



MONITORING REPORT
Version 03

Cenol and Telha Forte Ceramics Switching
Fuel Project

Monitoring report of the fourth period: February 01st, 2010 to February 28th, 2011

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SECTION A. General description of small-scale project activity

A.1 Title of the small-scale project activity:

Cenol and Telha Forte Ceramics Switching Fuel Project

Monitoring report of the fourth period completed on August 23rd, 2011 – Version 03

A.2. Description of the small-scale project activity:

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

The project activity is the project of *Cenol* and *Telha Forte* Ceramics, which are two red ceramic industries located in *São Miguel do Guamá* municipality, in the state of *Pará*, north of Brazil. Both ceramics produce structural ceramic units like bricks, destined for the local market.

The fuel utilized in the baseline scenario to cook the ceramic pieces was native wood from the *Amazonian*¹ biome, which is a common practice in the region. This type of wood is considered a non-renewable woody biomass, once it is not originated in areas with reforestation activities or sustainable management activities.

The purpose of this project activity is to promote a fuel switch in *Cenol* and *Telha Forte* Ceramics by utilizing renewable biomasses (such as *açaí* pits and sawdust) to feed their kilns instead of using native wood without sustainable management from the Amazonian biome.

Therefore, the fuel switching project reduces the greenhouse gases emissions, through substitution of native wood by renewable biomass for thermal energy generation. This fuel switch could only be feasible when considering the carbon credits incomes, since the adaptation of machineries to the new biomasses and the purchase of new equipments required considerable investments.

The main goal of this project activity is to minimize the negative impacts of the deforestation of the Amazonian biome (the main source of greenhouse gas emissions in Brazil) by providing incentives for the interested parties in acquiring demonstrably renewable fuels.

In opposition to the identified baseline, the project activity generates thermal energy without stimulating the deforestation. This project activity is making the use of renewable biomasses feasible when comparing to the non-renewable fuel use, by generating assets from the carbon market.

The Project's contribution for the sustainable development.

The project activity contributes to the reduction of the greenhouse gas (GHG) emissions by reducing the deforestation of the *Amazonian* biome.

¹ This biome occupies almost half of the country and consists mostly of a tropical forest. Even though this biome is the most preserved, about 16% of its area has been destroyed, which is equivalent to two times the area of São Paulo state. Deforestation, fires, mining, biopiracy and the agropasture represent the main environmental problems in Amazon biome. All these actions contribute to severe climate changing on the planet, like global warming. Amazon is considered a great "cooler" to the atmosphere and the world's largest biodiversity shelter. Source: text adapted from: <<http://ibflorestas.org.br/pt/bioma-amazonico.html>>. Last visit on: April 08th, 2011.

The Amazonian Biome deforestation, which can be observed in Table 1 and Figure 1, aggravates because of the grazing practice, agriculture and site preparation which involves extraction and burning of wood and firewood commercialization².

Table 1. Average area of deforestation observed in the states of Amazonian Biome (km²/year)³

States of Amazonia Biome	2005	2006	2007	2008	2009	2010
Acre	592	398	184	254	167	273
Amazonas	775	788	610	604	405	474
Amapá	33	30	39	100	70	SD*
Maranhão	922	651	613	1,272	828	679
Mato Grosso	7,145	4,333	2,678	3,258	1,049	828
Pará	5,731	5,505	5,425	5,606	4,281	3,710
Rondônia	3244	2049	1611	1136	482	427
Roraima	133	231	309	574	121	SD*
Tocantins	271	124	63	107	61	60
Legal Amazon	18,846	14,109	11,532	12,911	7,464	6,451

***Data to be confirmed by INPE (Brazilian Institute of Space Studies), without data to estimate.**

² FERREIRA, Leandro Valle; VENTICINQUE, Eduardo and ALMEIDA, Samuel. O desmatamento na Amazônia e a importância das áreas protegidas. *Estud. av.* [online]. 2005, vol.19, n.53, pp. 157-166. ISSN 0103-4014. Available at: <http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0103-40142005000100010&lng=en&nrm=iso>. Visited on June 14th, 2010.

³ INPE – Brazilian Institute of Space Studies. Ministry of Science and Technology. PRODES 2010 - Estimates of Amazon deforestation in the period 2009-2010. Available at: <www.dpi.inpe.br/gilberto/present/prodes_taxa2010.ppt>. Visited on April 11th, 2011.

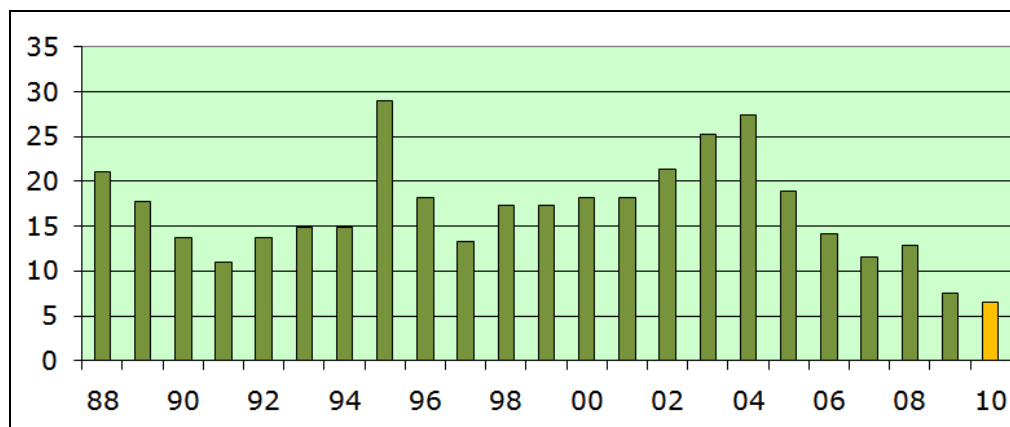


Figure 1. Average area deforested (thousands of km² per year) in the Amazonian Biome during the period 1988 – 2010⁴

In addition, the project activity contributes to reducing the level of the greenhouse gas (GHG) emissions and also to the sustainable development of the host country, by:

- Improving the environmental integrity of the immediate area through a more prudent use of agricultural refuse as biomass for fuel, which in the baseline scenario would be left to decay in open dumps;
- Diversifying and improving sources for thermal energy generation;
- Using clean and efficient technologies, which promote the preservation of natural resources in accordance with *Agenda 21* and with Brazilian Sustainable Developments Criteria;
- Demonstrating the viability of implementing innovative technological practices to the ceramic sector as a whole, thus promoting holistic change in the more effective use of renewable biomass and the better realization of more efficient thermal energy generation potential;
- Contributing directly to the conservation of *Amazonian* biome through the use of renewable biomasses.

The *Amazonian* biome is the major tropical forest of the world, and it occupies around two-fifths of South America and more than half of the area of Brazil⁵. The Second Brazilian Inventory of Anthropogenic Greenhouse Gas Emissions⁶ – Background Reports indicates that the major source of GHG emissions in *Brazil* is due to deforestation, mainly occurred in *Amazonian* (65% of the deforestation) and *Cerrado* biomes (24%). Another relevant issue is the concerning deforestation rate in the *Amazonian* biome. Currently, every part of the society sector should be involved in this issue, and all efforts are necessary to minimize the *Amazonian* biome scenario of degradation and prevent its extinction. Furthermore, this biome is a supply of biodiversity, holding the bigger variety of species in the world; there are still many unknown vegetal and animal species in this magnificent biome⁷.

⁴ INPE – Brazilian Institute of Space Studies. Ministry of Science and Technology. PRODES 2010 - Estimates of Amazon deforestation in the period 2009-2010. Available at: <www.dpi.inpe.br/gilberto/present/prodes_taxa2010.ppt>. Visited on April 11th, 2011.

⁵ A maior floresta tropical do mundo. Available at: <http://www.colegioacademia.com.br/admin/professores/arquivos_upl/28_a-maior-floresta-tropical-do-mundo.pdf>. Last visit on: April 11th, 2011.

⁶ Second National Communication of Brazil to the United Nations Framework Convention on Climate Change. — Brasília: Ministério da Ciência e Tecnologia, 2010. Available at: <http://www.mct.gov.br/upd_blob/0214/214054.pdf>. Visited on January 31st, 2011.

⁷ Source: PERES, C. A. Porque precisamos de megareservas na Amazônia. Megadiversidade, Vol. 1, Número 1, julho 2005. Available at: <http://www.unifap.br/ppgbio/doc/23_Peres.pdf>. Last visit on: April 08th, 2011.

A.3. Current status of the project activity:

The VCS PD was validated by the Designated Operational Entity TÜV Nord Cert GmbH and this present monitoring report will be verified by the Designated Operational Entity Bureau Veritas Certification (BVC).

The monitoring data was kept according to monitoring plan described in the project description document. The project activity utilized as renewable biomasses sawdust and *açaí* pits. The emission reductions due to the switching non-renewable biomass (native wood from deforestation) to renewable biomasses resulted in **42,014 tCO₂e** during the monitoring period of February 1st, 2010 to February 28th, 2011.

SECTION B. Application of monitoring methodology and results

B.1. Title and reference of the approved baseline and monitoring methodology applied to the small-scale project activity:

Category AMS-IE: Switch from Non-renewable Biomass for Thermal Applications by the User (Version 01 - Valid from February 01st, 2008 to April 08th, 2010).

Reference: Appendix B of the simplified modalities and procedures for small-scale CDM project activities.

This is a grouped project.

B.2. Monitoring period

This report refers to the data registered during February 1st, 2010 to February 28th, 2011.

B.3. Data and parameters applied:

Data / Parameter:	EF _{projected fossil fuel}
Data unit:	tCO ₂ /TJ
Description:	CO ₂ Emission factor of residual fuel oil
Source of data to be used:	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. Visited on April 13 th , 2011.
Value of data	77.4
Description of measurement methods and procedures to be applied:	In the baseline scenario, the probable fossil fuel that would be consumed in the absence of native wood without sustainable forest management would be the heavy oil. This fuel is more expensive than wood, however it can be a more plausible of substitute of wood than natural gas due to risks involving natural gas distribution.
QA/QC procedures to be applied :	For the fossil fuel likely to be used by similar consumers, IPCC default value of residual fossil fuel is used.
Any comment:	Applicable for stationary combustion in the manufacturing industries and construction.

Data / Parameter:	NCV _{biomass}
Data unit:	TJ/ton of wood
Description:	Net Calorific Value
Source of data to be used:	Sources: QUIRINO, W. F. et al. Poder Calorífico da Madeira e de Resíduos Lignocelulósicos. Biomassa & Energia, v.1, n.2, p. 173-182, 2004. Available at: < http://www.renabio.org.br/arquivos/p_poder_lignocelulosicos_11107.pdf >. Last visit on: April 13 th , 2011. SANTOS, E. C. S. et al. Caracterização Energética de Espécies Lenhosas Nativas da Amazônia. XXXVI Congresso Brasileiro de Engenharia Agrícola, Bonito, MS, 2007.

Value of data	0.0182
Description of measurement methods and procedures to be applied:	This value provided the energy generated by the amount of wood that would be used in the absence of the project. The species used to calculate the average value are typical trees of <i>Amazonian</i> Biome that are usually utilized as fuel in the ceramic industries of the region. Some sources of data used provide the Gross Calorific Values (GCV) of the <i>Amazonian</i> species. In order to transform the GCV to NCV, it was utilized the equation which is available at the VCU Estimative spreadsheet. 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).
QA/QC procedures to be applied :	The species used to calculate the average value are typical trees of <i>Amazonian</i> Biome that are usually utilized as fuel in the ceramic industries of the region.
Any comment:	

Data / Parameter:	ρ_{biomass}
Data unit:	ton/ m ³
Description:	Specific gravity
Source of data to be used:	Sources: 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. LORENZI, H. Árvores Brasileiras: Manual de Identificação e Cultivo de Plantas Arbóreas Nativas do Brasil, vol.2. 4.ed. Nova Odessa, SP: Instituto Plantarum, 2002. QUIRINO, W. F. et al. Poder Calorífico da Madeira e de Resíduos Lignocelulósicos. Biomassa & Energia, v.1, n.2, p. 173-182, 2004. Available at: <http://www.renabio.org.br/arquivos/p_poder_lignocelulosicos_11107.pdf>. Last visit on: April 13th, 2011.
Value of data	0.6753
Description of measurement methods and procedures to be applied:	The species used to calculate the average value are typical trees of <i>Amazonian</i> Biome that are usually employed as fuel in the ceramic industries of the region. The amount of wood used in the baseline was measured by volume units, so this data was used to the unity conversion.
QA/QC procedures to be applied :	The species used to calculate the average value are typical trees of <i>Amazonian</i> Biome that are usually utilized as fuel in the ceramic industries of the region.
Any comment:	

Data / Parameter:	BF_v
Data unit:	ton of wood per thousand of devices
Description:	Consumption of non-renewable biomass per thousand of ceramic devices

Source of data to be used:	Historical data from ceramic owner			
Value of data		BF_y	Cenol Ceramic	Telha Forte Ceramic
		(ton/thousands of pieces)	1.00	1.00
Description of measurement methods and procedures to be applied:	The value was acquired through the average consumption and production of ceramic devices during the years when the ceramics used to consume non-renewable wood. This value is in accordance with the data acquired in other ceramics that utilize the same types of kiln in the region. The value is utilized to calculate the real amount of wood displaced to maintain the ceramic production in the baseline scenario.			
QA/QC procedures to be applied :	Cenol and Telha Forte Ceramics' kilns are within the average for "Paulistinha" and "Round" kilns. ⁸ These values were not expected because of the lack of technology in the region, the indiscriminate use of the wood causing it surplus.			
Any comment:				

B.4. Data and parameters monitored:

Data / Parameter:	Q _{renbiomass}				
Data unit:	ton per month				
Description:	Amount of renewable biomasses utilized in the monitored period from February 1 st , 2010 to February 28 th , 2011.				
Source of data to be used:	Measured by the biomass providers and controlled by the ceramic owner. The registered VCS PD v.5 establishes that the ceramic owner would measure this parameter; however, during the entire monitored period, this parameter was monitored through all the receipts and invoices of biomass received by the ceramic industry.				
Value of data		Cenol Ceramic			
		Year	Period	Sawdust (ton)	Açaí pits (ton)
		2010	February	0.00	56.39
			March	62.35	0.00
			April	313.19	0.00
			May	40.03	0.00
			June	307.94	169.18
			July	303.17	413.56

⁸ Source: TAPIA, R. E. C. et al. **Manual para a indústria de cerâmica vermelha**. Rio de Janeiro: SEBRAE/RJ, 2005. (Série Uso Eficiente de Energia).

			August	114.12	2,011.39	
			September	35.25	3,214.46	
			October	24.50	3,684.41	
			November	214.12	695.53	
			December	214.93	300.77	
	Total 2010		1,629.60	10,545.68		
	2011	January	126.26	0.00		
		February	5.40	0.00		
	Total 2011		131.66	0.00		
	Total Renewable Biomass - Monitoring period – Cenol Ceramic			12,306.94		
	Telha Forte Ceramic					
	Year	Period	Sawdust (ton)	Açaí pits (ton)		
2010	February	42.61	26.37			
	March	491.80	18.80			
	April	33.81	0.00			
	May	339.98	0.00			
	June	96.26	93.99			
	July	115.47	37.60			
	August	106.50	714.32			
	September	45.62	1,522.64			
	October	3.69	1,992.59			
	November	93.15	1,861.00			
	December	65.74	808.31			
Total 2010		1,434.61	7,075.62			
2011	January	42.03	488.75			
	February	5.40	18.80			
Total 2011		47.43	507.55			
Total Renewable Biomass - Monitoring period – Telha Forte Ceramic			9,065.21			
Description of measurement methods and procedures to be applied:	The amount of biomasses was monitored in accordance to the weight described in the receipts or invoices from the providers. The values in the receipts are described in m³, therefore it was necessary the conversion to ton through the specific gravity of each biomass. The specific gravity values of the renewable biomasses utilized in this project are:					

		Biomass	Sawdust	Açaí Pits
		Specific Gravity (ton/m³)	0.245	0.723
	The sources of these data are: Sawdust: Masses and Dead Loads of Concrete and Other Materials. Available at: < http://www.cca.org.nz/pdf/Masses.pdf >. Last visit on: March 10 th , 2010. Açaí pits: PADILHA, J. L.; CANTO, S. A. E.; RENDEIRO, G. Avaliação do potencial dos caroços de açaí para geração de Energia. Biomassa & Energia, v. 2, n. 3, p. 231-239, 2005. Available from: < http://www.renabio.org.br/arquivos/p_avaliacao_energia_8340.pdf >. Last visit on: April 11 th , 2011.			
QA/QC procedures to be applied:	It was monitored through receipts of purchase from the biomass providers. The ceramic industries control the quantity of biomass through an internal spreadsheet, which is fed with the measured values of all the biomass that arrive from the providers. These internal spreadsheets were double checked with all the receipts and invoices of biomass employed.			
Any comment:	Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.			

Data / Parameter:	PR_y			
Data unit:	Unity of ceramic pieces			
Description:	Production of ceramic devices in the monitored period from February 1 st , 2010 to February 28 th , 2011.			
Source of data to be used:	Controlled by the project proponent			
Value of data	PR_y			
	Year	Period	Cenol Ceramic	Telha Forte Ceramic
	2010	February	1,209,315	1,197,675
		March	1,485,495	1,384,275
		April	1,237,755	1,262,231
		May	1,341,690	1,294,781
		June	1,259,940	1,101,344
		July	1,353,345	1,166,681
		August	1,428,675	1,162,763
		September	1,214,076	1,303,031
		October	1,236,000	1,282,594

		November	1,230,666	1,322,419
		December	1,399,854	1,401,656
	Total 2010		14,396,811	13,879,450
	2011	January	1,369,416	1,365,656
		February	1,222,638	1,201,331
	Total 2011		2,592,054	2,566,988
Description of measurement methods and procedures to be applied:	The ceramics have an internal control of the quantity of pieces fired through sheets that are daily fed by an operator inside of each Ceramic company that counts the total of wagons that enter inside the kilns. Each wagon carries a determined number of pieces, which depends on the type of piece produced. This was better detailed on the MR Calculation spreadsheet, in the “Cenol PR_y” and “Telha Forte PR_y” sheets. During this monitored period, <i>Cenol</i> ceramic deactivated two “Paulista” kilns, and it is currently operating with seven “Round” kilns and one “Paulista” kiln. According to the VCS PD, <i>Cenol</i> Ceramic operated with three “Paulista” kilns and seven “Round” kilns. During this monitored period, <i>Telha Forte</i> ceramic constructed three new “Paulista” kilns that were not mentioned in the VCS PD. Thus, the production of these new kilns was excluded from the calculations, as described below. According to the VCS PD, <i>Telha Forte</i> Ceramic operated with five “Paulista” kilns and eight “Round” kilns, producing around 2,500,000 ceramic units per month, or 30,000,000 ceramic units per year. However, nowadays the ceramic is only operating with eight “Paulista” kilns. In order to exclude the production of these three new Paulista kilns, which corresponds to around 37.5% of the total production of this monitored period (3 new kilns/ total kilns (8 kilns) = 37.5%), the total production of <i>Telha Forte</i> ceramic was multiplied by 62.5%.			
QA/QC procedures to be applied:	The ceramics have an internal control of the quantity of ceramic units produced. It was rechecked according to the biomass employed and the kiln consumption of renewable biomass.			
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 production in <i>Telha Forte</i> in this monitored period was lower than estimated in the VCS PD due to the normal oscillation of the market demand.			

Data / Parameter:	Leakage of non-renewable biomass
Data unit:	tCO ₂ e
Description:	Leakage resulted from the non-renewable biomass

Source of data to be used:	Monitored
Value of data	0
Description of measurement methods and procedures to be applied:	The three sources of leakages predicted in applied methodology were monitored. Scientific articles, official statistical data, regional and national surveys were provided in order to ensure that there was no leakage from non-renewable biomass (or to estimate the leakage). More information, please see Section B.5 – Leakage, Part B.
QA/QC procedures to be applied :	Data available regarding the ceramic industry fuel consumption were employed to monitor the leakage.
Any comment:	Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.

Data / Parameter:	Renewable biomass surplus			
Data unit:	ton or m³			
Description:	Amount of renewable biomass available			
Source of data to be used:	Monitored			
Value of data		Biomass surplus	Surplus	Year
		Açaí pits in tons	79,715.5	2007
		Sawdust in m³	1,999,833	2007
Description of measurement methods and procedures to be applied:	It was used to calculate the leakage of renewable biomass. The sources of leakages predicted in “General guidance on leakage in biomass project activities” of Indicative Simplified Baseline and Monitoring Methodologies for Selected Small-Scale CDM Project Activity Categories, were monitored. The measurement of the leakage was based in national and international articles and database every monitoring period. The sources provided information about the biomass availability in the project activity’s region. More information, please see Section B.5 – Leakage, Part A.			
QA/QC procedures to be applied :	Data available regarding to the ceramic industry fuel consumption were utilized to monitor the leakage.			
Any comment:	Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever			

	occurs later.
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Data / Parameter:	Origin of renewable biomass
Data unit:	Not applicable
Description:	Renewable origin of the biomass
Source of data to be used:	Controlled by the project proponent
Value of data	Not directly applied for the calculation. It is considered that all biomass used is renewable.
Description of measurement methods and procedures to be applied:	This information was given by the biomasses providers. The guarantee of acquiring renewable biomass was achieved by invoices from the providers. As stated in the Section 2.2 of VCS PD version 5, the biomasses (sawdust and <i>açaí</i> pits) are considered renewable as fulfilling the options described in the applied methodology.
QA/QC procedures to be applied :	The biomasses were considered renewable as they are according to the definition given by the applied methodology. Furthermore, documents proving the origin of renewable biomass were provided.
Any comment:	Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.

Data / Parameter:	$f_{NRB,v}$
Data unit:	Percentage
Description:	Fraction of biomass (wood) used in the absence of the project activity that is established as non-renewable biomass using survey methods
Source of data used:	Survey methods.
Value of applied:	89.23%
Justification of the choice of data or description of measurement methods and procedures actually applied :	Before the project activity, wood from areas without forest management was offered with low prices and high viability to the ceramic facilities owner. Thus, the totality of fuel employed in the baseline scenario is from non-renewable origin. However, according to SOCIOAMBIENTAL (2010) ⁹ , <i>Amazonian</i> Biome has 10.75% (or 53,829,235 ha) of its total area with sustainable use. According to a research made by Brazilian Environmental Ministry, there are around 60m ³ of wood per hectare in <i>Amazonian</i> biome ¹⁰ . Thus, the amount of non-renewable woody biomass available at <i>Amazonian</i> biome is around 26,808,826,464 m ³ .

⁹SOCIOAMBIENTAL. Instituto Socioambiental, 2010. *Unidades de Conservação na Amazônia Legal*. Available at: <http://www.socioambiental.org/uc/quadro_geral>. Last visit on: April 11th, 2011.

¹⁰ Source: Brazilian Environment Ministry, Normative Instruction n° 6 of 2006. Available at: <http://www.carvaomineral.com.br/abcm/meioambiente/legislacoes/bd_carboniferas/geral/in_06-2006_mma_n.pdf>. Last visit on: August 12th, 2009.

	Considering that 0.0123% of this biome has been saved by other project activities¹¹, thus, the fraction of non-renewable biomass is around: $100\% - (10.75\% + 0.0123\%) = 89.23\%$. Two sheets were made in order to calculate the amount of wood consumed. The first one encompasses the amount of wood consumed by the ceramics located at the <i>Amazonian</i> biome. The other sheet calculates the amount of wood consumed regarding only <i>Cenol</i> and <i>Telha Forte</i> Ceramics. Dividing these values by the total of wood available, it was achieved the amount of renewable biomass that has been saved by all the project activities, or only by <i>Cenol</i> and <i>Telha Forte</i> Ceramics Switching Fuel Project, respectively.¹² Finally, each value was subtracted from the fraction of non-renewable biomass to achieve the $f_{NRB,y}$, in order to be ensured that the proposed project activity is not saving the non-renewable biomass accounted for by the already registered project activities. Therefore, it was taken the smaller value in order to be more conservative. These sheets are available at the VCS MR Calculation spreadsheet.
QA/QC procedures to be applied :	The monitoring of this parameter was based on national and international articles, databases and data monitored by the project developer such as project activities at the same region. The sources provided information about the sustainable use of <i>Amazonian</i> biome. Wood saved from projects to which the same methodology was applied, which are in the same biome and were developed by <i>Sustainable Carbon – Projetos Ambientais Ltda.</i> was considered in this fraction. CDM or VCS registered projects were included in this fraction if placed in the same region and developed with the same methodology.
Any comment:	Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.

Monitoring shall consist of an annual check of all appliances or a representative sample thereof to ensure that they are still operating or are replaced by an equivalent in service appliance.

B.5. Calculation of emission reductions

The Category AMS-I.E: Switch from Non-renewable Biomass for Thermal Applications by the User (Version 01 - Valid from February 01st, 2008 to April 08th, 2010) comprises small thermal appliances that displace the use of non-renewable biomass by introducing new renewable energy end-user technologies. The project's emissions from the combustion of native wood are accounted in the same way as fossil fuel combustion, once it is not renewable and emits CO₂.

¹¹ According to data from project activities at Sustainable Carbon Company. Available at: http://mc.markit.com/br-reg/public/index.jsp?p=&r=1000000000000007&u=&scolumn=project_name&sdir=ASC&s=cp&q=>. Last visit on: April 14th, 2011.

¹² According to data from project activities at Sustainable Carbon Company. Available at: http://mc.markit.com/br-reg/public/index.jsp?p=&r=1000000000000007&u=&scolumn=project_name&sdir=ASC&s=cp&q=>. Last visit on: April 14th, 2011.

The project activity in this monitoring period (13 months) generated 235.00 TJ, or 216.92 TJ per year. Converting this number to MWh, it was generated 60,256.93 MWh per year, which corresponds to the use of 6.88 MW_{thermal} on average of the kilns capacity during the monitored period, which is less than the limits of 45 MW_{thermal} for Type I Small scale project activities.

Baseline

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

Where:

ER_y:	Emission reductions during the year y in tCO ₂ e
B_y:	Quantity of biomass that is substituted or displaced in tons
f_{NRB,y}:	Fraction of non-renewable biomass (wood) used in the absence of the project activity in year y
NCV_{biomass}:	Net calorific value of non-renewable biomass in TJ/ton
EF_{projected_fossil fuel}:	Emission factor for the projected fossil fuel consumption in the baseline in tCO ₂ e/TJ ¹³ .

B_y is determined using the option “b” of the Methodology:

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

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

Where:

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

η_{old}: Efficiency of the system being replaced

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

Where:

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

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

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

Where:

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

¹³ The fossil fuel likely to be used by similar consumers is taken the IPCC default value of residual fossil fuel.

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

Where:

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

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

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

The exactly production (PR_y) was monitored through a sheet that was daily fed by an operator inside of the ceramic companies that counts the total of pieces produced in the machine that gives form to the ceramic blocks.

The value of BF_y was determined through historical consumption of non-renewable biomass by the ceramics.

Leakage

The methodology AMS-I.E.-Switch from Non-Renewable Biomass for Thermal Applications by the User – Version 01 - Valid from February 01st, 2008 to April 08th, 2010 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 the project activity, shall also be estimated according to the “General guidance on leakage in biomass project activities” (attachment C of appendix B)¹⁴ 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 2).

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	-

¹⁴ Document available at: <http://cdm.unfccc.int/methodologies/SSCmethodologies/AppB_SSC_AttachmentC.pdf>. Last visit on January 24th, 2011.

	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 of the present project activity are the competing use of biomass for biomass residues or waste and the emissions from biomass generation/cultivation in case of biomass from cropland. The source of leakage of the present project is showed below according to each type of biomass:

Sawdust

The production of wood generates a large amount of residues, which can be reused to generate thermal energy, considering that around 22% of the wood produced generates sawdust¹⁵. The production of wood in the state of *Pará* (PA) was of 9,090,150 m³¹⁶ in 2007. Thus, the production of sawdust was around 1,999,833 m³ per year.

Cenol and *Telha Forte* ceramics utilized around 12,219.69 m³ of sawdust per year. Thus, the project activity utilized around 1% of the biomass availability in the state of *Pará*. This way, this renewable biomass does not have potential to generate leakage emissions due to its high availability.

As can be observed in the figure below, the potential of energy generation in the state of *Pará* is considered medium, which means that there is an availability of this kind of fuel to be employed in the project activity.

¹⁵ BRITO EO. *Estimativa da produção de Resíduos na Indústria Brasileira de Serraria e Laminação de Madeira. Rev. da Madeira*. v.4. n.26. 1995, pp. 34-39.

¹⁶ According to IBGE (Geographic and Statistic Brazilian Institute). Available at: <<http://www.ibge.gov.br/estadosat/temas.php?sigla=pa&tema=extracaovegetal2007>>.

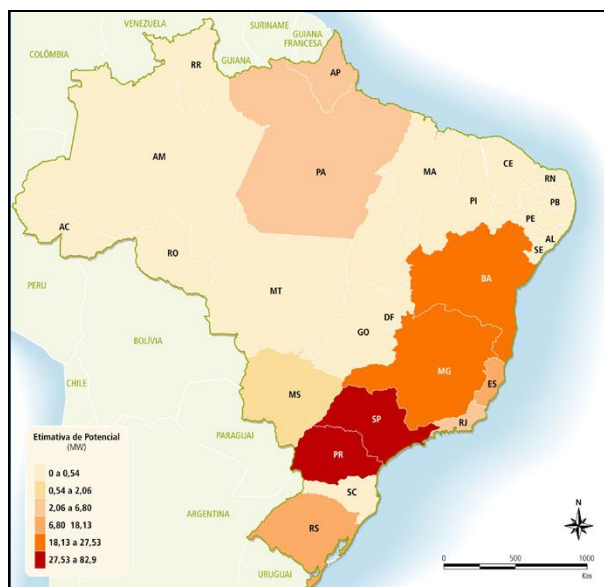


Figure 2. Woody Residues Potential for Energy Generation¹⁷

Açaí Pits

In terms of *açaí* pits, the state of *Pará* is the biggest producer of *açaí* (*Euterpe oleraceae*) in *Brazil*. The pits are easily found, especially in *Belém*, which is the major consumer of *açaí* in the State of *Pará*. The *açaí* is the basis of the daily alimentation of the population in this state, where is widely cultivated. Nevertheless, its residues are still without adequate economic destination¹⁸.

The production of *açaí* in the state of *Pará* in the year of 2007 was 93,783 tons¹⁹. The pit corresponds to 85% of the weight of *açaí*²⁰; therefore the *açaí* pit production was around 79,715.5 tons in the year of 2007.

The project activity utilized approximately 16,734.31 tons of *açaí* pits per year, representing around 20.99 % of the total of the amount produced. Therefore, the project activity does not disturb this renewable fuel market once there is availability of this kind of biomass.

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 were identified:

¹⁷ CENTRO NACIONAL DE REFERÊNCIA EM BIOMASSA - CENBIO. *Panorama do potencial de biomassa no Brasil*. Brasília; Dupligráfica, 2003. 80 p.apud ELETROBRÁS 1ºFórum Capixaba de Energia. Available at: <<http://www.aspe.es.gov.br/PALESTRAS/Renata%20Falc%C3%A3o%20-%20Energias%20Renov%C3%A1veis-Vit%C3%B3ria%20Final.pdf>>. Last visit on April 11th, 2011.

¹⁸ SILVA, I. T. et al. *Uso do caroço de açaí como possibilidade de desenvolvimento sustentável do meio rural, da agricultura familiar e de eletrificação rural no estado do Pará*. 2004. Available at: <<http://www.feagri.unicamp.br/energia/agre2004/Fscommand/PDF/Agrener/Trabalho%2059.pdf>>. Last visit on: April 11th, 2011.

¹⁹ According to IBGE (Geographic and Statistic Brazilian Institute). Available at: <<http://www.ibge.gov.br/estadosat/temas.php?sigla=pa&tema=extracaovegetal2007>>.

²⁰ Source: <<http://minhasfrutas.blogspot.com/2008/12/importancia-economica-do-aai.html>>. Last Visit on: March 11th, 2010.

- 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.

It is expected that the carbon credits incomes will stimulate the use of renewable biomass to other ceramics 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 that would be utilized in this project activity is not being saved for other project activity, since other ceramic companies were already consuming wood from non sustainable forest management (common practice).

With the implementation of the project activity, *Cenol* and *Telha Forte* Ceramics avoided the consumption of non-renewable wood, helping the conservation of the Amazon Rainforest in *Amazonian* biome, besides the ecological and social benefits to the region.

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

This 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 did not encompass any type of leakage.

Emission Reductions

The crediting period of this Monitoring Report contemplates the period from February 01st, 2010 to February 28th, 2011. The emission reductions of this period are shown in the tables below:

Table 3. Quantity of non-renewable native wood that would be utilized in the absence of the project and emission reductions due to the project activity at *Cenol* Ceramic

Emission Reductions of <i>Cenol</i> Ceramic			
Period	PR _y (ceramic units)	B _y (ton)	ER _y (tCO ₂ e)
February 2010	1,209,315	1,209	1,520
March 2010	1,485,495	1,485	1,867
April 2010	1,237,755	1,238	1,555
May 2010	1,341,690	1,342	1,686
June 2010	1,259,940	1,260	1,583
July 2010	1,353,345	1,353	1,701

August 2010	1,428,675	1,429	1,795
September 2010	1,214,076	1,214	1,526
October 2010	1,236,000	1,236	1,553
November 2010	1,230,666	1,231	1,546
December 2010	1,399,854	1,400	1,759
Total 2010	14,396,811	14,397	18,091
January 2011	1,369,416	1,369	1,721
February 2011	1,222,638	1,223	1,536
Total 2011	2,592,054	2,592	3,257

Table 4. Quantity of non-renewable native wood that would be utilized in the absence of the project and emission reductions due to the project activity at *Telha Forte Ceramic*

Emission Reductions of <i>Telha Forte Ceramic</i>			
Period	PR_y (ceramic units)	B_y (ton)	ER_y(tCO₂e)
February 2010	1,197,675	1,198	1,505
March 2010	1,384,275	1,384	1,739
April 2010	1,262,231	1,262	1,586
May 2010	1,294,781	1,295	1,627
June 2010	1,101,344	1,101	1,384
July 2010	1,166,681	1,167	1,466
August 2010	1,162,763	1,163	1,461
September 2010	1,303,031	1,303	1,637
October 2010	1,282,594	1,283	1,612
November 2010	1,322,419	1,322	1,662
December 2010	1,401,656	1,402	1,761
Total 2010	13,879,450	13,879	17,440
January 2011	1,365,656	1,366	1,716
February 2011	1,201,331	1,201	1,510
Total 2011	2,566,988	2,567	3,226

Total Emission Reductions

Table 5. Total Emission Reductions for the grouped project activity

ER_y			
Period	PR_y (ceramic units)	B_y (tons)	ER_y (tCO₂e)
February to December, 2010	28,276,261	28,276	35,531
January to February, 2011	5,159,042	5,159	6,483
Total	33,435,303	33,435	42,014
Emission Reductions from February 1st, 2010 to February 28th, 2011 - methodology AMS-I.E.-Switch from Non-Renewable Biomass for Thermal Applications by the User – (Version 01 - Valid from February 01st, 2008 to April 08th, 2010)			

QA/ QC procedure results**Table 6. Production and biomass predicted and monitored at *Cenol* and *Telha Forte* Ceramics**

		VCS PD	Monitoring Period	Double Check (QA/QC Procedure)
Cenol	Production (thousands of pieces)	15,600	16,989	The thermal energy generated per thousand of ceramic pieces produced at <i>Cenol</i> Ceramic during the monitored period was similar to the VCS PD.
	Sawdust Consumption (ton)	10,292	1,761	
	Açaí Consumption (ton)	2,167	10,546	
	Thermal Energy generated in this MR (TJ)	111	136	
	Thermal energy per thousand of pieces produced (TJ/thousands of pieces)	0.007	0.008	
Telha Forte	Production (thousands of pieces)	32,500	16,446	The thermal energy generated per thousand of ceramic pieces produced at <i>Telha Forte</i> Ceramic during the monitored period was similar to the VCS PD.
	Sawdust Consumption (ton/month)	13,000	1,482	
	Açaí Consumption (ton/month)	2,708	7,583	
	Thermal Energy generated in this MR (TJ)	140	99	
	Thermal energy per thousand of pieces produced (TJ/thousands of pieces)	0.004	0.006	

B.6. Monitoring results

Therefore, based on Category AMS-I.E: Switch from Non-renewable Biomass for Thermal Applications by the User (Version 01 - Valid from February 01st, 2008 to April 08th, 2010) and on monitored data as well considering the high contribution to sustainability, the project participants request carbon credits due to emissions reductions achieved by the project activity, which are equal to **42,014 tCO₂e**.

The contribution to sustainability was monitored applying the SOCIALCARBON STANDARD, which is based in six main pointers: Technology; Natural; Financial; Human; Social and Carbon Resources.

B.7. Date of completion of the monitoring report and the name of the responsible person(s)/entity(ies)

The responsible for project monitoring is Mr. *Francisco Valdir*, from *Cenol and Telha Forte Ceramics*.

The monitoring report was completed in August 23rd, 2011 by *Marcelo Hector Sabbagh Haddad, Gabriel Fernandes de Toledo Piza, Mariana dos Santos Silva, and Thiago de Avila Othero*, from *Sustainable Carbon – Projetos Ambientais LTDA*.