

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

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**MONITORING REPORT**  
**Version 03 – 04/02/2015**  
*Balsas Renewable Energy Project*  
**GS 1291 First monitoring period from 01/12/2011 - 01/09/2014 (days included)**

**SECTION A. General description of the project activity**

**A.1. Brief description of the project activity:**

The project activity is the project of *Balsas Ceramic*, which is a red ceramic company located in *Balsas* municipality, state of *Maranhão*, northeast of Brazil. *Balsas Ceramic* produces structural ceramic bricks destined mainly for the regional market in the municipalities of *Balsas*, *Mangabeira*, *Fortaleza dos Nogueira* and *Alto Parnaíba*.

The ceramic factory used exclusively non-renewable woody biomass (wood without sustainable forest management, also referred as native firewood) as fuel. The use of this type of non-renewable biomass is a common practice in the ceramic industry. Although firewood has been used for many decades as a fuel in Brazil, it is impossible to define a start date on which this kind of non-renewable biomass began to be applied. Firewood used to be the most employed source of primary energy until 1970's, when the petroleum started to supply the majority of Brazilian's energy needs<sup>1</sup>. Moreover, the Brazilian Energy and Mine Ministry has been monitoring every energy sector of Brazil since 1970, and firewood appears over the years monitored as a significant source of thermal energy for ceramic sector<sup>2</sup>. On the other hand, the project activity focuses on the use of renewable biomass for thermal energy supply.

This project activity reduces the greenhouse gases (GHG) emissions through the substitution of non-renewable biomass for renewable biomasses to generate thermal energy. As renewable biomasses, the project activity utilizes mostly biomass residues (such as rice husks and wood residues), biomass from forests and biomass from cropland and/or grasslands) to feed the ceramic's kilns. The project also involves energy efficiency measures, such as improved fuel handling and kilns improvement to reduce the necessary energy per production output<sup>3</sup>.

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

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

**A.2. Project Participants**

<sup>1</sup> BRITO, J.O. "The use of wood as energy". Available at: <[http://www.scielo.br/scielo.php?pid=S0103-40142007000100015&script=sci\\_arttext&tlng=ES](http://www.scielo.br/scielo.php?pid=S0103-40142007000100015&script=sci_arttext&tlng=ES)>. Last visited on 27/05/2013.

<sup>2</sup> Energy Research Company. National Energy Balance - energy consumption per sector. Available at: <[https://ben.epe.gov.br/BEN2007\\_Capitulo3.aspx](https://ben.epe.gov.br/BEN2007_Capitulo3.aspx)>. Last visit on: 27/05/2013.

<sup>3</sup> No emission reductions are claimed for energy efficiency measures, since these are applied after the complete fuel switch to renewable biomass.

Table 01. Project participants

| Name of the party involved(*)<br>(host) indicates a host party                                                                                                                                                                                                                                                                                                                  | Private and/or public entity(ies)<br>project participants (*)<br>(as applicable) | Kindly indicate if the Party<br>involved<br>wishes to be considered as<br>project participant<br>(Yes/No) |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| Brazil (host)                                                                                                                                                                                                                                                                                                                                                                   | Sustainable Carbon - Projetos Ambientais Ltda                                    | No                                                                                                        |
|                                                                                                                                                                                                                                                                                                                                                                                 | Cerâmica Balsas Ltda                                                             | No                                                                                                        |
| (*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required. However, this is a voluntary project. Hence, no approval from the Host Party is needed. |                                                                                  |                                                                                                           |

**A.3. Location of the project activity:**

The ceramic is located in Brazil, in the state of Maranhão in the north region of the country. The geographic location is illustrated in Figure 01.

Table 02. Location of the ceramic

| Ceramic       | Latitude  | Longitude  | Postal Address                                                                                                   |
|---------------|-----------|------------|------------------------------------------------------------------------------------------------------------------|
| <i>Balsas</i> | -7.486111 | -46.156667 | BR 230, km 09 Rodovia Balsa/Riachão -<br>Zona rural<br><i>Balsas</i> - Maranhão, Brazil<br>Zip code: 65800 – 000 |

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

#### A.4. Technical description of the project

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

Before August, 2008 Balsas Ceramic production process encompassed one Tunnel<sup>4</sup> kiln which operated using exclusively native firewood (wood without sustainable forest management) from the Cerrado Biome as fuel. In the middle of August, 2008 the ceramic company started testing renewable biomass, such as rice husks<sup>5</sup>, in the Tunnel kiln. By December, 2008 they finished the construction of two Round<sup>6</sup> kilns which also started to operate using exclusively native firewood up to March, 2009. Tunnel kilns have a much higher efficiency rate due to the production setup. While the Tunnel kilns are run at a constant temperature guaranteeing and continuous production flow, Round kilns, on the other hand only have a limited capacity and need to be ignited and cooled down for each production cycle. The fuel switching, from non-renewable biomass (native firewood) to renewable biomass (rice husks) - in the Tunnel kiln and in the both Round kilns - occurred in March 21st, 2009<sup>7</sup>. It is important to state that, the fuel switching was not expected in absence of the project activity, once there were no the incentives from the carbon credits revenues to support the fuel switching. The Cerrado biome has the highest deforestation rate on Brazil and the common practice in the project region is the use of non-renewable native wood<sup>8</sup>.

As the project activity, besides the proponent has switched its fuel to renewable biomass the ceramic company has also acquired new equipments, including automatic feeders, to allow an efficient use of renewable biomass as fuel.

Before being cooked in the kilns, the pieces must be dried. At the ceramic factory the pieces are dried naturally, so no fuel is used for the drying process. During 2008, Balsas Ceramic has produced approximately 11,516 thousands of ceramic pieces. The identified baseline for this ceramic is the utilization of around 5,500.83 tonnes of non-renewable woody biomass per year to provide thermal energy to the ceramic's kilns.

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

This project does not involve significant construction, as only auxiliary equipments are installed to allow the efficient use of biomass. Hence, the start date of construction is actually interpreted as the date when the ceramics have signed contracts with Sustainable Carbon for the development of an emission reduction project. This has occurred on 01/09/2009. Hence, the project is following the retroactive project cycle according to Gold Standard Toolkit version 2.1.

<sup>4</sup> High efficiency kiln. Tunnel kiln has three sections: heating, burning and cooling, with the reutilization of heat among the sections. This kind of kiln is more efficient and modern than other kilns, where the ceramic pieces are transported through a conveyor belt or special karts inside the kiln.

<sup>5</sup> During the crediting period other types of renewable biomasses can also be used, such as: wood residues, biomass from forests and biomass from cropland and/or grasslands.

<sup>6</sup> Medium efficiency kiln. Round kilns are extremely economical and work well with any type of fuel. It is an easy kiln to operate and it considered the best kiln to cook and burn roof tiles.

<sup>7</sup> According to the ceramic owner, the complete fuel switch has occurred in 01/04/2009.

<sup>8</sup> BRASIL. Ministério do Meio Ambiente (MMA). Projeto de monitoramento do desmatamento nos biomas brasileiros por satélite (PMDBBS). Brasília, 2012. Disponível em: <[http://siscom.ibama.gov.br/monitorabiomas/cerrado/RELATORIO%20FINAL\\_CERRADO\\_2010.pdf](http://siscom.ibama.gov.br/monitorabiomas/cerrado/RELATORIO%20FINAL_CERRADO_2010.pdf)>. Acesso em: 28/05/2013.

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

The project utilizes the following methodology approved under the Clean Development Mechanism for small scale projects: **“AMS-I.E: Switch from Non-Renewable Biomass for Thermal Applications by the User”**, version 05<sup>9</sup>, Valid from 03/08/2012 onwards

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

**A.6. Registration date of the project activity:**

This voluntary project was registered under the Gold Standard on 20/11/2013. Registration under the CDM is not applicable to voluntary projects.

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

The starting date of the project activity was considered 21/03/2009. On this date, the ceramic have signed contracts with Sustainable Carbon to develop an emission reduction project. The starting date of the project is before the “*Time of first submission*” as per Gold Standard definitions<sup>10</sup>. Hence, the project is following the retroactive project cycle according to Gold Standard Toolkit version 2.1.

**Start date of the crediting period:** 20/11/2011.

**End of the crediting period:** 19/11/2021

**Length of the crediting period:** 10 years

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

The following entity is responsible for applying the monitoring methodology:

**SUSTAINABLE CARBON - PROJETOS AMBIENTAIS LTDA**

Project developers: Mariana Broso Fieri, Thiago de Avila Othero and Marcelo Hector Sabbagh Haddad: Technical Coordinators.

Dênis Gonçalves dos Santos, Larissa Tega da Fonseca, Beatriz Dal Rovere, Victor de Oliveira Moller: Technical Analyst

**SECTION B. Implementation of the project activity**
**B.1. Implementation status of the project activity**

This voluntary project was validated by the Designated Operational Entity TÜV Rheinland (China) Ltd and this present monitoring report is being verified by the *Instituto Brasileiro de Opinião Pública e Estatística Ltda (IBOPE)*.

In June, 2012 Balsas and Sustainable Carbon begun the validation of their first GHG emission reduction project, entitled *Balsas Renewable Energy Project*. The project involved fuel switching to renewable biomass in the ceramic.

<sup>9</sup>

Methodology

available

at:

<<http://cdm.unfccc.int/methodologies/DB/WHTQUFLWCNVN9CIUZC198A712WGQR4/view.html>>. Last visited on: 13/10/2014

<sup>10</sup> According to Gold Standard Requirements version 2.1, the time of first submission means submission of the Local Stakeholder Consultation Report for projects proceeding under the regular project cycle, and submission of the required Gold Standard project activity documentation for a Pre-Feasibility Assessment and payment of the applicable fee under the retroactive project cycle.

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By the middle of 2008, Balsas ceramic began tests with renewable biomass. The start date of the project activity was 21/03/2009. On this date, Balsas Ceramic has begun to switch to renewable biomass (Rice Husk). The ceramic has operated exclusively with demonstrably renewable biomass since the beginning of the crediting period, which is defined as 20/11/2011.

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

During validation and this first monitored period, the ceramic utilized Rice Husk as fuel to the kilns.

### B.2. Revision of the monitoring plan

According to Table 17 of the MSPPDD Balsas "Values used during the project monitoring might be taken either from sales reports or from production control documents." Although this information is correct, the values used for the calculations were taken from manual control of devices burned in the kiln. Measurements were done by counting the total amount of wagon that enters in the kiln. Each wagon has the same capacity of ceramic pieces, and the burning cycle depends on the temperature of kiln (the kiln temperature is inversely proportional to the burn time). All data of production were consolidated in an internal control sheet monitored by employees.

Monitoring of the sustainability indicators was based on best available sources of information.

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

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

### B.4. Notification or request of approval of changes

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

## SECTION C. Description of the monitoring system

The project utilizes the following methodology approved under the Clean Development Mechanism for small scale projects: **"AMS-I.E: Switch from Non-Renewable Biomass for Thermal Applications by the User"**, version 05<sup>11</sup>, Valid from 03/08/2012 onwards.

The ceramic owner was responsible for implementing the monitoring plan. In addition, the ceramic employees were responsible for developing the forms and registration formats for data collection and further classification. The authority for the registration, monitoring, measurement and reporting was *Mr. José Thyron Ladeira da Paz*. Monitored data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity.

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

**Table 03. Monitored parameters.**

| Parameters      | Description                           | Units                       | Origin                                                                                                        | Frequency                                     |
|-----------------|---------------------------------------|-----------------------------|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| PR <sub>y</sub> | Amount of products produced in year y | Thousands of ceramic pieces | This parameter was monitored by employees on Balsas ceramic, counting the total production. Measurements were | Measured on a daily or weekly basis. Data was |

<sup>11</sup>

Methodology

available

at:

<<http://cdm.unfccc.int/methodologies/DB/WHTQUFLWCNVNB9CIUZC198A712WGQR4/view.html>>. Last visited on: 13/10/2014

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| Parameters                                      | Description                                                                                                                                                                                             | Units              | Origin                                                                                                                                                                                                | Frequency                                 |
|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
|                                                 |                                                                                                                                                                                                         |                    | done by an internal control sheet monitored by the project proponent. Values used during the project monitoring might be taken either from sales reports or from production control documents..       | aggregated on a monthly and yearly basis. |
| $Q_{\text{renbiomass}}$                         | Amount of renewable biomass used during year y of the crediting period                                                                                                                                  | Tonnes             | Measured by the biomass providers and controlled by the ceramic owner. Data was calculated from receipts, invoices and other documents regarding the acquisition of biomass                           | Monthly                                   |
| $f_{\text{NRB},y}$                              | Fraction of woody biomass used in the absence of the project activity in year y that can be established as non-renewable                                                                                | Fraction           | Survey methods, as described in Section E.1                                                                                                                                                           | Annually                                  |
| <b>Origin of Renewable Biomass</b>              | Renewable origin of the biomass                                                                                                                                                                         | Not applicable     | Controlled by the ceramic owner.                                                                                                                                                                      | Annually                                  |
| <b>Leakage due to competing uses of biomass</b> | This source of leakage is relevant for biomass residues and biomass from existing forests. The quantity of renewable biomass available will be assessed annually to determine the occurrence of leakage | tCO <sub>2</sub> e | Monitored by surveys and publications                                                                                                                                                                 | Each crediting period                     |
| <b>Leakage of non-renewable woody biomass</b>   | This source of leakage assesses the use/diversion of non-renewable woody biomass saved under the project activity by non-project households/users that previously used renewable energy sources.        | tCO <sub>2</sub> e | Monitored by surveys and publications                                                                                                                                                                 | Annually                                  |
| <b>Checking of all appliances (kiln)</b>        | According to the applied methodology, monitoring shall include checking of all appliances or a representative sample thereof, to ensure that they are still operating or are replaced by an             | Not applicable     | Sustainable Carbon performed visual inspections and interviews with the employees on the ceramic factory to confirm the kilns were still operating or were replaced by an equivalent in service kiln. | Once every two years                      |

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| Parameters | Description                      | Units | Origin | Frequency |
|------------|----------------------------------|-------|--------|-----------|
|            | equivalent in service appliance. |       |        |           |

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

|                          |                                                                                                                                                                                                                                                                                                              |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Data / Parameter:</b> | <b>EF<sub>projected fossilfuel</sub></b>                                                                                                                                                                                                                                                                     |
| Data unit:               | tCO <sub>2</sub> /TJ                                                                                                                                                                                                                                                                                         |
| Description:             | Emission factor for substitution of non-renewable woody biomass by similar consumers.                                                                                                                                                                                                                        |
| Source of data used:     | Approved small scale methodology AMS-I.E “Switch from Non-Renewable Biomass for Thermal Applications by the User”, version 05.                                                                                                                                                                               |
| Value(s) :               | 81.6 tCO <sub>2</sub> /TJ                                                                                                                                                                                                                                                                                    |
| Purpose of data:         | In the baseline scenario, non-renewable biomass was used as an energy source. This is the common practice for the red ceramic sector in the project region. As described in Section B.5 of the PDD, Version 12, the use of fossil fuels is the most likely scenario in the absence of non-renewable biomass. |
| Additional comment:      | According to the applied methodology, a value of 81.6 tCO <sub>2</sub> /TJ shall be used for this emission factor, representing the mix of fossil fuels to be used for the present and future.                                                                                                               |

|                          |                                                                                                                                                                                                                                                                |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Data / Parameter:</b> | <b>NCV<sub>biomass</sub></b>                                                                                                                                                                                                                                   |
| Data unit:               | TJ/ton                                                                                                                                                                                                                                                         |
| Description:             | Net calorific value of the non-renewable woody biomass that is substituted                                                                                                                                                                                     |
| Source of data used:     | Approved small scale methodology AMS-I.E “Switch from Non-Renewable Biomass for Thermal Applications by the User”, version 05.                                                                                                                                 |
| Value(s) :               | 0.015                                                                                                                                                                                                                                                          |
| Purpose of data:         | This parameter was used to calculate baseline emissions from the use of the fossil fuel that would be used in the baseline scenario. It provides the energy generated by the amount of non-renewable biomass that would be used in the absence of the project. |
| Additional comment:      | In the baseline scenario, non-renewable biomass was used as an energy source. This is the common practice for the red ceramic sector in the project region. Applied value is recommended by the approved methodology.                                          |

|                          |                                                                                                               |
|--------------------------|---------------------------------------------------------------------------------------------------------------|
| <b>Data / Parameter:</b> | <b>P<sub>biomass</sub></b>                                                                                    |
| Data unit:               | Tonnes/m <sup>3</sup>                                                                                         |
| Description:             | Specific gravity of non-renewable biomass type <i>j</i>                                                       |
| Source of data used:     | Brazilian study carried out with Cerrado wood:<br>VALE, A.T; BRASIL, M.A.M; LEÃO, A.L. <b>Quantificação e</b> |

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|                     |                                                                                                                                                                                                                                                                                                                             |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     | <b>caracterização energética da madeira e casca de espécies de Cerrado.</b> Ciência Florestal, Santa Maria; v.12, n.1, p. 71-80; 2002. Available at: < <a href="http://www.ufsm.br/cienciaflorestal/artigos/v12n1/A8V12N1.pdf">http://www.ufsm.br/cienciaflorestal/artigos/v12n1/A8V12N1.pdf</a> >. Visited on: 17/10/2014. |
| Value(s) :          | 0.5702                                                                                                                                                                                                                                                                                                                      |
| Purpose of data:    | The amount of wood used in the baseline was measured in volume units. This data is used for the unit conversion. The species used to calculate the average value of this parameter are typical trees of Cerrado Biome that are usually utilized as fuel in the ceramic industries of the region.                            |
| Additional comment: | Not applicable.                                                                                                                                                                                                                                                                                                             |

|                          |                                                                                                                                                                                                                                                                                                                                  |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Data / Parameter:</b> | <b>BF<sub>y</sub></b>                                                                                                                                                                                                                                                                                                            |
| Data unit:               | Tonnes of wood per thousand of ceramic pieces                                                                                                                                                                                                                                                                                    |
| Description:             | Quantity of woody biomass per thousand of ceramic units fired in year y                                                                                                                                                                                                                                                          |
| Source of data used:     | Historical data from project proponent                                                                                                                                                                                                                                                                                           |
| Value(s) :               | 0.4776                                                                                                                                                                                                                                                                                                                           |
| Purpose of data:         | The value was acquired using historical data on woody biomass consumption and production of ceramic pieces when the ceramic used to consume non-renewable wood. Data from year 2008 was used. The value was employed to calculate the real amount of wood displaced to maintain the ceramic production in the baseline scenario. |
| Additional comment:      | Not applicable.                                                                                                                                                                                                                                                                                                                  |

**D.2. Data and parameters monitored**

|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |          |                                               |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------|-----------------------------------------------|
| Data / Parameter:                | PR <sub>y</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |          |                                               |
| Data unit:                       | Thousands of ceramic pieces                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |          |                                               |
| Description:                     | Amount of products produced in year y                                                                                                                                                                                                                                                                                                                                                                                                                              |       |          |                                               |
| Measured /Calculated /Default:   | Values used for the calculations were taken from manual control of devices burned in the kiln. Measurements were done by counting the total amount of wagon that enters in the kiln. Each wagon has the same capacity of ceramic pieces, and the burning cycle depends on the temperature of kiln (the kiln temperature is inversely proportional to the burn time). All data of production were consolidated in an internal control sheet monitored by employees. |       |          |                                               |
| Source of data:                  | Controlled by the ceramic owners                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |          |                                               |
| Value(s) of monitored parameter: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Year  | Mounth   | PR <sub>y</sub> in thousand of ceramic pieces |
|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2011  | December | 854                                           |
|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Total |          | 854                                           |
|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2012  | January  | 902                                           |
|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       | February | 929                                           |
|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       | March    | 1,014                                         |
|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       | April    | 642                                           |
|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       | May      | 1,524                                         |
|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       | June     | 1,459                                         |
|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       | July     | 1,496                                         |

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|                                          |                                                                                                                                                                                                                                                                                                          |                            |           |           |  |
|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-----------|-----------|--|
|                                          |                                                                                                                                                                                                                                                                                                          |                            | August    | 1,398     |  |
|                                          |                                                                                                                                                                                                                                                                                                          |                            | September | 1,131     |  |
|                                          |                                                                                                                                                                                                                                                                                                          |                            | October   | 896       |  |
|                                          |                                                                                                                                                                                                                                                                                                          |                            | November  | 840       |  |
|                                          |                                                                                                                                                                                                                                                                                                          |                            | December  | 992       |  |
|                                          |                                                                                                                                                                                                                                                                                                          | Total                      |           | 13,224    |  |
|                                          |                                                                                                                                                                                                                                                                                                          | 2013                       | January   | 962.24    |  |
|                                          |                                                                                                                                                                                                                                                                                                          |                            | February  | 837.21    |  |
|                                          |                                                                                                                                                                                                                                                                                                          |                            | March     | 948.40    |  |
|                                          |                                                                                                                                                                                                                                                                                                          |                            | April     | 990.93    |  |
|                                          |                                                                                                                                                                                                                                                                                                          |                            | May       | 1,140.55  |  |
|                                          |                                                                                                                                                                                                                                                                                                          |                            | June      | 1,208.29  |  |
|                                          |                                                                                                                                                                                                                                                                                                          |                            | July      | 1,520.74  |  |
|                                          |                                                                                                                                                                                                                                                                                                          |                            | August    | 1,491.44  |  |
|                                          |                                                                                                                                                                                                                                                                                                          |                            | September | 1,433.76  |  |
|                                          |                                                                                                                                                                                                                                                                                                          |                            | October   | 1,285.44  |  |
|                                          |                                                                                                                                                                                                                                                                                                          |                            | November  | 1,038.24  |  |
|                                          |                                                                                                                                                                                                                                                                                                          |                            | December  | 964.08    |  |
|                                          |                                                                                                                                                                                                                                                                                                          | Total                      |           | 13,821    |  |
|                                          |                                                                                                                                                                                                                                                                                                          | 2014                       | January   | 782       |  |
|                                          |                                                                                                                                                                                                                                                                                                          |                            | February  | 1,038     |  |
|                                          |                                                                                                                                                                                                                                                                                                          |                            | March     | 1,112     |  |
|                                          |                                                                                                                                                                                                                                                                                                          |                            | April     | 1,112     |  |
|                                          |                                                                                                                                                                                                                                                                                                          |                            | May       | 1,197     |  |
|                                          |                                                                                                                                                                                                                                                                                                          |                            | June      | 1,305     |  |
|                                          |                                                                                                                                                                                                                                                                                                          |                            | July      | 1,349     |  |
|                                          |                                                                                                                                                                                                                                                                                                          |                            | August    | 1,349     |  |
|                                          |                                                                                                                                                                                                                                                                                                          |                            | September | 1,067     |  |
|                                          |                                                                                                                                                                                                                                                                                                          | Total                      |           | 10,311.13 |  |
|                                          |                                                                                                                                                                                                                                                                                                          | Total in monitoring period |           | 38,210    |  |
| Monitoring equipment :                   | No monitoring equipment was used to determine this parameter. Production was counted by trained personnel on the ceramic.                                                                                                                                                                                |                            |           |           |  |
| Measuring/ Reading/ Recording frequency: | This parameter was monitored by employees on ceramic, counting the total production on a daily or weekly basis. Data was aggregated on a monthly and yearly basis.                                                                                                                                       |                            |           |           |  |
| Calculation method (if applicable):      | Data regarding production was monitored through the number of devices burned in the kiln, measured manually on a daily or weekly basis and compiled into spreadsheets <sup>12</sup> .                                                                                                                    |                            |           |           |  |
| QA/QC procedures applied:                | The ceramic has internal controls to assure proper monitoring of this parameter. Data will be compared to the amount of renewable biomass employed.<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 |                            |           |           |  |

<sup>12</sup> Spreadsheets with production control were made available to the verification team.

## CDM – Executive Board

|                     |                                                                                                                                                                                                        |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     | occurs later.                                                                                                                                                                                          |
| Purpose of data:    | This parameter is used to calculate baseline emissions and the total energy produced in the current monitoring period in order to compare to the thermal energy necessary in the GS PDD (QA/QC table). |
| Additional comment: | Not applicable                                                                                                                                                                                         |

| Data / Parameter:                                                 | Q <sub>renbiomass</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |           |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|--|-------------------------------------------------------------------|--|--|--------|--|-----------|------|----------|--------|-------|--|--------|------|---------|-------|----------|-------|-------|-------|-------|-------|-----|-------|------|-------|------|-------|--------|-------|-----------|-------|---------|-------|----------|-------|----------|-------|-------|--|-------|------|---------|-------|----------|-------|-------|-------|-------|-------|-----|-------|------|-------|------|-------|--------|-------|-----------|-------|
| Data unit:                                                        | Tonnes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |           |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
| Description:                                                      | Amount of renewable biomass used during year y of the crediting period                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |           |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
| Measured /Calculated /Default:                                    | Measured by the biomass providers and controlled by the ceramic owners                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |           |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
| Source of data:                                                   | It was monitored through purchase invoice, delivery notes or other documents concerning the acquisition of renewable biomasses.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
| Value(s) of monitored parameter:                                  | <table><tr><th colspan="3">Amount of renewable biomass employed during the monitoring period</th></tr><tr><th colspan="2">Period</th><th>Rice Husk</th></tr><tr><td>2011</td><td>December</td><td>481.63</td></tr><tr><td colspan="2">Total</td><td>481.63</td></tr><tr><td rowspan="12">2012</td><td>January</td><td>274.0</td></tr><tr><td>February</td><td>348.8</td></tr><tr><td>March</td><td>506.5</td></tr><tr><td>April</td><td>535.6</td></tr><tr><td>May</td><td>548.1</td></tr><tr><td>June</td><td>477.5</td></tr><tr><td>July</td><td>274.0</td></tr><tr><td>August</td><td>294.8</td></tr><tr><td>September</td><td>228.4</td></tr><tr><td>October</td><td>465.0</td></tr><tr><td>November</td><td>377.8</td></tr><tr><td>December</td><td>436.0</td></tr><tr><td colspan="2">Total</td><td>4,766</td></tr><tr><td rowspan="9">2013</td><td>January</td><td>485.8</td></tr><tr><td>February</td><td>323.9</td></tr><tr><td>March</td><td>452.6</td></tr><tr><td>April</td><td>411.0</td></tr><tr><td>May</td><td>597.9</td></tr><tr><td>June</td><td>531.5</td></tr><tr><td>July</td><td>423.5</td></tr><tr><td>August</td><td>427.7</td></tr><tr><td>September</td><td>336.3</td></tr></table> |           |  | Amount of renewable biomass employed during the monitoring period |  |  | Period |  | Rice Husk | 2011 | December | 481.63 | Total |  | 481.63 | 2012 | January | 274.0 | February | 348.8 | March | 506.5 | April | 535.6 | May | 548.1 | June | 477.5 | July | 274.0 | August | 294.8 | September | 228.4 | October | 465.0 | November | 377.8 | December | 436.0 | Total |  | 4,766 | 2013 | January | 485.8 | February | 323.9 | March | 452.6 | April | 411.0 | May | 597.9 | June | 531.5 | July | 423.5 | August | 427.7 | September | 336.3 |
| Amount of renewable biomass employed during the monitoring period |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
| Period                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Rice Husk |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
| 2011                                                              | December                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 481.63    |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
| Total                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 481.63    |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
| 2012                                                              | January                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 274.0     |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
|                                                                   | February                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 348.8     |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
|                                                                   | March                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 506.5     |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
|                                                                   | April                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 535.6     |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
|                                                                   | May                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 548.1     |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
|                                                                   | June                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 477.5     |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
|                                                                   | July                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 274.0     |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
|                                                                   | August                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 294.8     |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
|                                                                   | September                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 228.4     |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
|                                                                   | October                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 465.0     |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
|                                                                   | November                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 377.8     |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
|                                                                   | December                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 436.0     |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
| Total                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 4,766     |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
| 2013                                                              | January                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 485.8     |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
|                                                                   | February                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 323.9     |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
|                                                                   | March                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 452.6     |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
|                                                                   | April                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 411.0     |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
|                                                                   | May                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 597.9     |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
|                                                                   | June                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 531.5     |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
|                                                                   | July                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 423.5     |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
|                                                                   | August                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 427.7     |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |
|                                                                   | September                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 336.3     |  |                                                                   |  |  |        |  |           |      |          |        |       |  |        |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |         |       |          |       |          |       |       |  |       |      |         |       |          |       |       |       |       |       |     |       |      |       |      |       |        |       |           |       |

## CDM – Executive Board

|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                            | October   | 344.6  |              |                              |           |       |
|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-----------|--------|--------------|------------------------------|-----------|-------|
|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                            | November  | 265.7  |              |                              |           |       |
|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                            | December  | 340.5  |              |                              |           |       |
|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Total                      |           | 4,941  |              |                              |           |       |
|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2014                       | January   | 448.4  |              |                              |           |       |
|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                            | February  | 440.1  |              |                              |           |       |
|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                            | March     | 494.1  |              |                              |           |       |
|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                            | April     | 610.3  |              |                              |           |       |
|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                            | May       | 473.3  |              |                              |           |       |
|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                            | June      | 597.9  |              |                              |           |       |
|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                            | July      | 631.1  |              |                              |           |       |
|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                            | August    | 631.1  |              |                              |           |       |
|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                            | September | 481.6  |              |                              |           |       |
|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Total                      |           | 4,808  |              |                              |           |       |
|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Total in monitoring period |           | 14,997 |              |                              |           |       |
|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                            |           |        |              |                              |           |       |
| Monitoring equipment:                    | No monitoring equipment was used to determine this parameter.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                            |           |        |              |                              |           |       |
| Measuring/ Reading/ Recording frequency: | This parameter was monitored by documents concerning the acquisition of renewable biomasses, counting the biomass purchase on a daily or weekly basis. Data was aggregated on a monthly and yearly basis. Measurement was done by a spreadsheet monitored by the project proponent. The amount of renewable biomass described represents both the biomass fired and biomass stocked in the ceramics. These figures are different than the actual biomass fired on each ceramic. However, in the long term, biomass fired and biomasses purchased are likely to be similar. |                            |           |        |              |                              |           |       |
| Calculation method (if applicable):      | Biomass providers measure the amount of products delivered to the ceramics to determine due financial compensation.<br>In case any renewable biomass was measured in volume, default values of specific gravity were used to convert it to tonnes. Values below were applied for the given biomass types: <table><tr><th>Biomass type</th><th>Specific gravity (tonnes/m³)</th></tr><tr><td>Rice Husk</td><td>1.458</td></tr></table>                                                                                                                                      |                            |           |        | Biomass type | Specific gravity (tonnes/m³) | Rice Husk | 1.458 |
| Biomass type                             | Specific gravity (tonnes/m³)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                            |           |        |              |                              |           |       |
| Rice Husk                                | 1.458                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                            |           |        |              |                              |           |       |
| QA/QC procedures applied:                | The amount of renewable biomass purchased was controlled with digital spreadsheets filled by third party consultants. Sustainable Carbon has double checked these spreadsheets against biomass invoices to detect inconsistencies.<br>The ceramic is responsible for storing all documents related to the purchase or acquisition of renewable biomass. Data was compared to production output.<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.         |                            |           |        |              |                              |           |       |

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|                     |                                                                                                                                                                                                                                                                                                                                                              |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Purpose of data:    | This parameter was used to :<br>a. Compare the total energy produced in the current monitoring period to the thermal energy that would be necessary according to the VCS PD estimates (QA/QC table);<br>b. Demonstrate that the Project fits in small scale category (<45MWth/year);<br>c. Calculation of leakage emissions due to competing use of biomass. |
| Additional comment: | Not applicable                                                                                                                                                                                                                                                                                                                                               |

|                                                                  |                                                                                                                                                                                                                                                                                               |
|------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Data / Parameter:</b>                                         | <b><math>f_{NRB,y}</math></b>                                                                                                                                                                                                                                                                 |
| Data unit:                                                       | Fraction or percentage                                                                                                                                                                                                                                                                        |
| Description:                                                     | Fraction of woody biomass used in the absence of the project activity in year $y$ that can be established as non-renewable using survey methods                                                                                                                                               |
| Source of data:                                                  | Survey methods.                                                                                                                                                                                                                                                                               |
| Value(s) of monitored parameter:                                 | 0.8683                                                                                                                                                                                                                                                                                        |
| Brief description of measurement methods and procedures applied: | The monitoring of this parameter was based on national and international articles, databases and data monitored by the project developer such as project activities at the same region. The sources provided information about the availability of woody biomass in the <i>Cerrado</i> biome. |
| QA/QC procedures applied:                                        | Data from published sources were used to determine this parameter.                                                                                                                                                                                                                            |
| Any comment:                                                     | Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later. The monitored value for this parameter is equal to the figures described in version 12 of the PDD.                            |
| Purpose of data:                                                 |                                                                                                                                                                                                                                                                                               |
| Additional comment:                                              |                                                                                                                                                                                                                                                                                               |

|                                          |                                                                                                                                                                                                                                                                    |
|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Data / Parameter:</b>                 | <b><i>Origin of Renewable Biomass</i></b>                                                                                                                                                                                                                          |
| Data unit:                               | Not applicable                                                                                                                                                                                                                                                     |
| Description:                             | Renewable origin of the biomass                                                                                                                                                                                                                                    |
| Measured /Calculated /Default:           | The guarantee of acquiring renewable wood was achieved by invoices from the providers. Biomasses were considered renewable as fulfilling the options described in the methodology applied.                                                                         |
| Source of data:                          | Controlled by the ceramic owners                                                                                                                                                                                                                                   |
| Value(s) of monitored parameter:         | Not applied for the calculation. All biomass used during the crediting period are demonstrably renewable, since they comply with CDM definitions of renewable biomass.                                                                                             |
| Monitoring equipment:                    | No monitoring equipment was used to determine this parameter.                                                                                                                                                                                                      |
| Measuring/ Reading/ Recording frequency: | Each monitoring period                                                                                                                                                                                                                                             |
| Calculation method (if applicable):      | Not applicable                                                                                                                                                                                                                                                     |
| QA/QC procedures applied:                | Ceramic owners will store invoices, receipt of sales or other documents to allow the traceability of the renewable biomass.                                                                                                                                        |
| Purpose of data:                         | Not directly applied for the calculation. This parameter is used to guarantee that the amount of biomass acquired by the project proponent has a renewable origin. It is also necessary to comply with procedures required by the methodology AMS-I.E, Version 01. |
| Additional comment:                      | Not applicable                                                                                                                                                                                                                                                     |

|                          |                                                        |
|--------------------------|--------------------------------------------------------|
| <b>Data / Parameter:</b> | <b><i>Leakage due to competing uses of biomass</i></b> |
|--------------------------|--------------------------------------------------------|

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| Data unit:                               | tCO <sub>2</sub> e                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |                                                  |         |         |      |      |      |   |      |      |      |   |      |      |      |   |      |      |      |   |      |                     |   |       |         |               |                    |         |              |                |
|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------------------------------------------|---------|---------|------|------|------|---|------|------|------|---|------|------|------|---|------|------|------|---|------|---------------------|---|-------|---------|---------------|--------------------|---------|--------------|----------------|
| Description:                             | This source of leakage was relevant for biomass residues and biomass from existing forests, according to the general guidance on leakage in biomass project activities. The quantity of renewable biomass available was assessed annually to determine the occurrence of leakage.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                    |                                                  |         |         |      |      |      |   |      |      |      |   |      |      |      |   |      |      |      |   |      |                     |   |       |         |               |                    |         |              |                |
| Measured /Calculated /Default:           | Calculated                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |                                                  |         |         |      |      |      |   |      |      |      |   |      |      |      |   |      |      |      |   |      |                     |   |       |         |               |                    |         |              |                |
| Source of data:                          | Monitored by surveys and publications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                    |                                                  |         |         |      |      |      |   |      |      |      |   |      |      |      |   |      |      |      |   |      |                     |   |       |         |               |                    |         |              |                |
| Value(s) of monitored parameter:         | <div>Leakage emissions are calculated as 0 (zero) tCO<sub>2</sub>e in this monitoring period.</div> <table><thead><tr><th></th><th>Amount of Rice Husk employed by project activity</th><th>Surplus</th><th>Leakage</th></tr></thead><tbody><tr><td>2011</td><td>0.48</td><td>0.30</td><td>0</td></tr><tr><td>2012</td><td>4.77</td><td>2.94</td><td>0</td></tr><tr><td>2013</td><td>4.94</td><td>3.05</td><td>0</td></tr><tr><td>2014</td><td>4.81</td><td>2.97</td><td>0</td></tr><tr><td>Unit</td><td>thousands of thones</td><td>%</td><td>tCO2e</td></tr></tbody></table> <div>The following surplus of the Rice Husk is considered, as based on a study developed by Sustainable Carbon.</div> <table><thead><tr><th>Harvest</th><th>Rice (tonnes)</th><th>Rice husk (tonnes)</th></tr></thead><tbody><tr><td>2010/11</td><td>704 thousand</td><td>161.9 thousand</td></tr></tbody></table> |                    | Amount of Rice Husk employed by project activity | Surplus | Leakage | 2011 | 0.48 | 0.30 | 0 | 2012 | 4.77 | 2.94 | 0 | 2013 | 4.94 | 3.05 | 0 | 2014 | 4.81 | 2.97 | 0 | Unit | thousands of thones | % | tCO2e | Harvest | Rice (tonnes) | Rice husk (tonnes) | 2010/11 | 704 thousand | 161.9 thousand |
|                                          | Amount of Rice Husk employed by project activity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Surplus            | Leakage                                          |         |         |      |      |      |   |      |      |      |   |      |      |      |   |      |      |      |   |      |                     |   |       |         |               |                    |         |              |                |
| 2011                                     | 0.48                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0.30               | 0                                                |         |         |      |      |      |   |      |      |      |   |      |      |      |   |      |      |      |   |      |                     |   |       |         |               |                    |         |              |                |
| 2012                                     | 4.77                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2.94               | 0                                                |         |         |      |      |      |   |      |      |      |   |      |      |      |   |      |      |      |   |      |                     |   |       |         |               |                    |         |              |                |
| 2013                                     | 4.94                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 3.05               | 0                                                |         |         |      |      |      |   |      |      |      |   |      |      |      |   |      |      |      |   |      |                     |   |       |         |               |                    |         |              |                |
| 2014                                     | 4.81                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2.97               | 0                                                |         |         |      |      |      |   |      |      |      |   |      |      |      |   |      |      |      |   |      |                     |   |       |         |               |                    |         |              |                |
| Unit                                     | thousands of thones                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | %                  | tCO2e                                            |         |         |      |      |      |   |      |      |      |   |      |      |      |   |      |      |      |   |      |                     |   |       |         |               |                    |         |              |                |
| Harvest                                  | Rice (tonnes)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Rice husk (tonnes) |                                                  |         |         |      |      |      |   |      |      |      |   |      |      |      |   |      |      |      |   |      |                     |   |       |         |               |                    |         |              |                |
| 2010/11                                  | 704 thousand                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 161.9 thousand     |                                                  |         |         |      |      |      |   |      |      |      |   |      |      |      |   |      |      |      |   |      |                     |   |       |         |               |                    |         |              |                |
| Monitoring equipment:                    | No monitoring equipment was used to determine this parameter.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                    |                                                  |         |         |      |      |      |   |      |      |      |   |      |      |      |   |      |      |      |   |      |                     |   |       |         |               |                    |         |              |                |
| Measuring/ Reading/ Recording frequency: | Annually                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |                                                  |         |         |      |      |      |   |      |      |      |   |      |      |      |   |      |      |      |   |      |                     |   |       |         |               |                    |         |              |                |
| Calculation method (if applicable):      | The values described on table above were calculated by the equation: Biomass surplus (%) = (Biomass Availability/Biomass consumption) – 1.<br>Leakage emissions due to the competing use of biomass are considered not to occur for all biomass types currently used by the project activity. The reasons for this approach are described on Section E.3.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                    |                                                  |         |         |      |      |      |   |      |      |      |   |      |      |      |   |      |      |      |   |      |                     |   |       |         |               |                    |         |              |                |
| QA/QC procedures applied:                | Data available regarding the ceramic industry fuel consumption was utilized to monitor the leakage.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                    |                                                  |         |         |      |      |      |   |      |      |      |   |      |      |      |   |      |      |      |   |      |                     |   |       |         |               |                    |         |              |                |
| Purpose of data:                         | Calculation of leakage emissions. This parameter is used to evaluate if there is any source of indirect emission related to renewable biomass. If applicable, leakage emissions are used to adjust emission reductions resulting from the project.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |                                                  |         |         |      |      |      |   |      |      |      |   |      |      |      |   |      |      |      |   |      |                     |   |       |         |               |                    |         |              |                |
| Additional 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                    |                                                  |         |         |      |      |      |   |      |      |      |   |      |      |      |   |      |      |      |   |      |                     |   |       |         |               |                    |         |              |                |

|                                |                                                                                                      |
|--------------------------------|------------------------------------------------------------------------------------------------------|
| <b>Data / Parameter:</b>       | <b>Leakage of non-renewable woody biomass</b>                                                        |
| Data unit:                     | tCO <sub>2</sub> e                                                                                   |
| Description:                   | Leakage relating to non-renewable woody biomass                                                      |
| Measured /Calculated /Default: | The source of leakage from non-renewable biomass was monitored according to the applied methodology. |

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|                                          |                                                                                                                                                                                                                                                        |
|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Source of data:                          | Monitored                                                                                                                                                                                                                                              |
| Value(s) of monitored parameter:         | 0 (zero). It was assumed that no emissions occur due to this source, as explained in Section B.6.1. of the <i>Project Design Document</i> , version 05.                                                                                                |
| Monitoring equipment:                    | No monitoring equipment was used to determine this parameter.                                                                                                                                                                                          |
| Measuring/ Reading/ Recording frequency: | Annually                                                                                                                                                                                                                                               |
| Calculation method (if applicable):      | Not applicable                                                                                                                                                                                                                                         |
| QA/QC procedures applied:                | Data available regarding the ceramic industry fuel consumption was employed to monitor the leakage.                                                                                                                                                    |
| Purpose of data:                         | Calculation of leakage emissions. This parameter is used to evaluate if there is any source of indirect emission related to non-renewable biomass. If applicable, leakage emissions are used to adjust emission reductions resulting from the project. |
| Additional comment:                      | Not applicable                                                                                                                                                                                                                                         |

|                                  |                                                                                                                                                                                                                                                                                |           |                     |                                 |                               |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|---------------------|---------------------------------|-------------------------------|
| Data / Parameter:                | Specific fuel consumption                                                                                                                                                                                                                                                      |           |                     |                                 |                               |
| Data unit:                       | TJ/thousands of ceramic units produced                                                                                                                                                                                                                                         |           |                     |                                 |                               |
| Description:                     | Specific fuel consumption of the Ceramic factory                                                                                                                                                                                                                               |           |                     |                                 |                               |
| Measured /Calculated /Default:   | To monitor this parameter was necessary to convert the total amount of biomass acquired to thermal energy (measured in TJ) and divide this value by the amount of ceramic units produced (PR <sub>y</sub> ) during this monitoring period. It was measured on a monthly basis. |           |                     |                                 |                               |
| Source of data:                  | Determined by the energy produced in TJ due to the amount of renewable biomass acquired (Q <sub>renbiomass</sub> ) and the amount of ceramic units produced (PR <sub>y</sub> ) by the Ceramic factory.                                                                         |           |                     |                                 |                               |
| Value(s) of monitored parameter: |                                                                                                                                                                                                                                                                                |           |                     |                                 |                               |
|                                  | Period                                                                                                                                                                                                                                                                         |           | Thermal Energy (TJ) | PRY Thousands of ceramic pieces | TJ/Thousand of ceramic pieces |
|                                  | 2011                                                                                                                                                                                                                                                                           | December  | 6.6                 | 853.6                           | 0.0078                        |
|                                  | Total aggregate                                                                                                                                                                                                                                                                |           | 6.6                 | 853.6                           | 0.0078                        |
|                                  | 2012                                                                                                                                                                                                                                                                           | January   | 3.8                 | 901.7                           | 0.0042                        |
|                                  |                                                                                                                                                                                                                                                                                | February  | 4.8                 | 928.8                           | 0.0052                        |
|                                  |                                                                                                                                                                                                                                                                                | March     | 7.0                 | 1,013.8                         | 0.0069                        |
|                                  |                                                                                                                                                                                                                                                                                | April     | 7.4                 | 642.2                           | 0.0115                        |
|                                  |                                                                                                                                                                                                                                                                                | May       | 7.6                 | 1,523.9                         | 0.0050                        |
|                                  |                                                                                                                                                                                                                                                                                | June      | 6.6                 | 1,459.4                         | 0.0045                        |
|                                  |                                                                                                                                                                                                                                                                                | July      | 3.8                 | 1,496.2                         | 0.0025                        |
|                                  |                                                                                                                                                                                                                                                                                | August    | 4.1                 | 1,398.1                         | 0.0029                        |
|                                  |                                                                                                                                                                                                                                                                                | September | 3.2                 | 1,130.7                         | 0.0028                        |
|                                  |                                                                                                                                                                                                                                                                                | October   | 6.4                 | 895.8                           | 0.0072                        |
|                                  |                                                                                                                                                                                                                                                                                | November  | 5.2                 | 840.4                           | 0.0062                        |
|                                  |                                                                                                                                                                                                                                                                                | December  | 6.0                 | 992.4                           | 0.0061                        |
|                                  | Total aggregate                                                                                                                                                                                                                                                                |           | 65.8                | 13,223.6                        | 0.0050                        |
|                                  | 2013                                                                                                                                                                                                                                                                           | January   | 6.7                 | 962.2                           | 0.0070                        |
|                                  |                                                                                                                                                                                                                                                                                | February  | 4.5                 | 837.2                           | 0.0053                        |

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|                                          |                                                                                                                                                                                                                                                         |           |             |                 |               |
|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------------|-----------------|---------------|
|                                          |                                                                                                                                                                                                                                                         | March     | 6.2         | 948.4           | 0.0066        |
|                                          |                                                                                                                                                                                                                                                         | April     | 5.7         | 990.9           | 0.0057        |
|                                          |                                                                                                                                                                                                                                                         | May       | 8.3         | 1,140.6         | 0.0072        |
|                                          |                                                                                                                                                                                                                                                         | June      | 7.3         | 1,208.3         | 0.0061        |
|                                          |                                                                                                                                                                                                                                                         | July      | 5.8         | 1,520.7         | 0.0038        |
|                                          |                                                                                                                                                                                                                                                         | August    | 5.9         | 1,491.4         | 0.0040        |
|                                          |                                                                                                                                                                                                                                                         | September | 4.6         | 1,433.8         | 0.0032        |
|                                          |                                                                                                                                                                                                                                                         | October   | 4.8         | 1,285.4         | 0.0037        |
|                                          |                                                                                                                                                                                                                                                         | November  | 3.7         | 1,038.2         | 0.0035        |
|                                          |                                                                                                                                                                                                                                                         | December  | 4.7         | 964.1           | 0.0049        |
|                                          | <b>Total aggregate</b>                                                                                                                                                                                                                                  |           | <b>68.2</b> | <b>13,821.3</b> | <b>0.0049</b> |
|                                          | <b>2014</b>                                                                                                                                                                                                                                             | January   | 6.2         | 781.8           | 0.0079        |
|                                          |                                                                                                                                                                                                                                                         | February  | 6.1         | 1,038.2         | 0.0058        |
|                                          |                                                                                                                                                                                                                                                         | March     | 6.8         | 1,112.4         | 0.0061        |
|                                          |                                                                                                                                                                                                                                                         | April     | 8.4         | 1,112.4         | 0.0076        |
|                                          |                                                                                                                                                                                                                                                         | May       | 6.5         | 1,196.9         | 0.0055        |
|                                          |                                                                                                                                                                                                                                                         | June      | 8.3         | 1,305.0         | 0.0063        |
|                                          |                                                                                                                                                                                                                                                         | July      | 8.7         | 1,348.5         | 0.0065        |
|                                          |                                                                                                                                                                                                                                                         | August    | 8.7         | 1,348.5         | 0.0065        |
|                                          |                                                                                                                                                                                                                                                         | September | 6.6         | 1,067.4         | 0.0062        |
|                                          | <b>Total aggregate</b>                                                                                                                                                                                                                                  |           | <b>66.4</b> | <b>10,311.1</b> | <b>0.0064</b> |
| Monitoring equipment:                    | No monitoring equipment was used to determine this parameter.                                                                                                                                                                                           |           |             |                 |               |
| Measuring/ Reading/ Recording frequency: | Monthly                                                                                                                                                                                                                                                 |           |             |                 |               |
| Calculation method (if applicable):      | The total of energy used by the biomass consumption in TJ divide per the total amount of ceramic units produced (PRy)                                                                                                                                   |           |             |                 |               |
| QA/QC procedures applied:                | Data from published sources will be used to determine this parameter. It will be measured on a monthly basis to evaluate how this parameter behaves throughout time. Experts will also be consulted to confirm if the values are according to expected. |           |             |                 |               |
| Purpose of data:                         | Calculation of "Production - $Q_{renbiomass}$ QA/QC Procedure"                                                                                                                                                                                          |           |             |                 |               |
| Additional comment:                      | Not applicable.                                                                                                                                                                                                                                         |           |             |                 |               |

**SECTION E. Emission reductions calculation****E.1. Baseline emissions calculation**

Baseline emissions were estimated following procedures of the applied methodology: "**AMS-I.E:Switch from Non-Renewable Biomass for Thermal Applications by the User**", version 05<sup>13</sup>, Valid from 03/08/2012 onwards. The project activity in this monitoring period (34 months) generated 206.96 TJ, or 73.04 TJ per year. Converting this number to MWh, it was generated 227.78 MWh per year, which

<sup>13</sup>

Methodology available at:  
<http://cdm.unfccc.int/methodologies/DB/WHTQUFLWCNVNB9CIUZC198A712WGQR4/view.html> >. Last visited on:  
 13/10/2014

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corresponds to the use of 2.32 MW<sub>thermal</sub> on average of the kilns capacity during the monitored period, which is less than the limits of 45 MW<sub>thermal</sub> for Type I Small scale project activities.

### **Baseline Emission**

Below, a description of the equations and procedures used for the calculation of emission reductions follows:

### **Emission Reductions**

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

Where:

|                                            |                                                                                                                                                       |
|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ER<sub>y</sub>:</b>                     | Emission reductions during the year y in tCO <sub>2</sub> e                                                                                           |
| <b>B<sub>y</sub>:</b>                      | Quantity of woody biomass that is substituted or displaced in tonnes                                                                                  |
| <b>f<sub>NRB,y</sub>:</b>                  | Fraction of woody biomass used in the absence of the project activity in year y that can be established as non-renewable biomass using survey methods |
| <b>NCV<sub>biomass</sub>:</b>              | Net calorific value of non-renewable woody biomass that is substituted, in TJ/ton                                                                     |
| <b>EF<sub>projected fossil fuel</sub>:</b> | Emission factor for substitution of non-renewable woody biomass by similar consumers, in tCO <sub>2</sub> e/TJ <sup>14</sup> .                        |

B<sub>y</sub> is calculated according to option (a) of the selected methodology, as follows:

(a) B<sub>y</sub> is calculated as the product of the number of appliances multiplied by the estimate of average annual consumption of woody biomass per appliance (tonnes/year);  
More specifically, appliances are the kilns producing ceramic pieces. The consumption of woody biomass in the kilns is calculated as the amount of products (ceramic pieces) produced and the consumption of woody biomass per thousand of ceramic pieces fired in year y, as follows:

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

Where:

|                        |                                                                                                                                                                                                                                                                                          |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>PR<sub>y</sub>:</b> | Amount of products produced in year y, in thousand of ceramic pieces                                                                                                                                                                                                                     |
| <b>BF<sub>y</sub>:</b> | Quantity of woody biomass per thousand of ceramic units fired in year y.<br>The value of BF <sub>y</sub> was determined with the use of the historical records from the ceramic factory, by dividing monthly average consumption in the baseline by monthly average baseline production. |

According to procedures on the applied methodology, the project participants shall determine the shares of renewable and non-renewable woody biomass in B<sub>y</sub> using nationally approved methods. Also, the following principles shall be taken into account:

### **Demonstrably Renewable woody biomass<sup>15</sup> (DRB)**

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

1. The woody biomass is originating from land areas that are forests<sup>16</sup> where:
  - (a) The land area remains a forest;

<sup>14</sup> According to the applied methodology, a value of 81.6 tCO<sub>2</sub>/TJ shall be used for this emission factor, representing the mix of fossil fuels to be used for the present and future.

<sup>15</sup> This definition uses elements of Annex 18, EB 23. Document available at: <[http://cdm.unfccc.int/EB/Meetings/023/eb23\\_repan18.pdf](http://cdm.unfccc.int/EB/Meetings/023/eb23_repan18.pdf)>. Last visit on 28/05/2013.

<sup>16</sup> The forest definitions as established by the country in accordance with the Decisions 11/CP.7 and 19/CP.9 should apply.

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

### Non-renewable biomass

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

- A trend showing an increase in time spent or distance travelled for gathering fuel-wood by users (or fuel-wood suppliers) or alternatively, a trend showing an increase in the distance the fuel wood is transported to the project area<sup>17</sup>;
- Survey results, national or local statistics, studies, maps or other sources of information such as remote sensing data that show that carbon stocks are depleting in the project area<sup>18</sup>;
- Increasing trends in fuel wood prices indicating a scarcity of fuel-wood;
- Trends in the types of cooking fuel collected by users, suggesting scarcity of woody biomass.

Thus the fraction of woody biomass saved by the project activity in year  $y$  that can be established as non-renewable is:

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

Before the project activity, wood from areas without forest management was offered with low prices and high viability to the ceramic owner. According to the IBAMA Normative Instruction N° 112 from 21/08/2006<sup>19</sup>, the entrepreneur who uses raw material from native forests is obliged to use the DOF to control the origin, transportation, and storage of forest products and by-products. This document ensures that the related forest products were obtained from legalized areas where conservation measures are applied. Therefore, firewood with DOF is considered renewable, since it complies with item 1 of the definition of renewable biomass. On the other hand, no native firewood with no DOF is considered a non-renewable biomass. Thus, the fuel employed in the baseline scenario by *Balsas* ceramic was from non-renewable origin.

The  $f_{NRB,y}$  parameter is determined in two steps: the first step is based on project specific information regarding the amount of native firewood from areas without forest management and the amount of firewood with DOF. This provides a fraction of non-renewable biomass used in the baseline scenario based on the origin of the firewood. The second step is an assessment on the fraction of woody biomass used that can be established as non-renewable biomass using survey methods applied to the *Cerrado* biome, where the project is located. Such assessment was based on Annex 20 of the 35<sup>th</sup>

<sup>17</sup> More information on this indicator for the project area available on Page 29.

<sup>18</sup> More information on this indicator for the project area available on Page 29.

<sup>19</sup> BRASIL. INSTRUÇÃO NORMATIVA IBAMA N° 112, DE 21 DE AGOSTO DE 2006. Available at: <[http://www.cetesb.sp.gov.br/licenciamentoo/legislacao/federal/inst\\_normativa/2006\\_Instr\\_Norm\\_IBAMA\\_112.pdf](http://www.cetesb.sp.gov.br/licenciamentoo/legislacao/federal/inst_normativa/2006_Instr_Norm_IBAMA_112.pdf)>. Visited on 28/05/2013.

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meeting of the Small Scale Working Group of the Clean Development Mechanism, which provides a methodology for the calculation of  $f_{NRB,y}$ <sup>20</sup>. A description of such methodology follows:

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

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

$$NRB = R - DRB \quad (\text{equation 4})$$

Where:

R Total annual biomass removals (tonnes/year)

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

$$R = MAI + \Delta F \quad (\text{equation 5})$$

Where:

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

$\Delta F$  Annual change in living Forest biomass (tonnes/year)

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

$$MAI = F \times GR \quad (\text{equation 6})$$

Where:

F Extent of forest (ha)

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

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

$$DRB = PA \times GR \quad (\text{equation 7})$$

Where:

PA Protected Area Extent of Forest (ha)

This approach is considered appropriate since it takes in consideration historical practices of the ceramic factory in regard to fuel usage, meaning only native firewood from areas without forest management will be considered as non-renewable. Also, choosing the biome where the project is located as the geographical boundary for the second step is a more accurate approach than performing a national assessment, given the dimensions and peculiarities of each biome in Brazil and considering that sub-regional information is not available nor feasible to obtain. Also, there is evidence to support

<sup>20</sup> Document is available at: <[http://cdm.unfccc.int/Panels/ssc\\_wg/meetings/035/ssc\\_035\\_an20.pdf](http://cdm.unfccc.int/Panels/ssc_wg/meetings/035/ssc_035_an20.pdf)>. Last visited on 28/05/2013.

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that carbon stocks are depleting in the project area<sup>21</sup> and that there is a trend showing an increase in time spent or distance travelled for gathering fuel-wood by users<sup>22 23</sup>.

### E.2. Project emissions calculation

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

### E.3. Leakage calculation

Leakage is estimated at 0 (zero) tCO<sub>2</sub>e during the current monitoring period.

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

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

Leakage from the use of renewable biomass was considered using the general guidance on leakage in biomass project activities (attachment C of Appendix B)<sup>24</sup>. Also, the specific rules on biomass resources as set out in the applicable version of the Gold Standard, especially ToolKit Annex C were complied with.

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

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

**Table 04. 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                                              | -                        |

<sup>21</sup> The Brazilian Forestry Service provides data regarding estimates of carbon pools in million metric tonnes for natural forests per biome, per category and per year, showing that the net carbon emissions for the *Cerrado* biome in the measured carbon pools constantly decreased between 1990 and 2005. Document available at: <<http://www.florestal.gov.br/snif/recursos-florestais/estoque-das-florestas>>. Last visited on 27/05/2013.

<sup>22</sup> EMBRAPA. **Manejo Florestal ou Silvicultura?** Information on third paragraph shows increasing distances to obtain firewood in the *Cerrado* biome. Document available at: <<http://www.embrapa.br/imprensa/artigos/2003/artigo.2004-12-07.2303694691/>>. Last visited on 27/05/2013.

<sup>23</sup> REINATO, Carlos H. R. et al. **Consumo de energia e custo de secagem de café cereja em propriedades agrícolas do sul de Minas Gerais.** Information on third paragraph shows increasing distances to obtain firewood in the *Cerrado* biome Document available at: <<http://www.scielo.br/pdf/rbeaa/v6n1/v6n1a20.pdf>>. Last visited on 27/05/2013.

<sup>24</sup> Document available at: <[http://cdm.unfccc.int/methodologies/SSCmethodologies/AppB\\_SSC\\_AttachmentC.pdf](http://cdm.unfccc.int/methodologies/SSCmethodologies/AppB_SSC_AttachmentC.pdf)>. Last visit on 27/02/2014.

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| Biomass Type              | Activity/Source                                   | Shift of pre project activities | Emissions from biomass generation/cultivation | Competing use of biomass |
|---------------------------|---------------------------------------------------|---------------------------------|-----------------------------------------------|--------------------------|
| Biomass residues or waste | Biomass residues or wastes are collected and use. | -                               | -                                             | X                        |

Observing the table above, the sources of leakage relevant to the present project activity are the competing use of biomass for biomass from existing forests and for biomass residues or waste. The source of leakage of the present project is assessed below, for each type of biomass:

**Rice Husk**

The project activity is switching native firewood to rice husk, an abundant biomass in the region. The state of *Maranhão* is one of the main producers of rice in Brazil and, consequently, a great supplier of rice husk.

Table 5 shows production of rice and rice husk in the state of *Maranhão* in the years of 2010 and 2011<sup>25</sup>. Each tonne of produced rice leads to the supply of 0.23 tonne of rice husk<sup>26</sup>.

**Table 5. Rice and rice husk production in 2010 e 2011.**

| Harvest | Rice (tonnes) | Rice husk (tonnes) |
|---------|---------------|--------------------|
| 2009/10 | 590 thousand  | 135.7 thousand     |
| 2010/11 | 704 thousand  | 161.9 thousand     |

The harvest of 2010/11 produced 704 thousand tonnes, generating around 161.9 thousand tonnes of rice husks. The project activity has employed approximately 5.36 thousands of biomass per year which leads to the fraction of 3.31 % of the total availability of this kind of biomass in the region. Thus, It can be concluded that the biomass available is widely superior then the amount required for this project i.e. leakage from rice husk can be neglected.

**E.4. Emission reductions calculation / table**

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

**Table 06. Emission reductions for the project activity (tCO<sub>2</sub>e)**

| Year         | Mounth   | ER <sub>y</sub> (tCO <sub>2</sub> e) |
|--------------|----------|--------------------------------------|
| <b>2011</b>  | December | 433                                  |
| <b>Total</b> |          | <b>433</b>                           |
| <b>2012</b>  | January  | 457                                  |
|              | February | 471                                  |
|              | March    | 514                                  |

<sup>25</sup> Source:<[http://cepa.epagri.sc.gov.br/Publicacoes/Sintese\\_2011/Arroz%20sintese%202011.pdf](http://cepa.epagri.sc.gov.br/Publicacoes/Sintese_2011/Arroz%20sintese%202011.pdf)>. Visited in: 28/05/2013.

<sup>26</sup> GAIDZINSKI, R. Utilização da casca de arroz como sorvente alternativo para o tratamento de efluentes da Região Carbonífera Sul Catarinense. 2007. Page 2. Rice husk is a by-product of rice production which represents about 23% of rice's weight. Available at: [http://www.cetem.gov.br/publicacao/serie\\_anais\\_I\\_jpci\\_2007/Roberta\\_Gaidzinski.pdf](http://www.cetem.gov.br/publicacao/serie_anais_I_jpci_2007/Roberta_Gaidzinski.pdf). Last visited on 17/07/2013.

|                                   |           |               |
|-----------------------------------|-----------|---------------|
|                                   | April     | 325           |
|                                   | May       | 773           |
|                                   | June      | 740           |
|                                   | July      | 759           |
|                                   | August    | 709           |
|                                   | September | 573           |
|                                   | October   | 454           |
|                                   | November  | 426           |
|                                   | December  | 503           |
| <b>Total</b>                      |           | <b>6,704</b>  |
| <b>2013</b>                       | January   | 488           |
|                                   | February  | 424           |
|                                   | March     | 481           |
|                                   | April     | 503           |
|                                   | May       | 578           |
|                                   | June      | 613           |
|                                   | July      | 771           |
|                                   | August    | 757           |
|                                   | September | 727           |
|                                   | October   | 652           |
|                                   | November  | 527           |
|                                   | December  | 489           |
| <b>Total</b>                      |           | <b>7,010</b>  |
| <b>2014</b>                       | January   | 396           |
|                                   | February  | 527           |
|                                   | March     | 564           |
|                                   | April     | 564           |
|                                   | May       | 607           |
|                                   | June      | 662           |
|                                   | July      | 684           |
|                                   | August    | 684           |
|                                   | September | 541           |
| <b>Total</b>                      |           | <b>5,229</b>  |
| <b>Total in monitoring period</b> |           | <b>19,376</b> |

Table 07. Emission reductions for the project activity (tCO<sub>2</sub>e)

| Balsas ceramic                                                       | 2011     | 2012                   | 2013                   | 2014                    | December 2011<br>to September<br>2014 |
|----------------------------------------------------------------------|----------|------------------------|------------------------|-------------------------|---------------------------------------|
|                                                                      | December | January to<br>December | January to<br>December | January to<br>September |                                       |
| Baseline emission                                                    | 433      | 6,704                  | 7,010                  | 5,229                   | <b>19,376</b>                         |
| Project Emission                                                     | 0.00     | 0.00                   | 0.00                   | 0.00                    | 0.00                                  |
| Emission reductions for the<br>monitored period (tCO <sub>2</sub> e) | 433      | 6,704                  | 7,010                  | 5,229                   | <b>19,376</b>                         |

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

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

**Table 08. Comparison of values described on the PDD and the monitoring period.**

| Production - Qrenbiomass<br>QA/QC Procedure                                 | PDD       | Monitorin<br>g Period |
|-----------------------------------------------------------------------------|-----------|-----------------------|
| Production in thousand of<br>ceramic pieces                                 | 32,628.58 | 38,209.57             |
| Rice Husk                                                                   | 16,940.97 | 14,997.02             |
| Thermal Energy                                                              | 233.79    | 206.96                |
| Thermal energy per thousand<br>of pieces produced<br>(TJ/thousand of units) | 0.0072    | 0.0054                |
| Emission reduction                                                          | 16,116.00 | 19,376                |
| Total of months in this<br>monitoring reoprt                                | 34        |                       |

|                                                                   |
|-------------------------------------------------------------------|
| <b>E.6. Remarks on difference from estimated value in the PDD</b> |
|-------------------------------------------------------------------|

As detailed on the table above, most of the values of production (parameter PR<sub>y</sub>) presented in this monitoring period increased compared to the estimated in the PDD. Civil construction in Brazil has observed constant growth in recent years. As a result, the production of the ceramic factories had to increase to attend this market demand. This scenario is also observed in the State of Maranhão,<sup>27</sup> where the project is located.

According to the Brazilian Chamber of the Construction Industry (CBIC), the civil construction sector has grown 42.41% from 2004 to 2010, which means an annual average increase of 5.18%. The main drivers for this significant increase are the increase of housing credit, the increase of family income; macroeconomic stability and Government Housing Programmes 2009 – 2023.<sup>28</sup>

During the current monitoring period, variations were observed on the thermal energy per production output (TEPO), which is measured in TJ per 1,000 of ceramic pieces produced. When compared with the GS PDD, Balsas ceramic had a 32% decrease of its TEPO. The ceramic factory utilized 13% less biomass than estimated on PDD to produce 15% more than estimated.

The difference of 32% can be attributed to energy efficiency, given the improvements in fuel usage resulting from the project.

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

<sup>27</sup> Information taken from: < <http://g1.globo.com/ceara/noticia/2012/01/pib-da-construcao-civil-no-ce-cresce-acima-da-media-do-pais-diz-sindicato.html>>. Last visited on 28/02/2014.

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

### Annex 1 – Sustainability Monitoring Plan

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

|                                                           |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------------------------------------------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No                                                        |        | 01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Indicator                                                 |        | Air quality                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Chosen parameter                                          |        | Emissions to the atmosphere                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Implications on monitoring requirements and justification |        | <p>The project is expected to generate positive impacts on air quality, by improving operational procedures related to fuel usage and by increasing monitoring procedures on atmospheric emissions. In the baseline scenario, the ceramic factories used native firewood as fuel and little control existed on the kilns feeding, leaving the possibility of high atmospheric pollution due to irregular burning (i.e. excessive feeding of the kilns and burning of wet firewood).</p> <p>Air quality is expected to improve due to the more efficient burning of fuels, as automatic feeders tend to maximize the use of fuels and avoid excess of smoke due to irregular burning.</p>                                                                                                                                                                 |
| Way of monitoring                                         | How    | Evaluations by applying <i>Ringelmann</i> smoke charts as recommended by SEMA (Environment Department and Natural Resources of <i>Maranhão</i> State), the environmental authority. Results shall be stored to assess the intensity of atmospheric emissions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                           | When   | On an bi-weekly basis                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                                           | By who | Ceramic factory employees.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| QA/QC procedures to be applied                            |        | <p>Ringelmann smoke charts shall be used in accordance with SEMA guidelines.</p> <p>Besides the control based on such charts, the project also applied the following indicator from SOCIALCARBON Standard®<sup>29</sup> : SOCIALCARBON indicators for Ceramic Industry<sup>30</sup>: <b>Emissions to the atmosphere</b> - Evaluates the control over the atmospheric emissions involving the gases emitted during the productive process, except the greenhouse gases.</p> <p>According to the SOCIALCARBON indicators for Ceramic Industry, emissions to the atmosphere was analyzed on a periodical basis and is scored from 1 to 6, where 1 represents a critical situation and 6 represents a sustainable scenario. More detail can be verified on Section <i>F.2. Sustainable Development matrix</i> on the Gold Standard Passport, version 05.</p> |
| Monitoring Value and Frequency                            |        | <p>During this monitoring period, the ceramic factory applied the monitoring of smoke emissions using the Ringelmann smoke chart every two or three days. The results were compiled in files.</p> <p>The indicator “<i>Emissions to the atmosphere</i>” from SOCIALCARBON Standard® allows classifying the project activity into scenario 4, defined as:</p> <p>“<i>Scenario 4:</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

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

<sup>30</sup> Available at:

<[http://www.socialcarbon.org/uploadDocs/Documents/Indicators\\_for\\_Industries\\_of\\_the\\_Ceramic\\_Sector\\_v8\\_English.pdf](http://www.socialcarbon.org/uploadDocs/Documents/Indicators_for_Industries_of_the_Ceramic_Sector_v8_English.pdf)>. Last visit on 24/02/2014.

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|  |                                                                                                                                                                                                                                              |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <i>There is monitoring but the entrepreneur can't guarantee that it is in conformity with the legislations, norms and applied requisites. There are actions to control and reduce the emissions with evident results and/or measurable.”</i> |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                                                           |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------------------------------------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No                                                        |        | 02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Indicator                                                 |        | Soil condition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Chosen parameter                                          |        | Procedures related to the control and disposal of ashes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Implications on monitoring requirements and justification |        | During the kilns operation, ashes result from the burning of biomass. In the baseline scenario, the ceramics try to minimize the environmental impact of the ashes by recycling it or selling it to third parties and raw material. With the project activity, new kinds of fuels will be used (renewable biomasses such as biomass residues) and the generation of ashes might increase.                                                                                                                                                                                                                                |
| Way of monitoring                                         | How    | Ashes shall be quantified by using the number of wheelbarrows transported until the storage site and the number of buckets that is added to the clay mass by the trucks. Employees on the ceramic shall use spreadsheets to record the number of carts each time ashes are collected and transported to the storage site and the number of buckets added into the clay mass. Photographs shall be used as evidencing to its final destination. Interviews and meetings with stakeholders and ceramic personnel on Balsas ceramic shall also be applied to identify the relevant score under the Social Carbon indicator. |
|                                                           | When   | Ashes shall be quantified and have their destination monitored whenever they are collected and transported to the storage site and to the clay mass. The assessment on the relevant score of the Social Carbon indicator will be performed once every monitoring period.                                                                                                                                                                                                                                                                                                                                                 |
|                                                           | By who | Project participants. Ceramic owner shall assign personnel to quantify and monitor the final destination of ashes. Sustainable Carbon will help the ceramic owner identify the corresponding scoring of the Project scenario, following the requirements of Social Carbon Standard.                                                                                                                                                                                                                                                                                                                                      |
| QA/QC procedures to be applied                            |        | Besides the procedures to control and dispose ashes on each ceramic, the project proponents applied the indicator from SOCIALCARBON Standard: SOCIALCARBON indicators for Ceramic Industry: <b>Ashes</b> - Evaluates the procedures adopted by the entrepreneur in order to control the ashes and its destination. The project situation was analyzed on a periodical basis and is scored from 1 to 6, where 1 represents a critical situation and 6 represents a sustainable scenario. More detail can be verified on Section F.2. <i>Sustainable Development matrix</i> on the Gold Standard Passport, version 05.     |
| Monitoring Value and Frequency                            |        | <p>Since the first monitoring period, ceramic owners have provided a proper destination to ashes resulted from biomass combustion. Ashes quantification and destination are documented on proper files for all the ceramic factories.</p> <p>The indicator “Ashes” from SOCIALCARBON Standard allows classifying the project activity into scenario four, defined as:<br/>“Scenario 4:<br/>- Ashes are totally reused or donated, with control of the quantity and destination of the material.”</p>                                                                                                                     |

|    |    |
|----|----|
| No | 03 |
|----|----|

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| Indicator                                                 |        | Access to affordable and clean energy services                                                                                                                                                                                                                                                                                                                                          |
|-----------------------------------------------------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Chosen parameter                                          |        | Total energy produced from renewable sources                                                                                                                                                                                                                                                                                                                                            |
| Implications on monitoring requirements and justification |        | The project is expected to positively impact the access to affordable and clean energy services. The measures applied by the project activity resulted in renewable energy generation by utilizing renewable biomasses, thus providing alternative and clean energy sources that were not utilized in the baseline scenario.                                                            |
| Way of monitoring                                         | How    | The amount of renewable biomass used by <i>Balsas</i> ceramic was monitored during the crediting period (through purchase invoice, delivery notes or other documents concerning the acquisition of biomass). By using default values of energy content, the project proponents were able to determine the amount of renewable energy produced during each year of the crediting period. |
|                                                           | When   | On a monthly basis. Data was consolidated on an annual basis                                                                                                                                                                                                                                                                                                                            |
|                                                           | By who | Project Participants. Staff from <i>Balsas</i> ceramic should store information on biomass purchase and acquisition. Sustainable Carbon should determine the amount of renewable energy generated during the crediting period.                                                                                                                                                          |
| QA/QC procedures to be applied                            |        | The amount of renewable biomass purchased was controlled with digital spreadsheets filled by staff members from Grupo Tavares. Sustainable Carbon has double checked these spreadsheets against biomass invoices to detect inconsistencies.                                                                                                                                             |
| Monitoring Value and Frequency                            |        | Biomass acquisition was monitored for each purchase, by storing documents such as invoices or receipts. These allowed Sustainable Carbon to determine the amount of energy produced from renewable sources.                                                                                                                                                                             |

|                                                           |        |                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No                                                        |        | 04                                                                                                                                                                                                                                                                                                                                                                           |
| Indicator                                                 |        | Quantitative employment and income generation                                                                                                                                                                                                                                                                                                                                |
| Chosen parameter                                          |        | Voluntary Emission Reductions issued.                                                                                                                                                                                                                                                                                                                                        |
| Implications on monitoring requirements and justification |        | The project is expected to reduce 56,880 tCO <sub>2</sub> e during the crediting period. However, the actual emission reductions will depend on the production and the related amount of renewable biomass used. The issuance of carbon credits will also be subject to the capacity of the project to comply with Gold Standard requirements for voluntary offset projects. |
| Way of monitoring                                         | How    | The issuance of Voluntary Emission Reductions (or similar assets from the carbon market) will be monitored.                                                                                                                                                                                                                                                                  |
|                                                           | When   | Yearly                                                                                                                                                                                                                                                                                                                                                                       |
|                                                           | By who | Project Participants. Staff from each ceramic should store information regarding the project operation, including fuel usage and production output. Sustainable Carbon should determine the emission reductions resulting from the project.                                                                                                                                  |
| QA/QC procedures to be applied                            |        | This parameter will be monitored based on the amount of VERs issued. VER issuance is subject to third party verification following Gold Standard requirements. Hence, additional QA/QC procedures are not necessary                                                                                                                                                          |
| Monitoring Value and Frequency                            |        | (a) This parameter is monitored every monitoring period based on the amount of VERs issued at each monitoring period.                                                                                                                                                                                                                                                        |

|    |    |
|----|----|
| No | 05 |
|----|----|

## CDM – Executive Board

| Indicator                                                 |        | Quantitative employment and income generation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Chosen parameter                                          |        | Additional revenues for biomass suppliers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Implications on monitoring requirements and justification |        | The project is allowing the ceramic factory to use exclusively renewable biomass as fuel. Since these types of fuels are more expensive than native firewood, it is likely that total revenues to biomass suppliers will increase. Furthermore, these revenues are now being destined to suppliers of renewable biomass, which do not cause deforestation.                                                                                                                                                                                                                                                                                                                                                                 |
| Way of monitoring                                         | How    | Total revenues will be monitored by storing purchase invoices, receipts of sale and other documents related to the biomass acquisition. Only documents issued from either government agencies or control documents that were provided or validated by the biomass suppliers will be considered as "other documents". Total revenues shall be compared to the baseline fuel cost for Balsas ceramic which was destined to native firewood suppliers. This parameter is defined ex-ante using data from 2008 (the most recent year prior to the project start date) <sup>31</sup> . A conservative correction factor of 15% will be applied annually, to account for general price increase due to inflation <sup>32</sup> . |
|                                                           | When   | Once every monitoring period                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                           | By who | Project Participants. Staff from <i>Balsas</i> ceramic shall store information biomass acquisition and costs. Sustainable Carbon shall determine the additional revenues by comparing monitored values with figures estimated for the baseline situation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| QA/QC procedures to be applied                            |        | The amount of renewable biomass purchased was controlled with digital spreadsheets filled by third party consultants. Sustainable Carbon has double checked these spreadsheets against biomass invoices to detect inconsistencies.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Monitoring Value and Frequency                            |        | Biomass acquisition was monitored for each purchase, by storing documents such as invoices or receipts. These allowed Sustainable Carbon to determine the payments for biomass suppliers.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

|                                                           |     |                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No                                                        |     | 06                                                                                                                                                                                                                                                      |
| Indicator                                                 |     | Origin of renewable biomass                                                                                                                                                                                                                             |
| Chosen parameter                                          |     | Origin of renewable biomass                                                                                                                                                                                                                             |
| Implications on monitoring requirements and justification |     | Following the project measures, <i>Balsas</i> ceramic have begun utilizing renewable biomass as fuel. Currently, the ceramics use exclusively renewable biomasses as fuels since the beginning of the crediting period, which is defined as 20/11/2011. |
| Way of monitoring                                         | How | The origin of the renewable biomass will be assessed storing documents (receipts, invoices) from the biomasses providers, thus allowing determining its origin. The biomasses shall be                                                                  |

<sup>31</sup> The same data was used for the assessment of additionality. Hence, this approach provides consistency. Furthermore, it is not feasible to monitor the cost of non-renewable biomass ex-post, since this biomass is no longer used by the project.

<sup>32</sup> No methodology was found to correct the price of non-renewable biomass in Brazil, since this is mostly an informal market. A 15% correction factor is considered conservative since it is above current inflation levels in Brazil.

## CDM – Executive Board

|                                |        |                                                                                                                                                                                                                                                            |
|--------------------------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                |        | considered renewable as fulfilling definitions of renewable biomass approved by the CDM Executive Board <sup>33</sup> .                                                                                                                                    |
|                                | When   | Once every monitoring period                                                                                                                                                                                                                               |
|                                | By who | Project Participants. Staff from <i>Balsas</i> ceramic shall store information regarding the biomass purchase and acquisition. Sustainable Carbon shall assess the source of biomass and confirm they comply with CDM EB definitions of renewable biomass. |
| QA/QC procedures to be applied |        | Ceramic owners will store invoices, receipt of sales or other documents to allow the traceability of the renewable biomass.                                                                                                                                |
| Monitoring Value and Frequency |        | The guarantee of acquiring Rice Husk was achieved by invoices from the providers. Biomasses were considered renewable as fulfilling the options described in the methodology applied.                                                                      |

|                                                           |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------------------------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No                                                        |        | 07                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Indicator</b>                                          |        | <b>Competing uses of biomass</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Chosen parameter</b>                                   |        | <b>Biomass surplus</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Implications on monitoring requirements and justification |        | In the baseline situation, <i>Balsas</i> ceramic used predominantly non-renewable woody biomass for thermal energy generation. The project activity aims to allow the complete switch from non-renewable biomass to renewable biomasses. The target is to generate all the energy demand of the ceramics from renewable sources.                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Way of monitoring                                         | How    | According to the Gold Standard Passport (version 05, dated 04/07/2013), Sustainable Carbon will assess the biomass surplus by using published literature, official reports or surveys. In case this information proves to be unavailable, Sustainable Carbon will hire third party experts on biomass to determine the existence of biomass surplus for each biomass type used by <i>Balsas</i> Ceramic in the project region. Such assessment will be made <i>ex ante</i> .<br>During the monitoring period, Sustainable Carbon shall annually determine if the quantity of available biomass in the region (as determined <i>ex ante</i> ), is at least 25% larger than the quantity of biomass that is utilized including the project activity. |
|                                                           | When   | Annually                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                                                           | By who | Project Participants. Staff from <i>Balsas</i> ceramic shall store information regarding the project operation, including biomass usage. Sustainable Carbon shall assess the biomass surplus and determine the occurrence of leakage.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| QA/QC procedures to be applied                            |        | An independent third party expert opinion on the results and findings of the assessment of biomass surplus was obtained, to ensure the results are appropriate and conservative.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Monitoring Value and Frequency                            |        | Monitoring values and frequency are available on Section D.2 (pages 15-16).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

<sup>33</sup> EB 23, Annex 18 – Definition of renewable biomass. Available at: [http://cdm.unfccc.int/EB/Meetings/023/eb23\\_repan18.pdf](http://cdm.unfccc.int/EB/Meetings/023/eb23_repan18.pdf).