

KAMIRANGA CERAMIC FUEL SWITCHING PROJECT



Document Prepared By Sustainable Carbon – Projetos Ambientais Ltda

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1 PROJECT DETAILS

1.1 Summary Description of Project

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

The project activity is the project of *Kamiranga Ceramic* which is a ceramic company located in *São Miguel do Guamá* municipality in the State of *Pará*, north of Brazil. The ceramic company produces structural ceramic pieces such as bricks mainly for the regional market in *Belém* and for the northeast region of the state.

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

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

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

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

Since the last monitoring period, *Kamiranga ceramic* has constructed two new *Paulista* kilns that were not mentioned in the VCS PD. One of the kilns was built during the last monitored period, which corresponds to the period from 01/02/2010 to 28/02/2011. Thus, the production of this new kiln was excluded from the last monitoring period since it was not possible to perform the additionality assessment due to the lack of data¹.

In the current monitoring period the construction of the second new *Paulista* Kiln was concluded. As the ceramic company always used exclusively renewable biomass in these new kilns, during the current monitoring period was performed the additionality assessment in order to include the production provided by these new kilns. The additionality assessment was based on the use of renewable biomass in the both new *Paulista* kilns, comparing fuel costs of the current scenario and the baseline scenario.

The emission reductions due to the switching of non-renewable fuel (non-renewable wood) to renewable biomasses were equal to **35,270 tCO₂e** during the monitoring period from 01/03/2011 to 30/04/2012. The contribution to sustainability is being monitored applying the SOCIALCARBON® Standard, which is based in six main pointers: Technology; Natural; Financial; Human; Social and Carbon Resources.

¹ The ceramic units produced by the new *Paulista* kiln were excluded in the last monitored period. Proportionally, the amount of biomass employed was also decreased due to the exclusion of the new kiln.

1.2 Sectoral Scope and Project Type

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

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

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

1.3 Project Proponent

Project Proponents

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

Kamiranga Ceramic:

Industrial Establishment: *Cerâmica Kamiranga Indústria e Comércio LTDA*

Mr. Sigifério Alves de Oliveira. Director and owner: Information about the ceramic company, detailed information on process and production lines, environmental challenges, technological challenges, research and development history, ceramics devices market challenges.

Mr. Gleydson Moura. Administrative Auxiliary and Monitoring data responsible: General data and information on inputs and outputs of the ceramic industry, detailed information on the acquisition of renewable biomasses and how this data is kept by the controller's office.

Other information on the project's proponent²:

Phone number: (11) 2649-0036

Project Developer

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

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

The monitoring report was completed on 31/08/2012 by *Marcelo Hector Sabbagh Haddad, Camila Vaccari, Mariana dos Santos Silva, Mariana Fier, Larissa Tega da Fonseca, Felipe Sanchez A. Silva, and Thiago de Avila Othero*, from *Sustainable Carbon – Projetos Ambientais LTDA*.

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

Address:

R. Doutor Bacelar. 368 – Conj. 54 – Vila Clementino

Postal Code: 04.026-001

São Paulo – SP. Brazil

Phone number: +55 11 2649 0036

² Address of the ceramic can be found on Section 1.7.

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

E-mails: marcelo@sustainablecarbon.com; camila@sustainablecarbon.com;
marianas@sustainablecarbon.com; thiago.othero@sustainablecarbon.com;
felipe@sustainablecarbon.com.

1.4 Other Entities Involved in the Project

No other entity is involved in this project activity.

1.5 Project Start Date

According to version 2.3 of the VCS PD³, project start date was defined as 01/09/2007. On this date, the project began reducing or removing GHG emissions. The event that establishes this date is the end of the Hoffman kiln construction.

1.6 Project Crediting Period

The crediting period for this project started on 01/01/2008 and ends on 31/12/2017.

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

1.7 Project Location

According to the applied methodology, the project boundaries for the project are the physical geographical areas of the renewable energy generation. Thus, the ceramic limits. *Kamiranga* ceramic is located in *Brazil*, in the State of Pará which is indicated in Figure 01. The project site has the following postal address:

Kamiranga Ceramic

Estrada Santa Rita da Barreira, s/nº – km 04 – Zona Rural

São Miguel do Guamá – Pará, Brazil

Postal Code: 68660-000

³ Document available at: <http://mc.markit.com/br-reg/public/project.jsp?project_id=100000000000226>. Last visit on: 04/06/2012.

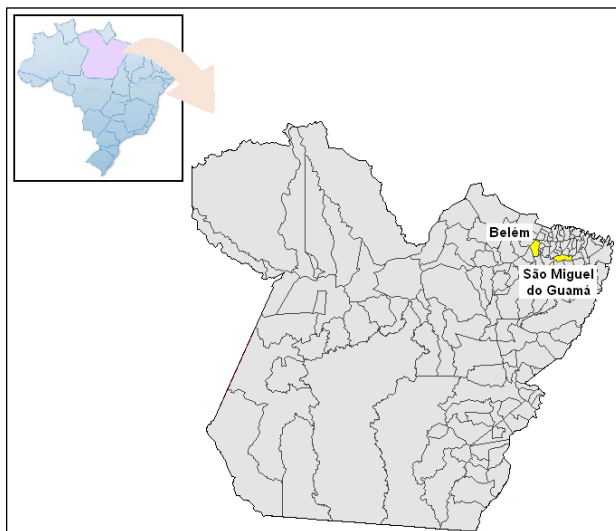


Figure 1. Geographic location of *São Miguel do Guamá* which has the following coordinates: 01° 37' 09.22" S and 47° 28' 33.68" W.

1.8 Title and Reference of Methodology

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

Category AMS-I.E.: Switch from Non-Renewable Biomass for Thermal Applications by the User – Version 01, valid from 01/02/2008 to 08/04/2010⁴. This category comprises small thermal appliances that displace the use of non-renewable biomass by introducing new renewable energy end-user technologies.

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

VCS PD project was validated by the Designated Operational Entity TÜV Nord Cert GmbH and this present monitoring report will be verified by TÜV Rheinland (China) Ltd.

The project has been fully operational since the starting date of the crediting period. This means the ceramic is operating using exclusively renewable biomass, thus mitigating their baseline emissions.

As described on the VCS PD version 2.3, during the validation process the production at *Kamiranga Ceramic* encompassed two *Paulista* kilns⁵ and one Hoffman kiln⁶. These kilns produced, together, around 2,780 tonnes of ceramic units per month.

⁴ This version of the methodology is available at:

<http://cdm.unfccc.int/UserManagement/FileStorage/CDM_AMSP4VBBO5G54RXDE9KQ6FJWMGHZLHFA5>. Last visit on: 04/06/2012.

⁵ “*Paulista*” is a kind of intermittent kiln with rectangular shape and lateral furnaces. The burning cycle with “*Paulista*” kilns comprises 6 hours to load the kiln with ceramic units, 40 hours of heating, 8 hours of firing, 24 hours of cooling, 6 hours to download, and approximately 30 minutes to clean. At *Kamiranga Ceramic*, one “*Paulista*” kiln produces approximately 43.22 tonnes of ceramic units per burning cycle, and the other “*Paulista*” kiln produces approximately 60 tonnes of ceramic units per burning cycle.

⁶ “*Hoffman*” kilns have parallel chambers where the heat from one chamber is used in the next, therefore recycling the generated heat in the previous chambers. The fuels are fed through entrances located on the top of this kiln. The

The Hoffman kiln has 30 cycles per month, producing around 78.86 tonnes of ceramic units per cycle. This totalizes 2,365.8 tonnes of ceramic units per month.

The *Paulista* kilns described on the VCS PD have 4 cycles per month, one producing around 43.22 tonnes of ceramic units per cycle, and the other one producing 60 tonnes per cycle. Thus, it totalizes 412.8 tonnes of ceramic units per month.

Since the last monitoring period, *Kamiranga* ceramic has constructed two new *Paulista* kilns that were not mentioned in the VCS PD. One of the kilns was built during the last monitored period, which corresponds to the period from 01/02/2010 to 28/02/2011. Thus, the production of this new kiln was excluded from the last monitoring period since it was not possible to perform the additionality assessment due to the lack of data⁷.

In the current monitoring period the construction of the second new *Paulista* Kiln was concluded. As the ceramic company always used exclusively renewable biomass in these new kilns, during the current monitoring period was performed the additionality assessment in order to include the production provided by these new kilns. The additionality assessment was based on the use of renewable biomass in the both new *Paulista* kilns, comparing fuel costs of the current scenario and the baseline scenario.

Regarding the Financial Barrier, a comparison was made between the cost of energy generated on the baseline scenario of *Cavalcante* Ceramic and at the current monitoring period of *Kamiranga* Ceramic, detailed in Table 01⁸.

The cost of non-renewable wood was updated according to local surveys in the Third Monitoring Report of *Cavalcante* Ceramic, a ceramic company that is located on the same city of *Kamiranga* and which is also involved in a fuel switching project with Sustainable Carbon. A conservative correction factor was applied annually for 2012 to the cost of the non-renewable biomass, in order to account for general price increases due to inflation. These surveys indicates that the costs for non-renewable biomass for the period was 260 BRL per 23 m³, resulting in 16.74 BRL/tonne.

The annual rate of increase applied on the current monitoring period for *Kamiranga* Ceramic was 6.50%⁹, once it was the highest inflation rate evidenced since the year of 2004.

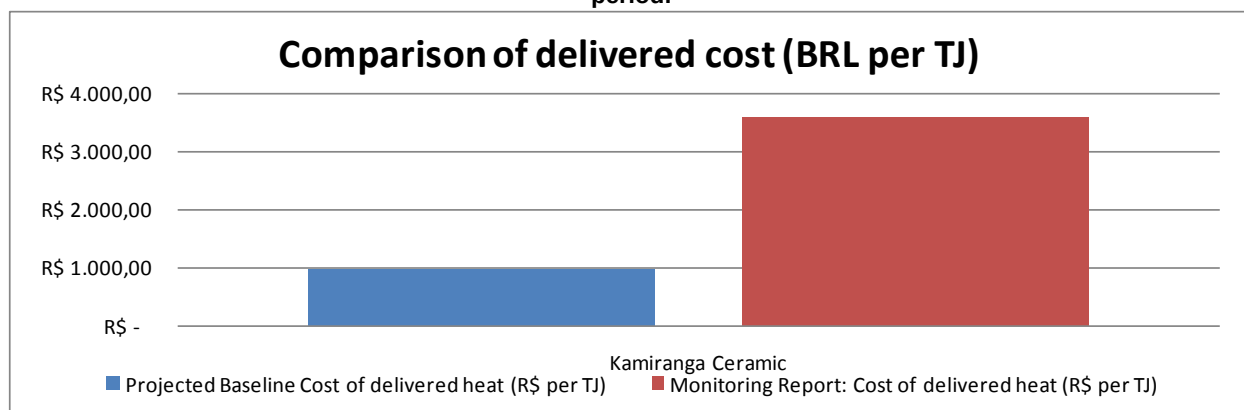
most common fuels that are used in this type of kiln are fire wood and sawdust. The burning cycle with “Hoffman” kiln comprises 1 hours to load the kiln with ceramic units, 16 hours of heating, 40 minutes of firing, few hours of cooling, 1 hours to download, and approximately 30 minutes to clean. The “Hoffman” kiln at *Kamiranga* Ceramic produces approximately 78.86 tonnes of ceramic units per burning cycle.

⁷ The ceramic units produced by the new *Paulista* kiln were excluded in the last monitored period. Proportionally, the amount of biomass employed was also decreased due to the exclusion of the new kiln.

⁸ The cost of non-renewable wood was taken from the Third Monitoring Report from *Cavalcante* Ceramic due to lack of data regarding the cost of non-renewable wood in the baseline of *Kamiranga* Ceramic.

⁹ Available at: <<http://agenciabrasil.ebc.com.br/noticia/2012-01-06/inflacao-oficial-registra-em-2011-maior-taxa-desde-2004>>.

Chart 1. Comparison between the cost of delivery heat at the projected baseline and current monitored period.



The Chart above displays the comparison of cost of delivered heat at the projected baseline scenario (year 2012) and at the current monitoring period (from 01/03/2011 to 01/04/2012). It can be observed that the non-renewable biomass is more financially attractive than using the renewable biomasses currently employed by the project activity: sawdust and *açaí* pits.

With the project activity's implementation, the fuel spending has increased, as can be verified at the Table 1 below. Comparing the cost per energy generated, *Kamiranga* ceramic spend with renewable biomass BRL 3,607.28 per TJ generated against BRL R\$ 979.57 per TJ that could be expected in case non-renewable wood was used (projected baseline scenario for 2012, considering a conservative correction of 6.50% annually). The operation of the new kilns with renewable biomass, shows to be less financially attractive due to the fact that the use of renewable biomass is more expensive than using non-renewable wood.

According to the National Institute for Space Research¹⁰¹¹, *Pará* State was responsible for almost one third of Amazon deforestation recorded in August of 2011, despite the reduction in deforestation rates evidenced in the Amazon biome from August, 2010 to July, 2011¹². The consumption of non-renewable biomass by ceramic industry was noted by several authors (UHLIG, 2008¹³; NERI, 2003¹⁴; BRITO¹⁵; BRASIL, 2001¹⁶; CARDOSO, 2008¹⁷). This was also observed in other industries, for example in

¹⁰ Instituto Nacional de Pesquisas Espaciais (INPE).

¹¹ LOURENÇO, I. Agencia brasil. **Pará foi campeão de desmatamento em agosto**. Available at: <<http://agenciabrasil.ebc.com.br/noticia/2011-10-03/para-foi-campeao-de-desmatamento-em-agosto>>. Last visited on 11/10/2012.

¹² BRASIL. Brasil.gov.br. **Desmatamento na Amazônia brasileira em 2011 apresenta menor taxa já registrada**. Available at: <<http://www.brasil.gov.br/noticias/arquivos/2011/12/6/desmatamento-na-amazonia-brasileira-em-2011-apresenta-menor-taxa-ja-registrada>>. Last visited on 11/10/2012.

¹³ UHLIG, A. **Lenha e carvão vegetal no Brasil: balanço oferta-demanda e métodos para a estimação do consumo**. 2008, 156f. Dissertação (Pós graduação em Energia) – Universidade de São Paulo. Available at: <http://www.teses.usp.br/teses/disponiveis/86/86131/tde-14052008-113901/publico/UHLIG_Tese1.pdf>. Last visited on 11/10/2012.

¹⁴ NERI, J.T. **Energia Limpa, Sustentável ou de Subsistência? Cerâmica Industrial**, Rio Grande do Norte; V, 8, n.1, 35 -6, 2003. Available at: < http://www.ceramicaindustrial.org.br/pdf/v08n01/v8n1_5.pdf>. Last visited on 11/10/2012.

¹⁵ BRITO, J.O. **O uso energético da madeira**. Available at: <http://www.scielo.br/scielo.php?pid=S0103-40142007000100015&script=sci_arttext&tlng=ES>. Last visited on 11/10/2012.

¹⁶ BRASIL. Ministério de Ciências e Tecnologias. **Levantamento da Situação e das Carências Tecnológicas dos Minerais Industriais Brasileiros**: com enfoque na mineração de: Argila para cerâmica, Barita, Bentonita, Caulim para carga, Talco / Agalmatolito e Vermiculita. Brasília, 2001. Available at: <www.cgee.org.br/atividades/redirect/1330>. Last visited on 11/10/2012.

production of steel¹⁸, which has a much better structure and internal organization when compared to ceramic factories that are generally small and family-run enterprises. BRASIL (2001)¹⁹, suggests that it is important to stimulate the miner sector, especially to respect the environment. Therefore, the statements described above evidence that the use of non-renewable wood still can be a hypothetically feasible scenario for the project activity.

¹⁷ CARDOSO, C.F.R. **Panorama do Setor Florestal: o que tem sido feito na esfera do Governo Federal**. Rio de Janeiro, 03 Set. 2008. Report presented in 1º SEMINÁRIO DE MADEIRA ENERGÉTICA, 2008.

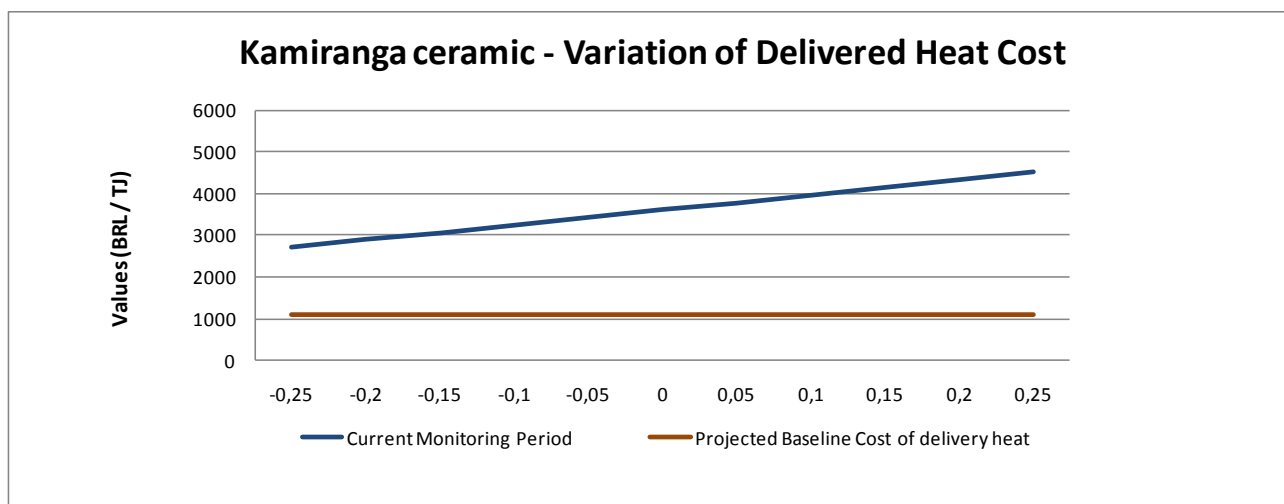
¹⁸ Instituto Observatório Social. O Aço da Devastação. Available at: <<http://www.observatoriosocial.org.br/portal/noticia/780>>. Last visited on 11/10/2012.

¹⁹ BRASIL. Ministério de Ciências e Tecnologias. **Levantamento da Situação e das Carências Tecnológicas dos Minerais Industriais Brasileiros**: com enfoque na mineração de: Argila para cerâmica, Barita, Bentonita, Caulim para carga, Talco / Agalmatolito e Vermiculita. Brasília, 2001. Available at: <www.cgee.org.br/atividades/redirect/1330>. Last visited on 11/10/2012.

Table 1. Cost of renewable biomass per energy generated at the baseline scenario and at the current monitoring period

Variation - Cost of delivered heat													
Current Monitoring Period	Renewable Biomass	Cost of delivered heat (R\$ per TJ)	-25%	-20%	-15%	-10%	-5%	0%	5%	10%	15%	20%	25%
	Açaí pits	R\$ 1,809.58	R\$ 1,357.19	R\$ 1,447.67	R\$ 1,538.15	R\$ 1,628.63	R\$ 1,719.11	R\$ 1,809.58	R\$ 1,900.06	R\$ 1,990.54	R\$ 2,081.02	R\$ 2,171.50	R\$ 2,261.98
	Sawdust	R\$ 4,383.60	R\$ 3,287.70	R\$ 3,506.88	R\$ 3,726.06	R\$ 3,945.24	R\$ 4,164.42	R\$ 4,383.60	R\$ 4,602.78	R\$ 4,821.96	R\$ 5,041.14	R\$ 5,260.32	R\$ 5,479.50
	Total	R\$ 3,607.28	R\$ 2,705.46	R\$ 2,885.82	R\$ 3,066.19	R\$ 3,246.55	R\$ 3,426.92	R\$ 3,607.28	R\$ 3,787.64	R\$ 3,968.01	R\$ 4,148.37	R\$ 4,328.74	R\$ 4,509.10

Projected Baseline Cost of delivery heat	Non-renewable wood	R\$ 979.57	R\$ 979.57	R\$ 979.57	R\$ 979.57	R\$ 979.57	R\$ 979.57	R\$ 979.57	R\$ 979.57	R\$ 979.57	R\$ 979.57	R\$ 979.57	R\$ 979.57
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None of the changes described above have significant effects on the project monitoring or on its capacity to mitigate GHG emissions. The monitoring data was kept according to the monitoring plan described in the project description document. This Monitoring Report refers to the forth monitoring period of this project and includes data from 01/03/2011 to 30/04/2012.

2.2 Deviations from the Monitoring Plan

The registered VCS PD version 2.3 establishes that the project proponent (meaning the ceramic owner) would measure the amount of renewable biomasses used (parameter $Q_{renbiomass}$). However, during the entire monitored period this parameter was monitored through all the receipts and invoices of biomass received by the ceramic industry. This means the amount of renewable biomass is measured by each provider and controlled by the ceramic owner by storing receipts and invoices.

This approach was chosen considering that it is the responsibility of the provider to measure the amount of biomass since this information needs to be available in the sale invoice or receipt. As this information is used for commercial purposes (to calculate due financial compensations), it is considered that data from the suppliers are a reliable source for this parameter.

2.3 Grouped Project

Not applicable. This is not a grouped project.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data Unit / Parameter:	EF projected fossil fuel
Data unit:	tCO ₂ /TJ
Description:	CO ₂ Emission factor of residual fuel oil
Source of data:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories. Source: http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf . Page 2.18. Table 2.3. IPCC. Visited on May 17 th . 2012.
Value applied:	77.4 tCO ₂ /TJ
Purpose of the data:	In the baseline scenario, the probable fossil fuel that would be consumed in the absence of native wood obtained through deforestation of the <i>Amazon</i> biome would be the heavy oil. This fuel is more expensive than wood, however it can be a more plausible of substitute of wood than natural gas due to risks involving natural gas distribution.
Any comment:	Applicable for stationary combustion in the manufacturing industries and construction. The fossil fuel likely to be used by similar consumers is taken the IPCC default value of residual fossil fuel. Data will be kept for

	two years after the end of the crediting period or the last issuance of carbon credits income for this project activity, whichever occurs later.
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Data Unit / Parameter:	NCV _{biomass}
Data unit:	TJ/tonne
Description:	Net Calorific Value
Source of data:	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 13/05/2012. SANTOS. E. C. S. et al. Caracterização Energética de Espécies Lenhosas Nativas da Amazônia. XXXVI Congresso Brasileiro de Engenharia Agrícola. Bonito. MS. 2007.
Value applied:	0.0182
Purpose of the data:	This value provided the energy generated by the amount of wood that would be used in the absence of the project. Some sources of data used provide the Gross Calorific Values (GCV) of the Amazon species. In order to transform the GCV to NCV, it was utilized the equation which is available at the VCS MR Calculation 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).
Any comment:	The species used to calculate the average value are typical trees of Amazon Biome that are usually utilized as fuel in the ceramic industries of the region. Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.

Data Unit / Parameter:	ρ biomass
Data unit:	tonne/m ³
Description:	Specific gravity
Source of data:	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: 04/06/2012.
Value applied:	0.67
Purpose of the data:	The species used to calculate the average value are typical trees of Amazon Biome that are usually employed as fuel in the ceramic industries of the region. The amount of wood used in the baseline was measured by volume units, so this data was used to the unity conversion.
Any comment:	The species used to calculate the average value are typical trees of Amazon Biome that are usually utilized as fuel in the ceramic industries of the region.

Data Unit / Parameter:	BF_y
Data unit:	Tonnes of native wood per tonnes of ceramic units fired
Description:	Baseline consumption of non-renewable biomass per tonnes of ceramic units produced in year y
Source of data:	Historical data from the project proponent
Value applied:	0.81
Purpose of the data:	The value was acquired through the average consumption and production of ceramic devices during the years when the ceramic used to consume non-renewable wood. This value is in accordance with the data acquired in other ceramic companies that employ the same type

	of kilns. The value was employed to calculate the real amount of wood displaced to maintain the ceramic production in the baseline scenario.
Any comment:	Values from 2004, 2005, 2006 and 2007 were applied to estimate the baseline consumption of non-renewable biomass. Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.

3.2 Data and Parameters Monitored

Data Unit / Parameter:	$Q_{renbiomass}$						
Data unit:	Tonnes per month						
Description:	Amount of renewable biomass used						
Source of data:	Measured by the biomass providers and monitored by the ceramic owner. The registered VCS PD v.2.3 establishes that the project proponent (meaning 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 which were measured by the providers.						
Description of measurement methods and procedures to be applied:	The amount of biomass was monitored in accordance to the weight or volume described in the receipts from the providers. The values in the receipts may be described in m^3, therefore it is necessary the conversion to tonnes through the specific gravity of each biomass. The specific gravity values of the renewable biomasses utilized in this project are: <table><tr><td>Biomass</td><td>Sawdust</td><td>Açaí Pits</td></tr><tr><td>Specific gravity (tonne/m^3)</td><td>0.35</td><td>0.723</td></tr></table> Sources of data: <u>Sawdust:</u> SIMIONI. F. J. Análise diagnóstica e Prospectiva da cadeia produtiva de energia de biomassa de origem florestal no planalto sul de Santa Catarina. Curitiba. 2007. Available at:	Biomass	Sawdust	Açaí Pits	Specific gravity (tonne/ m^3)	0.35	0.723
Biomass	Sawdust	Açaí Pits					
Specific gravity (tonne/ m^3)	0.35	0.723					

	<http://hdl.handle.net/1884/10294>. Last visit on: 05/06/2012. <u>Açaí Pits:</u> PADILHA et al. Avaliação do Potencial dos Caroços de Açaí para a geração de energia. Biomassa & Energia. v. 2. n. 3. p. 231-239. 2005. Available at : <http://www.renabio.org.br/arquivos/p_avaliacao_energia_8340.pdf>. Last visit on: 05/06/2012.															
Frequency of monitoring/recording:	Monthly															
Value monitored:	<table><tr><th colspan="3">Calculations of <i>Kamiranga</i> Ceramic - Renewable Biomass Monitored Data</th></tr><tr><th>Period/ Biomass</th><th>Sawdust (tonnes)</th><th>Açaí Pits (tonnes)</th></tr><tr><td>Total 2011</td><td>4,683.56</td><td>1,283.33</td></tr><tr><td>Total 2012</td><td>1,818.20</td><td>759.15</td></tr><tr><td>Total in the period (tonnes)</td><td>6,501.76</td><td>2,042.48</td></tr></table> More detailed information is available in Section 5.	Calculations of <i>Kamiranga</i> Ceramic - Renewable Biomass Monitored Data			Period/ Biomass	Sawdust (tonnes)	Açaí Pits (tonnes)	Total 2011	4,683.56	1,283.33	Total 2012	1,818.20	759.15	Total in the period (tonnes)	6,501.76	2,042.48
Calculations of <i>Kamiranga</i> Ceramic - Renewable Biomass Monitored Data																
Period/ Biomass	Sawdust (tonnes)	Açaí Pits (tonnes)														
Total 2011	4,683.56	1,283.33														
Total 2012	1,818.20	759.15														
Total in the period (tonnes)	6,501.76	2,042.48														
Monitoring equipment:	No monitoring equipment was used to determine this parameter															
QA/QC procedures to be applied:	Amount of biomass was checked according to receipts of purchase. The energy balance was verified according to the production of ceramic units (measured in tonnes). The thermal energy generated with the use of sawdust and açaí pits per tonne of ceramic devices produced during the current monitoring period was compared to the VCS PD. The thermal energy generated per tonne of ceramic pieces produced at <i>Kamiranga</i> Ceramic on the monitored period was higher than estimated on the VCS PD.															
Calculation method:	The energy generated by the amount of renewable biomass during the current monitoring period was calculated based on the Net Calorific Value of each biomass, as can be seen on the VCS MR Calculation spreadsheet.															
Any comment:	Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.															

Data Unit / Parameter:	PR _y
Data unit:	Tonnes of ceramic units fired per month

Description:	Production of ceramic units																																															
Source of data:	Controlled by the project proponent																																															
Description of measurement methods and procedures to be applied:	This parameter was monitored by the project proponent. The amount was acquired by counting the total production of the period considered. Values used for the calculations are taken from production control documents. Data was aggregated on a monthly and yearly basis. Measurements were done by an internal control notebook organized per month and daily filled according to data based on the ceramic pices that comes into the kilns.																																															
Frequency of monitoring/recording:	Monthly																																															
Value monitored:		<table><tr><th colspan="3">Production of ceramic pieces at Kamiranga Ceramic</th></tr><tr><th></th><th>Period</th><th>Kamiranga production (tonnes)</th></tr><tr><td rowspan="11">2011</td><td>March</td><td>2,192</td></tr><tr><td>April</td><td>1,883</td></tr><tr><td>May</td><td>1,991</td></tr><tr><td>June</td><td>2,053</td></tr><tr><td>July</td><td>1,982</td></tr><tr><td>August</td><td>1,963</td></tr><tr><td>September</td><td>2,034</td></tr><tr><td>October</td><td>2,133</td></tr><tr><td>November</td><td>1,933</td></tr><tr><td>December</td><td>1,219</td></tr><tr><td></td><td>Total 2011</td><td>19,385</td></tr><tr><td rowspan="5">2012</td><td>January</td><td>3,911</td></tr><tr><td>February</td><td>3,779</td></tr><tr><td>March</td><td>3,931</td></tr><tr><td>April</td><td>3,640</td></tr><tr><td></td><td>Total 2012</td><td>15,261</td></tr><tr><td colspan="2">Total Monitoring Period</td><td>34,645</td></tr></table>		Production of ceramic pieces at Kamiranga Ceramic				Period	Kamiranga production (tonnes)	2011	March	2,192	April	1,883	May	1,991	June	2,053	July	1,982	August	1,963	September	2,034	October	2,133	November	1,933	December	1,219		Total 2011	19,385	2012	January	3,911	February	3,779	March	3,931	April	3,640		Total 2012	15,261	Total Monitoring Period		34,645
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Monitoring equipment:	No monitoring equipment was used to determine this parameter. Production was counted by trained personnel on theceramic company.																																															
QA/QC procedures to be applied:	Data concerning PR _y measurement points are from an internal control notebook used by Kamiranga Ceramic. This notebook was organized per month and daily filled according to data based on ceramic units burned in the kilns.																																															
Calculation method:	The ceramic industry has an internal control of the quantity of ceramic units produced. It was rechecked according to the biomass employed																																															

	in the ceramic kilns. As described on the VCS PD version 2.3, during the validation process the production at <i>Kamiranga Ceramic</i> encompassed two <i>Paulista</i> kiln and one Hoffman kiln. These kilns produced, together, around 2,780 tonnes of ceramic units per month. The Hoffman kiln has 30 cycles per month, producing around 78.86 tonnes of ceramic units per cycle. This totalizes 2,365.8 tonnes of ceramic units per month. The <i>Paulista</i> kilns described on the VCS PD have 4 cycles per month, one producing around 43.22 tonnes of ceramic units per cycle, and the other one producing 60 tonnes per cycle. Thus, it totalizes 412.8 tonnes of ceramic units per month. Since the last monitoring period, <i>Kamiranga ceramic</i> has constructed two new <i>Paulista</i> kilns that were not mentioned in the VCS PD. One of the kilns was built during the last monitored period, which corresponds to the period from 01/02/2010 to 28/02/2011. Thus, the production of this new kiln was excluded from the last monitoring period since it was not possible to perform the additionality assessment due to the lack of data²⁰. In the current monitoring period the construction of the second new <i>Paulista</i> Kiln was concluded. As the ceramic company always used exclusively renewable biomass in these new kilns, during the current monitoring period was performed the additionality assessment in order to include the production provided by these new kilns. The additionality assessment was based on the use of renewable biomass in the both new <i>Paulista</i> kilns, comparing fuel costs of the current scenario and the baseline scenario.
Any comment:	Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.

Data Unit / Parameter:	Origin of renewable biomass
Data unit:	Not applicable
Description:	Renewable origin of the biomass
Source of data:	Controlled by the project proponent
Description of	This information was given by the biomasses providers. The

²⁰ The ceramic units produced by the new *Paulista* kiln were excluded in the last monitored period. Proportionally, the amount of biomass employed was also decreased due to the exclusion of the new kiln.

measurement methods and procedures to be applied:	guarantee of acquiring renewable biomass was achieved by invoices from the providers. As stated in the Section 2.2 of VCS PD version 2, the biomasses (sawdust and açaí pits) are considered renewable as fulfilling the options described in the methodology applied.
Frequency of monitoring/recording:	Annually.
Value monitored:	Not applicable.
Monitoring equipment:	No monitoring equipment was used to determine this parameter.
QA/QC procedures to be applied:	The biomasses were considered renewable as they were in accordance with the definition given by the Annex 18. EB 23 of UNFCCC ²¹ .
Calculation method:	Not applicable
Any comment:	All the renewable biomasses utilized in the monitoring period were already described in the VCS PD v.2.3 and are in accordance with definitions of renewable biomass set in the applied methodology. Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.

Data Unit / Parameter:	Renewable biomass surplus
Data unit:	Tonnes or m ³
Description:	Amount of renewable biomass available
Source of data:	Monitored
Description of measurement methods and 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. The bibliographic references are described on the section 4.3 “Leakage”.
Frequency of monitoring/recording:	Annually

²¹ CDM – Executive Board. Annex 18 definition of renewable biomass. EB 23. Available at: < http://cdm.unfccc.int/EB/023/eb23_repan18.pdf>. Last visited on 21/05/2012.

Value monitored:	Biomass	Surplus	Year
	Açaí pits in tonnes	90,973	2008
	Sawdust in m ³	1,999,833	2007
Detailed information in Section 4.3.: "Leakage".			
Monitoring equipment:	No monitoring equipment is used to determine this parameter.		
QA/QC procedures to be applied:	Data available regarding the ceramic industries fuel consumption was employed to monitor the leakage		
Calculation method:	The amount of biomass used by the project activity in each year of the crediting period is compared to total biomass available, as estimated on the VCS PD.		
Any comment:	Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.		

Data Unit / Parameter:	Leakage of non-renewable biomass
Data unit:	tCO ₂ e
Description:	Leakage resulted from the non-renewable biomass
Source of data:	Monitored
Description of measurement methods and procedures to be applied:	The three sources of leakages predicted in the 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). Please see Section 4.3: "Leakage".
Frequency of monitoring/recording:	Annually
Value monitored:	0
Monitoring equipment:	No monitoring equipment is used to determine this parameter.
QA/QC procedures to be applied:	Data available regarding the ceramic industries fuel consumption were utilized to monitor the leakage.
Calculation method:	Not applicable.
Any comment:	Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.

Data Unit / Parameter:	$f_{NRB,y}$
Data unit:	Fraction of biomass or percentage
Description:	Fraction of biomass (wood) used in the absence of the project activity in year y that can be established as non-renewable biomass using survey methods
Source of data:	Survey methods
Description of measurement methods and procedures to be applied:	Before the project activity, wood from areas without forest management was offered with low prices and high viability to the ceramic facility owner. Thus, the totality of fuel employed in the baseline scenario is from non-renewable origin. However, according to SOCIOAMBIENTAL (2010)²² the Amazon 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 60 m³ of wood per hectare in Amazon biome²³. Therefore, the amount of non-renewable woody biomass available at Amazon biome is around 26.808.826.464 m³. Considering that 0.0089% of this biome has been saved by other project activities²⁴. Thus, the fraction of non-renewable biomass is around: 100% - (10.75% + 0.0089%) = 89.24%. 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 Amazon biome. The other sheet calculates the amount of wood consumed regarding only <i>Kamiranga</i> Ceramic. Dividing these values by the total of wood available, it was achieved the amount of renewable biomass that has been saved by all the

²²SOCIOAMBIENTAL. Instituto Socioambiental, 2010. Unidades de Conservação na Amazônia Legal. Available at: <http://www.socioambiental.org/uc/quadro_geral>. Last visit on: 11/04/2011.

²³ Source: Brazilian Environment Ministry, Normative Instruction nº 6 of 2006. Available at: <http://www.carvaomineral.com.br/abcm/meioambiente/legislacoes/bd_carboniferas/geral/in_06-2006_mma_n.pdf>. Last visit on: 21/05/2012.

²⁴ According to data from project activities at Sustainable Carbon Company. Available at: <http://mc.markit.com/br-reg/public/index.jsp?p=&r=100000000000007&u=&scolumn=project_name&sdir=ASC&s=cp&q=>>. Last visit on: 21/05/2012.

	project activities, or only by <i>Kamiranga Ceramic Fuel Switching Project</i>, respectively.²⁵ 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.
Frequency of monitoring/recording:	Annually
Value monitored:	89.24%
Monitoring equipment:	No monitoring equipment was used to determine this parameter.
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 Amazon biome. Wood saved from projects to which the same methodology was applied, which are in the same biome and that were developed by <i>Sustainable Carbon – Projetos Ambientais Ltda</i> was considered in this fraction²⁶. CDM or VCS registered projects were also included in this fraction if placed in the same region and developed with the same methodology. Moreover the amount of non-renewable biomass applied in the project activity were monitored monthly and were considered in the value of $f_{NRB,y}$ parameter.
Calculation method:	Not applicable.
Any comment:	Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.

3.3 Description of the Monitoring Plan

The monitoring is done with the aim of determining the most approximate quantity of non-renewable wood that in the absence of the project, would be used in the ceramics' kilns and consequently the amount of GHG that would be emitted in tonnes of CO₂e. Section 3.2 describes data and parameters monitored, as well as the procedures involved on the monitoring plan.

²⁵ According to data from project activities at Sustainable Carbon Company. Available at: < http://mc.markit.com/br-reg/public/project.jsp?project_id=100000000000131>. Last visit on: 21/05/2012.

²⁶ Document available at: <<http://mc.markit.com/br-reg/public/index.jsp?s=cp>> Last visit on: 05/06/2012.

Ceramic personnel are responsible to monitor the operating conditions on the factory, including the amount of renewable biomass consumed and the monthly production of ceramic devices (parameters $Q_{\text{renbiomass}}$ and PR_y). Ceramic personnel are also responsible to store invoices, receipts of sales and other documents related to purchase or acquisition of biomass.

Based on this information, Sustainable Carbon is responsible to assess if the biomasses are from renewable origin, to evaluate if there is a surplus of renewable biomass and to calculate emission reductions, including an assessment of leakage emissions and the determination of parameter $f_{\text{NRB},y}$. Sustainable Carbon also assists the Ceramic personnel to double check the monitored data on biomass consumption and ceramic devices production. No internal auditing was performed on data related to this monitoring period. Non-conformities identified in the double check procedures are clarified between Sustainable Carbon technical team and the monitoring responsible on the ceramic during site visits for data collection, by reassessing existing documents and sources of information.

The responsible for the monitoring plan are *Mr. Gleydson Moura and Mr. Sigifério Alves de Oliveira*, from *Kamiranga* ceramic. Sustainable Carbon technical team (including those members described on Section 1.3) was also involved in the project monitoring.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Baseline emissions are estimated following procedures of the applied methodology: AMS-I.E.: Switch from Non-Renewable Biomass for Thermal Applications by the User – Version 01, valid from 01/02/2008 to 08/04/2010²⁷. The project activity in the current monitoring period (14 months) generated 66.73 TJ per year. Converting this number to MWh it was generated 18,535.64 MWh per year, which corresponds to the use of 2.12 MW_{thermal}. This is less than the limits of 45 MW_{thermal} for Type I Small scale project activities.

Baseline

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

Where:

ER_y : Emission reductions during the year y in tCO₂e

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

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

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

²⁷ Available at: This version of the methodology is available at: http://cdm.unfccc.int/UserManagement/FileStorage/CDM_AMSP4VBBO5G54RXDE9KQ6FJWMGHZLHFA5. Last visited on 25/05/2012.

$EF_{\text{projected fossil fuel}}$: Emission factor for the projected fossil fuel consumption in the baseline in tCO_2/TJ^{28} .

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

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

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

Where:

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

η_{old} : Efficiency of the system being replaced

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

Where:

SGE: Specific energy which has to be generated in the process to produce a certain amount of ceramic pieces in TJ/thousands of ceramic pieces.

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

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

Where:

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

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

Where:

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

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

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

As shown in the calculations above, the η_{old} is not required to calculate the Emission Reductions, thus it was excluded.

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

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

²⁸ The fossil fuel likely to be used by similar consumers is taken the IPCC default value of residual fossil fuel.

Table 2. Baseline emissions for *Kamiranga* ceramic.

	Period	Baseline emissions (tCO ₂ e)
2011	March	2,231
	April	1,917
	May	2,027
	June	2,090
	July	2,018
	August	1,999
	September	2,071
	October	2,172
	November	1,967
	December	1,241
	Total 2011	19,733
2012	January	3,982
	February	3,847
	March	4,002
	April	3,706
	Total 2012	15,537
Total Monitoring Period		35,270

4.2 Project Emissions

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

4.3 Leakage

Leakage is estimated as 0 (zero) tCO₂e during the entire monitoring period.

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

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

The leakage from biomass projects, like this project activity, should also be estimated according to the “General guidance on leakage in biomass project activities²⁹” (attachment C of appendix B) of Indicative Simplified Baseline and Monitoring Methodologies for Selected Small-Scale CDM Project Activity

²⁹ Document available at:

<http://cdm.unfccc.int/methodologies/SSCmethodologies/AppB_SSC_AttachmentC.pdf>. Last visit on 21/05/2012.

Categories, which identifies different emission sources based on the type of biomass considered (described in the table below).

Table 3. Sources of leakage according to the type of the biomass

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

Observing table 3 the possible sources of leakage of the present project activity is the competing use of biomass residues, such as sawdust and açai pits. All of these biomasses have enough availability as showed below, demonstrating the lack of leakage for each biomass.

Forest Residues (Sawdust)

Forest Residues are used for the ceramic devices burning. The production of wood generates a large amount of residues, which can be reused to generate thermal energy. As can be observed in the Figure 2, the potential of energy generation in the State of Pará is high, which means that there is an enormous availability of this kind of fuel to be employed in the project activity. This way, this biomass does not have potential to generate leakage emissions due to its high availability.

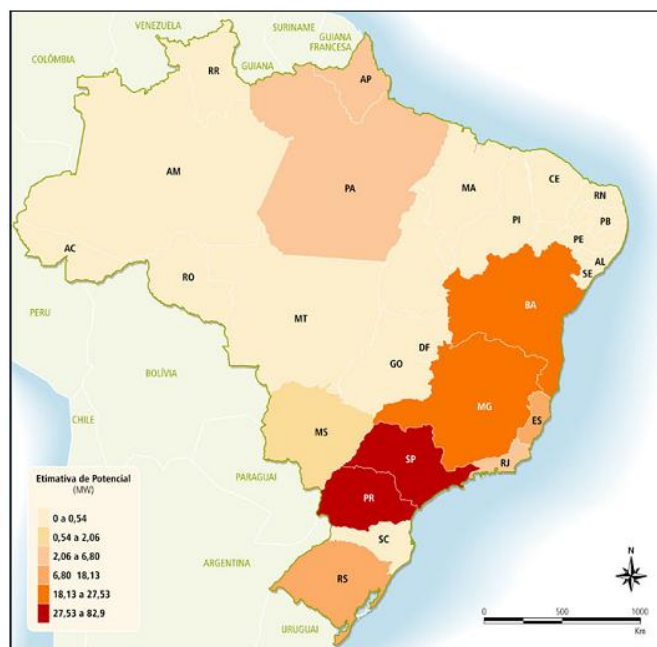


Figure 2. Forest Residues Potential for Energy Generation³⁰

Considering that around 22% of the wood produced generates sawdust³¹. The production of wood in the State of Pará (PA) was of 9,090,150 m³³² in 2007. Thus, the production of sawdust was around 1,999,833 m³ per year.

During the current monitoring period, the project activity employed around 5,572.94 tonnes (or 15,922.67 m³) of sawdust per year representing 0.80% of the total of these residues generated in the State of Pará. This way this renewable biomass did not have potential to generate leakage emissions due to its high availability.

Açaí pits

In terms of açaí pits, the State of Pará is the largest 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

³⁰ Source: CENTRO NACIONAL DE REFERÊNCIA EM BIOMASSA - CENBIO. Panorama do potencial de biomassa no Brasil. Brasília; Dupligráfica, 2003. 80 p. apud ELETROBRÁS 1º Fórum Capixaba de Energia <<http://www.aspe.es.gov.br/PALESTRAS/Renata%20Falc%C3%A3o%20-%20Energias%20Renov%C3%A1veis-Vit%C3%B3ria%20Final.pdf>> Last visit on 21/05/2012.

³¹ 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.

³² According to IBGE (Geographic and Statistic Brazilian Institute). Available at: <<http://www.sidra.ibge.gov.br/bda/extveg/default.asp?t=2&z=t&o=18&u1=1&u3=1&u2=15>>. Last visited on 21/05/2012.

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 destination³³.

The production of açaí in the State of Pará in the year of 2008 was 107.028 tonnes³⁴. The pit corresponds to 85% of the weight of açaí³⁵; therefore the açaí pit production was around 90,973 tonnes in the year of 2008.

Kamiranga ceramic employed approximately 1,750.7 tonnes of açaí pits per year representing around 1,92% of the total of the amount produced. Therefore, the project activity did not disturb in any aspects the availability of this biomass, once there is plenty of it available.

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:

- 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 were not be applicable as the project activity did 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 currently great amount of renewable biomasses available locally as described before. The non-renewable biomass that would be utilized in this project activity was not saved for other project activity, since other ceramic companies were already consuming wood from non sustainable forest management (common practice).

³³ 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 21/05/2012.

³⁴ Available at: <<http://www.sidra.ibge.gov.br/bda/extveg/default.asp?t=2&z=t&o=18&u1=1&u3=1&u2=15>>. Last visit on: 21/05/2012.

³⁵ Source: <<http://minhasfrutas.blogspot.com/2008/12/importancia-economica-do-aai.html>>. Last Visit on: 21/05/2012.

With the implementation of the project activity, *Kamiranga* Ceramic avoided the consumption of non-renewable wood, helping the conservation of the Amazon Rainforest in Amazon 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.*

The leakage is not applicable for this project activity in *Kamiranga* Ceramic as there is no transference of equipment.

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

Table 4. Production – $Q_{\text{renbiomass}}$ - QA/QC Procedure

	VCS PD	Monitoring Period
Production of ceramic pieces at <i>Kamiranga</i> Ceramic (tonnes of ceramic pieces)	38,920	34,803
Sawdust (tonnes)	4,676.00	6,501.76
<i>Açaí</i> pits (tonnes)	0.00	2,042.48
Thermal Energy generated (TJ)	39.15	77.85
Thermal energy per tones of ceramic pieces produced (TJ/tonnes of ceramic pieces)	0.001	0.002

As can be verified on Table 4, the thermal energy generated with the use of renewable biomass per tonne of ceramic units produced during the current monitoring period was higher than estimated on the VCS PD.

Therefore, based on Category AMS-I.E: Switch from Non – Renewable Biomass for Thermal Application by the User (Version 01. valid from February 01st. 2008 to April 08th. 2010) this project activity contributes to sustainable development once the ceramic company is using renewable biomass and applying the SOCIALCARBON methodology.

4.4 Summary of GHG Emission Reductions and Removals

Table below summarizes the emission reductions for this monitoring period³⁶.

Table 5. Emission reductions for the monitoring period.

	Period	PR _y (units)	By (tonnes)	ER _y (tCO ₂ e)
2011	March	2,192	1,775	2,231
	April	1,883	1,525	1,917
	May	1,991	1,613	2,027
	June	2,053	1,663	2,090
	July	1,982	1,605	2,018
	August	1,963	1,590	1,999
	September	2,034	1,648	2,071
	October	2,133	1,728	2,172
	November	1,933	1,565	1,967
	December	1,219	988	1,241
	Total 2011	19,385	15,702	19,733
2012	January	3,911	3,168	3,982
	February	3,779	3,061	3,847
	March	3,931	3,184	4,002
	April	3,640	2,948	3,706
	Total 2012	15,261	12,361	15,537
Total Monitoring Period		34,645	28,063	35,270

³⁶ Emission reductions are equal to the baseline emissions, since there are no project emissions according to the applied methodology and since leakage emissions are estimated at zero tCO₂e.

5 ADDITIONAL INFORMATION

5.1 5.1 Amount of renewable biomass consumed per month on *Kamiranga* ceramic

Table 6. Amount of renewable biomass used by *Kamiranga* Ceramic.

Calculations of <i>Kamiranga</i> Ceramic - Renewable Biomass Monitored Data			
Period/ Biomass		Sawdust (tonnes)	Açaí Pits (tonnes)
2011	March	390.47	0.00
	April	117.16	0.00
	May	288.56	180.75
	June	529.32	180.75
	July	366.77	180.75
	August	617.27	198.83
	September	360.19	180.75
	October	483.75	180.75
	November	998.99	180.75
	December	531.08	0.00
Total 2011		4,683.56	1,283.33
2012	January	504.44	289.20
	February	216.05	343.43
	March	493.79	0.00
	April	603.92	126.53
Total 2012		1,818.20	759.15
Total in the period (tonnes)		6,501.76	2,042.48