# VELOTEX CERAMIC SWITCHING FUEL PROJECT

Document Prepared By Sustainable Carbon – Projetos Ambientais Ltda

| | |
|---|---|
| **Project Title** | Velotex Ceramic Switching Fuel Project |
| **Version** | 04 |
| **Report ID** | *3* |
| **Date of Issue** | 20 - February – 2013 |
| **Project ID** | 200 |
| **Monitoring Period** | 01 – October – 2011 to 31 – December – 2012 |
| **Prepared By** | Sustainable Carbon - Projetos Ambientais Ltda |
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# 1 PROJECT DETAILS

## 1.1 Summary Description of Project

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

The project activity promotes a fuel switch at *Velotex* Ceramic, which is a ceramic company that produces different types of structural ceramic blocks, destined for the regional market of *Itabaiana* and its surroundings in the State of *Sergipe* as well as cities in the bordering States of *Alagoas* and *Bahia*.

The purpose of this project activity in the ceramic is to stop using the native wood from *Caatinga* biome, which is a non-renewable fuel, and substitute it with renewable biomasses to feed the ceramic kilns and fire their ceramic units. This way Velotex Ceramic can minimize environmental impacts related to the native wood deforestation and consumption.

This project activity contributes in the reduction of the greenhouse gas (GHG) emissions by diminishing the deforestation of the *Caatinga* biome. This biome is rich in natural resources with approximately 932 plant species[1], however it is one of the most threatened ecosystems of the planet[2]. One of the main causes of its degradation is the high calorific power of its vegetation. In a region where the scarcity of rivers implies lesser access to the electric energy, the firewood and charcoal correspond to 30% of the used energy matrix in the industries of the region, which intensifies the local deforestation[3].

In the period of 2008 and 2009, the *Caatinga* biome had an annual deforestation rate of 0.23%, which is equivalent to 1,921.18 km².[4]

*Velotex* utilized 1,515 m³ per month of native wood from *Caatinga* biome until 24/11/2005, which was before the project activity. The native wood without documentation is considered non-renewable, once it is not originated from areas with forest conservation management on reforestation. It is well known that the employment of native wood is a usual practice in the majority of the ceramics in *Sergipe* State, and changing this habit is a huge barrier for all the ceramics factories in *Itabaiana* region.

[1] Seiffarth A. J. Caatinga: um bioma exclusivamente brasileiro...e o mais frágil. IHU. Available at: http://fmclimaticas.org.br/sistema/publicacoes/arquivos/Caatinga,%20um%20bioma%20exclusivamente%20brasileiro.pdf

[2] Suzuki N. Caatinga é um dos biomas mais ameaçados do planeta. ReporterBrail. Available at: http://www.reporterbrasil.org.br/exibe.php?id=553. Last visit on: 01/06/2012.

[3] Available at: < http://www.reporterbrasil.org.br/exibe.php?id=553>. Last visited on 28/03/2012.

[4] Available at: http://siscom.ibama.gov.br/monitorabiomas/caatinga/caatinga.htm. Last visited on 22/03/2012.

During the period from 01/10/2011 to 31/12/2012 emission reductions due to the switching of non-renewable fuel to renewable biomasses were equal to **47,020 $tCO_2e$**. The contribution to sustainable development is being monitored through the application of SOCIALCARBON® Standard. This methodology evaluates the continuous improvement in six aspects: Social, Human, Financial, Natural, Technology and Carbon Resources.

### 1.2 Sectoral Scope and Project Type

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

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

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

### 1.3 Project Proponent

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

***Velotex* Ceramic:**

*Mr. Luiz Carlos Silva,* Monitoring data responsibilities: General data, information on inputs and outputs of the ceramic, detailed information and numbers on sales, how output data is handled and how data is stored and kept by the *Velotex*'s office.

*Mr. Noel Oliveira Figueiredo Junior*, Director: Information and visit of the ceramic, detailed information on process and production lines, environmental challenges, technological challenges, research and development history and ceramic devices market challenges.

Other information on the project's proponent:

Address:

Povoado Rio das Pedras, s/n – Zona Rural.

Itabaiana – Sergipe – Brazil

Postal Code: 49500-000

Phone number: +55 (79) 3436-1274

**Project Developer**

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

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

The monitoring report was completed on 20/02/2013 by *Mariana Broso Fieri, Mariana dos Santos Silva, Camila Vaccari,* and *Larissa Tega* da *Fonseca* and coordinated by *Marcelo Hector Sabbagh Haddad and Thiago de Avila Othero* from *Sustainable Carbon – Projetos Ambientais LTDA.*

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

Address:

R. Doutor Bacelar, 368 – Conj. 131 – Vila Clementino

São Paulo – SP, Brazil

Postal Code: 04026-001

Phone number: +55 (11) 2649 0036

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

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

### 1.4 Other Entities Involved in the Project

No other entity was involved in the project.

### 1.5 Project Start Date

According to version 10 of the VCS PD[5], project start date was defined as 24/11/2005. On this date, the project started to reduce or remove GHG emissions, i.e. the ceramic started using renewable biomass as fuel.

### 1.6 Project Crediting Period

The crediting period for this project started on 01/04/2006 and will finalize on 31/03/2016.

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

[5] *Document available at: http://mc.markit.com/br-reg/public/index.jsp?q=Velotex&s=cp. Last visited on 23/03/2012.*

## 1.7 Project Location

According to the applied methodology AMS-I.E.: Switch from Non-Renewable Biomass for Thermal Applications by the User, version 01, the project boundaries for the project are the physical, geographical areas of the renewable energy generation, thus, the ceramic limits. The ceramic is located in the Municipality of *Itabaiana* in the State of *Sergipe*, which is indicated in Figure 01. The project site has the following postal address:

***Velotex* Indústria e Comércio de Artefatos de Barro Ltda**

Address:

Povoado Rio das Pedras, s/n – Zona Rural.

Itabaiana – Sergipe – Brazil

Postal Code: 49500-000

Geographical coordinates: 10°45'47" S and 37°22'55" W,

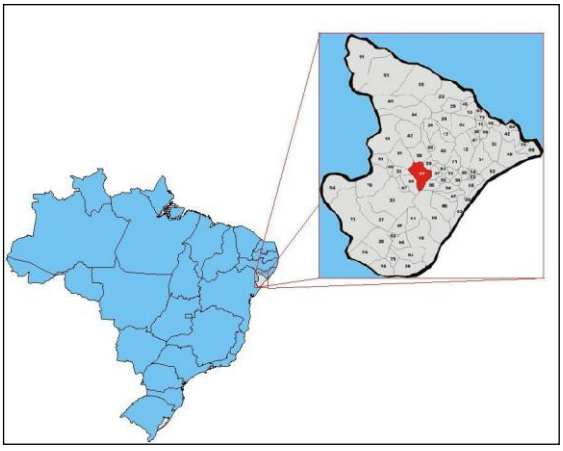

**Figure 1. Geographic location of the city of the project activity that has the following coordinates: latitude: 10°45'47" S, longitude: 37°22'55" W[6].**

## 1.8 Title and Reference of Methodology

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

[6] Geographic location of Itabaiana city. According to: http://www.itabaiana.se.gov.br/acidade_aspectos.asp. Last visited on 27/03/2012.

Category AMS-I.E.: Switch from Non-Renewable Biomass for Thermal Applications by the User – Version 01, valid from 01/02/2008 to 08/04/2010[7]. This category comprises small thermal appliances that displace the use of non-renewable biomass by introducing new renewable energy end-user technologies.

## 2 IMPLEMENTATION STATUS

### 2.1 Implementation Status of the Project Activity

The VCS PD was validated by the Designated Operational Entity TÜV Nord CERT GmbH and this present monitoring report is being verified by Designated Operational Entity TÜV Rheinland do Brasil Ltda.

As described on the VCS PD version 10, the production process at *Velotex* Ceramic encompasses three "Hoffman" kilns[8] in order to burn the fuel and fire the ceramic units, which are mainly used in the construction sector. The "Hoffman" kilns have capacity for approximately 4,470 tonnes of ceramic units per month. The *Velotex* Ceramic has also 9 dryers, which are responsible to remove moisture of the ceramic units. The drying process is in part performed by artificial dryers and naturally dried in open areas. The artificial dryers are supplied with renewable biomass to produce heat to dry the ceramic units.

The table below demonstrates the emission reductions verified in the last monitored period:

| **2º Monitoring Period** | **Emission Reduction (tCO2e)** |
|---|---|
| **2008 (From 01/10/2008 to 31/12/2008)** | 8,956 |
| **2009** | 33,074 |
| **2010** | 35,071 |
| **2011 (From 01/01/2011 to 30/09/2011)** | 28,173 |
| **Total in the monitoring period** | **105,274** |

[7] This version of the methodology is available at: <http://cdm.unfccc.int/UserManagement/FileStorage/CDM_AMSP4VBBO5G54RXDE9KQ6FJWMGHZLHFA5>. Last visited on 27/03/2012.

[8] "Hoffman" kilns have parallel chambers where the heat from one chamber is used in the next, therefore recycling the generated heat from the previous chambers.

The monitoring data was kept according to the monitoring plan described in the project description document. This Monitoring Report refers to the third monitoring period of this project, and includes data from 01/10/2011 to 31/12/2012.

### 2.2 Project Description Deviations

The registered VCS PD version 10 establishes that the project developer (meaning the ceramic owner) would measure the amount of renewable biomasses used (parameter $Q_{renbiomass}$). However, during the entire monitored period, this parameter was monitored through all the receipts and invoices of biomass received by the ceramic industry. This means the amount of renewable biomass is measured by each provider and controlled by the ceramic owners, by storing receipts and invoices.

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

### 2.3 Grouped Project

Not applicable. This is not a grouped project.

## 3 DATA AND PARAMETERS

### 3.1 Data and Parameters Available at Validation

| | |
|---|---|
| Data Unit / Parameter: | **$EF_{projected\ fossil\ fuel}$** |
| Data unit: | $tCO_2/TJ$ |
| Description: | $CO_2$ Emission factor of residual fuel oil |
| Source of data: | IPCC 2006 Guidelines for National Greenhouse Gas Inventories. Source: http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf. Page 2.18. Table 2.3. IPCC. Visited on 20/12/2012 |
| Value applied: | 77.4 $tCO_2/TJ$ |
| Purpose of the | This parameter was used to calculate baseline emissions from the use of the fossil fuel that would be used in the baseline scenario, in the absence |

| | |
|---|---|
| data: | of non-renewable wood. |
| Any comment: | Applicable for stationary combustion in the manufacturing industries and construction. The fossil fuel likely to be used by similar consumers is taken the IPCC default value of residual fossil fuel.<br><br>Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits income for this project activity, whichever occurs later. |

| | |
|---|---|
| Data Unit / Parameter: | **$NCV_{biomass}$** |
| Data unit: | TJ/tonne of wood |
| Description: | Net Calorific Value of non-renewable biomass |
| Source of data: | Brazilian study carried out with *Caatinga* wood:<br><br>QUIRINO, W.F; VALE, A.T; ANDRADE A.P.A; ABREU, V.L.S; AZEVEDO, ACS. Calorific Value of Wood and Wood Residues**.** Available at: http://www.renabio.org.br/06-B&E-v1-n2-2004-173-182.pdf. Visited on 20/12/2012.<br><br>OLIVEIRA, E; VITAL B.R; PIMENTA, A.S; LUCIA, R.M.D; LADEIRA, A.M.M; CARNEIRO, A.C.O. Anatomical Structure and charcoal quality of *Mimosa tenuiflora* (Willd.) Poir. Wood. Available at: http://www.scielo.br/pdf/rarv/v30n2/a18v30n2.pdf. Visited on 20/12/2012 |
| Value applied: | 0.019 |
| Purpose of the data: | This value provided the energy generated by the amount of wood that would be used in the absence of the project. |
| Any comment: | The species used to calculate the average value are typical trees of *Caatinga* Biome that are usually utilized as fuel in the ceramic industries of the region.<br><br>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 Unit / Parameter: | $\rho_{biomass}$ |
| Data unit: | tonne/m³ |
| Description: | Specific gravity |
| Source of data: | IPCC: Intergovernmental Panel on Climate Change. Orientación del IPCC sobre lãs buenas prácticas para UTCUTS – chapter 3 – Table 3ª.1.9-2<br><br>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.<br><br>OLIVEIRA, E; VITAL B.R; PIMENTA, A.S; LUCIA, R.M.D; LADEIRA, A.M.M; CARNEIRO, A.C.O. Anatomical Structure and charcoal quality of *Mimosa tenuiflora* (Willd.) Poir. Wood. Available at: http://www.scielo.br/pdf/rarv/v30n2/a18v30n2.pdf. Visited on 20/12/2012<br><br>QUIRINO, W.F; VALE, A.T; ANDRADE A.P.A; ABREU, V.L.S; AZEVEDO, ACS. Calorific Value of Wood and Wood Residues**.** Available at: http://www.renabio.org.br/06-B&E-v1-n2-2004-173-182.pdf. Visited on 20/12/2012. |
| Value applied: | 0.88 |
| Purpose of the data: | The amount of wood used in the baseline was measured by volume units, so this data was used to the unity conversion. |
| Any comment: | The species used to calculate the average value are typical trees of *Caatinga* Biome and usually utilized as fuel in the ceramic industries of the region. |

| | |
|---|---|
| Data Unit / Parameter: | $BF_y$ |
| Data unit: | Tonne of wood per tonne of ceramic devices |
| Description: | Consumption of non-renewable biomass per tonne of ceramic devices |
| Source of data: | Historical data from project proponent |
| Value applied: | 0.44704 tonne of wood per tonne of units of ceramic devices |
| Purpose of the | The value was acquired through the average consumption and production |

| | |
|---|---|
| data: | of ceramic units during the years when the ceramic factory used to consume non-renewable wood. This value is in accordance with the data acquired in other ceramics that employ the same type of kilns and furnace.<br><br>The value was employed to calculate the real amount of wood displaced to maintain the ceramic production in the baseline scenario. |
| Any comment: | Data is in accordance with TAPIAS, 2000[9], which estimates an approximate value for this kind of kiln (Hoffmann) – From 0.6 to 0.9 m³/thousand of pieces. |

## 3.2 Data and Parameters Monitored

| | |
|---|---|
| Data Unit / Parameter: | $Q_{renbiomass}$ |
| Data unit: | Tonnes per month |
| Description: | Amount of renewable biomass per month |
| Source of data: | • Measured by the biomass providers and controlled by the ceramic owner. The registered VCS PD v.10 establishes that the ceramic owner would measure this parameter; however, during the entire monitored period, this parameter was monitored through all the receipts and invoices of biomass received by the ceramic company. |
| Description of measurement methods and procedures to be applied: | The amount of biomass was monitored in accordance to the weight or volume described in the receipts from the providers. Some values in the receipts were described in m³, therefore it was necessary the conversion to tonnes through the specific gravity of each biomass.<br><br>The specific gravity values of the renewable biomasses utilized in this project are: |

| Biomass | Specific gravity (tonne/m³) |
|---|---|

[9] Available at: TAPIA, R.E.C. et al. Manual para a industria de cerâmica vermelha. Rio de Janeiro, SEBRAE/RJ, 2000. (Série Uso Eficiente de Energia)

| | |
|---|---|
| **Wood from reforested areas (eucalyptus)** | 0.495 |
| **Sawdust** | 0.245 |
| ***Algaroba* wood** | 0.756 |
| **Pallet** | 0.400 |
| **Municipal wood residues** | 0.880 |

Sources:

- **Sawdust**

Masses and dead loads of concrete and other material. Available at: <http://web.archive.org/web/20100524083333/http://cca.org.nz/pdf/Masses.pdf>. Last visited on: 19/02/2013.

- **Eucalyptus Genre**

Average value estimated thought “Análise da Produção Energética e de Carvão Vegetal de Espécies de Eucalipto” data. Available at: http://www.ipef.br/publicacoes/scientia/nr23/cap08.pdf. Visited on 13/03/09.

- ***Algaroba* Wood Average Value:**

Comparação da Qualidade da Madeira de seis espécies de Algarobeira para a produção de Energia. Available at: http://www.cnpf.embrapa.br/publica/boletim/boletarqv/bolet45/pag99_106.pdf. Visited on 13/03/09.

- **Pallet:**

Pinus Pallets, Available at: http://www.pinuspalete.com.br/especificacoes.htm. Visited on 13/03/09.

- **Municipal wood residues:**

The municipal wood residues are comprised mainly of branches and trunks from native trees utilized in the urban forestry. Thus, the same specific gravity value for native wood was assumed, according to the VCS PD version 10, fixed parameter "ρ biomass".

| | |
|---|---|
| Frequency of monitoring/recording: | Monthly |
| Value monitored: | |

**Qrenbiomass - Renewable Biomass (tonnes)**

| Period | Sawdust | Pallet | Algaroba | Eucalyptus | Municipal wood residues |
|---|---|---|---|---|---|
| **October** | 454.31 | 11.20 | 250.24 | 180.18 | 112.00 |
| **November** | 362.93 | 118.22 | 325.83 | 261.86 | 110.25 |
| **December** | 557.50 | 7.80 | 516.36 | 265.33 | 103.95 |
| **Total 2011** | **1,374.74** | **137.22** | **1,092.43** | **707.37** | **326.20** |
| **January** | 372.68 | 8.91 | 354.56 | 168.31 | 208.56 |
| **February** | 419.00 | 1.49 | 402.95 | 137.13 | 90.64 |
| **March** | 558.06 | 36.76 | 622.94 | 234.14 | 384.56 |
| **April** | 485.88 | 26.85 | 178.42 | 177.21 | 245.98 |
| **May** | 495.81 | 144.57 | 218.48 | 223.75 | 431.20 |
| **June** | 427.33 | 112.21 | 106.60 | 203.94 | 367.84 |
| **July** | 317.76 | 19.73 | 96.01 | 82.17 | 273.68 |
| **August** | 554.64 | 79.53 | 65.77 | 0.00 | 142.56 |
| **September** | 383.41 | 49.93 | 371.95 | 26.24 | 269.28 |
| **October** | 470.74 | 38.88 | 258.55 | 0.00 | 211.20 |
| **November** | 580.35 | 45.93 | 532.23 | 50.49 | 226.16 |
| **December** | 239.88 | 4.00 | 490.65 | 99.00 | 59.84 |
| **Total 2012** | **5,305.54** | **568.79** | **3,699.11** | **1,402.38** | **2,911.50** |
| **Total** | **6,680.28** | **706.01** | **4,791.54** | **2,109.75** | **3,237.70** |

| | |
|---|---|
| Monitoring equipment: | No monitoring equipment was used to determine this parameter. |
| QA/QC procedures to be applied: | Amount of biomass was double checked according to receipts of purchase. The energy balance was verified according to the amount of biomass applied. More details are available on Table 4. |
| Calculation method: | Not applicable |

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|---|---|
| Any comment: | During the current monitoring period the ceramic used 5 types of biomass which provided a great variety of suppliers and ensured the fuel supply. |

| | |
|---|---|
| Data Unit / Parameter: | **$PR_y$** |
| Data unit: | Tonnes of ceramic units |
| Description: | Tonnes of ceramic units produced per month. |
| Source of data: | Controlled by the project developer. |
| Description of measurement methods and procedures to be applied: | The amount represents the total production of the period monitored. The measurement was done by an internal control sheet monitored by the project proponent, which was filled daily. This sheet contains the amount of lines of kilns that were fired per month. Each line produces 2.5 thousand blocks of type 09x14x19 and each thousand weighs 1.5 tonnes (according to the table below). Therefore, the ceramic factory calculated the number of lines fired into tonnes of common blocks (09x14x19) by multiplying the amount of lines by 2.5 and 1.5. |
| Frequency of monitoring/recording: | Monthly |
| Value monitored: | |

**Weight of ceramic units produced at *Velotex* Ceramic (tonnes per unit)**

| 11.5x19x24 | 14x19x29 | 19x19x24 | 09x14x19 | 09x19x24 |
|---|---|---|---|---|
| 0.0032 | 0.0058 | 0.0048 | 0.0015 | 0.0025 |

| | Period | Total Production in tonnes of ceramic devices |
|---|---|---|
| 2011 | October | 5,198 |
| | November | 4,395 |
| | December | 4,984 |
| | **Total 2011** | **14,576** |
| 2012 | January | 5,089 |
| | February | 4,811 |
| | March | 5,475 |

| | | | |
|---|---|---|---|
| | | **April** | 4,789 |
| | | **May** | 5,051 |
| | | **June** | 4,549 |
| | | **July** | 4,429 |
| | | **August** | 4,613 |
| | | **September** | 4,343 |
| | | **October** | 4,556 |
| | | **November** | 4,845 |
| | | **December** | 4,838 |
| | | **Total 2012** | **57,386** |
| | | **Total** | **71,963** |

More detailed information, please see VCS MR Calculation *Velotex* spreadsheet.

| | |
|---|---|
| Monitoring equipment: | No monitoring equipment was used to determine this parameter. Production was counted by trained personnel on the ceramic. |
| QA/QC procedures to be applied: | The ceramic has an internal control of the quantity of ceramic units produced. It was rechecked according to the biomass employed and the kiln consumption of renewable biomass. |
| Calculation method: | The weights of the ceramic units produced in this monitoring period were measured by a calibrated scale from Ceramic's Quality Laboratory. These values were used to convert production from units to tonnes. |
| Any comment: | Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later. |

| | |
|---|---|
| Data Unit / Parameter: | **Origin of renewable biomass** |
| Data unit: | Not applicable |
| Description: | Renewable origin of the biomass |
| Source of data: | Controlled by the project developer |
| Description of measurement | The guarantee of acquiring sawdust, wood from reforested areas (Eucalyptus), *Algaroba* wood, municipal wood residues and pallets was |

| | |
|---|---|
| methods and procedures to be applied: | achieved by invoices and receipts from the providers. |
| Frequency of monitoring/recording: | Annually |
| Value monitored: | Not applicable. All biomass used by the ceramic are considered renewable. |
| Monitoring equipment: | No monitoring equipment was used to determine this parameter. |
| QA/QC procedures to be applied: | The biomasses were considered renewable as they were in accordance with the definition given by the Annex 18, EB 23 of UNFCCC definition[10]. |
| Calculation method: | Not applicable |
| Any comment: | All the renewable biomasses utilized in the monitoring period are in accordance with definitions of renewable biomass set in the applied methodology. All these biomasses were already described in the project description document.<br><br>Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later. |

| | |
|---|---|
| Data Unit / Parameter: | **Renewable biomass surplus** |
| Data unit: | tonnes or $m^3$ |
| Description: | Amount of renewable biomass available |
| Source of data: | Monitored |
| Description of measurement | The sources of leakages predicted in “General guidance on leakage in biomass project activities” of Indicative Simplified Baseline and |

[10] CDM – Executive Board. Annex 18 definition of renewable biomass. EB 23. Available at: <http://cdm.unfccc.int/search?q=Annex+18%2C+EB+23>. Las visited on 28/10/2011.

<table>
<tr><td>methods and procedures to be applied:</td><td>Monitoring Methodologies for Selected Small-Scale CDM Project Activity Categories, were monitored. The measurement of the leakage was based in national and international articles and database every monitoring period. The sources provided information about the biomass availability in the project activity's region.<br><br>More detailed information, please see section 4.3 Leakage, section A.</td></tr>
<tr><td>Frequency of monitoring/recording:</td><td>Annually</td></tr>
<tr><td>Value monitored:</td><td>
<table>
<tr><th>Biomass</th><th>Amount per year (m³)</th></tr>
<tr><td>Forest Residues (sawdust, pallets, wood shaving and eucalyptus husk)</td><td>248,868</td></tr>
<tr><td>Wood from management areas (eucalyptus and pinus)</td><td>10,855,724</td></tr>
<tr><td>Algaroba wood (m³)</td><td>2,500,000</td></tr>
<tr><td>Municipal wood residues[11]</td><td>-</td></tr>
</table>
<br>More detailed information, please see section 4.3 Leakage.</td></tr>
<tr><td>Monitoring equipment:</td><td>No monitoring equipment was used to determine this parameter.</td></tr>
<tr><td>QA/QC procedures to be applied:</td><td>Data available regarding the ceramic industries fuel consumption was employed to monitor the leakage.</td></tr>
<tr><td>Calculation method:</td><td>The amount of biomass used by the project activity in each year of the crediting period compared to total biomass available, as estimated on the VCS PD.</td></tr>
<tr><td>Any comment:</td><td>Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.</td></tr>
</table>

[11] Data not available. It is assumed that the municipal wood residues are continuously generated by the municipality and region. According to CENBIO (2008), the lack of sites for the final disposal of the municipal wood residues, combined to the high cost of treatment techniques, constitute one of the largest and main problems faced today. Souce: <http://cenbio.iee.usp.br/download/documentos/notatecnica_ix.pdf>. Last visited on 24/06/2012.

| | |
|---|---|
| Data Unit / Parameter: | **Leakage of non-renewable biomass** |
| Data unit: | $tCO_2e$ |
| Description: | Leakage resulted from the non-renewable biomass |
| Source of data: | Monitored |
| Description of measurement methods and procedures to be applied: | The source of leakage predicted in the methodology applied was monitored.<br>More detailed information, please see section 4.3 Leakage, section B. |
| Frequency of monitoring/recording: | Annually |
| Value monitored: | 0 |
| Monitoring equipment: | No monitoring equipment was used to determine this parameter. |
| QA/QC procedures to be applied: | Data available regarding the ceramic industries fuel consumption were utilized to monitor the leakage. |
| Calculation method: | Not applicable. |
| Any comment: | Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later. |

| | |
|---|---|
| Data Unit / Parameter: | $f_{NRB,y}$ |
| Data unit: | Fraction of biomass or (percentage) |
| Description: | Fraction of biomass (wood) used in the absence of the project activity in year y. |
| Source of data: | Survey methods. |
| Description of | |

| | |
|---|---|
| measurement methods and procedures to be applied: | Before the project activity, wood from areas without forest management was offered with low prices and high viability to the ceramics owner. Thus, the totality of fuel employed in the baseline scenario is from non-renewable origin.<br><br>According to International Tropical Timber Organization (ITTO, 2011), article "Brazil Profile". Available at: http://www.itto.int/sfm/. Last visited on 19/02/2012, the area of *Caatinga* with sustainable use corresponds to 295,000 ha.<br><br>Besides that, according to IBGE, the approximate area of *Caatinga* biome is 844,453 km², which means 84,445,300 ha. Therefore, the amount of wood with sustainable use in *Caatinga* Biome is 0.35%.<br><br>It was made two sheets to calculate the amount of wood consumed. The first one encompasses the amount of wood consumed by the ceramics located at the *Caatinga* biome. The other sheet calculates the amount of wood consumed regarding only *Velotex* Ceramic.<br><br>Dividing these values by the total of wood available, it was achieved the amount of renewable biomass that has been saved by all the project activities or only by *Velotex* project, respectively[12].<br><br>Afterwards, summing each value with the sustainable use areas defined by ITTO (2011), it was acquired two fraction of renewable biomass.<br><br>Finally, each value was subtracted from 100% to achieve the $f_{NRB,y}$. Therefore, it was taken the smaller value in order to be more conservative. These sheets are available at the VCS MR Calculation spreadsheet, $f_{NRB,y}$ tab. |
| Frequency of monitoring/recording: | Annualy |
| Value monitored: | 99.40% |
| Monitoring equipment: | No monitoring equipment was used to determine this parameter. |
| QA/QC procedures to be applied: | The monitoring of this parameter was based in national and international articles and database every monitoring period. The sources provided information about the sustainable use of *Caatinga* biome.<br><br>Wood saved from projects located in the same biome and that applied the same methodology developed by *Sustainable Carbon* was |

[12] According to data from project activities elaborated by Sustainable Carbon – Projetos Ambientais LTDA.

| | |
|---|---|
| | considered in this fraction. CDM or VCS registered projects with the same methodology were also included in this fraction if placed in the same region. |
| Calculation method: | Not applicable. |
| Any comment: | It was employed in order to estimate the amount of non-renewable biomass. |

### 3.3 Description of the Monitoring Plan

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

Mr. Luiz Carlos da Silva, ceramic manager, is responsible for the monitoring plan as well as the administration of ceramic expenses and sales. He collected production data and organized it according to production forms. Furthermore, he was responsible for storing the invoices, receipts and other documents related to purchase or acquisition of renewable biomass. All this information is reported to the ceramic owner, Mr. Noel Oliveira Figueiredo Junior.

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

However, no internal auditing was performed on data related to this monitoring period. Typing errors and illegible documents identified in the double check procedures are clarified between Sustainable Carbon technical team and the monitoring responsible on the ceramic during site visits for data collection, by reassessing existing documents and sources of information. The responsible for the monitoring plan is Mr. Luiz Carlos da Silva from *Velotex* ceramic. Sustainable Carbon technical team (including those members described on Section 1.3) was also involved in the project monitoring.

## 4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

### 4.1 Baseline Emissions

Baseline emissions are estimated following procedures of the applied methodology: AMS-I.E.: Switch from Non-Renewable Biomass for Thermal Applications by the User – Version 01, valid from 01/02/2008

to 08/04/2010[13]. The project activity in this monitoring period (15 months) generated 293.68 TJ, or 234.94 TJ per year. Converting this number to MWh, 65,261.61 MWh was generated per year, which corresponds to the use of 7.45 MWthermal on average of the kilns capacity during the monitored period, which is less than the limits of 45 MWthermal for Type I Small scale project activities.

**Baseline emissions**

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

Where:

$ER_y$: Emission reductions during the year y in $tCO_2e$

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

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

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

$EF_{projected\ fossil\ fuel}$: Emission factor for the projected fossil fuel consumption in the baseline in $tCO_2/TJ$[14].

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

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

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

Where:

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

$\eta_{old}$ : Efficiency of the system being replaced.

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

Where:

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

[13] Available at: http://cdm.unfccc.int/filestorage/C/D/M/CDM_AMSP4VBBO5G54RXDE9KQ6FJWMGHZLHFA5/AMS_I.E_ver01.pdf?t=M2x8bTFpZDA2fDDxRa33pfwjFwdqnyRJ_eRl Last visited on 26/03/ 2012.

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

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

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

Where:

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

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

Where:

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

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

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

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

**Table 1. Baseline emissions for *Velotex* ceramic.**

| Year | Month | Baseline Emissions ($tCO_2e$) |
|---|---|---|
| 2011 | October | 3,396 |
| | November | 2,872 |
| | December | 3,256 |
| | **Total 2011** | **9,524** |
| 2012 | January | 3,325 |
| | February | 3,144 |
| | March | 3,577 |
| | April | 3,129 |
| | May | 3,300 |
| | June | 2,972 |
| | July | 2,894 |
| | August | 3,014 |
| | September | 2,837 |
| | October | 2,977 |
| | November | 3,166 |
| | December | 3,161 |
| | **Total 2012** | **37,496** |
| | **Total Monitoring Period** | **47,020** |

### 4.2 Project Emissions

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

### 4.3 Leakage

Leakage is estimated to be 0 (zero) $tCO_2e$ during the entire monitoring period.

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

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

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

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

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

Observing table 2, the possible sources of leakage of the present project activity are the competing use of biomass from existing forests (such as Wood from reforested areas and *Algaroba* wood) and from

biomass residues or waste, such as *Algaroba wood*, municipal wood residues, bamboo, pallets and sawdust. Below, information is presented for each type of biomass that was used as fuel by *Velotex* Ceramic during this monitoring period.

*Algaroba* wood

According to Silva (2007)[15], *Algaroba*[16] (*Prosopis juliflora* (Sw.) D.C.) is a tropical tree legume fairly common in the semi-arid region of Brazil, which thrives in dry environments where other plants would hardly survive.

At the beginning of 1940's, this specie was introduced in the Northeast region of Brazil with the aim of providing food to animals and to be utilized for reforestation actions. However, currently, due to its competitive skills, *Algaroba* spreads through several regions of Brazilian semi-arid areas[17].

A research made by EMBRAPA[18], which encompass the States of the northeast region of Brazil, affirmed that *Algaroba* is characterized as an invasive exotic plant due to its fast expansion, which causes many environmental impacts[19]. Besides, *Algaroba* presents a considerable capacity of regeneration and dispersal[20], which means that the plant does not die, it sprouts again instead.

The research's author reported that wood from *Algaroba* exploration is mainly commercialized as fuel for industries of vegetable oil, leather, ceramic and bakeries. On the other hand, *Algaroba* wood is not sold for stake[21], pegs and poles uses.

The factors which contribute most to the expansion of *Algaroba* uses, as firewood in these industries sectors, were its wide availability in the region and its legal release extraction from IBAMA[22]. This way, in order to control the decrease of biologic diversity in *Caatinga* biome, which has been occasioned from

[15] Silva, C. G. M, Melo Filho, A. B., Pires, E. F., Stamford M. Physicochemical and microbiological characterization of mesquite flour (Prosopis juliflora (Sw.) DC). Ciênc. Tecnol. Aliment., Campinas, 27(4): 733-736, out.-dez. 2007.

[16] Algaroba may also be known as mesquite.

[17] EMBRAPA, Projeto vai definir manejo para evitar invasão da Algaroba no ambiente semi-árido. Available at: <http://www.embrapa.gov.br/imprensa/noticias/2002/agosto/bn.2004-11-25.4648301041/>. Visited on 14/12/2008.

[18] EMBRAPA is the Brazilian Agricultural Research Corporation's which its mission is to provide feasible solutions for the sustainable development of Brazilian agribusiness through knowledge and technology generation and transfer.

[19] Araujo, J. L. P., Correia, R. C., Araujo, E. P., Lima, P. C. F. Cadeia Produtiva da Algaroba no Pólo de Produção da Bacia do Submédio São Francisco. EMBRAPA. Petrolina -PE – Brazil.

[20] EMBRAPA, Projeto vai definir manejo para evitar invasão da Algaroba no ambiente semi-árido. Available at: <http://www.embrapa.gov.br/imprensa/noticias/2002/agosto/bn.2004-11-25.4648301041/>. Visited on 14/12/2008.

[21] Heavy pole to which cattle is tied.

[22] IBAMA (Brazilian Institute for Environment and the Renewable Natural Resource) is the environmental agency of Brazil affiliated with Ministry of Environment. The main missions of IBAMA are: Environmental Protection, Environmental Licensing, Environmental Quality and Sustainable Use of Forest Management and Animal Resources. More information about IBAMA is available at: <www.ibama.gov.br >. Last visited on 13/03/2009.

*Algaroba*'s genre invasion, the government started to stimulate the *Algaroba* exploration in order to avoid it´s noxious effects[23].

Furthermore, this research showed that *Algaroba* is not used as a unique source of fuel for thermal energy generation in these industries sectors, e.g. corresponding only for 30% of the fuel's source in bakeries of the region studied.

The same research estimated that in the Northeast semi-arid region there were about 500 hundreds hectares spread through every type of its region land. Moreover, according to EMBRAPA (1992)[24], wood's production by *Algaroba* is at least 5 m³/ha/year, i.e. the production in the project's region was about 2,500,000 of m³ per year.

In this monitoring period *Velotex* ceramic had an annual consumption of around 2,037 m³ of *Algaroba* wood. Hence, the total amount of *Algaroba* used by *Velotex* Ceramic per year[25] represented around 0.2% of biomass availability in the region.

Therefore, this kind of fuel did not encompass any type of leakage since there was a great amount of these renewable biomasses available locally as described before.

Forest Residues (Sawdust and Pallets)

Forest Residues (sawdust and pallets) were also a fuel utilized for the ceramic units burning. The production of wood generates a large amount of residues, which can be reused to generate thermal energy. As can be observed in the figure 2, the potential of energy generation in the northeast region is plentiful, which means that there is an enormous availability of this kind of fuel to be employed in the project activity. This way, this biomass did not have potential to generate leakage emissions due to its high availability.

[23] Algaroba extraction is authorized in the State of Ceará, and it may be checked at normative instruction number 08 from 24/08/2004, developed by SEMACE.

[24] EMBRAPA, Comunicado Técnico Nº, Nov/92, p.1-2. Available at: <http://www.cpatsa.embrapa.br/public_eletronica/downloads/COT51.pdf>. Visited on 04/01/2013.

[25] Velotex Ceramic consumes approximately 5,070.42 m³ of Algaroba wood per year.

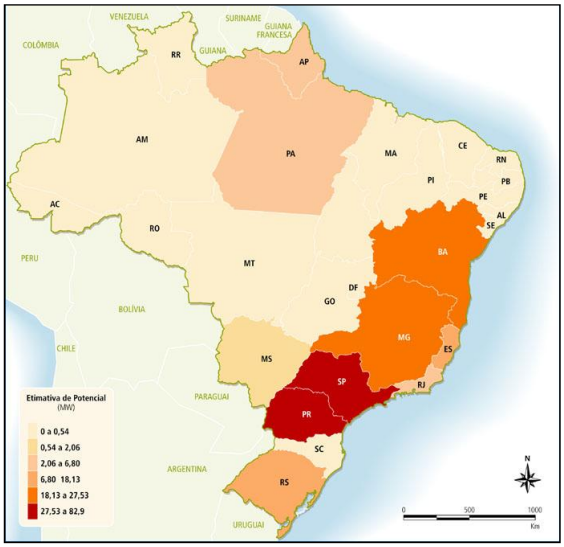


**Figure 2. Forest Residues Potential for Energy Generation[26]**

Considering that around 22% of the wood produced generates residues[27], the production of wood in the State of *Sergipe* was 14,345 m³ per year[28] and *Bahia*[29] was 1,116,877 m³ per year[30] in 2007, thus, both states generated around 248,868 m³ of forest residues.

The project activity employed per year, approximately, 21,813.16 m³ of sawdust, 1,412.02 m³ of pallets, thus 23,225.18 m³ of forest residues, which represented 9.33% of the total of these residues generated in the States of *Sergipe* and *Bahia*.

This way, this renewable biomass did not have potential to generate leakage emissions due to its high availability.

[26] Source: CENTRO NACIONAL DE REFERÊNCIA EM BIOMASSA - CENBIO. Panorama do potencial de biomassa no Brasil. Brasília; Dupligráfica, 2003. 80 p. Avaiable at: www.aneel.gov.br/aplicacoes/atlas/pdf/05-Biomassa(2).pdf. Last Visited on: 27/03/2012.

[27] 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.

[28] According to IBGE (Geographic and Statistic Brazilian Institute). Available at: http://www.ibge.gov.br/estadosat/temas.php?sigla=se&tema=extracaovegetal2007

[29] The state of Bahia was considered in the leakage, since the majority of forest residues are provided from Bahia state.

[30] According to IBGE(Geographic and Statistic Brazilian Institute). Available at: http://www.ibge.gov.br/estadosat/temas.php?sigla=ba&tema=extracaovegetal2007

Wood from reforested areas (Eucalyptus)

The States of *Sergipe* and *Bahia* presented together a production of 10,855,724 m³ of firewood[31], being among the largest productions for Brazilian's states. The present project utilized around 3,406.64 m³ of wood from management areas per year. Therefore, the project utilized 0.03% of the total biomass availability in both states. Thus, the amount of firewood from management areas necessary to provide thermal energy in *Velotex´*s kilns represented a non-representative quantity of this kind of biomass, which avoided the possibility of leakage.

Municipal wood residues

Urban gardens residues are very usual residue in Brazil, where around 70% of the amount of this kind of biomass is left in open dumps or landfills. This way the urban garden residue does not have any kind of utilization turning out in an residue which may originate problems such as high costs for its correct disposal or treatment or result in negative environmental effects when not disposed correctly[32].

For all this reasons the utilization of Urban gardens residues as fuel turn out be a considerable destination for these kind of residue, and would provide an abundant source of renewable biomass if utilized in the proposed project activity.

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

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

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

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

- Increase in the use of non-renewable biomass outside the project boundary to create non-renewable biomass baselines can also be potential source of leakage. If this leakage assessment quantifies an

[31] According to IBGE (Geographic and Statistic Brazilian Institute) available at: http://www.ibge.gov.br/estadosat/temas.php?sigla=ce&tema=extracaovegetal2007. Last visited on 13/03/ 2009.

[32] CENBIO, 2008. Souce: <http://cenbio.iee.usp.br/download/documentos/notatecnica_ix.pdf> visited on 04/01/2013.

increase in use of non-renewable biomass outside the project boundary then baseline is adjusted to account for the quantified leakage.

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

Therefore, it can be concluded that this source of leakage, until the date of this monitoring report, is not considered in this project activity.

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

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

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

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

### 4.4 Summary of GHG Emission Reductions and Removals

Table below summarizes the emission reductions for this monitoring period[33].

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

**Table 3. Emission reductions for the monitoring period.**

| Year | Month | $PR_y$ - Production (tonnes) | $B_y$ (tonnes) | $ER_y$ ($tCO_2e$) |
|---|---|---|---|---|
| 2011 | **October** | 5,198 | 2,323 | 3,396 |
| | **November** | 4,395 | 1,965 | 2,872 |
| | **December** | 4,984 | 2,228 | 3,256 |
| | **Total 2011** | **14,576** | **6,516** | **9,524** |
| 2012 | **January** | 5,089 | 2,275 | 3,325 |
| | **February** | 4,811 | 2,151 | 3,144 |
| | **March** | 5,475 | 2,448 | 3,577 |
| | **April** | 4,789 | 2,141 | 3,129 |
| | **May** | 5,051 | 2,258 | 3,300 |
| | **June** | 4,549 | 2,033 | 2,972 |
| | **July** | 4,429 | 1,980 | 2,894 |
| | **August** | 4,613 | 2,062 | 3,014 |
| | **September** | 4,343 | 1,941 | 2,837 |
| | **October** | 4,556 | 2,037 | 2,977 |
| | **November** | 4,845 | 2,166 | 3,166 |
| | **December** | 4,838 | 2,163 | 3,161 |
| | **Total 2012** | **57,386** | **25,654** | **37,496** |
| | **Total Monitoring Period** | **71,963** | **32,170** | **47,020** |

**Table 4. Production – QA/ QC procedure results**

| $Q_{renbiomass}$ - QA/QC Procedure | | | |
|---|---|---|---|
| **Parameter** | | **VCS PD** | **Monitoring Period - October 2011 to December 2012** |
| **$PR_y$ (tonnes of product)** | | 67,050.00 | 71,962.50 |
| **$Q_{renbiomass}$ (tonnes)** | **Wood from reforested areas (eucalyptus) (tonnes)** | 675.00 | 2,109.75 |
| | **Sawdust (tonnes)** | 2,250.00 | 6,680.28 |
| | **Algaroba wood (tonnes)** | 2,250.00 | 4,791.54 |
| | **Coconut Husk (tonnes)** | 22.50 | 0.00 |
| | **Taquara Bamboo (tonnes)** | 4,500.00 | 0.00 |
| | **Residues from Cashew Tree (tonnes)** | 675.00 | 0.00 |
| | **Pinus (tonnes)** | 585.00 | 0.00 |
| | **Eucalyptu's Husk (tonnes)** | 967.50 | 0.00 |
| | **Wood shaving (tonnes)** | 450.00 | 0.00 |
| | **Pallet (tonnes)** | 4.50 | 706.01 |
| | **Municipal wood residues (tonnes)** | 0.00 | 3,237.70 |
| **Thermal Energy (TJ)** | | 206.43 | 293.68 |
| **Thermal Energy per year (TJ)** | | 165.14 | 234.94 |
| **Conversion factor - TJ to MWh** | | - | 277.78 |
| **Thermal energy generated (MWh)** | | - | 65,261.61 |
| **Thermal energy generated (MW)** | | - | 7.45 |
| **Thermal energy per tonnes produced (TJ/tonne produced)** | | 0.0031 | 0.0041 |
| **Double Check (QA/QC Procedure)** | | The thermal energy generated per tonnes of ceramic pieces produced at Velotex Ceramic during the monitored period was higher than the VCS PD. | |

As can be verified on Table 4, the thermal energy generated with the use of renewable biomass per tonnes of ceramic units produced during the current monitoring period was higher than the VCS PD version 10. This demonstrates the ceramic is using renewable biomass to its producing process.

Therefore, based on Category AMS-I.E: Switch from Non – Renewable Biomass for Thermal Application by the User (Version 01, valid from 01/02/2008 to 08/04/2010) this project activity contributes to sustainability, once the ceramic company is using renewable biomass and applying the SOCIALCARBON® methodology.

# 5 ADDITIONAL INFORMATION

## 5.1 Amount of renewable biomass consumed per month on *Velotex* ceramic

**Table 5. Amount of Sawdust used by *Velotex* Ceramic.**

| Period | | $Q_{renbiomass}$ - Sawdust | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Ismário (tonnes) | Galego (tonnes) | Index (tonnes) | Norcon (tonnes) | Marcos de Arapiraca (tonnes) | Edilvan (tonnes) | JS IND - Colchões Zeep (tonnes) | Ivan (tonnes) | Pres. Areia Branca (tonnes) | José Rodrigues (tonnes) |
| 2011 | October | 5.00 | 123.40 | 4.41 | 1.20 | 100.94 | 219.36 | | | | |
| | November | | 93.40 | | 3.36 | 72.03 | 172.10 | 22.04 | | | |
| | December | | 145.80 | | 4.48 | 146.02 | 236.20 | 18.00 | 7.00 | | |
| | **Total 2011** | **5.00** | **362.60** | **4.41** | **9.04** | **318.99** | **627.66** | **40.04** | **7.00** | **0.00** | **0.00** |
| 2012 | January | | 102.52 | | 1.62 | 82.08 | 171.44 | 10.00 | | 2.10 | |
| | February | | 81.52 | | | 99.72 | 223.76 | 12.00 | 2.00 | | |
| | March | | 158.44 | | 1.56 | 105.84 | 283.76 | | 5.86 | | 2.60 |
| | April | | 123.46 | | | 115.64 | 237.82 | 5.60 | | | |
| | May | | 120.06 | | 1.96 | 111.23 | 256.12 | 4.70 | | | |
| | June | | 102.90 | | 1.59 | 122.01 | 173.96 | | 2.84 | | |
| | July | | 89.76 | | | 104.62 | 78.42 | 10.00 | | | |
| | August | | 142.44 | | 1.80 | 120.30 | 243.22 | | | | |
| | September | | 158.90 | | 1.80 | 95.55 | 97.00 | | | 2.00 | |
| | October | | 172.90 | | | 135.00 | 116.60 | | 2.96 | | |
| | November | | 229.78 | 4.51 | | 159.74 | 153.50 | | | | |
| | December | | 88.50 | | | 82.08 | 38.70 | | | | |
| | **Total 2012** | **0.00** | **1,571.18** | **4.51** | **10.33** | **1,333.81** | **2,074.30** | **42.30** | **13.66** | **4.10** | **2.60** |
| **Total - Monitoring Period** | | **5.00** | **1,933.78** | **8.92** | **19.37** | **1,652.80** | **2,701.96** | **82.34** | **20.66** | **4.10** | **2.60** |
| **Total - Monitoring Period ($m^3$)** | | **20.41** | **7,892.98** | **36.41** | **79.06** | **6,746.12** | **11,028.41** | **336.08** | **84.33** | **16.73** | **10.61** |

| $Q_{renbiomass}$ - Sawdust | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **MC Móveis (tonnes)** | **Móveis Rústicos (tonnes)** | **Itaguassu Agro (tonnes)** | **Vale (tonnes)** | **Reginaldo (tonnes)** | **Kit Inteligente (tonnes)** | **Esq. São José (tonnes)** | **Mad. Santa Maria (tonnes)** | **Gregori (tonnes)** | **Alexandre (tonnes)** | **Total Sawdust (tonnes)** |
| | | | | | | | | | | **454.31** |
| | | | | | | | | | | **362.93** |
| | | | | | | | | | | **557.50** |
| **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **1,374.74** |
| 1.38 | 1.54 | | | | | | | | | **372.68** |
| | | | | | | | | | | **419.00** |
| | | | | | | | | | | **558.06** |
| 3.36 | | | | | | | | | | **485.88** |
| | 1.74 | | | | | | | | | **495.81** |
| | | 3.13 | 20.90 | | | | | | | **427.33** |
| | 1.56 | | | 4.00 | 29.40 | | | | | **317.76** |
| | | | | 3.00 | 35.28 | | | | 8.60 | **554.64** |
| 1.70 | | | | | 26.46 | | | | | **383.41** |
| | | | | | 41.88 | 1.40 | | | | **470.74** |
| 1.78 | 1.90 | | | | 26.46 | | 2.68 | | | **580.35** |
| | | | | | 23.52 | | | 7.08 | | **239.88** |
| **8.22** | **6.74** | **3.13** | **20.90** | **7.00** | **183.00** | **1.40** | **2.68** | **7.08** | **8.60** | **5,305.54** |
| **8.22** | **6.74** | **3.13** | **20.90** | **7.00** | **183.00** | **1.40** | **2.68** | **7.08** | **8.60** | **6,680.28** |
| **33.55** | **27.51** | **12.78** | **85.31** | **28.57** | **746.94** | **5.71** | **10.94** | **28.90** | **35.10** | **27,266.45** |

**Table 6. Amount of Pallet used by *Velotex* Ceramic.**

| | | $Q_{renbiomass}$ - Pallet (tonnes) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Period** | | **Norcon** | **Cosil** | **Vale** | **Itaguassu Agro** | **MC Móveis** | **Móveis Rústicos** | **Nassal** | **Vale** | **Cimesa** | **Zé Grilo** | **Kit Inteligente** | **Votorantin** | **João Rollemberg** | **Celi** | **Total Pallet** |
| **2011** | **October** | | | | 2.30 | | | 0.50 | | | | | | | 8.40 | **11.20** |
| | **November** | 113.68 | | | 4.54 | | | | | | | | | | | **118.22** |
| | **December** | 2.76 | | | | | | | | | | | | | 5.04 | **7.80** |
| | **Total 2011** | **116.44** | **0.00** | **0.00** | **6.84** | **0.00** | **0.00** | **0.50** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **13.44** | **137.22** |
| **2012** | **January** | 0.92 | | | 3.49 | 0.86 | 0.64 | | | | | | | | 3.00 | **8.91** |
| | **February** | 1.49 | | | | | | | | | | | | | | **1.49** |
| | **March** | 0.76 | | 14.80 | 1.60 | | | | | | | | | | 19.60 | **36.76** |
| | **April** | 1.32 | | 20.00 | 3.53 | | | 2.00 | | | | | | | | **26.85** |
| | **May** | 11.24 | | 82.24 | 4.69 | | | | | | | | | 40.40 | 6.00 | **144.57** |
| | **June** | 0.58 | | | 3.63 | | | | 88.00 | | | | | 20.00 | | **112.21** |
| | **July** | | | | 1.62 | | | | 15.00 | 3.11 | | | | | | **19.73** |
| | **August** | 0.80 | | | 1.11 | | | | 18.04 | | 22.00 | 21.60 | 15.68 | | 0.30 | **79.53** |
| | **September** | 1.12 | | 16.21 | 4.08 | | | | | | | | 23.72 | | 4.80 | **49.93** |
| | **October** | 0.96 | | 19.24 | | | | | | | | | 18.68 | | | **38.88** |
| | **November** | | | | | | | | 17.29 | | | 9.60 | 15.04 | | 4.00 | **45.93** |
| | **December** | | | | | | | | | | | | 4.00 | | | **4.00** |
| | **Total 2012** | **19.19** | **0.00** | **152.49** | **23.75** | **0.86** | **0.64** | **2.00** | **138.33** | **3.11** | **22.00** | **31.20** | **77.12** | **60.40** | **37.70** | **568.79** |
| **Total - Monitoring Period** | | **135.63** | **0.00** | **152.49** | **30.59** | **0.86** | **0.64** | **2.50** | **138.33** | **3.11** | **22.00** | **31.20** | **77.12** | **60.40** | **51.14** | **706.01** |
| **Total - Monitoring Period ($m^3$)** | | **339.08** | **0.00** | **381.23** | **76.48** | **2.15** | **1.60** | **6.25** | **345.83** | **7.78** | **55.00** | **78.00** | **192.80** | **151.00** | **127.85** | **1,765.03** |

**Table 7. Amount of *Algaroba* used by *Velotex* Ceramic.**

| Period | | $Q_{renbiomass}$ - Algaroba (tonnes) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Geno | Jose Acrisio | Jose Almeida | Edilvan | Gilvan | Ailton | Marcelo | Zé Grilo | Ivan | Valdir | Jackson | Marcio Premoldado | Emerson | Djalma | Junior B Jardim | Gago de Alcides | Total Algaroba |
| 2011 | October | 40.07 | 90.72 | 81.65 | 37.80 | | | | | | | | | | | | | **250.24** |
| | November | | 150.44 | | 105.08 | 47.63 | | | 22.68 | | | | | | | | | **325.83** |
| | December | | 145.16 | 77.11 | 124.74 | 169.35 | | | | | | | | | | | | **516.36** |
| | **Total 2011** | **40.07** | **386.32** | **158.76** | **267.62** | **216.98** | **0.00** | **0.00** | **22.68** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **1,092.43** |
| 2012 | January | | 69.55 | | 25.70 | 145.91 | 74.09 | | 39.31 | | | | | | | | | **354.56** |
| | February | | 111.89 | | | 147.42 | | 52.16 | 91.48 | | | | | | | | | **402.95** |
| | March | | 73.33 | | 95.26 | 191.27 | | 58.21 | 39.31 | 165.56 | | | | | | | | **622.94** |
| | April | | | | 136.84 | | | | | | 41.58 | | | | | | | **178.42** |
| | May | | | | 218.48 | | | | | | | | | | | | | **218.48** |
| | June | | | | 106.60 | | | | | | | | | | | | | **106.60** |
| | July | | | | 96.01 | | | | | | | | | | | | | **96.01** |
| | August | | | | | | | | 27.97 | | | | | | | | 37.80 | **65.77** |
| | September | | | | 133.81 | | | | | | | | | | | | 238.14 | **371.95** |
| | October | | | | 55.94 | | | | | | | | | | | | 202.61 | **258.55** |
| | November | | | | 27.22 | | | | | | | 41.58 | 139.10 | 75.60 | 38.56 | | 210.17 | **532.23** |
| | December | | | | 68.80 | | | | | | | | 190.51 | | 34.78 | 37.04 | 159.52 | **490.65** |
| | **Total 2012** | **0.00** | **254.77** | **0.00** | **964.66** | **484.60** | **74.09** | **110.37** | **198.07** | **165.56** | **41.58** | **41.58** | **329.61** | **75.60** | **73.34** | **37.04** | **848.24** | **3,699.11** |
| **Total - Monitoring Period** | | **40.07** | **641.09** | **158.76** | **1,232.28** | **701.58** | **74.09** | **110.37** | **220.75** | **165.56** | **41.58** | **41.58** | **329.61** | **75.60** | **73.34** | **37.04** | **848.24** | **4,791.54** |
| **Total - Monitoring Period ($m^3$)** | | **53.00** | **848.00** | **210.00** | **1,630.00** | **928.02** | **98.00** | **145.99** | **292.00** | **218.99** | **55.00** | **55.00** | **435.99** | **100.00** | **97.01** | **48.99** | **1,122.01** | **6,338.02** |

**Table 8. Amount of E*ucalyptus* used by *Velotex* Ceramic.**

| Period | | $Q_{renbiomass}$ - Eucalyptus (tonnes) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Ze coco - José dos Santos | Rubens | Ismário | Val | Noel | Luciano | João Rollemberg | Total Eucalyptus |
| 2011 | October | | | 12.87 | 91.08 | | 76.23 | | **180.18** |
| | November | | | | 139.59 | | 122.27 | | **261.86** |
| | December | | | | 143.06 | | 122.27 | | **265.33** |
| | **Total 2011** | **0.00** | **0.00** | **12.87** | **373.73** | **0.00** | **320.77** | **0.00** | **707.37** |
| 2012 | January | 25.25 | | | 96.03 | | 47.03 | | **168.31** |
| | February | | 21.29 | | 47.03 | | 68.81 | | **137.13** |
| | March | | | | | 211.37 | 22.77 | | **234.14** |
| | April | | | | | | | 177.21 | **177.21** |
| | May | | | | | | 24.26 | 199.49 | **223.75** |
| | June | | | | | | 22.77 | 181.17 | **203.94** |
| | July | | | | | | | 82.17 | **82.17** |
| | August | | | | | | | | **0.00** |
| | September | | | | | | | 26.24 | **26.24** |
| | October | | | | | | | | **0.00** |
| | November | 50.49 | | | | | | | **50.49** |
| | December | 99.00 | | | | | | | **99.00** |
| | **Total 2012** | **174.74** | **21.29** | **0.00** | **143.06** | **211.37** | **185.64** | **666.28** | **1,402.38** |
| **Total - Monitoring Period** | | **174.74** | **21.29** | **12.87** | **516.79** | **211.37** | **506.41** | **666.28** | **2,109.75** |
| **Total - Monitoring Period ($m^3$)** | | **352.69** | **42.97** | **25.98** | **1,043.08** | **426.63** | **1,022.13** | **1,344.81** | **4,258.30** |

**Table 9. Amount of *Municipal Wood Residues* used by *Velotex* Ceramic.**

| | | Qrenbiomass - Municipal Wood Residues | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Period | | MC Móveis | Colchões Zeep | Cajueiro | Luiz | Zé Grilo | Galego | Alexandre | Total Municipal wood residues |
| 2011 | October | | | | | 112.00 | | | **112.00** |
| | November | | | | | 110.25 | | | **110.25** |
| | December | | | | | 103.95 | | | **103.95** |
| | **Total 2011** | **0.00** | **0.00** | **0.00** | **0.00** | **326.20** | **0.00** | **0.00** | **326.20** |
| 2012 | January | | | | | 208.56 | | | **208.56** |
| | February | | | | | 90.64 | | | **90.64** |
| | March | | | | | 384.56 | | | **384.56** |
| | April | 1.30 | 3.56 | 32.56 | | 208.56 | | | **245.98** |
| | May | | | | | 431.20 | | | **431.20** |
| | June | | | | 38.72 | 329.12 | | | **367.84** |
| | July | | | | | 237.60 | 36.08 | | **273.68** |
| | August | | | | | 142.56 | | | **142.56** |
| | September | | | | | 225.28 | | 44.00 | **269.28** |
| | October | | | | | 211.20 | | | **211.20** |
| | November | | | | | 226.16 | | | **226.16** |
| | December | | | | | 59.84 | | | **59.84** |
| | **Total 2012** | **1.30** | **3.56** | **32.56** | **38.72** | **2,755.28** | **36.08** | **44.00** | **2,911.50** |
| **Total - Monitoring Period** | | **1.30** | **3.56** | **32.56** | **38.72** | **3,081.48** | **36.08** | **44.00** | **3,237.70** |
| **Total - Monitoring Period ($m^3$)** | | **1.48** | **4.05** | **37.00** | **44.00** | **3,501.68** | **41.00** | **50.00** | **3,679.20** |