Voluntary Carbon Standard
Project Description Template

19 November 2007

April 17th, 2009

Contents

1 Description of Project:

1.1 Project title

Cavalcante Ceramic fuel switching project
Version 04
PDD completed in: April 17th, 2009

1.2 Type/Category of the project

The voluntary project activity, although being applied at the voluntary market, encloses the following category of the simplified modalities and procedures, which is described in appendix B, for small scale type I CDM project activities.

- **Category AMS-I.E: Switch from Non – Renewable Biomass for Thermal Application by the User** – Version 01 from February 01 of 2008 onwards.
- This project is not a grouped project.

This category comprises small thermal appliances that displace the use of non-renewable biomass by introducing new renewable energy end-user technologies.

1.3 Estimated amount of emission reductions over the crediting period including project size:

The amount of emission reductions are greater than 5,000 tonnes of CO2 equivalent and less than 1,000,000 tonnes of CO_2 equivalent, thus classifying as a project under the VCS 2007 size groups (micro project, project, mega project).

Table 1. Emission reductions estimate during the crediting period.

Year	**Annual estimate of emission reductions per ton of CO2equ**
2007	17,800
2008	17,800
2009	22,935
2010	24,646
2011	24,646
2012	24,646
2013	24,646
2014	24,646
2015	24,646
2016	24,646
Total of estimate reductions (tonnes of CO2equ)	**231,058**
Number of years of the crediting period	10
Annual average of estimate reductions for the 10 year crediting period (tonnes of CO2equ)	**23,106**

1.4 A brief description of the project:

Cavalcante Ceramic, the project proponent, is a red ceramic industry that produces bricks for the surrounding market of *São Miguel do Guamá*, *Pará* State. Before the project activity implementation, the fuel employed to fire the ceramic devices was native wood from the Amazonian biome.

The project activity consists on utilizing sawdust to feed the kilns other than using native wood from the Amazonian biome which was a pioneer practice in the region. In the absence of the project this biomass would be anaerobically decaying in open dumps. The use of *açaí* pits and rice husk also can be used and are considered a complementary source of fuel, which will be implemented in the harvest period of the year. *Açaí* is a typically consumed fruit in the state of *Pará*. The rice husk is a renewable biomass that presents a shorter renewal cycle. Any other biomass can be used in the process once its renewability can be verified.

This fuel exchange could only be feasible when considering the carbon credits incomes, since there were considerable investments in order to adapt the machineries so they can operate with the new biomass and new equipments were purchased. This project represents a great risk to the ceramic once there was not much knowledge when handling the new biomass and other barriers were also considered.

The plant used to consume about 20,280 m³ of native wood from Amazonian biome per year to feed the kilns and maintain a temperature of 900°C for an average of 36 hours producing around 1,300,000 devices per month. After the beginning of April 2009, the ceramic industry will raise its production to 1,800,000 devices per month, this way, the ceramic will be burning 5 cycles per month in each kiln.

The switching fuel project in *Cavalcante* Ceramic will reduce greenhouse gases and then, by substituting the native firewood by sawdust for thermal energy generation used on the ceramic firing process. The sawdust originated in legal reforestation areas is a renewable biomass that presents a shorter renewal cycle when compared to the native firewood cycle, which is a non-renewable biomass and will not be used in the project activity. In case of lack of this biomass, the project proponent can use açaí, rice husk or elephant grass as renewable biomass.

1.5 Project location including geographic and physical information allowing the unique identification and delineation of the specific extent of the project:

The *Cavalcante* Ceramic Company is located in the city of *São Miguel do Guamá*, *Pará* state, north of Brazil, which is indicated in Figure 01. The project site has the following postal address:

- *Cavalcante* Ceramic

  Rodovia BR 010 – km 1811 – Bairro Industrial
  Postal code 68660 000
  São Miguel do Guamá – Pará, Brazil.
  GPS project boundaries: 1°34'38.81"S and 47°29'55.57"W

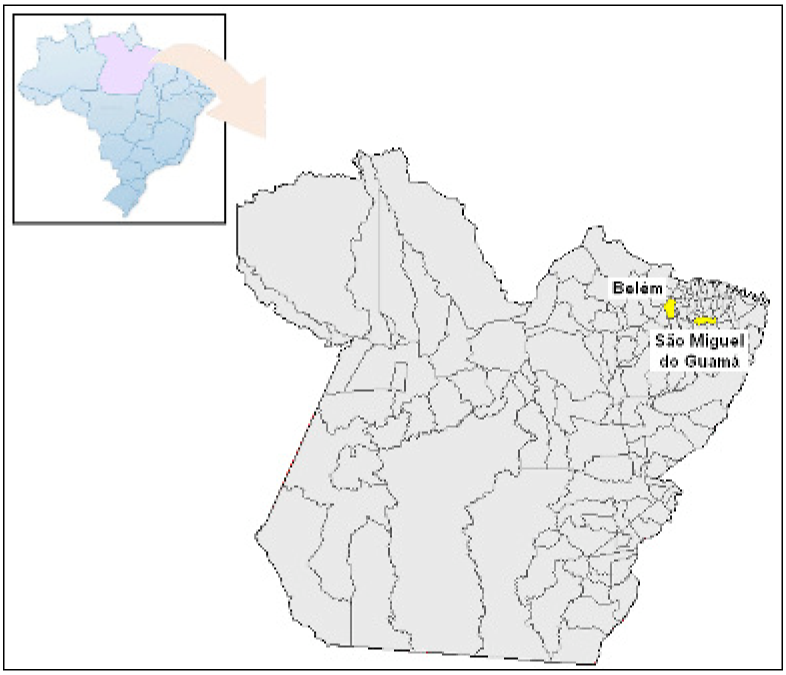

Figure 1. Geographic location of the city of the project activity that has the following coordinates: 01º 37’ 09.22’’ S 47º 28’ 33.68’’ W.

1.6 Duration of the project activity/crediting period:

- Project start date[1]: December 1st,2004
- Crediting period start date[2]: January 1st,2007
- Date of terminating the project[3]: 31st December 2017
- VCS project crediting period: 10 years, twice renewable

1.7 Conditions prior to project initiation:

The use of native wood from areas without reforestation activities is a common practice in the ceramic industries. Wood from deforestation is delivered and was utilized in the ceramic facilities and this non-renewable biomass was offered with low prices.

The plant used to consume about 20,280 m³ of native wood from Amazonian biome per year to feed the kilns and maintain a temperature of 900°C for an average of 36 hours producing around 1,300,000 devices per month. After the beginning of April 2009, the ceramic industry will raise its production to 1,800,000 devices per month. The switching fuel project in *Cavalcante* Ceramic will reduce greenhouse gases and then, by substituting the native firewood by sawdust for thermal energy generation used on the ceramic firing process. The sawdust originated in legal reforestation areas is a renewable biomass that presents a shorter renewal cycle when compared to the native firewood cycle, which is a non-renewable biomass and will not be used in the project activity.

Although the project activity focuses on the use of sawdust as renewable biomass for energy supply, the ceramic also can use açaí pits and rice husk which have availability in the region.

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[1] *Date on which the project began reducing or removing GHG emissions, i.e. when the project developer began employing renewable biomass.*

[2] *Earliest credit start date under the VCS 2007.*

[3] *Date on which the project completes 10 years after the date on which the project proponent completed the fuel switch.*

1.8 A description of how the project will achieve GHG emission reductions and/or removal enhancements:

The emission reductions will be achieved by displacing the use of wood from areas with no sustainable forest management that provide thermal energy in the ceramic companies. Therefore, the emissions launched during the combustion of wood are not compensated by any replanting activity. An opposite scenario occurs with the renewable biomasses employed in this project activity.

1.9 Project technologies, products, services and the expected level of activity:

In *Cavalcante's* Ceramic burning process there are 6 "*Paulistinha*[4]" kilns with 2 chambers each, in order to dry and cook their products. Each chamber has 7 entrances through which the biomass is fed. These kilns are commonly employed in Brazil to burn bricks and roofs.
In the project activity, *Cavalcante* Ceramic consumes around 604.5 tonnes per month of sawdust to feed its kilns to obtain an approximate temperature of 900°C with a burning cycle of 36 hours, in order to sustain the production of 1,300,000 ceramic devices per month, this way the efficiency is 0.465 tonnes of sawdust per thousand of ceramic devices produced.

Cavalcante Ceramic burns approximately 43 kilns per month with 30,000 ceramic devices each, consuming approximately 0.465 tonnes of sawdust per burning cycle. The burning cycle comprises 24 hours to load the kiln with ceramic devices, approximately 36 hours to warming and burning together, 72 hours to cooling another 24 hours to download and approximately 30 minutes to clean, but the cleaning is sporadically done. These values may change since the ceramic will seek a more efficient process.

Table 2. Technical parameters of "Paulistinha" and "Round" kilns.

Technical Parameter	Paulistinha
Consumption of sawdust (ton per thousand of devices)	0.465
Consumption of firewood (m^3 of wood per thousand of devices)	1.3
Features	Intermittent with rectangular shape and lateral furnaces
Maximum Temperature	900°C
Average production per burning cycle (thousand of ceramic devices)	30,000
Average supposed capacity of each kiln (MW)	2.72
Hours of burning	36

The sawdust employed in the project activity will be acquired from legal saw mills (identified in the website of the Environmental Information System of *Pará* State – http://www.sectam.pa.gov.br/seiamlic/)[5]. The enterprises listed

[4] *The "Paulistinha" is a kind of intermittent kiln with rectangular shape and lateral furnaces. It is usually employed to burn roofs.*

[5] *Environmental Information System of the state of Pará. According to Environmental Legislation of the State of Pará, the industries which use forested*

in this website have all the necessary licenses which ensures that the saw mills utilize wood from areas with sustainable forest management. In order to avoid the consumption of non-renewable sawdust, the amount of carbon credits will be calculated based only in the amount of biomasses described in receipts from the legal saw mills of *Pará* state.
In case of lack of this biomass, the project proponent can use açaí, rice husk or elephant grass.
The forest residues (sawdust) are resulted from wood manufacturing, considering that around 22% of the wood produced will generate sawdust[6].

Ceramic owner showed also interest in elephant grass. Currently, elephant grass has been acquiring national importance as biomass to generate thermal energy due to its high productiveness and easy adaptation in almost all climate and soil Brazilian conditions. Due to the project activity, a set of adaptations were necessary, such as alterations to the furnaces and other machineries as well as the construction of a shed where the biomass must be stored so the ceramic can operate with the sawdust and the other auxiliary biomasses. Julio de Seixas is in charge of reselling the sawdust from Cikel – Brasil Verdes Madeiras LTDA. which has Forest Stewardship Council(<www.fsc.org>) certification of it management plan, as it says in their website: <http://www.cikel.com/>

Table 3. Main biomasses provider.

Biomass	Provider	Location
Sawdust	*CIKEL – Brasil Verdes Madeiras – Delivered by Julio de Seixas Campos LTDA.*	*Belém – PA*
	Marcenaria São Francisco LTDA	*Belém – PA*
	GL Ind. Com. Exportação e Transporte Ltda – EPP	*Belém – PA*
	Madeireira Canaã LTDA	*Benevides – PA*
	Industria Furlaneto e Exportação LTDA	*Santa Bárbara do Pará – PA*
	Rondobel Industria e Comercio de Madeiras LTDA	*Belém – PA*
	M. D. M. Silva	*Belém – PA*
	Hadex	*Benevides – PA*
	Unitex	*Marituba – PA*

The following figures show some of the new technology employed.

material raw have to ensure the sustainable management of their forested resources to be able to get their licenses. More information available at: <http://www.belem.pa.gov.br/semma/paginas/Lei-5_887.htm>. Visited in January 19^{th}, 2009

[6] *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.*

Figure 2. Shed where the sawdust is stored at *Cavalcante* Ceramic.

Figure 3. "*Paulistinha*" Kiln and mechanic burners at *Cavalcante* Ceramic.

1.10 Compliance with relevant local laws and regulations related to the project:

This project is in accordance to the CONAMA[7] Resolution, no. 237/97 which establishes that clay extraction activities and ceramic production must be supported by specific licenses, such as operational license, clay extraction license, environmental licenses and the permission of the local government which must run under the valid time.

The project is also in accordance to Federal Constitution, Article 20, which establishes the payment of a Financial Compensation by the Mineral Resources Exploitation. This financial compensation is annually performed to DNPM[8] (National Department of Mineral Production).

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[7] *CONAMA – Brazilian National Environment Council*

[8] *The objectives of the National Department of Mineral Production are: to foster the planning and promotion of exploration and mining of mineral resources, to supervise geological and mineral exploration and the development of mineral technology, as well as to ensure, control and monitor the exercise of mining activities throughout the national territory, in accordance with the Mining Code, the Mineral Water Code and respective legislation and regulations that complement them. Source: <http://www.dnpm.gov.br/enportal/conteudo.asp?IDSecao=168&IDPagina=222>. Last visit in: January 15th, 2008*

1.11 Identification of risks that may substantially affect the project's GHG emission reductions or removal enhancements:

- **Price of the renewable biomasses**

The thermal energy generation through the combustion of biomasses is an innovation in the ceramic industry. The future demand of this alternative fuel (e.g. by other consumers) is not easy to foresee. There is currently a great amount of these types of biomasses available locally, however, it is possible that the demand and the prices will increase. If this scenario occurs, the project approval will make the continuous use of renewable biomasses feasible.

- **Availability of the renewable biomasses**

The current great amount of the biomasses available locally was already described herein, however if a non-foreseeable reason affect the availability of the biomasses, the ceramic owner will search for other type of renewable biomasses, such as açaí pits, rice husk and elephant grass, which will requires high investments.

1.12 Demonstration to confirm that the project was not implemented to create GHG emissions primarily for the purpose of its subsequent removal or destruction.

The historical of *Cavalcante's* activities using native wood as fuel clearly confirms the project was not implemented to create GHG emissions for the purpose of its subsequent removal or destruction.
Cavalcante ceramic uses native wood to generate thermal energy in order to cook ceramic devices in its kilns for 20 years. This is evidence that guarantees the integrity of this project activity.

1.13 Demonstration that the project has not created another form of environmental credit (for example renewable energy certificates.

This project is not creating any other form of environmental credit under any specific program. Social Carbon Methodology is being applied only as a Sustainability tool in association with VCS 2007 standard.

1.14 Project rejected under other GHG programs (if applicable):

This project was not rejected under any formal GHG reduction or removal program. The project report was produced to make the project public and available to voluntary measures or other opportunities of the carbon market.

1.15 Project proponents roles and responsibilities, including contact information of the project proponent, other project participants:

Project Proponent

The project proponent has contributed to the current report by assigning the following roles and responsibilities to two members of its team:

Mrs. *Maria Conceição dos Santos e Silva*, Monitoring data responsible: General data, information on inputs and outputs of the ceramic, detailed information and numbers on sales, how output data is handled and how data is stored and kept by the *Cavalcante's* office.
Mr. José Vandick, Director: Information and visit of the ceramic, detailed information on process and production lines, environmental challenges, technological challenges, research and development history and ceramic devices market challenges.

Project Developer

Social Carbon Company: Project participant, project idealizer and responsible to prepare the project report and to accompany the proponent until the end of the crediting period.

Other information on the project's proponent:
Address: *Rodovia BR 010 – km 1811 – Bairro Industrial, São Miguel do Guamá – Pará, Brazil*
Postal Code: *68660-000*
Phone number: +55 (91) 3446-1184

As the project authorized contact, Social Carbon Company was given the responsibility of preparing the present project report and to accompany the proponent until the end of the crediting period. The assessors involved are:
Rafael Ribeiro Borgheresi, Technical Analyst: Project Design Document writer, elaboration of GHGs Emissions' Inventory, direct contact between Social Carbon Company and the ceramic and responsible for collecting necessary information.
Coordinated by: Flávia Yumi Takeuchi, Technical Coordinator.

Other information on the project's developer's contact:
Address: R. Borges Lagoa, 1065 – Conj. 146 – Vila Clementino
Postal Code: 04038 032
São Paulo – SP, Brazil
Phone number: +55 (11) 5083-3252
Web site: http://www.socialcarbon.org
Email: rborgheresi@cantorco2e.com.br
ftakeuchi@cantorco2e.com.br

1.16 Any information relevant for the eligibility of the project and quantification of emission reductions or removal enhancements, including legislative, technical, economic, sectoral, social, environmental, geographic, site-specific and temporal information):

The project is eligible according to:

- Legislative: the project attends all legal requirements;
- Technical: alterations/adaptations required are technically feasible;
- Economic: carbon credits will make the project feasible;
- Sectoral: incentive of good practices to the sector;
- Social: social carbon methodology will be applied which will improve long term sustainability. The culture of burning wood as fuel will be slowly mitigated;
- Environmental: the project attends all legal requirements and no environmental impacts are predicted;
- Geographic/site specific: the plant can be uniquely geographically identified with no barriers regarding logistic;
- Temporal information: the project will not double count the GHG emissions during the ten years renewable of the crediting period.

However there is no information relevant for its eligibility which is not already described in this VCS PD.

1.17 List of commercially sensitive information (if applicable):

None of the information disclosed to the validator was withheld from the public version of the report.

2 VCS Methodology:

2.1 Title and reference of the VCS methodology applied to the project activity and explanation of methodology choices:

- ***Category AMS-I.E: Switch from Non-Renewable Biomass for Thermal Applications by the User*** *– Version 01 from February 01 of 2008 onwards.*

The amount of non-renewable biomass (B_y) will be determined according to the option "b" of the applied methodology once option "a" is designed for really small appliances like household stoves and does not fit for the kind of projects in question. Thus, monitoring via option "a" is not recommended as it does not serve the purpose for accurate monitoring.

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 CO_2.

2.2 Justification of the choice of the methodology and why it is applicable to the project activity:

The methodology applied is Category AMS-I.E: Switch from Non - Renewable Biomass for Thermal Applications by the User - Version 01 from February 01 of 2008 onwards which is applicable for project activities that avoid greenhouse gas emissions by using renewable biomass in order to generate thermal energy.

This category comprises small thermal appliances that displace the use of non-renewable biomass by introducing new renewable energy end-user technologies. The end-user technology in the case of this project can be established as the project proponent, who utilizes the thermal energy generated by the new renewable energy technology.

There are no similar registered small-scale CDM project activities in the region of *São Miguel do Guamá* once Social Carbon Company made a research and did not find any registered small-scale CDM Project activity in the region. The sources of registered small-scale CDM project activity consulted were the United Nations Framework Convention on Climate Change (UNFCC) [9] and Brazilian's Technology and Science Ministry [10]. Therefore, the proposed

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[9] *CDM activities registered by CDM Executive board are Available at: <http://cdm.unfccc.int/Projects/registered.html>. Last visit in: January 15th, 2008*

[10] *Brazilian´s Technology and Science Ministry is responsible for registry and approval of all CDM activities within Brazilian boundaries. CDM activities submitted to the*

project activity is not saving the non-renewable biomass accounted by the other registered project activities.

Furthermore, firewood has been used for many centuries as fuel in Brazil[11]. Although, it is impossible to define a start date on which this kind of non-renewable biomass began to be applied, there are many documents to prove that wood has been used for thermal energy generation before 1989 as requested in the applied methodology. Firewood used to be the most employed source of primary energy until de decade of 1970, when the petroleum started to supply the majority of Brazilian's energy needs [12] . Moreover the Brazilian's Energy and Mine Ministry has been monitoring every energetic sectors of Brazil since 1970, and firewood appears over the years monitored as a significant source of thermal energy for ceramic sector[13]. Especially in the ceramic sector, the use of firewood is visible non-renewable and unsustainable, involving negative environmental impacts associated.[14]

This way, it can be concluded that non-renewable biomass has been used since 31 December 1989

The utilization of firewood from area without any kind of management cannot be considered a renewable source of biomass, since it does interfere in the carbon pools and increase the carbon emissions to the atmosphere, turning green house effect even worse. Moreover, the native wood provided from areas without a reforestation management plan does not fit any of the options of UNFCCC definition of renewable biomass in Annex 18, EB 23.

The elephant grass is considered renewable according to option III, as soon as it fit all the assumptions below:
" The biomass is non-woody biomass and originates from croplands and/or grasslands where:
(a) The land area remains cropland and/or grasslands or is reverted to forest; and
(b) Sustainable management practices are undertaken on these land areas to ensure in particular that the level of carbon stocks on these land areas does not systematically decrease over time (carbon stocks may temporarily decrease due to harvesting); and
(c) Any national or regional forestry, agriculture and nature conservation regulations are complied with."
Currently, elephant grass has been acquiring national importance as biomass to generate thermal energy due to its high productiveness and easy adaptation in almost all climate and soil Brazilian conditions[15]. In case of the utilization of the elephant grass, it will be cultivated in pasture or degraded areas, in which there is no vegetation to be deforested by the project proponent. Therefore, this practice will not generate competing use of biomass and it will not deforest a vegetated area.

Brazilian Inter-Ministerial Commission of CDM Activities are available at: <http://www.mct.gov.br/index.php/content/view/47952.html>. Last visit in: January 15th, 2008.

[11] *Uhlig, A. Lenha e carvão vegetal no Brasil: balance oferta-demanda e métodos para estimação de consumo, tese de doutorado, Universidade de São Paulo, São Paulo, 2008. 156 p. Available at: http://www.teses.usp.br/teses/disponiveis/86/86131/tde-14052008-113901/ >. Visited in: December, 12th 2008*

[12] *Brito, J.O."Energetic use of Wood". Available at: <http://www.scielo.br/scielo.php?pid=S0103-40142007000100015&script=sci_arttext&tlng=ES>. Last visit in: January 15th, 2008.*

[13] *National Energy Balance- energy consumption per sector. Available at: <https://ben.epe.gov.br/BEN2007_Capitulo3.aspx>. Last visit in: January 15th, 2008*

[14] *Source: Uhlig, A. Lenha e carvão vegetal no Brasil: balance oferta-demanda e métodos para estimação de consumo, tese de doutorado, Universidade de São Paulo, São paulo, 2008. 156 p. Available at: http://www.teses.usp.br/teses/disponiveis/86/86131/tde-14052008-113901/ >. Visited in: December, 12th 2008*

[15] *According to EMBRAPA (Brazilian Agricultural Research Corporation's). Source: <http://www.mwglobal.org/ipsbrasil.net/nota.php?idnews=3292>. Last visit in: January 15th, 2008*

Sawdust/wood chips are forest residues while açaí pits and rice husk are agro-industries residues, so they are considered renewable according to option V of methodology definition of renewable biomass: "The biomass is the non-fossil fraction of an industrial or municipal waste". Besides, sawdust, açaí pits and rice husk are common residues in the region generated.

Moreover, the project activity will annually generate less than 45 MWThermal.

2.3 Identifying GHG sources, sinks and reservoirs for the baseline scenario and for the project:

According to the applied methodology, the project boundary is the physical, geographical area of the use of biomass or the renewable energy, thus, the ceramic's limits.

In the baseline, there is use of non-renewable biomass to burn ceramic devices in the ceramic's kilns. This practice is responsible to discharge in the atmosphere the carbon that was stored inside of the wood (well-known by a carbon sink).

Table 4. Gases included in the project boundary and brief explanation.

	Gas	Source	Included?	Justification/ Explanation
Baseline	CO2	Emission from the combustion of non-renewable fuel	Yes	The major source of emissions in the baseline
	CH4	-	No	Deforestation rates will probably decay and possible emissions from anaerobic decay of stored wood will be avoided. Excluded for simplification. This is conservative
	N2O	-	No	Possibly emissions from wood burning will be excluded for simplification. This is conservative
Project Activity	CO2	-	No	Excluded for simplification. This emission source is assumed to be very small.
	CH4	-	No	Excluded for simplification. This emission source is assumed to be very small.
	N2O	-	No	Excluded for simplification. This emission source is assumed to be very small.

2.4 Description of how the baseline scenario is identified and description of the identified baseline scenario:

Observing table 5, a probable baseline scenario would be the use of Natural Gas. However, there is no distribution/gas pipe in the region[16], excluding this possibility.

The most probably scenario in the absence of native wood would be the use of fuel oil, which is not viable considering its higher prices when compared with non-renewable biomass. Even tough, fuel oil presents a higher Net Calorific Value when compared with non-renewable firewood; the costs with Fuel Oil are higher because of its expensive prices. Fuel Oil presents an average price of 0,895R$/Kg and the firewood used to present an average price of 30R$/m3 in the baseline scenario. These values lead us to conclude that the price of oil fuel around 0.000090587R$/Kcal[17] as long as the price of this kind of wood is around 0.0000000114R$/Kcal [18] utilizing the Net Calorific Value of both fuels. Therefore, the cost with the employment of oil fuel is higher than the utilization of firewood. Besides, the fuel oil requires more technology to be inserted. The conclusion is that use of fuel oil is not attractive, at all

Table 5. Distribution of fuel employed on the ceramic sector in Brazil.

BRAZILIAN ENERGY BALANCE 2007 - CERAMIC SECTOR EVALUATION Unit: 10^3 Tone of oil equivalent			
FUEL	**2004**	**2005**	**2006**
Natural Gas	767	831	901
Charcoal	52	70	42
Wood	1,611	1,710	1,762
Other recuperations	35	36	32
Diesel Oil	8	9	8
Fuel Oil	295	268	285
Liquified Petroleum Gas	134	148	151
Others from Petroleum	51	71	76
Piped gas	0	0	0
Electricity	262	270	276
Others non specified	0	0	0
TOTAL	**3,215**	**3,412**	**3,533**

(Brazilian Energy Balance, source: http://www.mme.gov.br)

Without the project activity, *Cavalcante* Ceramic would consume around 1,690 m³ of native fire wood per month to feed its kilns to obtain an approximate temperature of 900°C with a burning period of 36 hours, in order to produce 1,300,000 ceramic devices. After April 2009, the ceramic industry will increase its production to 1,800,000 ceramic devices per month, which means that the consumption of native wood would have a value around 2,340 m³ with the efficiency of 1.3 m³of wood per thousand of ceramic devices.

It is important to assert that the production can rise, which changes the consumption of the fuel and the quantity of Emission Reductions, this will be reported at the monitoring report.

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[16] *Source: <http://www.ctgas.com.br/mercado/gasodutos/gasodutos.html>. Last visit in: January 15th, 2008.*

[17] *According to data values and facts from "Estudo Comparativo da Queima de Óleo BPF e de Lenha em Caldeiras" available at: <http://www.abcm.org.br/xi_creem/resumos/TE/CRE04-TE01.pdf>. Last visit in: January 15th, 2008.*

[18] *According to the values of native wood paid in the Irmãos Fred before the project activity (30 BRLper m3) . The values of NCV and density utilized are the same utilized in monitoring parameters (NCV=0.01928431TJ /Tonne and Density=0,5702Tonnes/m3).*

Before the project activity, although the number of kilns and the production were the same, the production process was noticeably different; the wood was inserted in the kilns by the employee and it was not necessary any machine experience or logistic modification like the shed prepared in order to attend the project's needs.

2.5 Description of how the emissions of GHG by source in baseline scenario are reduced below those that would have occurred in the absence of the project activity (assessment and demonstration of additionality):

The methodology applied is Category AMS-I.E: Switch from Non- Renewable Biomass for Thermal Applications by the User - Version 01 from February 01 of 2008 onwards, which is applicable for project activities that avoid greenhouse gas emissions by using renewable biomass in order to generate thermal energy.

Furthermore, the project activity will annually generate less than 45 MWthermal.

To demonstrate that the project is additional it will be used the test 1 of section 5.8 of the Voluntary Carbon Standard - Specification for the project-level quantification, monitoring and reporting as well as validation and verification of greenhouse gas emission reductions or removals.

Test 1 – The project test

Step 1: Regulatory Surplus
The project is not mandated by any enforced law, statute or other regulatory framework in Federal, State and Municipal levels in the survey performed.

Step 2: Implementation Barriers
The project faces distinct barriers compared with barriers faced by alternative projects.

- ***Technological Barriers***

  As affirmed before the use of wood from areas without sustainable forest management is a traditional and well-known process, and as a result of the sudden change, a lot of effort from each employee in the ceramic was necessary. The main technological barriers were the non-availability of human knowledge to operate and maintain the new technology, the internal logistic modification and the employee's resistance to the new technology.

  Before the project activity, the process was noticeably different; native wood was inserted in the kilns by the employees and it was not necessary any machine experience or logistic modification in order to attend the project's needs. Thus, as soon as the biomass arrives at the ceramic, it passes through a logistic system until its insertion in the kiln.

  The operators did not have knowledge of the ideal amount of renewable biomasses that was necessary to achieve the ideal temperature for its ceramic devices cooking, to acquire the final product with same quality and to maintain the optimal process as they did when using native wood. pyrometric systems (thermo couples) were installed aiming the temperature and burning control of the kilns, due to the lack of experience with the biomasses. As a consequence of this barrier, there were variations in the color of the final ceramic devices, affecting the quality of the products; cracks on the ceramic devices; the explosion of some of them and cracks along the kilns; adding a significant amount of insecurity to the production process.

  In the baseline scenario, using the wood, the operators feed the kilns manually, procedure unfeasible when applied to sawdust. Different from the baseline, in the project activity, the sawdust and the auxiliary biomasses must be fed to the kilns by automatic machineries, the dosage units or mechanic burners, which are fed manually by an operator. Since the beginning of the switching fuel activities in the end 2004 until the complete switch in the end of 2006, 40 mechanic burners were acquired, however, only 35 machines are regularly employed in the production line, the other 5 are used when a problem is verified with one of the machines in the system. With the use of mechanic burners, the employees do not have near contact to kiln entrances which contributes to preserve their health and safety.

Due to the number of alterations in the production process, the ceramic had around 2 years to complete the fuel switch. This issue shows that the ceramic responsible was very aware when being more careful when starting to use other biomasses. There was a reduction in the production in the first initial months of the switch. Variation in the color of the final ceramic devices, cracks on the ceramic devices and the explosion of some of them and cracks along the kilns were also barriers faced by the project proponent.

As a result of the fuel switch, some training courses were required for the staffs in order to clarify new measures linked to the machinery, sustaining the quality of the final product and find a burn cycle standard.

Furthermore, there was a lack of infrastructure to utilize the new technology. The Ceramic sector and very resistant to changes or improvements to its work process and general practices. Another arduous barrier faced by the project developer was the employees' resistance of the changes, who were very used to the traditional situation.

Moreover, the use of new biomasses represented a high risk to the project developer. Although there is currently a great amount of these types of biomasses available locally, it is possible the unavailability of the biomasses. It may happen because thermal energy generation through the combustion of biomasses is an innovation in ceramic industry and their future demand (e.g. by other consumers) is not easy to foresee.

This means that the ceramics had to find the best procedure to handle with the new technology, i.e. the new biomass, logistic and machines.

Sheds were constructed in order to keep the biomass away from the rain and maintain it dried. When the biomass is dried, its efficiency increases considerably.

- **Financial barrier**

With the project implementation, the ceramic company had to withstand higher costs rather than if it had continued employing native wood as fuel, the estimated values in table 6 shows it in details. The most important additional costs are related to biomass acquisition which includes transportation and price per m^3, once the non-renewable biomass was delivered by lumberjacks and renewable biomass must be identified, loaded and transported by the ceramic, this costs are represented by the parameter 'Total biomass cost' in table 5.

In order to help with the new system, 6 new employees were hired as General Assistance and furthermore, initially there were high costs with the mechanic burner's maintenance, so this situation required three new employees to be hired. However, due to those high costs, the mechanic burners had to be removed and other entrances were constructed to inject the renewable biomass without spend electricity and with less maintenance costs. Therefore, due to the implementation of the project activity, the ceramics had to purchase mechanic burners to automatically inject the biomass with air inside the kilns and after they had to remove that as described above.

Table 6. Comparison between costs due to the fuel switch in the baseline scenario and the project activity scenario of *Cavalcante Ceramic*

Scenario	**Non-renewable biomass**		**Renewable biomass**	
	Non-Renewable wood	**Unit**	**Sawdust**	**Unit**
Variable Costs				
Production	**1,300,000**	**Ceramic unit per month**	**1,300,000**	**Ceramic unit per month**
	15,600,000	Ceramic unit per year	15,600,000	Ceramic unit per year
Consumption of the fuel	20,280	m³ of wood per year	7,254	Tonnes of biomass per year
Price of biomass	400.00	BRL per truck	170.00	BRL per truck of 40m³
Total biomass cost	97,920.00	BRL per year	331,989.00	BRL per year
New Labors	-	-	56,021	BRL per year
Total variable cost	**97,920.00**	**BRL per year**	**388,010.04**	**BRL per year**
Total Variable Costs per unit of ceramic device	**0.0063**	**BRL per unit**	**0.0249**	**BRL per ceramic device**

Table 7. Investment performed due to project activity.

Investment		
Costs with equipment acquisition (including freight)	39,456.19	BRL
Loss of revenues - period for adaptation of the kiln for biomass	10,446.42	BRL
Waste of products in the testing period (6 months)	1,343.11	BRL
Total Invested	**51,245.73**	**BRL**

- ***Institutional Barriers***

- *Risks of the project*

The project activity implementation presents a risk to the project proponent, once the use of a new biomass and its machines are an uncertainty in the production process, as the use of native wood is a usual and well-known process. The production can decrease, representing a risk and a hazardous period to the ceramic, as the operators do not have the knowledge of how to use sawdust rice husk, elephant grass and *açaí* pits, as well as the efficiency of this new biomass. Furthermore, the ceramic can overgrow a period in which there is possibility that there is lack of biomass, representing another risk period.

It must be emphasized that there is no direct subside or support from government for this project.

The project developer considered essential the incomes of VERs to implement the project activity due to the barriers exposed above, without that the fuel switching on *Cavalcante* Ceramic would not be feasible or attractive to the project developer

– Barrier due to the price of the biomass

The combustion of sawdust, *açaí* pits, rice husk and elephant grass to generate thermal energy is an innovation in the ceramic industry. The future demand of this alternative fuel e.g. by other consumers is not predictable. Although there is currently great amount of biomasses available, there is a possibility that the prices will increase, especially between harvests, when the problem with biomasses disposal is attenuated.

Even if the price of the biomass increases, the ceramic can not repass it, once it would not have competitive prices in relation to other ceramics which did not made the fuel switch. These circumstances make the commercialization of the carbon credits essential to the maintenance of the fuel switch.

Step 3: Common Practice

According to the GHG Protocol for Project Accounting, common practice analysis shall be carried out following:

1. Define the product or service provided by the project activity.

The product of the project activity is bricks.

2. Identify possible types of baseline candidates.

Observing table 8, the common fuels employed and therefore, the baseline candidates are: natural gas, charcoal, wood, other recuperations, diesel oil, fuel oil, liquefied petroleum gas, others from petroleum, piped gas, electricity and others non-specified. Other possible baseline candidate would be the use of renewable biomass without the carbon credits support.

Table 8. Distribution of fuel employed on the ceramic sector in Brazil in percentage. (Brazilian Energy Balance, source: http://www.mme.gov.br)

BRAZILIAN ENERGY BALANCE 2007 – CERAMIC SECTOR EVALUATION			
FUEL	**2004**	**2005**	**2006**
Natural Gas	24%	24%	26%
Charcoal	2%	2%	1%
Wood	50%	50%	50%
Other recuperations	1%	1%	1%
Diesel Oil	0%	0%	0%
Fuel Oil	9%	8%	8%
Liquified Petroleum Gas	4%	4%	4%
Others from Petroleum	2%	2%	2%
Piped gas	0%	0%	0%
Electricity	8%	8%	8%
Others non specified	0%	0%	0%

3. Define and justify the geographic area and the temporal range used to identify baseline candidates.

Brazil was identified as the geographic area of the baseline candidates because Energy Research Company[19] from Data from table above are provided by

[19] *Energy Research Company is a national entity which intended to provide services and researches to subsidize the energy sector planning, in areas as electric Power; oil, natural gas and their derivatives; coal; wood; renewable energy sources and energy efficiency; among others.*

Mines and Energy Ministry of Brazil is the most representative and reliable source of information about the ceramic sector and its fuel employed.

Therefore, data from table above were provided by a reliable source and it was considered 3 years of its historical data, including the most recent available data and the period when *Cavalcante* Ceramic did its fuel switch.

4. Define and justify any other criteria used to identify baseline candidates.

The other types of criteria used to identify baseline candidates were the common practice, the costs of fuel and the local availability of technology and fuel.

The criteria common practice was used to identify baseline candidates because if a kind of fuel has already been employed with success in the ceramic sector it is an obvious baseline candidate.

Besides, the fuel cost was criteria once if a kind of fuel has high costs it will discourage the scenario of investing in this type of fuel, for example.

Equally important, the local availability of technology and fuel were pieces of criteria because the lack of technology and fuel in the region excludes them as baseline candidates. An example may be the lack of natural gas distribution in some regions.

There are legal requirements constraints regarding the use of non renewable biomass as exposed in Decree N.5,975 of November 30th, 2006. However, it is not enforced namely due to the lack of police. The consumption of non renewable biomass by the ceramic industry was related by several authors (NERI, 2003[20]; ALBUQUERQUE et al, 2006[21]; BRASIL, 2001[22]; VIANA, 2006[23]; CARDOSO, 2008[24]). This have also been observed in other industries as in the production of steel (BRASIL, 2005[25]), which has a much better structure and internal organization when compared with the ceramic industry, that is usually a small and familiar enterprise. BRASIL (2001) suggests that it is important to stimulate the miner sector, especially who are respecting the environment. The incomes from carbon credits can be this incentive which would contribute to avoid the consumption of non renewable biomass illegally. Therefore laws and regulations will not be considered to constraint the geographical area and temporal range of the final list of the baseline candidates.

The project activity implementation without the carbon credits incomes is a criteria once there was biomass availability.

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[20] *NERI, J.T. Energia Limpa, Sustentável ou de Subsistência?* ***Cerâmica Industrial,*** *Rio Grande do Norte;V,8, n.1,35 -6,2003.*

[21] *ALBUQUERQUE, J.L.B. et al. Águia-cinzenta (Harpyhaliaetus coronatus) e o Gavião-real-falso (Morphnus guianensis) em Santa Catarina e Rio Grande do Sul: prioridades e desafios para sua conservação.* ***Revista Brasileira de Ornitologia,*** *v.14, n.4, p. 411 - 415, dez. 2006. Available at: <http://www.ararajuba.org.br/sbo/ararajuba/artigos/Volume144/ara144not3.pdf>. Access at: September 10th, 2008.*

[22] *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: < http://www.cgee.org.br/prospeccao/doc_arq/prod/registro/pdf/regdoc710.pdf>. Access at: September 10th, 2008.*

[23] *VIANNA, F.M.A.* ***Participação Pública em Programas Ambientais: Um Estudo em Área Suscetível a Desertificação no Estado do Rio Grande do Norte.*** *2006, 109f. Dissertação (Mestrado em Engenharia de Produção) - Universidade Federal do Rio Grande do Norte, Natal, 2006. Available at: <http://www.pep.ufrn.br/publicacoes.php?enviou=1>. Access at: September 10th, 2008.*

[24] *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.*

[25] *BRASIL. Diagnóstico do Setor Siderúrgico nos Estados do Pará e do Maranhão. Brasília: Ministério do Meio Ambiente, 2005. 76 p.*

5. Identify a final list of baseline candidates.

Table 8 provides the percentage of the level of penetration of each fuel utilized in the ceramic sector during the average of the three last years available (2005, 2006, and 2007). Baseline candidates are the use of:

a) Wood: The fuel most used, which would be the scenario of highest GHG emissions, once its emission factor is the highest according to IPCC 2006[26].

b) Natural gas: it is restricted by the absence of pipes, its high costs[27] and lack of availability[28]. The risk of lack of offering and higher costs when compared with other fuels discourages the scenario of investing in this type of fuel even in local with piped gas. The distribution of gas is preferentially performed to thermal power plants, increasing the risk of blackout of natural gas.

c) Fuel oil: This fuel is more expensive than wood, however it can be a more plausible of substitute of wood than natural gas. The risks involving natural gas distribution are so considerable that PETROBRÁS[29] was offering subsidy to the consumption of fuel oil in spite of natural gas in the State of São Paulo.

d) Renewable biomass: despite the high biomass availability, the main problems concerning the use of renewable biomass are related to the high investments, technological and institutional barrier, mainly the risk of changing for a biomass not consolidated as fuel for ceramic industries[30].

6. Identify baseline candidates that are representative of the common practice (for the project-specific baseline procedure).

In Brazil, the red ceramic devices are generally produced through an inefficient and traditional process using wood without forest management to generate thermal energy technologies[31]. In this industry segment is the use of wood represents about 98% of the total fuel employed stimulating the increase in Brazilian deforestation and desertification rates. It happens because wood without forest management is offered with lower prices than wood from areas with forest management[32], which is the fuel most employed and with less risk associated. Moreover, it has low costs and high availability. Using native wood as fuel to provide thermal energy is an efficient process and had shown good results. The Brazilian technology for ceramic industry is not very modernized, or up to date with the existing global technologies. Furthermore, using non-renewable wood is a simple procedure and well known by the kiln operators.

The native forest without any kind of sustainable management has always been a source of firewood, which seemed inexhaustible, due to the amount generated in the expansion of the agriculture frontier bringing forward environmental impacts, with regard to the degradation of soil, change in the regime of rainfall and consequent desertification.

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[26] *Source: 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.*

[27] *Source: <http://www.dep.fem.unicamp.br/boletim/BE31/artigo.htm>. Visited in: November, 20th 2008.*

[28] *Source: <http://www.ctgas.com.br/template02.asp?parametro=2547>. Visited in: November, 20th 2008.*

[29] *PETROBRÁS performs in oil and oil byproduct exploration, production, refining, marketing, and transportation, both in Brazil and abroad. More information available in: <http://www2.petrobras.com.br/ingles/ads/ads_Petrobras.html>.*

[30] *The use of renewable biomass was not included in table 10 which shows the fuel most employed in the ceramic sector according to Brazilian Energy Balance.*

[31] *ABREU, Y. V.; GUERRA, S. M. G. Indústria de Cerâmica no Brasil e o Meio Ambiente. Chile: IV Congreso Nacional de Energía, 2000. Available at: <http://www.nuca.ie.ufrj.br/bgn/bv/abreu2.htm>. Visited in: November, 20th 2008*

[32] *Seye, Omar. Análise de ciclo de vida aplicada ao processo produtivo de cerâmica estrutural tendo como insumo energético capim elefante (Pennisetum Purpureum Schaum) / Omar Seye. Campinas, SP: [s.n.], 2003.*

The ceramic industry sector has practically not evolved compared to the past, mainly due to the simplified techniques of manufacture. Moreover, the major equipments (chiefly kilns) of the production process were not improved significantly. Most of these companies still use non-renewable wood in their kilns and the drying process occurs naturally, without the utilization of energy. On the other hand, the influence of the market by improvements in this sector is very insignificant.

Thus, the common practice is the use of wood and its non-renewable fraction, which is the fuel most employed and with less risk associated.

The acquiring of new equipment and the overall costs of the fuel switch represented a risk to the project developer since the baseline practice was already established and well-known by the laborers. The operators did not have the knowledge of the ideal amount of renewable biomass that is necessary to use in order to achieve the temperature of about 900°C to cook its ceramic pieces, to acquire the final product with the same quality and to maintain the optimal process as they did when using the native wood without sustainable management. As a result of the fuel switch, an extensive training course was required for the staff in order to clarify new measures linked to the machinery in order to sustain the quality of the final product.

Thus, the project activity is not a common practice.

Cavalcante Ceramic is a ceramic industry that used native wood as fuel successfully for 20 years. The implementation of this project activity regarding the fuel switch and the acquiring of new equipment represents a risk to the project developer since the first practice was showing good results for several years. Besides, the burning of wood in the ceramic sector is well known by the labourers, once it has been done during a long period of time without any technical restriction. The operators had the knowledge of the ideal amount of wood in order to achieve the approximate temperature of 900°C to fire the ceramic and then, optimize this process. The fuel switch required a capacitating course for the staff in order to clarify new procedures related to the machineries implanted to maintain the final product quality.

Impact of project approval

Nowadays, the ceramic industrial segment of *Pará* state is constituted by small industrial units that still use the most diverse technological models. The productive chain of ceramics in the city is composed of 31 companies, the main economy to the city. The fuel used in almost all companies is the native firewood from *Amazonian* Biome, and it has some technological restrictions such as the energy exploitation and the efficiency of the machinery. The *Amazonian* Biome deforestation aggravates because of the grazing practice, agriculture and site preparation which involves extraction and burning of firewood and firewood commercialization. The First Brazilian Inventory of Anthropogenic Greenhouse Gas Emissions - Background Reports indicates that the major source of GHG emissions in Brazil is due to deforestation, mainly occurred in *Amazonian* (59% of the deforestation) and *Cerrado* biomes (26%).

Another relevant issue is the rise in deforestation rates in the *Amazonian* biome, which achieves more than 14,206,000ha deforested of the Brazilian Legal Amazonia [33]. About 31,000 and 32,000 km² per year are deforested in Brazil, especially in the *Amazon*, *Cerrado* and *Caatinga* biomes. Currently, every part of the society sector should be evolved in this, and all efforts are necessary to revert the *Amazonian* biome scenario of degradation, and prevent its extinction, once that Amazonian is not the only major tropical forest of the world. This biome is a supply of biodiversity and no other has the variety that the Amazonian biome does, there are still many unknown vegetal and animal species.

Therefore it can be concluded that measures should be taken to preserve these biomes and the project activity represents an example that can be followed by other activities.

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[33] *According to PRODES - Program for Deforestation Assessment in the Brazilian Legal Amazonian*

3 Monitoring:

3.1 Title and reference of the VCS methodology (which includes the monitoring requirements) applied to the project activity and explanation of methodology choices:

- ***Category I.E: Switch from Non-Renewable Biomass for Thermal Applications by the User –*** *Version 01 from February 01 of 2008 onwards.*

  This category 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 CO_2.
  The project activity will generate less than the limits of 45 MWthermal for Type I small scale project activities.

3.2 Monitoring, including estimation, modelling, measurement or calculation approaches:

The monitoring will be done with the aim of determining the most approximate quantity of wood without sustainable management that, in the absence of the project, would be used in the ceramic's kilns and consequently the amount of GHG that would be emitted in tonnes of CO_2e.

Table 9. Data reported in monitoring estimation

Parameters	Description	Units	Origin	Frequency
Qrenbiomass	Amount of renewable biomass	Tonnes	Measured by the project developer	Monthly
Origin of renewable biomass	Specific gravity of the biomass	Ton/ m3	Bibliography	Anually

PRy	Production of ceramic pieces	Units	Bibliography	Monthly
EFprojected fossil fuel	CO_2 Emission factor of residual fuel oil	tCO2/TJ	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.	Not monitored
Renewable Biomass Surplus	Amount of renewable biomass available	Tonnes or m³	Monitored by articles and database.	Annually
Leakage of Non-Renewable Biomass	Leakage resulted from the non-renewable biomasses	tCO2e	Monitored by articles and database.	Annually
NCVbiomass	CO2 Emission factor of projected fossil fuel	TJ	Bibliography	Not monitored
ρ biomass	Specific gravity of non-renewable biomass	ton/ m^3	Bibliography	Not monitored
ƒNRB,y	Fraction of biomass (wood) used in the absence of the project activity in year y can be established as non renewable biomass using survey methods	Percentage	Survey Methods	Annually
BFy	Consumption of non renewable biomass per thousand of ceramic devices produced	tonnes/ thousand of ceramic devices	Data from project developer	Function of PRy

In the monitoring plan, the amount of non-renewable biomass ($\mathbf{B_y}$) will be determined using the option 'b' of the applied methodology, i.e. it will be calculated from the thermal energy generated in the project activity as:

$$\mathbf{B_y} = \frac{\mathbf{HG_{p,y}}}{\eta_{old} \times \mathbf{NCV_{biomass}}}$$

As stated before, the ceramic utilized in 2007, around 20,280 m³ of native wood per month producing 1,300,000 ceramic devices. This information leads to the number of around 1.3 m³ of native wood to produce a thousand of ceramic devices.

The quantity of non-renewable native wood that would be used in the ceramics will be calculated through the multiplication of the ceramic's monthly production by the efficiency of the kiln, as the following example:

By = (Monthly production / 1000) x Kiln efficiency (BFy) x Specific Gravity (ρ) x Fraction of non renewable biomass (fNRB)
By = 1,300 x 1.3 m³ of wood/thousand pieces x 0.675 ton/m³ x 0.923
By = 1,052 tonnes of native wood/month = **12,634** tonnes of native wood/year

The responsible to monitor data provided in table 9 will be Ms. *Maria Conceição dos Santos e Silva.* Internal audit will guarantee data quality.

3.3 Data and parameters monitored / selecting relevant GHG sources, sinks and reservoirs for monitoring or estimating GHG emissions and removals:

Monitored Parameters

Data / Parameter:	**Qrenbiomass**
Data unit:	tonnes/year
Description:	Amount of renewable biomass
Source of data to be used:	Measured by the project developer
Value of data	7,254
Description of measurement methods and procedures to be applied:	The amount of renewable biomass will be monitored in accordance to the weight described in the receipts or invoices from the providers. It will be utilized the Specific Gravity in order to convert from m³ to ton. The data to be applied are: <table><tr><th>Biomass</th><th>Sawdust/wood chips</th></tr><tr><td>**Specific gravity (tonnes/m₃)**</td><td>0.35</td></tr></table> Source: Sawdust/Wood chips – Tractebel Energia S.A, 2006 – Checked at: http://hdl.handle.net/1884/10294
QA/QC procedures to be applied:	The ceramic has spreadsheets of the quantity of biomass acquired. It will be rechecked according to the receipts of purchase.
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:	**PRy**
Data unit:	Units
Description:	Production of blocks
Source of data to be used:	Controlled by the project developer.
Value of data applied for the purpose of calculating expected emission reductions	Approximately 1,300,000 pieces per month
Description of measurement methods and procedures to be applied:	The measurement will be done by an internal control sheet monitored by the project developer.
QA/QC procedures to be applied:	The lower value of biomass amount between the biomasses receipts and the biomass required to keep the production monitored by the project developer will be 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:	**Leakage of non-renewable biomass.**
Data unit:	tCO2e
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 the applied methodology will be monitored. Scientific articles, official statistical data, regional and national surveys will be provided in order to ensure that there is no leakage from non-renewable biomass (or to estimate the leakage).
QA/QC procedures to be applied :	Data available regarding the ceramic industry fuel consumption will be utilized to monitor the leakage.
Any comment:	Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.

Data / Parameter:	**Renewable biomass surplus**
Data unit:	ton or m^3
Description:	Amount of renewable biomass available
Source of data to be used:	Monitored
Value of data	Detailed information in section 4.1 – LEAKAGE.
Description of measurement methods and procedures to be applied:	It will be used to calculate the leakage of renewable biomass. The sources of leakages predicted in methodology applied will be monitored. The measurement of the leakage will be based in national and internal articles and database every monitoring period. The sources will provide information about the biomass availability in the project activity's region.
QA/QC procedures to be applied :	Data available regarding the ceramic industry fuel consumption will be 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:	**Origin of renewable biomass**
Data unit:	Not applicable
Description:	Renewable origin of the biomass
Source of data to be used:	Controlled by the project developer
Value of data	Renewable biomass
Description of measurement methods and procedures to be applied:	This information will be given by the biomasses providers. The guarantee of acquiring renewable wood will be achieved by invoices from the providers. It will be proved that the sustainable plan had been followed. As stated in the section 2.2, the biomasses (*Açaí* pits, Rice husk and Elephant grass) are considered renewable as fulfilling the options described in the methodology applied.
QA/QC procedures to be applied:	The biomass will be considered as renewable if it is according to the definition given by the applied 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.

Data / Parameter:	**$f_{NRB,y}$**
Data unit:	Percentage
Description:	Fraction of biomass (wood) used in the absence of the project activity is established as non-renewable biomass using survey methods.
Source of data used:	Survey methods.

Value of data:	92.28%
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 ceramics owner. Thus, the totality of fuel employed in the baseline scenario is from non-renewable origin. However, according to Klink[34] (2005)48, Amazonian Biome has only 7.7% of its total area with sustainable use, thus, 92.28% of its forest resources can be considered non-renewable.
QA/QC procedures to be applied:	The monitoring of this parameter will be based in national and international articles and database every monitoring period. The sources will provide information about the sustainable use of Amazon biome. Wood saved from projects with same biome and applied methodology developed by *Carbono Social Serviços Ambientais LTDA.* was considered in this fraction. The value considered was 0.018780748%. CDM or VCS registered projects will also be included in this fraction if placed in the same region and methodology.
Any comment:	It will be employed in order to estimate the amount 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.

Fixed Parameters

Data / Parameter:	**EFprojected fossil fuel**
Data unit:	tCO2/TJ
Description:	CO_2 Emission factor of residual fuel oil
Source of data 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.
Value applied:	77.4 tCO2/TJ
Justification of the choice of data or description of measurement methods and procedures actually 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.
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 for this project activity, whichever occurs later.

Data / Parameter:	**NCVbiomass**
Data unit:	**TJ/ton of wood**

[34] *KLINK, C. A.; MACHADO, R. Conservation of the Brazilian Cerrado, Belo Horizonte, v. 1, n. 1, p. 147-155, 2005. Available at: http://faculty.jsd.claremont.edu/emorhardt/159/pdfs/2006/Klink.pdf*

Description:	Net Calorific Value
Source of data used:	Sources: – Poder Calorífico da Madeira e de Resíduos Lignocelulósicos. Available in: http://www.renabio.org.br/arquivos/p_poder_lignocelulosicos_11107.pdf – 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.
Value applied:	0.0182
Justification of the choice of data or description of measurement methods and procedures actually applied :	This value will provide 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 Amazonian Biome that are usually utilized as fuel in the ceramic industries of the region.
Any comment:	IPCC default values shall be used only when country or project specific data are not available or difficult to obtain, according to "Guidance on IPCC default values" (Extract of the report of the twenty-fifth meeting of the Executive Board, paragraph 59). Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.

Data / Parameter:	**ρ biomass**
Data unit:	ton/ m3
Description:	Specific gravity
Source of data used:	Source: – Poder Calorífico da Madeira e de Resíduos Lignocelulósicos. Available in: http://www.renabio.org.br/arquivos/p_poder_lignocelulosicos_11107.pdf – 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.
Value applied:	0.6752
Justification of the choice of data or description of measurement methods and procedures actually applied:	The amount of wood used in the baseline was measured in volume units. This datum will be used for the unit conversion.
Any comment:	The species used to calculate de average value are typical trees of Amazonian Biome and 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 / Parameter:	**BFy**

Data unit:	tonnes of wood per thousand of devices
Description:	Amount of non-renewable biomass per burning cycle in the kilns and furnace
Source of data used:	Historical data from project developer
Value of data	Kilns – 1.3 m^3 of wood/thousand of devices
Justification of the choice of data or description of measurement methods and procedures actually applied:	The value was acquired through the average consumption and production of ceramic devices during the years when the ceramic used to consume non-sustainable wood. This value is in accordance with the data acquired in other ceramics that employ the same type of kilns. If nowadays the plant still used native firewood its consumption would be around 1,690 m^3 of native firewood per month to produce 1,300,000 bricks. The value is employed to calculate the real amount of wood displaced to maintain the ceramic production in the baseline scenario.
Any comment:	This data is already known by the project proponent but it was calculated by the project developer before the beginning project activity. 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.

3.4 Description of the monitoring plan

The party responsible for implementing the monitoring plan shall be the owners of the companies. The project developer will also be responsible for developing the forms and registration formats for data collection and further classification. For this purpose, the authorities for the registration, monitoring, measurement and reporting will be *Maria Conceição dos Santos e Silva*.

The management structure will rely on the local technicians with a periodical operation schedule during the project (the monitoring frequency of each data are available at section 3.2). The technical team will manage the monitoring, the quality control and quality assessment procedures and the different auditory will be responsible to carry the project premises.

Social Carbon Company will also implement the sustainability report following the Social Carbon methodology, which was developed by *Instituto Ecológica* and focus in implementing the environmental and social activities within the fuel switching project. Social Carbon follows the Social Carbon Guidelines available at: http://www.socialcarbon.org/Guidelines/
In addition the Social Carbon Reports will be available at: TZ1/Social Carbon Registry (http://www.tz1market.com/socialpublic.php) once the project is registered.

4 GHG Emission Reductions:

4.1 Explanation of methodological choice:

Methodology AMS-I.E: Switch from Non – Renewable Biomass for Thermal Application by the User – Version 01 from February 01 of 2008 onwards, which comprises project activities that avoid greenhouse gas emissions by using renewable biomass in order to generate thermal energy. 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 CO_2.

The project activity will generate less than the limit of 45 MWthermal for Type I small scale project activities.

Baseline

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

Where:

ER_y: Emission reductions during the year y in tCO2e

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

$f_{NRB,y}$: Fraction of non-renewable biomass (wood) used in the absence of the project activity in year y

$NCV_{biomass}$: 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_2e/TJ[35].

By is determined using the following option:

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:

HGp,y : Quantity of thermal energy generated by the renewable energy in the project in year y in TJ.

ηold : Efficiency of the system being replaced

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

Where:

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

PR_y: Amount of product produced in year y in thousand of ceramic devices

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

Where:

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

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

Where:

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

BF_y: Amount of native firewood needed to produce a certain amount of product in tonnes/thousand of ceramic devices

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

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

As shown in the calculations above, the ηold and the NCV biomass are not required to calculate the Emission Reductions, thus they were excluded.

Leakage (LE)

Methodology AMS-I.E: Switch from Non – Renewable Biomass for Thermal Application by the User, 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) of Indicative Simplified Baseline and Monitoring Methodologies for Selected Small-Scale CDM Project Activity Categories, which identifies different emission sources based on the type of biomass considered (described in the table below).

Table 10. 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 above, the source of leakage of the present project is the competing use of biomass

Forest Residues

Forest Residues are also a probable fuel to be 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 4, 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.

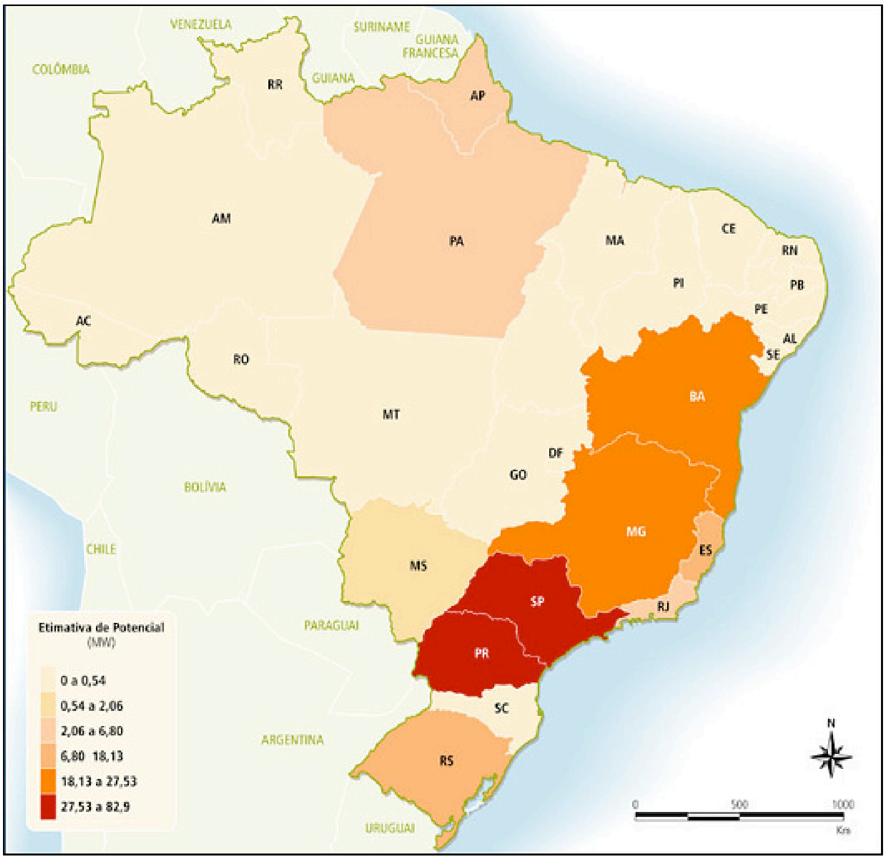

Figure 4. Forest Residues Potential for Energy Generation[36]

Considering that around 22% of the wood produced will generate sawdust[37]. The production of wood in the state of *Pará* was of 9,090,150 m3[38] in 2007, thus, 1,999,833 m3 will generate sawdust. The project activity will employ approximately 21,500 tonnes, thus 87,755 m3 of woodchips/sawdust per year which represents 4.39% of the total of these residues generated in the State of *Pará*. This way, this renewable biomass does not have potential to generate leakage emissions due to its high availability.

Açaí

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 Sate of *Pará*. The *açaí* is

[36] *Source: CENTRO NACIONAL DE REFERÊNCIA EM BIOMASSA - CENBIO. Panorama do potencial de biomassa no Brasil. Brasília; Dupligráfica, 2003. 80 p.*

[37] *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.*

[38] *According to IBGE (Geographic and Statistic Brazilian Institute) available from: <http://www.ibge.gov.br/estadosat/temas.php?sigla=pa&tema=extracaovegetal2007>. Last visited in January 10th, 2009.*

the basis of the daily alimentation of the population in this state, where is widely cultivated. Nevertheless, its residues are still without adequate economic destination[39].

The production of *açaí* in the state of *Pará* in the year of 2007 was 93,783 tonnes[40]. The pit corresponds to 85% of the weight of *açaí*[41]; therefore the *açaí* pit production was around 79,715.5 tonnes in the year of 2007. The project activity will employ approximately 4,500 tonnes of *açaí* pits per year, representing around 5% of the total of the amount produced. Therefore, the project activity will not disturb in any aspects this renewable fuel market once there is plenty of this kind of biomass available.

There are no data regarding the demand for the biomasses in the State of *Pará*. However, according to Barbosa (2009)[42], it is a common practice in sawmills the generation of methane due to the decay of sawdust in their on site places. However, currently, there is a very low demand for sawdust in the State of *Pará*. Furthermore, according to Townsend (2001)[43], on the locals where the *açaí* is processed, there is a lot of *açaí* pits left to decay once they have very low utility. Therefore, the demand for the renewable biomasses used by the ceramic companies is very low.

Elephant grass

This biomass is from cropland in abandoned areas, therefore the leakage that would be applicable is the emissions from biomass generation/cultivation. Currently, elephant grass has been acquiring national importance as biomass[44] to generate thermal energy due to its high productiveness and easy adaptation in almost all climate and soil Brazilian conditions; it also dismisses the use of fertilizers (NPK)[45]. In case of 77using this kind of biomass, the ceramic company will cultivate, by itself, elephant grass in abandoned areas, in which there is no vegetation to be deforested. Therefore, this practice will not generate competing use of biomass and it will not deforest a vegetated area, i.e. only the leakage from biomass cultivation will be monitored in case of its use.

Rice husk

In the case of rice husk, the state of *Pará* produced 368,410 tonnes of rice in husk in the year of 2007[46]. The husk corresponds to 23% of the weight of

[39] *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 in: January 15th, 2009.*

[40] *According to IBGE (Geographic and Statistic Brazilian Institute) Available at: <http://www.ibge.gov.br/estadosat/temas.php?sigla=pa&tema=extracaovegetal2007>. Last visited in January 15th, 2009*

[41] *Source: <http://minhasfrutas.blogspot.com/2008/12/importancia-economica-do-aai.html>. Last Visit in: January 15th, 2009.*

[42] *Barbosa D. – Do Globo Amazônia, em São Paulo. Available at: <http://portalamazonia.globo.com/noticias.php?idN=77689&idLingua=1%20-%2044k>. Visited in January 15th, 2009.*

[43] *Townsend C. R., Costa N. L., Pereira R. G. A., Senger C. C. D. Características químico-bromatológica do caroço de açaí. N° 193, ago./01, p.1-5 Available at: <http://www.cpafro.embrapa.br/Pesquisa/public/2001/outros/Cot_193.PDF>. Last visited in January 10th, 2009.*

[44] *Source: <www.mwglobal.org/ipsbrasil.net/nota.php?idnews=3292>. Last visit in: January 15th, 2009.*

[45] *Source: <www.cnpgl.embrapa.br/nova/informacoes/pastprod/textos/17Instrucao.pdf>. Last visit in: January 15th, 2008*

[46]*<http://www.ibge.gov.br/estadosat/temas.php?sigla=pa&tema=pamclo2007>. Last visit in: January 15th, 2008*

rice in husk[47]. Therefore, the production of rice husk in the state of *Pará* was 84,734.3 tonnes.
According to other ceramic[48] that employ rice husk, which has similar type of kiln and production capacity, it would consume together around 14,400 tonnes of rice husk, considering that the ceramics production would only depend on this type of renewable biomass. Thus, the rice husk consumption would represent around 17% of the total of the amount produced. Therefore, the project activity will not disturb in any aspects this renewable fuel market once there is plenty of this kind of biomass available.

There are no data regarding the demand for the biomasses in the State of Pará. However, according to Barbosa (2009)[49], it is a common practice in sawmills the generation of methane due to the decay of sawdust in their on site places. However, currently, there is a very low demand for sawdust in the State of Pará. Furthermore, according to Townsend (2001)[50], on the locals where the açaí is processed, there is a lot of açaí pits left to decay once they have very low utility. Therefore, the demand for the renewable biomasses used by the ceramic companies is very low.

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.

Therefore, it can be concluded that the wood which was avoided by the present project activity is not being used by other ceramists.

In spite of the fact that the ceramic industries do not represent the main share of wood consumption, the project activities contribute significantly to wood conservation since it will switch the use of wood to renewable biomass. The implementation of this project in *Cavalcante* Ceramic is breaking the culture of wood burning in the state of *Pará* and consequently, several Ceramics are becoming interested in implementing this project, given them the possibility of receiving incomes derived from the sale of carbon credits. The possibility of spreading the use of renewable biomass to other ceramics presents huge possibilities for sustainable development in the region.

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[47] GAIDZINSKI, R. Utilização da casca de arroz como sorvente alternativo para o tratamento de efluentes da Região Carbonífera Sul Catarinense. 2007. Available at: <http://www.cetem.gov.br/publicacao/serie_anais_I_jpci_2007/Roberta_Gaidzinski.pdf>. Last visit in: January 15th, 2008.

[48] According to Cenol and Telha Forte Ceramics - Pará

[49] Barbosa D. - Do Globo Amazônia, em São Paulo. Available at: <http://portalamazonia.globo.com/noticias.php?idN=77689&idLingua=1%20-%2044k>

[50] Townsend C. R., Costa N. L., Pereira R. G. A., Senger C. C. D. Características químico-bromatológica do caroço de açaí. Nº 193, ago./01, p.1-5 Available at: <http://www.cpafro.embrapa.br/Pesquisa/public/2001/outros/Cot_193.PDF>

It is known that in the project activity's region, the deforestation is mainly carried out in order to create pastures in farms, and the revenues from the wood sale compensate the high deforestation costs. Once the biomass is not consumed, in addition to the direct impact due to the demand decrease, it is expected that the commercialization of wood will decline and consequently, the incentives for deforestation will be mitigated. Thus, it will be more economically feasible for the farmer to recover a degraded area than to deforest it and sell the wood.

Initially the project developer consumed wood from the nearby areas, however, as time went by, this resource became scarce and the distance from wood suppliers was gradually increasing. This fact shows how this impact of baseline activities is prominent and how the project activities can reduce deforestation.

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 *Cavalcante* 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.

4.2 Quantifying GHG emissions and/or removals for the baseline scenario:

The applied methodology does not predict project emissions; therefore, the baseline emissions are equivalent to emission reductions, which is demonstrated below.

Production from April, 2009 of 1,800,000 devices was utilized as an example:

$$\mathbf{ERy = B_y \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected\_fossil\ fuel}}$$

By,total = 1,800 thousand of ceramic devices per month x 1.3m³ of wood/thousand of ceramic devices x 0.6752 ton/m³ x 12 months= **18,960** tonnes of wood

ERy, total = 18,960 tonnes of wood x 92.28% x 0.0182 TJ/ton x 77.4 tCO2/TJ = 24,648 tCO2
By, total considers all the non-renewable biomass that is dismissed. Thus, there is no need to calculate By, savings in the baseline emission in the estimative, it will be calculated only in the monitoring.

Table 11. Emission reductions without considering the project emissions and leakage

Year	Emission Reductions (tonnes of CO2e)
2007	17,800
2008	17,800
2009	22,935
2010	24,646
2011	24,646
2012	24,646
2013	24,646
2014	24,646
2015	24,646
2016	24,646
Total Emission Reductions (ton of CO2e)	**231,058**
Number of years of the crediting period	10
Annual average of estimated emission reductions for the 10 years of crediting	**23,106**

period (ton of CO2e)	

4.3 Quantifying GHG emissions and/or removals for the project:

The applied methodology does not predict project emissions and leakage was considered to be zero.

4.4 Quantifying GHG emission reductions and removal enhancements for the GHG project:

Table 12. Estimation of overall emission reductions

Year	Baseline emissions (tCO_2e)	Estimation of leakage (tCO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
2007	17,800	0	17,800
2008	17,800	0	17,800
2009	22,935	0	22,935
2010	24,646	0	24,646
2011	24,646	0	24,646
2012	24,646	0	24,646
2013	24,646	0	24,646
2014	24,646	0	24,646
2015	24,646	0	24,646
2016	24,646	0	24,646
Total	**231,058**	**0**	**231,058**

5 Environmental Impact:

As can be observed in table 13, the only negative impact identified is that the project activity will generate ashes due to the burning of the biomass, but this impact will be mitigated by incorporating the ashes into the clay used as thermal insulator in the kilns entrance.

The burning of the new biomasses also emits particulate material and CO_2, as well as when using wood. However, the emission reductions of GHG will improve since they are renewable biomasses.

This way the project does not cause any additional negative impacts as all generated energy is a result of the best and unique exploitation of the natural resources available. On the contrary, the Project will improve the local environmental conditions by establishing proper treatment for the renewable biomasses and also by contributing to the reduction of the deforestation rate.

Table 13. Summary of the environmental impacts.

Environmental Factor	Environmental Impact	Classification
Soil	Improvement of soil conditions because of the vegetation conservation	Positive
Air	Production of ash	Negative
Climate	GHG emission reduction	Positive
Water/ hydric resources	Preservation of ground water quality	Positive
Water/ hydric resources	Preservation of the water cycle renewal	Positive
Energy	No more use of a polluting residues as fuel for energy production	Positive
Fauna	Biodiversity preservation	Positive
Flora	Biodiversity preservation	Positive

Summary of the environmental impacts.

Environmental Laws related to the plant activities

The National Environmental Policy (PNMA), instituted by the Brazilian Law 6.938/81, has the purpose of preservation, improvement and recovery of the environmental quality, with the intention to assure conditions for the social-economic development and the protection of human dignity in the country. The PNMA establishes that the construction, installation, amplification and operation of any enterprise or activity which may exploit natural resources, and are considered potentially pollutant, or capable of degrading the environment, will be possible only if they obtain a previous environmental permission, according to the Brazilian Constitution of 1988. One of the tools settled by the PNMA, in order to monitor and study the potential impacts generated by these kinds of enterprises, is the Environmental Impact Assessment (EIA). An EIA was not required due to the project activity.

6 Stakeholders comments:

The main stakeholders considered in this project are the ceramic sector sindicate and the ceramic company employees. A letter was sent to the stakeholders informing about the project and in the ceramic´s facilities the letter was posted on the employee´s board, which is a visible place with high circulation of employees. The letter was available during 7 days and the comments were expected for a period of 7 days after the letter has been posted.

Moreover, having the ceramic sector syndicate being aware of the project, other local stakeholders will be able to be informed about the proposed project activities, because the ceramic sector association has great visibility trough different parts of the community, public entities on different levels, like Municipality, State and Federal organizations.

The ceramic sector syndicate keeps relationships to local developing agencies, like SEBRAE (Brazilian Service to support Micro and Small size companies), SENAI (Brazilian Service to support technically Manufacturing

Companies), among others so it will help in the diffusion of project results and practices.

Till validation time, positive answers were received and outcomes are available and arrived within the validation of the project.

For example, The São Miguel do Guamá Industries Syndicate (SICOM) sent a letter on December 19, 2008, certifying that they are aware of the activities related to the project. The syndicate demonstrated to recognize the importance of this practice, supporting and encouraging the divulgation of these projects.

In relation to the contact procedures and the involvement of the Stakeholders, an informal public consultation was realized (Figure 5 and Figure 6), inviting environmental organs, non-governmental organizations, the syndicate of the ceramic sector in the region, some ceramics from *São Miguel do Guamá* and Brazilian Service for Support of Micro and Small Companies.

The consultation explained the activities of the projects developed in the ceramics of São Miguel do Guamá pole, and also the Social Carbon Methodology. In the end of the lectures, the participants could give their opinions and resolved their doubts concerning the issue. The doubts were mainly about the Social Carbon methodology and its applicability. Furthermore, positive comments concerning the project were received.

Figure 5. Stakeholders Consultation

Figure 6. Stakeholders Consultation

7 Schedule:

- Project start date: December of 2004.
- Date of initiating project activity: 01/01/2007;
- Validation Report predicted to 19/11/2008;
- First Verification Report predicted to 19/12/2008;
- VCS project crediting period: 10 years renewable;
- Monitoring and reporting frequency: preferentially from 6 to 12 months, since the beginning of the crediting period;
- Date of terminating the project: 31/12/2016.

After the project start date, the ceramic owner made adaptations due to the use of new biomass and its technology encompassing, for example, tests using the new biomasses, the ideal mix of renewable biomasses (different percentages of each biomass) and technological adaptations such as the installation of molten iron grills in all six “Round” kiln entrances.

8 Ownership:

8.1 Proof of Title:

Ceramic’s article of incorporation and the contract between Social Carbon - project developer - and Ceramic *Cavalcante* will proof the title, demonstrating the rights to the GHG emissions reductions and the ownership of the project. These proofs of title will be checked by DOE and are in power of *Cavalcante* Ceramic and available to consultation.

8.2 Projects that reduce GHG emissions from activities that participate in an emissions trading program (if applicable):

Not applicable.