mst) to cubic meter (m³) was applied.*

[9] *The amount of wood from sustainable forest management areas utilized in the baseline scenario was updated in the current monitoring period, as its unit of measure is stereo meter (mst). A conversion factor from stereo meter (mst) to cubic meter (m³) was applied.*

approximately 5,117 tonnes of non-renewable woody biomass per year to provide thermal energy to the ceramics' kilns.

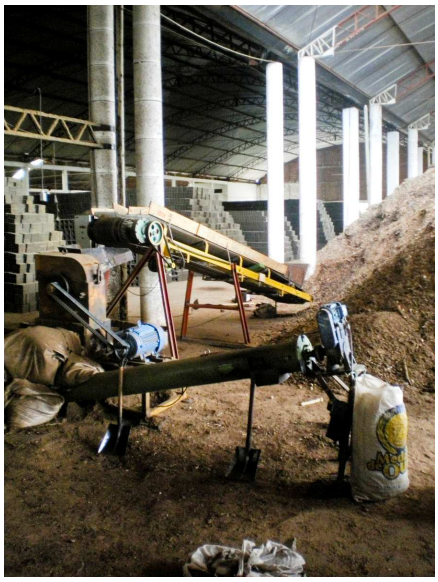

Figure 05. Biomass being processed to be used as fuel in Eliane Ceramic.

Santa Rita Ceramic:

This ceramic has three Hoffmann kilns. In the baseline scenario, the kilns operated predominantly using native firewood as fuel. This ceramic is divided into two nearby sites (distanced 900 meters from each other). In site 1, one Hoffmann kiln is operated (named Kiln 1), while in site two, two Hoffmann kilns exist (named Kiln 2 and Kiln 3). During the validation of the PDD, the kilns in Site 2 were not operating simultaneously due to the lack of employees and infrastructure. In this monitoring period, Santa Rita has sold the rights of use of its third kiln to a neighbor company who is not a project participant. As of January, 01st, 2012, Santa Rita has been operating with 1 kiln..

In the baseline scenario, a fraction of wood from areas with sustainable forest management plan was also used, though representing around 4% of total fuel usage[10]. Based on the project activity, the proponent switched its fuel to renewable biomasses such as cashew nut shells, residues from cashew tree, coconut husk and increased amounts of wood from areas with sustainable forest management plan. The ceramic also acquired new equipments, including automatic feeders, to allow an efficient use of renewable biomass as fuel.

Before being cooked in the kilns, the pieces must be dried. At Santa Rita Ceramic, the ceramic pieces are dried naturally, so no fuel is used for the drying process. During 2009, Santa Rita Ceramic produced 8,423 thousands of ceramic pieces. The identified baseline for this ceramic was the utilization of a total of approximately 5,307 tonnes of non-renewable biomass per year on average to provide thermal energy to the ceramics' kilns.

[10] *The amount of wood from sustainable forest management areas utilized in the baseline scenario was updated in the current monitoring period, as its unit of measure is stereo meter (mst). A conversion factor from stereo meter (mst) to cubic meter (m³) was applied.*

Figure 06. Hoffmann kiln being fed with renewable biomass in Santa Rita Ceramic.

This project activity reduces the greenhouse gases (GHG) emissions through the substitution of non-renewable biomass for renewable biomasses to generate thermal energy. As renewable biomasses, the project activity utilizes mostly biomass residues (such as cashew nut shells, residues from cashew tree, coconut residues) and wood from areas with sustainable forest management plan to feed the ceramic's kilns.

This project does not involve significant construction, as only auxiliary equipments are installed to allow the efficient use of biomass. Hence, the start date of construction is actually interpreted as the date when the ceramics have signed contracts with Sustainable Carbon for the development of an emission reduction project. This has occurred on 02/07/2010. Hence, the project is following the retroactive project cycle according to Gold Standard Toolkit version 2.1.

A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:

The project utilizes the following methodology approved under the Clean Development Mechanism for small scale projects: "**AMS-I.E: Switch from Non-Renewable Biomass for Thermal Applications by the User**", version 04[11], valid from 29/04/2011 to 02/08/2012.

This category comprises activities to displace the use of non-renewable biomass by introducing renewable energy technologies. The technology in case of this project activity was determined as the ceramic facilities, which utilized thermal energy generated by the new renewable energy technology. The project involves the substitution of non-renewable biomass with renewable biomass in existing red ceramic factories, thus complying with the referred methodology.

A.6. Registration date of the project activity:

This voluntary project was registered under the Gold Standard on 05/01/2012. Registration under the CDM is not applicable to voluntary projects.

[11] *Methodology available at: <http://cdm.unfccc.int/methodologies/DB/I1DGDUD1D5J0KMLSZFWMD3W9Z47OZZ>. Last visited on 27/02/2014.*

A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

The starting date of the project activity was considered 02/07/2010. On this date, the ceramics included in the project have signed contracts with Sustainable Carbon to develop an emission reduction project. The starting date of the project is before the "*Time of first submission*" as per Gold Standard definitions[12]. Hence, the project is following the retroactive project cycle according to Gold Standard Toolkit version 2.1.

Start date of the crediting period: 01/09/2010.
End of the crediting period: 31/08/2020
Length of the crediting period: 10 years

A.8. Name of responsible person(s)/entity(ies):

The following entity is responsible for applying the monitoring methodology:

SUSTAINABLE CARBON - PROJETOS AMBIENTAIS LTDA
Project developers: Mariana Broso Fieri, Thiago de Avila Othero and Marcelo Hector Sabbagh Haddad: Technical Coordinators.

SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

This voluntary project was validated by the Designated Operational Entity TÜV Rheinland (China) Ltd and this present monitoring report is being verified by the Designated Operational Entity IBOPE Ambiental.

In October, 2008 Grupo Tavares and Sustainable Carbon begun the validation of their first GHG emission reduction project, entitled *Assunção Ceramic Fuel Switching Project*. The project involved fuel switching to renewable biomass in another Ceramic belonging to Grupo Tavares. The *Assunção Ceramic Fuel Switching Project* was validated under the VCS (Verified Carbon Standard) in September, 2009.

By the beginning of 2010, Grupo Tavares begun tests with renewable biomass in the five ceramic factories included in the current project. The start date of the project activity was 02/07/2010, when Grupo Tavares and Sustainable Carbon signed contracts for the development of a GHG emission reduction project in the five ceramic factories included in the current project. All ceramics have operated exclusively with demonstrably renewable biomass since the beginning of the crediting period, which is defined as 01/09/2010.

During the current monitoring period, the ceramics had no significant changes on its physical structure, therefore there was no need to make any restoring in the kilns. Hence, no impacts on the emissions reductions were observed for this period on Antônio Ceramic, Ceará Ceramic, Ceagra Ceramic, Eliane Ceramic and Santa Rita Ceramic.

[12] *According to Gold Standard Requirements version 2.1, the time of first submission means submission of the Local Stakeholder Consultation Report for projects proceeding under the regular project cycle, and submission of the required Gold Standard project activity documentation for a Pre-Feasibility Assessment and payment of the applicable fee under the retroactive project cycle.*

During validation, the ceramics belonging to Grupo Tavares utilized residues from cashew trees, sawdust, coconut residues, cashew nut shells and wood from sustainable management plan areas as renewable biomass instead of native wood. In the first monitored period, the companies started to use Mamona (*Ricinus communis*) husk and Babaçu (*Orbignya phalerata*) residues as renewable biomasses. At the second monitored period and at this current monitored period the ceramics continued using the previously used types of biomass.

B.2. Revision of the monitoring plan

No revisions on the monitoring plan were made for the current monitoring period. The monitoring data was kept according to the monitoring plan described in the Project Design Document, version 05. Monitoring of the sustainability indicators was based on best available sources of information.

Regarding the Sustainability Monitoring Plan, in this current period analyzed, the ceramic factories did not offer any lectures to employees regarding safety issues, as they did in the previous period. That happened because the ceramics had a really low turnover of employees and there was no need to apply the same training offered in 2012. However, for the next monitoring period, the ceramics are planning to hire a safety engineer to give regular lectures and training to employees regarding health and safety matters. Also, regarding parameter "Use of safety equipments" of the Sustainability Monitoring Plan, the ceramics performed the control on the use of Individual Personal Equipments (IPE) and provided awards to employees as an attempt to encourage its use.

B.3. Request for deviation applied to this monitoring period

As described in the Project Design Document version 05, $Q_{renbiomass}$ parameter is measured by the biomass providers and controlled by the ceramic owners, through purchase invoices, delivery notes or other documents concerning the acquisition of renewable biomasses. However, the amount of wood from sustainable forest management areas and residues from cashew trees were updated in the current monitoring period, as its unit of measure is stereo meter (mst). Hence, a conversion factor from stereo meter (mst) to cubic meter (m^3) was used for both biomass, more information regarding conversion factor can be seen in section D.2 below.

Furthermore, in the registered PDD it was not considered the same conversion factor for the fraction of firewood from management areas used in the baseline scenario. Therefore, the conversion factor was applied in the amount of sustainable firewood used in baseline scenario, which means minor changes in the BF_y(Quantity of woody biomass per thousand of ceramic units fired in year y) and the $f_{NRB,y}$ (Fraction of woody biomass used in the absence of the project activity in year y that can be established as non-renewable biomass) parameters. Both changes in the parameters BF_y and $f_{NRB,y}$ do not affect the amount of emission reductions since the conversion factor will be applied only for renewable firewood. More detailed information can be verified in section D below.

B.4. Notification or request of approval of changes

Not applicable, as no requests were applied on the current monitoring period.

SECTION C. Description of the monitoring system

The project utilizes the following methodology approved under the Clean Development Mechanism for small scale projects: "**AMS-I.E: Switch from Non-Renewable Biomass for Thermal Applications by the User**", version 04[13], valid from 29/04/2011 to 02/08/2012.

The owner of each ceramic was responsible for implementing the monitoring plan. In addition, the ceramic employees were responsible for developing the forms and registration formats for data collection and further classification. The authority for the registration, monitoring, measurement and reporting was *Mr. Francisco Evanildo de Souza* for all five ceramic factories.
Monitored 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.

The management structure was relying on the local technicians with a periodical operation schedule during the monitoring period. The technical team managed the monitoring, the quality control and quality assessment procedures. Monitored parameters are described in Section D and were monitored with the frequency described in Table below.

Table 05. Monitored parameters.

Parameters	Description	Units	Origin	Frequency
PR_y	Amount of products produced in year y	Thousands of ceramic pieces	This parameter was monitored by employees on each ceramic, counting the total production. Measurements were done by an internal control sheet monitored by the project proponent. Values used during the project monitoring were taken either from sales reports or from production control documents.	Measured on a daily or weekly basis. Data was aggregated on a monthly and yearly basis.
$Q_{renbiomass}$	Amount of renewable biomass used during year y of the crediting period	Tonnes	Measured by the biomass providers and controlled by the ceramic owners. Data was calculated from receipts, invoices and other documents regarding the acquisition of biomass	Monthly
$f_{NRB,y}$	Fraction of woody biomass used in the absence of the project activity in year *y* that can be established as non-renewable	Fraction	Survey methods, as described in Section E.1	Annually
Origin of Renewable Biomass	Renewable origin of the biomass	Not applicable	Controlled by the ceramic owners	Annually
Leakage due	This source of	tCO_2e	Monitored by surveys and	Annually

[13] *Methodology available at: <http://cdm.unfccc.int/methodologies/DB/I1DGDUD1D5J0KMLSZFWMD3W9Z47OZZ>. Last visited on 27/02/2014.*

Parameters	Description	Units	Origin	Frequency
to competing uses of biomass	leakage is relevant for biomass residues and biomass from existing forests. The quantity of renewable biomass available will be assessed annually to determine the occurrence of leakage		publications[14]	
Leakage of non-renewable woody biomass	This source of leakage assesses the use/diversion of non-renewable woody biomass saved under the project activity by non-project households/users that previously used renewable energy sources.	tCO_2e	Monitored by surveys and publications	Annually
Checking of all appliances (kiln)	According to the applied methodology, monitoring shall include checking of all appliances or a representative sample thereof, to ensure that they are still operating or are replaced by an equivalent in service appliance.	Not applicable	Sustainable Carbon performed visual inspections and interviews with the employees on each ceramic factory to confirm the kilns were still operating or were replaced by an equivalent in service kiln.	Once every two years

SECTION D. Data and parameters

D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors

Data / Parameter:	$EF_{projected\_fossilfuel}$
Data unit:	tCO_2/TJ
Description:	Emission factor for substitution of non-renewable woody biomass by

[14] *In response to FAR 1 raised by the Gold Standard Secretariat during project registration, Sustainable Carbon has developed a detailed Study on the surplus of all types of biomass used by the project activity. This FAR has been closed in the first monitoring period.*

	similar consumers.
Source of data used:	Approved small scale methodology AMS-I.E "Switch from Non-Renewable Biomass for Thermal Applications by the User", version 04.
Value(s) :	81.6 tCO_2/TJ
Indicate what the data are used for:	In the baseline scenario, non-renewable biomass was used as an energy source. This is the common practice for the red ceramic sector in the project region. As described in Section B.5 of the PDD, Version 05, the use of fossil fuels is the most likely scenario in the absence of non-renewable biomass.
Additional comment:	According to the applied methodology, a value of 81.6 tCO_2/TJ shall be used for this emission factor, representing the mix of fossil fuels to be used for the present and future.

Data / Parameter:	**$NCV_{biomass}$**
Data unit:	TJ/ton
Description:	Net calorific value of the non-renewable woody biomass that is substituted
Source of data used:	Approved small scale methodology AMS-I.E "Switch from Non-Renewable Biomass for Thermal Applications by the User", version 04.
Value(s) :	0.015
Indicate what the data are used for :	This parameter was used to calculate baseline emissions from the use of the fossil fuel that would be used in the baseline scenario. It provides the energy generated by the amount of non-renewable biomass that would be used in the absence of the project.
Additional comment:	In the baseline scenario, non-renewable biomass was used as an energy source. This is the common practice for the red ceramic sector in the project region. Applied value is recommended by the approved methodology.

Data / Parameter:	**$\rho_{biomass}$**
Data unit:	Tonnes/m^3
Description:	Specific gravity of non-renewable biomass type *j*
Source of data used:	-IPCC: Intergovernmental Panel on Climate Change. Orientácion del IPCC sobre las buenas prácticas para UTCUTS - Chapter 3 – Table 3A.1.9-2 - LORENZI, H. *Árvores Brasileiras: Manual de Identificação e Cultivo de Plantas Arbóreas Nativas do Brasil*, vol.1. 4.ed. Nova Odessa, SP: Instituto Plantarum, 2002. - *Estrutura anatômica da madeira e qualidade do carvão de Mimosa tenuiflora (Willd.*). Available at: <http://www.scielo.br/pdf/rarv/v30n2/a18v30n2.pdf>. Visited on: 27/02/2014.

	- *Poder Calorífico da Madeira e de Resíduos Lignocelulósicos*. Available at: < http://www.renabio.org.br/06-B&E-v1-n2-2004-173-182.pdf >. Visited on: 27/02/2014.
Value(s) :	0.88
Indicate what the data are used for :	The amount of wood used in the baseline was measured in volume units. This data was used for the unit conversion. The species used to calculate the average value of this parameter are typical trees of *Caatinga* Biome that are usually utilized as fuel in the ceramic industries of the region.
Additional comment:	

Data / Parameter:	**BF_y**
Data unit:	Tonnes of wood per thousand of ceramic pieces
Description:	Quantity of woody biomass per thousand of ceramic units fired in year y
Source of data used:	Historical data from project proponent
Value(s) :	0.7231 for Antônio Ceramic 0.7510 for Ceará Ceramic 0.7327 for Ceagra Ceramic 0.7023 for Eliane Ceramic 0.6551 for Santa Rita Ceramic
Indicate what the data are used for :	The value was acquired using historical data on woody biomass consumption and production of ceramic pieces when the ceramic used to consume non-renewable wood. Data from year 2009 was used. The value was employed to calculate the real amount of wood displaced to maintain the ceramic production in the baseline scenario.
Additional comment:	The amount of wood from areas with sustainable forest management utilized in the baseline scenario, used to determine BF_y parameter was updated in the current monitoring period, as its unit of measure is stereo meter (mst). A conversion factor from stereo meter (mst) to cubic meter (m^3) was applied. The conversion factor for native wood of Caatinga biome is determinate by Brazilian Environmental Ministry[15]. The corrected calculation can be seen in the VER calculation spreadsheet. Please, see BF_y sheet.

D.2. Data and parameters monitored

Data / Parameter:	**PR_y**
Data unit:	Thousands of ceramic pieces
Description	Amount of products produced in year y

[15] Brasil. Ministério do Meio Ambiente Subsídios para a elaboração do plano de ação para a prevenção e controle do desmatamento na Caatinga / Ministério do Meio Ambiente. - Brasília, 2011. Available at: http://www.mma.gov.br/estruturas/168/_arquivos/diagnostico_do_desmatamento_na_caatinga_168.pdf. Last visited on: 27/02/2014. Value applied: 0.3.

:	
Measured /Calculated /Default:	Values used for the calculations were taken from manual control of devices burned in the kiln. Measurements were done by an internal control sheet monitored by employees.
Source of data:	Controlled by the ceramic owners
Value(s) of monitored parameter:	

PR_y (thousands of ceramic units)						
Period	**Antônio Ceramic**	**Ceagra Ceramic**	**Ceará Ceramic**	**Eliane Ceramic**	**Santa Rita Ceramic**	**Total**
May to December 2013	12.495,53	9.417,05	14.388,34	11.280,06	9.089,68	56.670,66
January to February 2014	2.890,01	2.221,55	3.632,55	2.971,42	2.005,70	13.721,22
Total Monitoring Period	**15.385,54**	**11.638,60**	**18.020,89**	**14.251,48**	**11.095,38**	**70.391,88**

Monitoring equipment :	No monitoring equipment was used to determine this parameter. Production was counted by trained personnel on each ceramic.
Measuring/ Reading/ Recording frequency:	This parameter was monitored by employees on each ceramic, counting the total production on a daily or weekly basis. Data was aggregated on a monthly and yearly basis.
Calculation method (if applicable):	This parameter was determined individually for each ceramic industry. Data regarding production was monitored through the number of devices burned in the kiln, measured manually on a daily or weekly basis and compiled into spreadsheets[16].
QA/QC procedures applied:	The ceramics have internal controls to assure proper monitoring of this parameter. Data will be compared to the amount of renewable biomass employed. Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.

Data / Parameter:	**$Q_{renbiomass}$**
Data unit:	Tonnes
Description:	Amount of renewable biomass used during year y of the crediting period
Measured /Calculated /Default:	Measured by the biomass providers and controlled by the ceramic owners
Source of data:	It was monitored through purchase invoice, delivery notes or other documents concerning the acquisition of renewable biomasses.
Value(s) of monitored parameter:	

$Q_{renbiomass}$ - Amount of renewable biomass			
Period	**May to December 2013**	**January to February 2014**	**Total (tonnes)**

[16] *Spreadsheets with production control were made available to the verification team.*

	<table><tr><th>Renewable Biomass</th><th>$Q_{renbiomass}$ (tonnes)</th><th>$Q_{renbiomass}$ (tonnes)</th><th></th></tr><tr><td>Babaçu</td><td>1.219,40</td><td>246,53</td><td>1.465,92</td></tr><tr><td>Cashew nut shells</td><td>3.247,82</td><td>749,62</td><td>3.997,44</td></tr><tr><td>Coconut residues</td><td>3.155,64</td><td>0,00</td><td>3.155,64</td></tr><tr><td>Mamona husk</td><td>874,76</td><td>100,00</td><td>974,76</td></tr><tr><td>Wood from sustainable management plan areas</td><td>4.822,92</td><td>628,79</td><td>5.451,71</td></tr><tr><td>Residues from cashew trees</td><td>5.642,27</td><td>493,95</td><td>6.136,22</td></tr><tr><td>Sawdust</td><td>13.025,03</td><td>2.412,68</td><td>15.437,71</td></tr><tr><td>Total</td><td>31.987,83</td><td>4.631,57</td><td>36.619,40</td></tr></table> These values represent the sum for all ceramics included in the project. The amount of renewable biomass used by each ceramic is available in the Voluntary Emission Reduction calculation spreadsheet for this monitoring period.
Monitoring equipment:	No monitoring equipment was used to determine this parameter.
Measuring/ Reading/ Recording frequency:	This parameter was monitored by documents concerning the acquisition of renewable biomasses, counting the biomass purchase on a daily or weekly basis. Data was aggregated on a monthly and yearly basis. Measurement was done by a spreadsheet monitored by the project proponent. The amount of renewable biomass described represents both the biomass fired and biomass stocked in the ceramics. These figures are different than the actual biomass fired on each ceramic. However, in the long term, biomass fired and biomasses purchased are likely to be similar.
Calculation method (if applicable):	Biomass providers measure the amount of products delivered to the ceramics to determine due financial compensation. In case any renewable biomass was measured in volume, default values of specific gravity were used to convert it to tonnes. Values below were applied for the given biomass types: <table><tr><th>Biomass type</th><th>Specific gravity (tonnes/m³)</th></tr><tr><td>Coconut residues</td><td>0.50</td></tr><tr><td>Residues from cashew trees</td><td>0.42</td></tr><tr><td>Sawdust</td><td>0.25</td></tr><tr><td>Wood from sustainable management plan areas</td><td>0.88</td></tr><tr><td>Cashew nut shells</td><td>0.34</td></tr></table> These values were taken from the sources below: - Coconut residue and residues from cashew trees: LORENZI, H. *Árvores Brasileiras: Manual de Identificação e Cultivo de Plantas Arbóreas Nativas do Brasil*, vol.1. 4. ed. Nova Odessa, SP: Instituto Plantarum, 2002. - Sawdust: PINHEIRO, G.F., RENDEIRO, G., PINHO, J.T. *Densidade Energética de resíduos vegetais*. Available at: < http://www.renabio.org.br/03-B&E-014-GiorgianaFP-DensEn-2005-p113-

123.pdf > Last visited on 27/02/2014.

- Wood from sustainable management plan areas: considered to be the same as for native firewood. Please check parameter $\rho_{biomass}$ on section D.1 for more information.
- Cashew nut shells: OGUNDIRAN, M.B., BABAYEMI, J.O.,NZERIBE, C.G. Determination of metal content and an assessment of the potential use of waste cashew nut ash (CNSA) as a source for potash production. Available at:

<http://www.ncsu.edu/bioresources/BioRes_06/BioRes_06_1_0529_Ogundrian_BC_Determ_Metal_Cashew_Nut_Ash_Potash_1329.pdf> Last visited on 27/02/2014.

In this Monitoring Report, the values presented in the table $Q_{renbiomass}$ for cashew wood and native wood from management areas were corrected, according to the conversion factors presented in table below.

Conversion factor from "st" to "m³"	
Native Wood from forest management areas	0.3000
Residues from cashew trees	0.3745

Native Wood from forest management areas:

Brasil. Ministério do Meio Ambiente Subsídios para a elaboração do plano de ação para a prevenção e controle do desmatamento na Caatinga / Ministério do Meio Ambiente. - Brasília, 2011. Available at: <http://www.mma.gov.br/estruturas/168/_arquivos/diagnostico_do_desmatamento_na_caatinga_168.pdf> Last visited on: 27/02/2014.

Residues from cashew trees:

Acoording to FERRAZ, Douglas Galvão. Inventário Florestal de Três Fragmentos com Candeia (Eremanthus erythropappus) no Município de Itajubá - MG. 2008. 26 f. Monografia (Conclusão de Curso) - Curso de Gestão Ambiental, Escola Agrotécnica Federal, Inconfidentes-mg, 2008. Available at: <http://docs.google.com/viewer?a=v&q=cache:mNfJBYKgNNMJ:www.ifs.ifsuldeminas.edu.br/pesquisas/TCC/TCC_Douglas.pdf+conver%C3%A7ao+mst+m3&hl=pt-BR&gl=br&pid=bl&srcid=ADGEESiMlDtbGvrwKnl888t-ddbzBkGnc2hYaTXhq3GtXUOg1wbAbYlk1f2UWhdlIHsWCyfjYtfFgNboU_qeG8hcJf5fAzliJjIjP3Z451eItDC6xOwmnW_X7D6HN69DDfUPbjq60wes&sig=AHIEtbTwzpj3zy7n6nlZFDM3-djyemLmDg>. Last visit on: 27/02/2014.

QA/QC procedures applied:	The amount of renewable biomass purchased was controlled with digital spreadsheets filled by third party consultants. Sustainable Carbon has double checked these spreadsheets against biomass invoices to detect inconsistencies. The ceramics are responsible for storing all documents related to the purchase or acquisition of renewable biomass. Data was compared to production output. 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:	Fraction or percentage
Description:	Fraction of woody biomass used in the absence of the project activity in year *y* that can be established as non-renewable using survey methods
Source of data:	Survey methods.
Value(s) of monitored parameter:	0.8583 for Antônio Ceramic 0.7665 for Ceará Ceramic 0.7869 for Ceagra Ceramic 0.8093 for Eliane Ceramic 0.8745 for Santa Rita Ceramic
Brief description of measurement methods and procedures 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 availability of woody biomass in the Caatinga biome, as described on section B.6.3. of the *Project Design Document Form*, version 05.
QA/QC procedures applied:	Data from published sources were used to determine this parameter.
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 monitored value for this parameter is equal to the figures described in version 05 of the PDD.

Data / Parameter:	***Origin of Renewable Biomass***
Data unit:	Not applicable
Description:	Renewable origin of the biomass
Measured /Calculated /Default:	The guarantee of acquiring renewable wood was achieved by invoices from the providers. Biomasses were considered renewable as fulfilling the options described in the methodology applied.
Source of data:	Controlled by the ceramic owners
Value(s) of monitored parameter:	Not applied for the calculation. All biomass used during the crediting period are demonstrably renewable, since they comply with CDM definitions of renewable biomass.
Monitoring equipment:	No monitoring equipment was used to determine this parameter.
Measuring/ Reading/ Recording frequency:	Each monitoring period
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	Ceramic owners will store invoices, receipt of sales or other documents to allow the traceability of the renewable biomass.

Data / Parameter:	***Leakage due to competing uses of biomass***
Data unit:	tCO_2e
Description:	This source of leakage was relevant for biomass residues and biomass from

<table>
<tr><td></td><td>existing forests, according to the general guidance on leakage in biomass project activities. The quantity of renewable biomass available was assessed annually to determine the occurrence of leakage.</td></tr>
<tr><td>Measured /Calculated /Default:</td><td>Calculated</td></tr>
<tr><td>Source of data:</td><td>Surplus of wood from sustainable forest management areas was obtained through a methodology developed by an expert hired by Sustainable Carbon, which assesses the availability and surplus of Caatinga firewood from forest management plans.
Surplus of the other types of renewable biomass used by the project activity was assessed by Sustainable Carbon from July to October 2012. Information on the biomass availability and consumption was assessed by Sustainable Carbon following a methodological plan that was based on the application of questionnaires to relevant biomass experts, producers and suppliers. An independent third party expert opinion on the results and findings of such study was obtained, to ensure the results are appropriate and conservative.</td></tr>
<tr><td>Value(s) of monitored parameter:</td><td>Leakage emissions are calculated as 0 (zero) tCO_2e in this monitoring period.
The following surplus of each biomass is considered, as based on a study developed by Sustainable Carbon.
<table>
<tr><th>Biomass type</th><th>Surplus (%)</th><th>Year of assessment</th></tr>
<tr><td>Cashew nut shell</td><td>45%</td><td>2011/2012</td></tr>
<tr><td>Residues from cashew tree</td><td>25%</td><td>2011/2012</td></tr>
<tr><td>Coconut residues</td><td>1,444% for dry coconut
3,491% for green coconut</td><td>2011/2012</td></tr>
<tr><td>Babaçu residues</td><td>83%</td><td>2011/2012</td></tr>
<tr><td>Mamona Husk</td><td>458%</td><td>2011/2012</td></tr>
<tr><td>Sawdust</td><td>65%</td><td>2011/2012</td></tr>
<tr><td>Wood from sustainable management areas</td><td>444%</td><td>2012/2013</td></tr>
</table></td></tr>
<tr><td>Monitoring equipment:</td><td>No monitoring equipment was used to determine this parameter.</td></tr>
<tr><td>Measuring/ Reading/ Recording frequency:</td><td>Annually</td></tr>
<tr><td>Calculation method (if applicable):</td><td>The values described on table above were calculated by the equation:
Biomass surplus (%) = (Biomass Availability/Biomass consumption) – 1.
Leakage emissions due to the competing use of biomass are considered not to occur for all biomass types currently used by the project activity. The reasons for this approach are described on Section E.3.</td></tr>
<tr><td>QA/QC procedures applied:</td><td>In the first monitored period (from September, 01st 2010 to December, 31st 2011), Sustainable Carbon developed a detailed Study on surplus of biomass used by the project activity. Also, in the second monitoring period, the surplus of Caatinga firewood from forest management plans was analyzed through a methodology developed by a biomass expert.</td></tr>
</table>

Data / Parameter:	***Leakage of non-renewable woody biomass***

Data unit:	tCO_2e
Description:	Leakage relating to non-renewable woody biomass
Measured /Calculated /Default:	The source of leakage from non-renewable biomass was monitored according to the applied methodology.
Source of data:	Monitored
Value(s) of monitored parameter:	0 (zero). It was assumed that no emissions occur due to this source, as explained in Section B.6.1. of the *Project Design Document*, version 05.
Monitoring equipment:	No monitoring equipment was used to determine this parameter.
Measuring/ Reading/ Recording frequency:	Annually
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	Data available regarding the ceramic industry fuel consumption was employed to monitor the leakage.

Data / Parameter:	***Checking of all appliances (kiln)***
Data unit:	Not applicable
Description:	Checking of all appliances (kiln)
Measured /Calculated /Default:	This parameter is determined by interviews and visual inspections.
Source of data:	Ceramic owners and employees
Value(s) of monitored parameter:	Not applicable. All kilns on each ceramic factory were in operation during all months of the monitoring period.
Monitoring equipment:	No monitoring equipment was used to determine this parameter.
Measuring/ Reading/ Recording frequency:	Once every two years
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	Visual inspections and interviews with employees on each ceramic are made to ensure that kilns are still operating or are replaced by an equivalent in service appliance.

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

Baseline emissions were estimated following procedures of the applied methodology: "**AMS-I.E:Switch from Non-Renewable Biomass for Thermal Applications by the User**", version 04[17], valid from 29/04/2011 to 02/08/2012. The project activity in this monitoring period (10 months) generated 550 TJ, or 660 TJ per year. Converting this number to MWh, it was generated 183,331 MWh per year, which corresponds to the use of 21 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 Emission

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

Where:

ER_y:	Emission reductions during the year y in tCO_2e
B_y:	Quantity of woody biomass that was substituted or displaced in tonnes
$f_{NRB,y}$:	Fraction of woody biomass used in the absence of the project activity in year *y* that was established as non-renewable biomass using survey methods
$NCV_{biomass}$:	Net calorific value of non-renewable woody biomass that was substituted, in TJ/ton
$EF_{projected\ fossil\ fuel}$:	Emission factor for substitution of non-renewable woody biomass by similar consumers, in tCO_2e/TJ[18].

B_y was calculated according to option (a) of the selected methodology, as follows:

(a) **B_y** was calculated as the product of the number of appliances multiplied by the estimate of average annual consumption of woody biomass per appliance (tonnes/year);

The consumption of woody biomass in the kilns was calculated as the amount of products (ceramic pieces) produced and the consumption of woody biomass per thousand of ceramic pieces fired in year y, as follows:

$$B_y = PR_y \times BF_y \quad \text{(Equation 02)}$$

Where:

PR_y:	Amount of products produced in year y, in thousand of ceramic pieces
BF_y:	Quantity of woody biomass per thousand of ceramic units fired in year y.

The value of BF_y was determined with the use of the historical records from the ceramics included in the project, by dividing monthly average consumption in the baseline by monthly average baseline production. According to procedures on the applied methodology, the project participants determined

[17] *Methodology available at: <http://cdm.unfccc.int/methodologies/DB/I1DGDUD1D5J0KMLSZFWMD3W9Z47OZZ>. Last visited on 27/02/2014.*

[18] *According to the applied methodology, a value of 81.6 tCO2/TJ shall be used for this emission factor, representing the mix of fossil fuels to be used for the present and future.*

the shares of renewable and non-renewable woody biomass in B_y using nationally approved methods. Also, the following principles were taken into account:

Demonstrably Renewable woody biomass[19] (DRB)

Woody biomass is "renewable" if one of the following two conditions is satisfied:

1. The woody biomass is originating from land areas that are forests[20] where:
   (a) The land area remains a forest;
   (b) Sustainable management practices are undertaken on these land areas to ensure, in particular, that the level of carbon stocks on these land areas does not systematically decrease over time (carbon stocks may temporarily decrease due to harvesting); and
   (c) Any national or regional forestry and nature conservation regulations are complied with.
2. The biomass is woody biomass and originates from non-forest areas (e.g. croplands, grasslands) where:

   (a) The land area remains cropland and/or grasslands or is reverted to forest;
   (b) Sustainable management practices are undertaken on these land areas to ensure in particular that the level of carbon stocks on these land areas does not systematically decrease over time (carbon stocks may temporarily decrease due to harvesting); and
   (c) Any national or regional forestry, agriculture and nature conservation regulations are complied with.

Non-renewable biomass

Non-renewable woody biomass (*NRB*) is the quantity of woody biomass used in the absence of the project activity (B_y) minus the *DRB* component, as long as at least two of the following supporting indicators are shown to exist:

- A trend showing an increase in time spent or distance travelled for gathering fuel-wood by users (or fuel-wood suppliers) or alternatively, a trend showing an increase in the distance the fuel wood is transported to the project area;
- Survey results, national or local statistics, studies, maps or other sources of information such as remote sensing data that show that carbon stocks are depleting in the project area;
- Increasing trends in fuel wood prices indicating a scarcity of fuel-wood;
- Trends in the types of cooking fuel collected by users, suggesting scarcity of woody biomass.

Thus the fraction of woody biomass saved by the project activity in year *y* that was established as non-renewable:

$$f_{NRB,y} = \frac{NRB}{NRB + DRB} \qquad \text{(Equation 3)}$$

Before the project activity, wood from areas without forest management was offered with low prices and high viability to the ceramic owner. Thus, the majority of the fuel employed in the baseline scenario was from non-renewable origin. A fraction of baseline fuel was from sustainable origin,

[19] *This definition uses elements of Annex 18, EB 23. Document available at: <http://cdm.unfccc.int/EB/Meetings/023/eb23_repan18.pdf>. Last visit on 23/04/2013.*

[20] *The forest definitions as established by the country in accordance with the Decisions 11/CP.7 and 19/CP.9 should apply.*

namely woody biomass for which a DOF (*Documento de Origem Florestal*, Forest Origin Document) was available. According to the IBAMA Normative Instruction Nº 112 from 21/08/2006[21], the entrepreneur who uses raw material from native forests is obliged to use the DOF to control the origin, transportation, and storage of forest products and by-products. This document ensures that the related forest products were obtained from legalized areas where conservation measures are applied. Therefore, firewood with DOF was considered renewable, since it complies with item 1 of the definition of renewable biomass.

The $f_{NRB,y}$ parameter was determined in two steps: the first step was based on project specific information regarding the amount of native firewood from areas without forest management and the amount of firewood with DOF. This provides a fraction of non-renewable biomass used in the baseline scenario based on the origin of the firewood. The second step was an assessment on the fraction of woody biomass used that could be established as non-renewable biomass using survey methods applied to the Caatinga biome, where the project is located. Such assessment was based on Annex 20 of the 35th meeting of the Small Scale Working Group of the Clean Development Mechanism, which provides a methodology for the calculation of $f_{NRB,y}$[22]. A description of such methodology follows:

On a project-specific basis, project participants determine the shares of renewable (DRB) and non-renewable woody biomass (NRB) in the total biomass consumption. This has been performed in the first step, as described above.

A default value for $f_{NRB,y}$ in the Caatinga biome was derived by calculating Total Annual Biomass Removals (R) in this biome as a proxy for By and estimating the proportion of R that was demonstrably renewable (DRB) and non-renewable (NRB). The following equation was used:

$$NRB = R - DRB \qquad \text{(Equation 4)}$$

Where:

R Total annual biomass removals (tonnes/year)

Total Annual Biomass Removals (R) for each country is inferred by calculating the sum of the Mean Annual Increment in biomass growth (MAI) and the Annual Change in Living Forest Biomass stocks (ΔF). Given biomass growth (MAI) and change in stock (ΔF) are both known, the balancing removals (R) was calculated as the sum of the two, as below:

$$R = MAI + \Delta F \qquad \text{(Equation 5)}$$

Where:

MAI Mean Annual Increment of biomass growth (tonnes/year)

ΔF Annual change in living Forest biomass (tonnes/year)

Mean Annual Increment of biomass growth (MAI) was calculated in equation below as the product of the Extent of Forest (F) in hectares and the country-specific Growth Rate (GR) of the Mean Annual Increment:

$$MAI = F \times GR \qquad \text{(Equation 6)}$$

Where:

F Extent of forest (ha)

GR Annual growth rate of biomass (t/ha-yr)

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[21] *BRASIL. INSTRUÇÃO NORMATIVA IBAMA Nº 112, DE 21 DE AGOSTO DE 2006. Available at: <http://www.cetesb.sp.gov.br/licenciamentoo/legislacao/federal/inst_normativa/2006_Instr_Norm_IBAMA_112.pdf>. Visited on 29/04/2013.*

[22] *Document is available at: <http://cdm.unfccc.int/Panels/ssc_wg/meetings/035/ssc_035_an20.pdf>. Last visited on 07/03/2012.*

Demonstrably renewable biomass (DRB) was calculated in equation below as the product of Protected Area Extent of Forest (PA) in hectares and the country-specific Growth Rate (GR) of the Mean Annual Increment:

$$DRB = PA \times GR \qquad \text{(Equation 7)}$$

Where:

PA Protected Area Extent of Forest (ha)

This approach was considered appropriate since it took in consideration historical practices of the ceramics involved in the project in regard to fuel usage, meaning only native firewood from areas without forest management were considered as non-renewable. Also, choosing the biome where the project is located as the geographical boundary for the second step is a more accurate approach than performing a national assessment, given the dimensions and peculiarities of each biome in Brazil and considering that sub-regional information is neither available nor feasible to obtain. Also, there is evidence to support that carbon stocks are depleting in the project area[23] and that there is a trend showing an increase in time spent or distance travelled for gathering fuel-wood by users[24].

E.2. Project emissions calculation

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

E.3. Leakage calculation

Leakage is estimated at 0 (zero) tCO_2e during the current 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.

Leakage from the use of renewable biomass was considered using the general guidance on leakage in biomass project activities (attachment C of Appendix B)[25]. Also, the specific rules on biomass resources as set out in the applicable version of the Gold Standard, especially ToolKit Annex C were complied with.

For this project activity, the following sources of leakage were included: A. *Shifts of pre-project activities*; B. *Emissions related to the production of Biomass,* and C. *Competing uses for the biomass*.

The Attachment C to Appendix B of the Indicative simplified baseline and monitoring methodologies provides different emission sources based on type of biomass being considered. For biomass from forests and biomass from croplands or grasslands, the project boundary included the area where the biomass was extracted or produced. Table below summarizes the sources of leakage.

---

[23] *The Second Brazilian Inventory of Anthropogenic Emissions and Removals of Greenhouse Gases provides data on net carbon emissions from Land Use Change for each Brazilian biome on Table 3.111, page 249. Net carbon emissions for the Caatinga biome indicate carbon pools have constantly decreased between 1990 and 2005. Document available at: <http://www.mct.gov.br/upd_blob/0214/214077.pdf>. Last visit on 27/02/2014.*

[24] *DA SILVA, E.R.* ***A exploração da lenha da caatinga como fonte de energia para as lavanderias de jeans em Toritama – Pernambuco.*** *Information on Page 2 shows increasing distances to obtain firewood in the Caatinga biome. Document available at:* < http://www.eventosufrpe.com.br/jepex2009/cd/resumos/R1451-2.pdf >. *Last visited on 27/02/2014.*

[25] *Document available at: <http://cdm.unfccc.int/methodologies/SSCmethodologies/AppB_SSC_AttachmentC.pdf>. Last visit on 27/02/2014.*

Table 06. 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 the table above, the sources of leakage relevant to the present project activity are the competing use of biomass for biomass from existing forests and for biomass residues or waste.

In response to FAR 1 raised by the Gold Standard Secretariat during project registration, Sustainable Carbon has developed a detailed Study on the surplus of all types of biomass used by the project activity. Such study was developed from July to October, 2012, and included various phases.

In total, 81 questionnaires were applied and information was collected from 16 experts, 51 producers and 14 suppliers of biomass. Experts interviewed belong to respectful research or commercial institutions whose work is related to biomass research or production.

The study by Sustainable Carbon was a pioneering effort to thoroughly document the surplus of the biomass types used by the project. There are gaps still to be filled regarding the renewable biomass supply chain in the State of Ceará, due to the lack of available information. Nonetheless, this study has provided a robust analysis of existing sources of information, and included two rounds of field trips for interview and local data collection with biomass experts and producers.

Also, an expert with significant background experience as an auditor for carbon projects (both voluntary and compliance projects) was hired to provide an independent opinion on the results and findings of Sustainable Carbon study. A detailed report on such study was prepared and made available for the verification DOE.

The results of the Study developed by Sustainable Carbon can be found in the monitored parameter *Leakage due to competing use of biomass*, where it shows each biomass type utilized by the ceramic factories and the correspondent surplus expressed in percentage. The data showed a large surplus of native wood from management plans in 2012. Hence, Sustainable Carbon considers that data indicates there is abundant firewood in the project region to avoid possibility of competing uses of biomass due to the project implementation.

The complete methodology and source of the official data provided by Environmental Authority of Ceará State will be made available to the verification team and the GS Secretariat.

E.4. Emission reductions calculation / table

Table below summarizes the emission reductions for each ceramic during this monitoring period.

Table 07. Emission reductions by each ceramic for the monitoring period.

	Emission reductions by each ceramic (tCO_2e)						
	Period	**Antônio Ceramic**	**Ceagra Ceramic**	**Ceará Ceramic**	**Eliane Ceramic**	**Santa Rita Ceramic**	**Total**
2013	**May**	731	947	969	364	707	3.718
	June	971	807	1.138	912	598	4.426
	July	1.334	848	1.286	1.106	810	5.384
	August	1.318	818	1.324	1.076	910	5.446
	September	1.152	803	1.318	1.043	790	5.106
	October	1.371	857	1.396	1.152	858	5.634
	November	1.304	770	1.358	1.105	913	5.450
	December	1.307	790	1.345	1.086	782	5.310
	Total 2013	**9.488**	**6.640**	**10.134**	**7.844**	**6.368**	**40.474**
2014	**January**	983	812	1.352	1.111	749	5.007
	February	1.212	755	1.206	955	656	4.784
	Total 2014	**2.195**	**1.567**	**2.558**	**2.066**	**1.405**	**9.791**
Total Monitoring Period		**11.683**	**8.207**	**12.692**	**9.910**	**7.773**	**50.265**

Table 08. Emission reductions for the project activity (tCO_2e)

Emission reductions for the project acitivity (tCO2e)			
Ceará Renewable Energy Bundled Project	**May to December 2013**	**January to February 2014**	**Total monitoring period**
Baseline emissions (tCO2e)	40.474	9.791	50.265
Project emissions (tCO2e)	0	0	0
Emission reductions for the project acitivity (tCO2e)	**40.474**	**9.791**	**50.265**

E.5. Comparison of actual emission reductions with estimates in the CDM-PDD

This section includes a comparison of actual values of the emission reductions achieved during the monitoring period with the estimations in the registered PDD.

Table 09. Comparison of values described on the PDD and the monitoring period.

Ceará Renewable Energy Bundled Project			
	PDD	**Current Monitoring Period**	**Monitoring Period - Annual average**
Energy Generated(TJ)	687	550	660
Energy generated (MWh)	190.732	152.776	183.331
Equivalente energy capacity (MW)	21,77	17,44	21
PR_y (thousands of ceramic units)	50.847	70.392	84.470
Emission reductions - ERy (tCO2e)	36.173	50.265	60.318

Table 10. Comparison of values for each ceramic company

Double check of production and thermal energy use											Variation - 2nd MR to Current Monitoring Period	Variation - Baseline to Current Monitoring Period
			1st MR		2nd MR			3rd MR - Current Monitoring Period				
Ceramic	Parameter (monthly average)	Baseline scenario - 2009	2010	2011	2012	2013 (jan to apr)	Weighted Average - Years 2012 and 2013	2013	2014	Weighted Average - Years 2013 and 2014		
Antônio	PRy (1,000 pieces)	660,17	478,25	549,33	1.740,02	1.419,53	1.659,90	1.561,94	1.445,00	1.538,55	-7%	133%
	Thermal Energy (TJ)	7,16	3,48	8,79	10,32	7,34	9,57	11,21	5,30	10,03	5%	40%
	TJ per 1,000 pieces	0,0108	0,0073	0,0160	0,0059	0,0052	0,0057	0,0072	0,0037	0,0065	13%	-40%
Ceagra	PRy (1,000 pieces)	1.238,57	2.372,17	2.085,92	1.484,03	1.476,15	1.482,06	1.177,13	1.110,78	1.163,86	-21%	-6%
	Thermal Energy (TJ)	13,61	6,35	21,51	11,75	11,29	11,64	15,05	10,06	14,06	21%	3%
	TJ per 1,000 pieces	0,0110	0,0027	0,0103	0,0079	0,0076	0,0079	0,0128	0,0091	0,0120	53%	10%
Ceará	PRy (1,000 pieces)	954,42	952,00	864,67	1.655,04	1.481,75	1.611,72	1.798,54	1.816,28	1.802,09	12%	89%
	Thermal Energy (TJ)	10,75	7,54	14,75	11,46	5,72	10,03	10,80	5,36	9,71	-3%	-10%
	TJ per 1,000 pieces	0,01	0,01	0,02	0,01	0,00	0,01	0,01	0,00	0,01	-12%	-52%
Eliane	PRy (1,000 pieces)	682,17	721,50	664,50	1.428,70	1.150,03	1.359,03	1.410,01	1.485,71	1.425,15	5%	109%
	Thermal Energy (TJ)	3,59	5,42	9,34	9,96	8,37	9,56	12,14	9,17	11,54	21%	221%
	TJ per million pieces	0,0053	0,0075	0,0141	0,0070	0,0073	0,0070	0,0086	0,0062	0,0081	15%	54%
Santa Rita	PRy (1,000 pieces)	701,92	1.011,25	1.642,25	1.004,52	463,58	869,29	1.136,21	1.002,85	1.109,54	28%	58%
	Thermal Energy (TJ)	3,45	3,29	12,18	10,62	6,28	9,53	10,61	5,84	9,66	1%	180%
	TJ per 1,000 pieces	0,0049	0,0033	0,0074	0,0106	0,0136	0,0113	0,0093	0,0058	0,0086	-24%	76%
Ceará Renewable Energy Bundled Project	TJ per 1,000 pieces	0,0091	0,0047	0,0115	0,0074	0,0065	0,0072	0,0084	0,0052	0,0078	8,38%	85,84%

E.6. Remarks on difference from estimated value in the PDD

As detailed on the table above, most of the values of production (parameter PR_y) presented in this monitoring period increased compared to the estimated in the PDD. Civil construction in Brazil has observed constant growth in recent years. As a result, the production of the ceramic factories had to increase to attend this market demand. This scenario is also observed in the State of Ceará,[26] where the project is located.

According to the Brazilian Chamber of the Construction Industry (CBIC), the civil construction sector has grown 42.41% from 2004 to 2010, which means an annual average increase of 5.18%. During the year of 2011, the Brazilian Gross National Product of the construction sector showed a growth of 3.6% compared to the same period in 2010, as described by the IBGE (Geographic and Statistic Brazilian Institute). Although the industry has regressed in 2012, there was a growth of 1.4% compared to the year of 2011.[27] Also, from the year 2012 to year 2013, there was a growth of 1.7%. The main drivers for this significant increase are the increase of housing credit, the increase of family income; macroeconomic stability and Government Housing Programmes 2009 – 2023.[28]

During the current monitoring period, variations were observed on the thermal energy per production output (TEPO), which is measured in TJ per 1,000 of ceramic pieces produced. When compared with the previous monitoring period, Antonio ceramic had a 13% increase of its TEPO. Although the TEPO for this ceramic is 40% lower than the baseline period, it is consistent with the past monitoring period, when fuel and operating conditions were similar to current conditions. Also, please notice the arguments mentioned for Eliane Ceramic.
Ceagra ceramic had an increase of 54% of its TEPO when compared to the previous monitoring period and presents an increase of 10% compared to the baseline period.
Santa Rita ceramic had a negative variation of 21% of its TEPO when compared to the previous monitoring period. However, the ceramic presents has increased the TEPO in 77% when compared to the baseline period.
Eliane ceramic factory presented a 15% increase of is TEPO when compared to the previous monitoring period and a remarkable increase of 54% when compared to the baseline period.
Ceará ceramic had a decrease of 13% of its TEPO when compared to the previous monitoring period and when compared to the baseline it had a negative variation of 52%. Please notice biomass is processed in Eliane ceramic (that presented an increase of 54% of its TEPO) to produce a fuel mix with improved burning properties. Part of this biomass is later distributed to the other ceramic factories included in the project. However, the amount transferred to other ceramics is not monitored, as the monitoring is made based on the invoices of biomass purchased. All biomass mixed by Eliane, hence, is attributed only to this ceramic in the monitoring report.
Finally, please notice the comparison between the current monitoring period and the baseline shows the combined TEPO for all ceramic factories included in the project represents 85% of the baseline period. The difference of 15% can be attributed to energy efficiency, given the improvements in fuel usage resulting from the project.

[26] *Information taken from:* < http://g1.globo.com/ceara/noticia/2012/01/pib-da-construcao-civil-no-ce-cresce-acima-da-media-do-pais-diz-sindicato.html>. Last visited on 28/02/2014.

[27] *Brazilian Chamber of the Construction Industry (CBIC).* Available at <http://www.cbicdados.com.br/menu/pib-e-investimento/pib-brasil-e-construcao-civil>. Last visited on 28/02/2014.

28 Brazilian Ministry of Cities. Nacional Housing Plan. Available *at: <http://www.cidades.gov.br/index.php?option=com_content&view=category&layout=blog&id=132&Itemid=159>. Last visited on 28/02/2014.*

The project measures do not affect the productive process in the ceramics and could not have caused such increase in production. Production levels are mainly influenced by the market demand, as there is no logic in producing more than the ceramic is expected to sell. Besides, as can be verified by the Financial Barrier (on Section B.1), the use of renewable biomass involves additional costs to the ceramics. Although the income from the commercialization of the carbon credits is essential to encourage and maintain the fuel switching process, they do not act as an incentive to increase production beyond market demand levels.

Annex 1 – Sustainability Monitoring Plan

This Annex describes the monitoring of the sustainability indicators, as defined by the Sustainability Monitoring Plan described in the Gold Standard Passport, version 05. Monitoring of the sustainability indicators was based on best available sources of information.

No		01
Indicator		**Air quality**
Chosen parameter		**Emissions to the atmosphere**
Implications on monitoring requirements and justification		The project is expected to generate positive impacts on air quality, by improving operational procedures related to fuel usage and by increasing monitoring procedures on atmospheric emissions. In the baseline scenario, the ceramic factories used native firewood as fuel and little control existed on the kilns feeding, leaving the possibility of high atmospheric pollution due to irregular burning (i.e. excessive feeding of the kilns and burning of wet firewood). Air quality is expected to improve due to the more efficient burning of fuels, as automatic feeders tend to maximize the use of fuels and avoid excess of smoke due to irregular burning.
Way of monitoring	How	Evaluations by applying Ringelmann smoke charts as recommended by SEMACE (Environmental Superintendence of the State of Ceará), the environmental authority. Results were stored to assess the intensity of atmospheric emissions.
	When	On an bi-weekly basis
	By who	Ceramics employees.
QA/QC procedures to be applied		Ringelmann smoke charts shall be used in accordance with SEMACE guidelines. Besides the control based on such charts, the project also applied the following indicator from SOCIALCARBON Standard® [29] : SOCIALCARBON indicators for Ceramic Industry [30]: **Emissions to the atmosphere** - Evaluates the control over the atmospheric emissions involving the gases emitted during the productive process, except the greenhouse gases. According to the SOCIALCARBON indicators for Ceramic Industry, emissions to the atmosphere was analyzed on a periodical basis and is scored from 1 to 6, where 1 represents a critical situation and 6 represents a sustainable scenario. More detail can be verified on Section *F.2. Sustainable Development matrix* on the Gold Standard Passport, version 05.
Monitoring Value and Frequency		During this monitoring period, all of the five ceramic factories applied the monitoring of smoke emissions using the Ringelmann smoke chart every two or three days. The results

[29] The SOCIALCARBON Standard is a certification adept at bringing demonstrable social, environmental and economic benefits to the stakeholders of carbon offset projects. More information at: <http://www.socialcarbon.org/ >. Last visit on 27/02/2014.

[30] Available at: <http://www.socialcarbon.org/uploadDocs/Documents/Indicators_for_Industries_of_the_Ceramic_Sector_v8_English.pdf >. Last visit on 24/02/2014.

	were compiled in files. The indicator *"Emissions to the atmosphere"* from SOCIALCARBON Standard® allows classifying the project activity into scenario 4, defined as: *"Scenario 4:* *There is monitoring but the entrepreneur can't guarantee that it is in conformity with the legislations, norms and applied requisites. There are actions to control and reduce the emissions with evident results and/or measurable.""*

No		02
Indicator		**Soil condition**
Chosen parameter		**Procedures related to the control and disposal of ashes.**
Implications on monitoring requirements and justification		During the kilns operation, ashes result from the burning of biomass. In the baseline scenario, the ceramics try to minimize the environmental impact of the ashes by recycling it or selling it to third parties and raw material. With the project activity, new kinds of fuels will be used (renewable biomasses such as biomass residues) and the generation of ashes might increase.
Way of monitoring	How	Ashes are to be quantified by using standard storage bags with a known weight. Employees on the ceramic used spreadsheets to control the amount of storage bags leaving the ceramic each time ashes were collected for final destination. Such spreadsheet shall also include information on the destination of ashes, such as the person/entity responsible for collecting the ashes and the place of destination. Photographs are to be used as evidence of the final destination whenever feasible. Interviews and meetings with stakeholders and ceramic personnel on each ceramic should also be applied to identify the relevant score under the SOCIALCARBON indicator.
	When	Ashes should be quantified and have their destination monitored whenever they were collected for final destination. The assessment on the relevant score of the SOCIALCARBON indicator was performed on the current monitoring period.
	By who	Project participants[31]
QA/QC procedures to be applied		Besides the procedures to control and dispose ashes on each ceramic, the project proponents applied the indicator from SOCIALCARBON Standard: SOCIALCARBON indicators for Ceramic Industry: **Ashes** - Evaluates the procedures adopted by the entrepreneur in order to control the ashes and its destination. The project situation was analyzed on a periodical basis and is scored from 1 to 6, where 1 represents a critical situation and 6 represents a sustainable scenario. More detail can be verified on Section *F.2. Sustainable Development matrix* on the Gold

[31] *Ceramic owners shall assign personnel to quantify and monitor the final destination of ashes. Sustainable Carbon will help the ceramic owners identify the corresponding scoring of the Project scenario, following the requirements of SOCIALCARBON Standard.*

	Standard Passport, version 05.
Monitoring Value and Frequency	Since the first monitoring period, ceramic owners have provided a proper destination to ashes resulted from biomass combustion. Ashes quantification and destination are documented on proper files for all the ceramic factories. The indicator *"Ashes"* from SOCIALCARBON Standard allows classifying the project activity into scenario four, defined as: *"Scenario 4:* *- Ashes are totally reused or donated, with control of the quantity and destination of the material."*

No		03
Indicator		**Quality of employment**
Chosen parameter		**Actions of health and security**
Implications on monitoring requirements and justification		Following the project measures, a certain level of automation in the logistics and feeding of fuels in the kilns were installed, improving the working conditions of employees responsible for feeding the kilns with bricks and fuels.
Way of monitoring	How	Site visits and interviews with employees and Managers of each ceramic.
	When	Each monitoring period
	By who	Project participants[32]
QA/QC procedures to be applied		To monitor the project impact on the quality of employment, the project applied the following indicator from SOCIALCARBON Standard: SOCIALCARBON indicators for Ceramic Industry: **Actions of Health and Security** – evaluates the existence and performance of campaigns, leisure and goal and plans regarding to health and security. The project situation was analyzed on a periodical basis and is scored from 1 to 6, where 1 represents a critical situation and 6 represents a sustainable scenario.
Monitoring Value and Frequency		According to the indicator from SOCIALCARBON Standard: SOCIALCARBON indicators for Ceramic Industry: **Actions of Health and Security,** the project activity can be classified into scenario three, defined as: *"Scenario 2: There were no serious accidents, but no campaign, lecture or training was done in the last 12 months.* All the ceramics promoted training on the correct use of Individual Protection Equipments on the previous period. However, in the current one, none ceramic factory offered any lecture or training to employees due to the low turnover rate of workers. The ceramic factories are planning to hire a safety engineer to offer regular trainings to the worker regarding health and security matters.

[32] *Sustainable Carbon will help the ceramic owners identify the corresponding scoring of the Project scenario, following the requirements of SOCIALCARBON Standard.*

No		04
Indicator		**Quality of employment**
Chosen parameter		**Use of safety equipments**
Implications on monitoring requirements and justification		In the baseline scenario, employees were resistant to use safety equipments, since they feel these equipments are uncomfortable to use due to high local temperatures. During the last monitoring period, the project developers conducted trainings regarding the importance of using safety equipments to employees. The aim of the project is to reduce resistance and obtain higher usage rates of safety equipments by employees working with biomass and around the kilns.
Way of monitoring	How	Ceramic managers are to use spreadsheets to control the use of safety equipments by employees. Employees should provide their signatures on such spreadsheet each time they receive safety equipment.
	When	On a weekly basis. Data were consolidated for each monitoring period.
	By who	Project participants[33]
QA/QC procedures to be applied		No QA/QC procedures are defined for this parameter
Monitoring Value and Frequency		All five ceramic factories have control over the delivery of IPEs to employees through a spreadsheet with the signature of each worker. Also, to encourage the use of IPEs, the ceramic distributed awards to workers that have used the equipments. However, a more efficient incentive mechanism shall be employed in the future.

No		05
Indicator		**Access to affordable and clean energy services**
Chosen parameter		**Total energy produced from renewable sources**
Implications on monitoring requirements and justification		The project is expected to positively impact the access to affordable and clean energy services. The measures applied by the project activity resulted in renewable energy generation by utilizing renewable biomasses, thus providing alternative and clean energy sources that were not utilized in the baseline scenario.
Way of monitoring	How	The amount of renewable biomass used by each ceramic was monitored during the crediting period (through purchase invoice, delivery notes or other documents concerning the acquisition of biomass). By using default values of energy content, the project proponents were able to determine the amount of renewable energy produced during each year of the crediting period.
	When	On a monthly basis. Data was consolidated on an annual basis
	By who	Project Participants. Staff from each ceramic should store information on biomass purchase and acquisition. Sustainable Carbon should determine the amount of renewable energy

[33] *Ceramic owners shall assign managers to monitor the use of safety equipments. Sustainable Carbon will help the ceramic owners quantifying the usage rate of such equipments.*

		generated during the crediting period.
QA/QC procedures to be applied		The amount of renewable biomass purchased was controlled with digital spreadsheets filled by staff members from Grupo Tavares. Sustainable Carbon has double checked these spreadsheets against biomass invoices to detect inconsistencies.
Monitoring Value and Frequency		Biomass acquisition was monitored for each purchase, by storing documents such as invoices or receipts. These allowed Sustainable Carbon to determine the amount of energy produced from renewable sources. Values are available in Table A1.

No		06
Indicator		**Quantitative employment and income generation**
Chosen parameter		**Voluntary Emission Reductions issued.**
Implications on monitoring requirements and justification		The project is expected to reduce 395,520 tCO_2e during the crediting period. However, the actual emission reductions will depend on the production and the related amount of renewable biomass used. The issuance of carbon credits will also be subject to the capacity of the project to comply with Gold Standard requirements for voluntary offset projects.
Way of monitoring	How	The issuance of Voluntary Emission Reductions (or similar assets from the carbon market) will be monitored.
	When	Once every monitoring period
	By who	Project Participants. Staff from each ceramic should store information regarding the project operation, including fuel usage and production output. Sustainable Carbon should determine the emission reductions resulting from the project.
QA/QC procedures to be applied		This parameter will be monitored based on the amount of VERs issued. VER issuance is subject to third party verification following Gold Standard requirements. Hence, additional QA/QC procedures are not necessary
Monitoring Value and Frequency		**(a)** This parameter is monitored every monitoring period based on the amount of VERs issued at each monitoring period. The project has issued the following amount of VERs: Year / VERs 2010 / 11,087 2011 / 28,677 2012 / 64,255 2013 / 16,802 **Total** / **120,821** It is important to clarify that a fee of 2% of the total amount of credits generated in the last monitoring period was discounted to the Gold Standard Share of Proceeds.

No	07
Indicator	**Quantitative employment and income generation**
Chosen parameter	**Additional revenues for biomass suppliers**
Implications on monitoring	The project is allowing the ceramics to use exclusively

requirements and justification		renewable biomass as fuel. Since these types of fuels are more expensive than native firewood, it is likely that total revenues to biomass suppliers will increase. Furthermore, these revenues are now being destined to suppliers of renewable biomass, which do not cause deforestation.
Way of monitoring	How	Total revenues will be monitored by storing purchase invoices, receipts of sale and other documents concerning biomass acquisition. Total revenues shall be compared to the baseline fuel cost for the ceramics which were destined to native firewood suppliers. This parameter is defined ex-ante using data from 2009 (the most recent year prior to the project start date)[34]. A conservative correction factor of 15% will be applied annually, to account for general price increase due to inflation[35].
	When	Once every monitoring period
	By who	Project Participants. Staff from each ceramic shall store information biomass acquisition and costs. Sustainable Carbon shall determine the additional revenues by comparing monitored values with figures estimated for the baseline situation.
QA/QC procedures to be applied		The amount of renewable biomass purchased was controlled with digital spreadsheets filled by third party consultants. Sustainable Carbon has double checked these spreadsheets against biomass invoices to detect inconsistencies.
Monitoring Value and Frequency		Biomass acquisition was monitored for each purchase, by storing documents such as invoices or receipts. These allowed Sustainable Carbon to determine the payments for biomass suppliers. Values are available in Table A2.

No		08
Indicator		**Origin of renewable biomass**
Chosen parameter		**Origin of renewable biomass**
Implications on monitoring requirements and justification		Following the project measures, the ceramics have begun utilizing renewable biomass as fuel. Currently, the ceramics use exclusively renewable biomasses as fuels since the beginning of the crediting period, which is defined as 01/09/2010.
Way of monitoring	How	The origin of the renewable biomass will be assessed storing documents (receipts, invoices) from the biomasses providers, thus allowing determining its origin. The biomasses shall be considered renewable as fulfilling definitions of renewable biomass approved by the CDM Executive Board[36].
	When	Once every monitoring period
	By who	Project Participants. Staff from each ceramic shall store information regarding the biomass purchase and acquisition.

[34] The same data was used for the assessment of additionality. Hence, this approach provides consistency. Furthermore, it is not feasible to monitor the cost of non-renewable biomass ex-post, since this biomass is no longer used by the project.

[35] No methodology was found to correct the price of non-renewable biomass in Brazil, since this is mostly an informal market. A 15% correction factor is considered conservative since it is above current inflation levels in Brazil.

[36] EB 23, Annex 18 – Definition of renewable biomass. Available at: <http://cdm.unfccc.int/EB/Meetings/023/eb23_repan18.pdf>.

		Sustainable Carbon shall assess the source of biomass and confirm they comply with CDM EB definitions of renewable biomass.
QA/QC procedures to be applied		Ceramic owners will store invoices, receipt of sales or other documents to allow the traceability of the renewable biomass.
Monitoring Value and Frequency		The guarantee of acquiring renewable wood was achieved by invoices from the providers. Biomasses were considered renewable as fulfilling the options described in the methodology applied.

No		09
Indicator		**Competing uses of biomass**
Chosen parameter		**Biomass surplus**
Implications on monitoring requirements and justification		In the baseline situation, all ceramics used predominantly non-renewable woody biomass for thermal energy generation. The project activity aims to allow the complete switch from non-renewable biomass to renewable biomasses. The target is to generate all the energy demand of the ceramics from renewable sources.
Way of monitoring	How	According to the Gold Standard Passport (version 05, dated 08/03/2012), national and international articles and databases should be assessed to determine the availability of each type of biomass used during the project operation. However, in response to FAR 1 raised by the Gold Standard Secretariat during project registration, Sustainable Carbon has developed a detailed Study on the surplus of all types of biomass used by the project activity. In addition to the first study, which could not determine the surplus of firewood with certainty, a new evaluation of an expert has been requested and a methodology has been developed in response to confirm the existence of availability and surplus of firewood at Caatinga forest management plans.
	When	Once every monitoring period
	By who	Project Participants. Staff from each ceramic shall store information regarding the project operation, including biomass usage. Sustainable Carbon shall assess the availability of biomass and determine the occurrence of leakage.
QA/QC procedures to be applied		An independent third party expert opinion on the results and findings of the assessment of biomass surplus was obtained, to ensure the results are appropriate and conservative.
Monitoring Value and Frequency		Monitoring values and frequency are available on Section D.2 (pages 19-20).

Table A 1. Total energy produced from renewable sources.

Ceramic	Total energy produced from renewable sources (TJ)		
	2013	2014	Monitoring period
Antônio Ceramic	89,72	10,59	100,31
Ceagra Ceramic	120,44	20,13	140,57
Ceará Ceramic	86,40	10,72	97,13
Eliane Ceramic	97,08	18,34	115,42
Santa Rita Ceramic	84,88	11,68	96,56
Ceará Renewable Energy Bundled	**478,53**	**71,47**	**549,99**

Table A 2. Additional revenues for biomass suppliers

Ceramic	Estimated revenues for biomass suppliers in the baseline scenario		Additional revenues for biomass suppliers		
	2013	2014	2013	2014	Monitoring report
Antônio Ceramic	R$ 262.463,78	R$ 69.809,03	R$ 398.370,52	R$ 7.511,97	R$ 405.882,49
Ceagra Ceramic	R$ 195.818,68	R$ 53.124,29	R$ 641.179,74	R$ 129.668,71	R$ 770.848,45
Ceará Ceramic	R$ 307.532,38	R$ 89.287,28	R$ 231.961,62	-R$ 51.682,28	R$ 180.279,33
Eliane Ceramic	R$ 219.915,60	R$ 66.620,18	R$ 378.172,60	R$ 31.012,92	R$ 409.185,53
Santa Rita Ceramic	R$ 169.232,12	R$ 42.943,56	R$ 261.640,38	R$ 42.906,84	R$ 304.547,22
Ceará Renewable Energy Bundled	**R$ 1.154.962,55**	**R$ 321.784,33**	**R$ 1.911.324,87**	**R$ 159.418,17**	**R$ 2.070.743,03**