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KAMIRANGA CERAMIC FUEL SWITCHING PROJECT

SUSTAINABLE
CARBON

Document Prepared by Sustainable Carbon – Projetos Ambientais Ltda

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Carbono Social Serviços Ambientais Ltda. (Social Carbon Company), which has changed its company name to Sustainable Carbon - Projetos Ambientais Ltda developed this project activity.

The project activity involves Kamiranga Ceramic Company, which is a red ceramic factory, located in São Miguel do Guamá municipality in the State of Pará, north of Brazil. The factory produces structural ceramic bricks mainly for the local market in Belém and for the northeast region of the state.

The objective of the implementation of this project activity in the ceramic is to stop using the native wood, which is a non-renewable fuel, and completely substitute it with renewable biomasses to feed their kilns and fire their ceramic pieces.

This fuel switching project is reducing the greenhouse gas (GHG) emissions through the substitution of native wood for renewable biomasses to generate thermal energy. In addition, in opposition to the identified baseline, the project activity generates thermal energy without stimulating deforestation and uses an abundant renewable biomass.

The fuel switch could only be feasible when considering the carbon credits incomes, since the adaptation of kilns to the new biomasses, and the purchase of new equipment required considerable investments. Due to the project activity, some alterations were required in the productive process of the ceramic. Moreover, the cost of fuel represents a barrier since renewable biomass is more expensive than native firewood on an energy basis.

The project start date was defined as 01-September-2007. On this date, Kamiranga project began reducing or removing GHG emissions. The event that establishes this date is the end of the Hoffman kiln construction. The first crediting period for this project started on 01-January-2008 and ended on 31-December-2017. This is the first monitoring report of the second crediting period – and the eighth of the project –, which started on 01-January-2018 and will end on 31-December-2027.

During the validation process, Kamiranga ceramic factory utilized two different types of kilns in their burning process: Hoffmann kilns and Paulista kilns. During the first crediting period, the implementation of the project activity saved energy due to the following modifications:

- Use of biomasses with less surface area than wood;
- Insertion of air with the new fuels, increasing the oxygenation;

Most of these improvements were made using the income derived from the carbon credits trade, since the implementation of the project as the construction of new kilns during the first crediting period.

Table 01 below illustrates the status of the project activity according to the kilns change during time.

Table 1. Status of the Ceramic Project Activity

Quantity	Kiln	Installation year	Respective monitoring period	Kiln Capacity (ceramic pieces)
2	Paulista kiln	2001	Prior to the carbon project	32,000
		2001		32,000
1	Hoffmann kiln	2007	PD version 2.3	220,000
2	Paulista kilns	2008	1 st MR	37,650
		2008		37,650
2	Paulista kilns	2010	3 rd MR	36,650
		2010		36,650

The emission reductions attributable to the switching of non-renewable fuel (non-renewable wood) to renewable biomasses were equal to **172.068 tCO₂e** during the monitoring period from 01-01-2018 to 31-03-2021. The contribution to sustainability is being monitored applying the SOCIALCARBON® Standard, which is based on six main resources: Technology; Natural; Financial; Human; Social and Carbon Resources.

1.2 Sectoral Scope and Project Type

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

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

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

1.3 Project Proponent

Organization name	Cerâmica Kamiranga Indústria e Comércio LTDA.
Contact person	Mr. Sigifério Alves de Oliveira and Mr. Nonato Fernandes

Title	Mr. Sigifério Alves de Oliveira: Director and owner. Responsible for information about the ceramic company, detailed information on process and production lines, environmental challenges, technological challenges, research and development history, ceramics devices market challenges. Mr. Raimundo Nonato Fernandes: Production Manager and Monitoring data responsible. Responsible for general data and information on inputs and outputs of the ceramic industry, detailed information on the acquisition of renewable biomasses and how this data is kept by the controller's office.
Address	Estrada Santa Rita da Barreira, s/n° - km 04 - Zona Rural São Miguel do Guamá - Pará, Brazil Postal Code: 68660-000
Telephone	+55 (91) 9112-8094
Email	kamiranga@bol.com.br

Organization name	Sustainable Carbon - Projetos Ambientais Ltda
Contact person	Marcelo Hector Sabbagh Haddad Carolina Pendl Abinajm Lyara Carolina Montone do Amaral Guilherme Lucas Medeiros Prado Yara Fernandes da Silva
Title	Marcelo Hector Sabbagh Haddad: Technical coordinator Carolina Pendl Abinajm: Technical analyst Heloísa Dornelles Moitinho: Technical analyst Lyara Carolina Montone do Amaral: Technical analyst Yara Fernandes da Silva: Technical analyst
Address	R. Doutor Bacelar. 368 - Conj. 23 - Vila Clementino Postal Code: 04.026-001 São Paulo - SP. Brazil
Telephone	+55 11 2649 0036
Email	tecnica@sustainablecarbon.com

1.4 Other Entities Involved in the Project

No other entity is involved in this project activity.

1.5 Project Start Date

According to version 2.3 of the VCS PD¹, project start date was defined as 01/09/2007. On this date, the project began reducing or removing GHG emissions. The event that establishes this date is the end of the Hoffman kiln construction.

1.6 Project Crediting Period

The first crediting period for this project started on 01-January-2008 and ended on 31-December-2017. The second crediting period started on 01-January-2018 and ends on 31-December-2027.

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

1.7 Project Location

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

Kamiranga Ceramic

Estrada Santa Rita da Barreira, s/n° - km 04 - Zona Rural

São Miguel do Guamá - Pará, Brazil

Postal Code: 68660-000

Geodetic Coordinates (SAD69): 1° 36'53.0"S and 47° 26'31.6"W / Meridian Convergence: 0° 4' 7.9"

¹ Document available at: <<https://registry.terra.org/app/projectDetail/VCS/197>>. Last visit on: May 27nd, 2021.



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

1.8 Title and Reference of Methodology

The project applies a small-scale methodology approved under the Clean Development Mechanism, as follows: category AMS-I.E.: Switch from Non-Renewable Biomass for Thermal Applications by the User – Version 07, valid from 22-July-16 to 31-October-17². This category comprises small thermal appliances that displace the use of non-renewable biomass by introducing new renewable energy end-user technologies.

1.9 Participation under other GHG Programs

- Emission Trading Programs and Other Binding Limits: The project activity is not included in an emission trading program or any other mechanism that includes GHG allowance trading.
- Other Forms of Environmental Credit: The project activity is not creating any other form of environmental credit under any specific program.
- Participation under Other GHG Programs: The project activity is not registered under any other GHG program.

1.10 Other Forms of Credit

² This version of the methodology is available at: < https://cdm.unfccc.int/filestorage/J/2/H/J2H1I470Y38ZS6WFCEOPM5NBVRG9QX/EB90_repan12_AMS-I.E_%28v07.0%29.pdf?t=MFB8cWhsM3F1fDBuV0-hnaHJS596jgpQzdRV>. Last visit on May 30th, 2021.

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

1.11 Sustainable Development

The project activity contributes to the reduction of greenhouse gas (GHG) emissions by avoiding the use of non-renewable fuels. In addition, the project activity will contribute to sustainable development of the host country, such as:

- The use of clean and efficient technologies through the use of renewable biomass as fuel. By these means, the project is in accordance to Agenda 21 and with Brazilian Sustainable Development Criteria;
- A pioneer initiative that encourages the development of new technologies throughout the country, which replaces the use of non-renewable fuels with renewable biomass which presents an efficient thermal energy generation potential as shown in the project demonstration.
- The use of renewable biomasses results in GHG emission reductions. This way the project does not cause any relevant negative impacts as all generated energy is a result of the best exploitation of the natural resources available. In addition, the project improves the local environmental conditions by establishing proper treatment for the renewable.

Furthermore, the project contributes to the following UN Sustainable Development Goals (SDG), which are better described in the SOCIALCARBON Report:

- SDG 3: Good health and well-being
- SDG 4: Quality education
- SDG 7: Affordable and Clean Energy
- SDG 8: Decent Work and Economic Growth
- SDG 9: Industry, Innovation and Infrastructure
- SDG 11: Sustainable Cities and Communities
- SDG 12: Responsible Consumption and Production
- SDG 13: Climate Action
- SDG 15: Life on Land

2 SAFEGUARDS

2.1 No Net Harm

The only negative impact identified is that the project activity will generate ashes due to the burning of the biomass, but this impact is mitigated by using the ashes material for maintenance of roads.

The burning of the new biomasses also emits particulate material and CO₂, as well as when using native wood. However, GHG emission reductions will be improved since they are renewable biomasses which have carbon neutral lifecycles.

The SOCIALCARBON indicators will evaluate if there are positive social and environmental impacts from the Project Activity. The SOCIALCARBON methodology uses a set of analytical tools that assess the social, environmental and economic conditions of communities affected by the project and demonstrates the project's contribution to sustainable development through continuous monitoring.

2.2 Local Stakeholder Consultation

The formal stakeholder consultation was carried out during the validation of the project. Currently, the company's administrative area is available to receive any kind of suggestions and comments from the community through the telephone, e-mail or even personally. During the present monitoring period no comments were registered.

2.3 AFOLU-Specific Safeguards

Not applicable. This is not an AFOLU project.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Activity

This Monitoring Report refers to the eighth monitoring period of this project activity and includes data from 01-January-2018 to 31-March-2021. The VCS PD of the second crediting period was validated by the Designated Operational Entity Earthood Services Private Limited as well as the present monitoring report.

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

As described on the VCS PD version 5, during the second crediting period, process the production at Kamiranga Ceramic encompassed four Paulista kilns³ and one Hoffman kiln⁴. These kilns produced, together, around 3,151 tonnes of ceramic units per month.

The Hoffman kiln has 30 cycles per month, producing around 78.86 tonnes of ceramic units per cycle. This totalizes 2,152 tonnes of ceramic units per month.

The Paulista kilns described on the VCS PD have 4 cycles per month, in which each produces between 36 and 43.22 tonnes of ceramic units per cycle.

During the third monitoring period of the past crediting period, Kamiranga ceramic factory has constructed two new Paulista kilns. Due to the lack of data it was not possible to perform the additionally assessment, and so the production of these two kilns was excluded from the third monitoring period at the time.

In the fourth monitoring period both kilns have operated on a regular basis. As the ceramic company has used exclusively renewable biomass in these new kilns, the additionality assessment was performed to include the production provided by the new kilns. The additionality assessment was based on the use of renewable biomass in both the new Paulista kilns, comparing the fuel costs during the fourth monitoring period scenario and the baseline scenario.

Regarding the Financial Barrier, a comparison was made between the cost of energy generated on the baseline scenario of Cavalcante Ceramic and the fourth monitoring period of Kamiranga Ceramic.

The cost of non-renewable wood was updated according to local surveys in the Third Monitoring Report of Cavalcante Ceramic, a ceramic company that is located on the same city of Kamiranga and which is also involved in a fuel switching project with Sustainable Carbon. A conservative correction factor was applied annually for 2012 to the cost of the non-renewable biomass, in order to account for general price increases due to inflation. These surveys indicate that the costs for non-renewable biomass for the period was 260 BRL per 23 m³, resulting in 16.74 BRL/tonne. The annual rate of increase applied on the Fourth Monitoring period for Kamiranga Ceramic was 6.50%⁵, once it was the highest inflation rate evidenced since the year of 2004.

³ “Paulista” is a kind of intermittent kiln with rectangular shape and lateral furnaces. The burning cycle with “Paulista” kilns comprises 6 hours to load the kiln with ceramic units, 40 hours of heating, 8 hours of firing, 24 hours of cooling, 6 hours to download, and approximately 30 minutes to clean. At Kamiranga Ceramic, one “Paulista” kiln produces approximately 43.22 tonnes of ceramic units per burning cycle, and the other “Paulista” kiln produces approximately 60 tonnes of ceramic units per burning cycle.

⁴ “Hoffman” kilns have parallel chambers where the heat from one chamber is used in the next, therefore recycling the generated heat in the previous chambers. The fuels are fed through entrances located on the top of this kiln. The most common fuels that are used in this type of kiln are firewood and sawdust. The burning cycle with “Hoffman” kiln comprises 1 hours to load the kiln with ceramic units, 16 hours of heating, 40 minutes of firing, few hours of cooling, 1 hours to download, and approximately 30 minutes to clean. The “Hoffman” kiln at Kamiranga Ceramic produces approximately 78.86 tonnes of ceramic units per burning cycle.

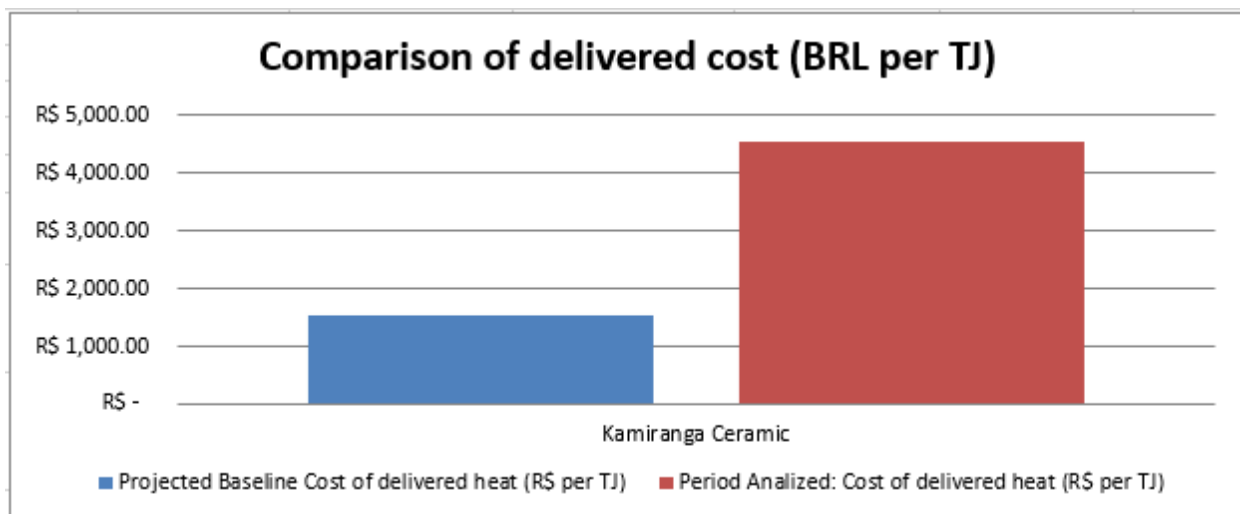
⁵ Available at: <<http://agenciabrasil.ebc.com.br/noticia/2012-01-06/inflacao-oficial-registra-em-2011-maior-taxa-desde-2004>> Last visit on: May 17th, 2021.

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

The financial barrier was recalculated in this 8th monitoring period, due to the increase in GHG ERRs comparing to the estimated, as verified in Section 5.4 of this report. The objective was to prove that renewable biomass is not financially attractive as non-renewable biomass, therefore, if it were not for the contribution of the project, it would be more interesting and profitable for the factory to use native firewood.

The price of renewable biomass that the factory pays to its suppliers and the value of non-renewable biomass, used for the analysis in the 4th monitoring period, were used. Due to the project, the current Kamiranga ceramics managers do not have contact with non-renewable biomass suppliers, for that reason the value verified in the baseline was corrected by the IPCA⁶ index until the period of this monitoring. The operation of the kilns with renewable biomass, still shows to be less financially attractive since the use of renewable biomass is more expensive than using non-renewable wood.

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



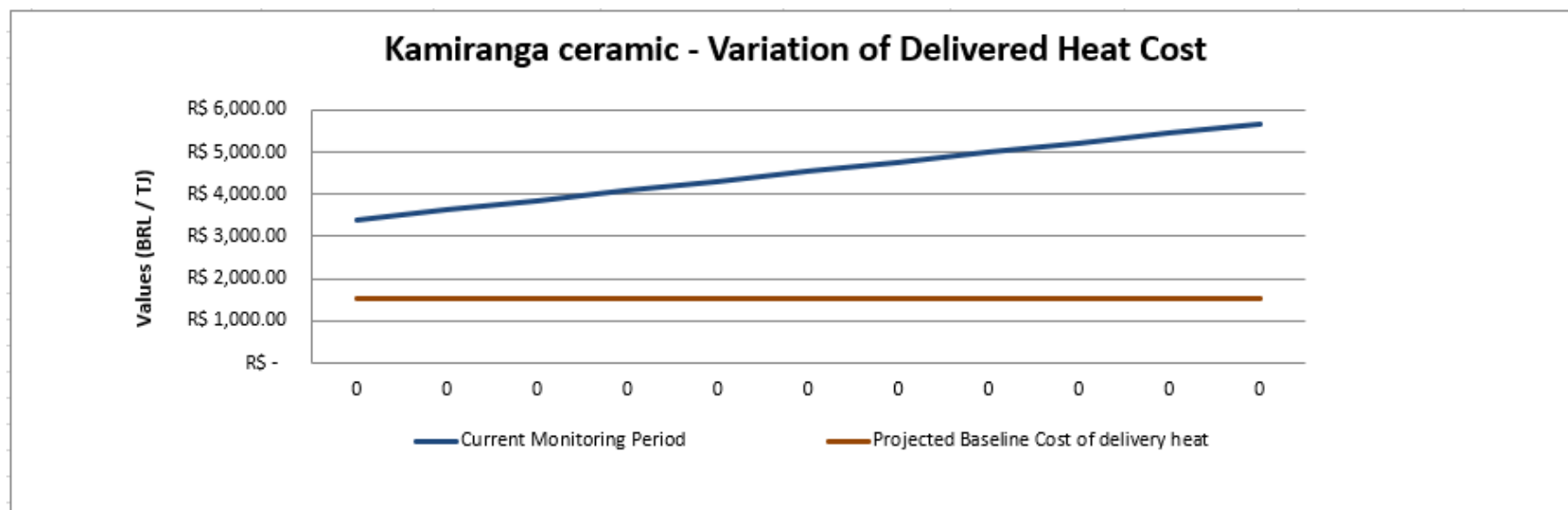
⁶ According to: <<https://www.ibge.gov.br/explica/inflacao.php>> The increase was 37.95%. The dates considered for monetary correction by the IPCA were December-2012 to January-2018.

The Chart above displays the comparison of cost of delivered heat at the projected baseline scenario and at the current monitoring period (from 01/01/2018 to 31/03/2021). It can be observed that the non-renewable biomass is more financially attractive than using the renewable biomasses currently employed by the project activity.

With the project activity's implementation, the fuel spending has increased, as can be verified in Table 2 below. Comparing the cost per energy generated, Kamiranga ceramic spend with renewable biomass BRL R\$ 4,531.62 per TJ generated against 1,639.59 per TJ that could be expected in case non-renewable wood was used.

Table 2. Cost of renewable biomass per energy generated at the baseline scenario and at the current monitoring period

Current Monitoring Period	Renewable Biomass	Cost of delivered heat (R\$ per TJ)	Variation - Cost of delivered heat										
			-25%	-20%	-15%	-10%	-5%	0%	5%	10%	15%	20%	25%
	Sawdust	R\$ 5,850.41	R\$ 4,387.80	R\$ 4,680.32	R\$ 4,972.84	R\$ 5,265.36	R\$ 5,557.88	R\$ 5,850.41	R\$ 6,142.93	R\$ 6,435.45	R\$ 6,727.97	R\$ 7,020.49	R\$ 7,313.01
	Wood Residues	R\$ 2,538.72	R\$ 1,904.04	R\$ 2,030.97	R\$ 2,157.91	R\$ 2,284.84	R\$ 2,411.78	R\$ 2,538.72	R\$ 2,665.65	R\$ 2,792.59	R\$ 2,919.52	R\$ 3,046.46	R\$ 3,173.39
	Açaí Pits	R\$ 3,053.05	R\$ 2,289.79	R\$ 2,442.44	R\$ 2,595.09	R\$ 2,747.75	R\$ 2,900.40	R\$ 3,053.05	R\$ 3,205.70	R\$ 3,358.36	R\$ 3,511.01	R\$ 3,663.66	R\$ 3,816.31
	Total	R\$ 4,531.62	R\$ 3,398.71	R\$ 3,625.29	R\$ 3,851.87	R\$ 4,078.45	R\$ 4,305.04	R\$ 4,531.62	R\$ 4,758.20	R\$ 4,984.78	R\$ 5,211.36	R\$ 5,437.94	R\$ 5,664.52
Projected Baseline Cost of delivery	Non-renewable wood	R\$ 1,639.59	R\$ 1,639.59	R\$ 1,639.59	R\$ 1,639.59	R\$ 1,639.59	R\$ 1,639.59	R\$ 1,639.59	R\$ 1,639.59	R\$ 1,639.59	R\$ 1,639.59	R\$ 1,639.59	R\$ 1,639.59



According to the National Institute for Space Research⁷⁸, Pará State was responsible for almost one third of Amazon deforestation recorded in August of 2011, despite the reduction in deforestation rates evidenced in the Amazon biome from August, 2010 to July, 2011⁹. The consumption of non-renewable biomass by ceramic industry was noted by several authors (UHLIG, 2008¹⁰; NERI, 2003¹¹; BRITO¹²; CARDOSO, 2008¹³). This was also observed in other industries, for example in production of steel¹⁴, which has a much better structure and internal organization when compared to ceramic factories that are generally small and family-run enterprises. Therefore, the statements described above evidence that the use of non-renewable wood still can be a hypothetically feasible scenario for the project activity.

From the fifth to the eighth monitoring period there were no changes in the kilns of Kamiranga Ceramic. The factory operated with one Hoffman kiln and four Paulista kilns, which are daily, fed with renewable biomass, such as sawdust and açaí pits. The renewable biomass used in the current monitoring period were: sawdust, açaí pits and wood residue.

None of the changes described above have significant effects on the project monitoring or on its capacity to mitigate GHG emissions. The monitoring data was kept according to the monitoring plan described in the project description document. This Monitoring Report refers to the eighth monitoring period of this project and includes data from 01-01-2018 to 31-03-2021.

3.2 Deviations

3.2.1 Methodology Deviations

There were no methodology deviations during this monitoring period.

3.2.2 Project Description Deviations

⁷ Instituto Nacional de Pesquisas Espaciais (INPE).

⁸ LOURENÇO, I. Agencia brasil. Pará foi campeão de desmatamento em agosto. Available at: <<http://agenciabrasil.ebc.com.br/noticia/2011-10-03/para-foi-campeao-de-desmatamento-em-agosto>>. Last visit on May 27th, 2021.

⁹ BRASIL. Brasil.gov.br. Desmatamento na Amazônia brasileira em 2011 apresenta menor taxa já registrada Available at: <<https://web.archive.org/web/20160513132723/http://www.brasil.gov.br/meio-ambiente/2011/12/desmatamento-na-amazonia-brasileira-em-2011-apresenta-menor-taxa-ja-registrada>>. Last visit on: May 27th, 2021.

¹⁰ UHLIG, A. Lenha e carvão vegetal no Brasil: balanço oferta-demanda e métodos para a estimação do consumo. 2008, 156f. Dissertação (Pós graduação em Energia) - Universidade de São Paulo. Available at: <http://www.teses.usp.br/teses/disponiveis/86/86131/tde-14052008-113901/publico/UHLIG_Tese1.pdf>. Last visited on October 2nd, 2020.

¹¹ NERI, J.T. Energia Limpa, Sustentável ou de Subsistência? Cerâmica Industrial, Rio Grande do Norte;V,8, n.1,35 - 6,2003. Available at: <<https://www.ceramicaindustrial.org.br/article/587657187f8c9d6e028b468c/pdf/ci-8-1-587657187f8c9d6e028b468c.pdf>>. Last visited on May 27th, 2021.

¹² BRITO, J.O. O uso energético da madeira. Available at: <http://www.scielo.br/scielo.php?pid=S0103-40142007000100015&script=sci_arttext&tlng=ES>. Last visited on October 2nd, 2020.

¹³ CARDOSO, C.F.R. Panorama do Setor Florestal: o que tem sido feito na esfera do Governo Federal. Rio de Janeiro, 03 Set. 2008. Report presented in 1º SEMINÁRIO DE MADEIRA ENERGÉTICA, 2008.

¹⁴ Instituto Observatório Social. O Aço da Devastação. Available at: <http://www.observatoriosocial.org.br/sites/default/files/08-01-2011_06-er18-o_aco_da_devastacao.pdf>. Last visited on May 27th, 2021.

There were no Project Description Deviations during this monitoring period.

3.3 Grouped Projects

Not applicable. This is not a grouped project.

3.4 Safeguards

Safeguards were addressed at Section 2 of the present VCS + SOCIALCARBON Monitoring Report.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	EF _{projected fossil fuel}
Data unit	tCO ₂ /TJ
Description	CO ₂ Emission factor of residual fuel oil
Source of data	AMS-I.E.: Switch from non-renewable biomass for thermal applications by the user - Version 7.0. Available at: https://cdm.unfccc.int/filestorage/J/2/H/J2H1I470Y38ZS6WFC EOPM5NBVRG9QX/EB90_repan12_AMS-I.E._%28v07.0%29.pdf?t=REx8cXR5MGJwfDDI1hd9mNP737ACH Fx20fhp . Last visited on May 27 th , 2021.
Value applied	81.6
Justification of choice of data or description of measurement methods and procedures applied	This value represents the emission factor of the substitution fuels likely to be used by similar users, on a weighted average basis. It is assumed that the mix of present and future fuels used would consist of a solid fossil fuel (lowest in the ladder of fuel choices), a liquid fossil fuel (represents a progression over solid fuel in the ladder of fuel use choices) and a gaseous fuel (represents a progression over liquid fuel in the ladder of fuel use choices). Thus a 50 percent weight is assigned to coal as the alternative solid fossil fuel (96 t CO ₂ /TJ) and a 25 per cent weight is assigned to both liquid and gaseous fuels (71.5 t CO ₂ /TJ for kerosene and 63.0 t CO ₂ /TJ for liquefied petroleum gas (LPG)).
Purpose of Data	The fossil fuel likely to be used by similar consumers is taken from the applied methodology. This parameter was used to calculate baseline emissions from the use of the fossil fuel that would be used in the baseline scenario, in the absence of non-renewable wood.
Comments	This parameter was used to calculate baseline emissions from the use of the fossil fuel that would be used in the baseline scenario, in the absence of non-renewable wood.

Data / Parameter	ρ_{wood}
Data unit	tonne/m ³
Description	Specific gravity
Source of data	LORENZI. H. Árvores Brasileiras: Manual de Identificação e Cultivo de Plantas Arbóreas Nativas do Brasil. vol.1. 4.ed. Nova Odessa. SP: Instituto Plantarum. 2002. LORENZI. H. Árvores Brasileiras: Manual de Identificação e Cultivo de Plantas Arbóreas Nativas do Brasil. vol.2. 4.ed. Nova Odessa. SP: Instituto Plantarum. 2002. QUIRINO. W. F. et al. Poder Calorífico da Madeira e de Resíduos Lignocelulósicos. Biomassa & Energia. v.1. n.89. p. 100-106. 2005. Available at: http://www.lippel.com.br/dados/download/05-05-2014-10-46poder-calorifico-da-madeira-e-de-materiais-ligno-celulosicos.pdf >. Last visit on: May 27th, 2021.
Value applied	0.67
Justification of choice of data or description of measurement methods and procedures applied	The species used to calculate the value are typical trees of Amazon Biome that are usually employed as fuel in the ceramic factories of the region. The amount of wood used in the baseline was measured in volume unit.
Purpose of Data	This parameter was used to calculate baseline emissions from the use of non-renewable fuel that would be used in the baseline scenario. The amount of wood used in the baseline was measured in volume units, so this data is used to convert measured values to tonnes.
Comments	The species used to calculate the average value are typical trees of Amazon Biome that are usually utilized as fuel in the ceramic industries of the region. Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.

Data / Parameter	BF_y
Data unit	Tonnes of native wood per tonnes of ceramic units fired
Description	Baseline consumption of non-renewable biomass per tonnes of ceramic units produced in year y
Source of data	Historical data from project proponent (ceramic owner)
Value applied	0.81

Justification of choice of data or description of measurement methods and procedures applied	The value was acquired through the average consumption and production of ceramic units during the years when the ceramic industry used to consume non-sustainable wood. This value is in accordance with the data acquired in other ceramics that employ the same type of kiln. The parameter cannot be updated because the historical situation does not exist anymore as a result of the CDM project activity. The value was employed to calculate the real amount of wood displaced to maintain the ceramic production in the baseline scenario.
Purpose of Data	The purpose of the data is to provide the consumption of non-renewable biomass per tonnes of ceramic units produced in a year in the baseline scenario.
Comments	Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.

Data / Parameter	EF _{CO2,f}						
Data unit	g CO2/t km						
Description	Default CO2 emission factor for freight transportation activity f						
Source of data	TOOL12 Methodological tool: Project and leakage emissions from transportation of freight Version 01.1.0 Available at: < https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-12-v1.1.0.pdf >. Last visit on May 27 th , 2021.						
Value applied	<table> <tr> <th>Vehicle class</th><th>Vehicle class Emission factor (g CO2/t km)</th></tr> <tr> <td>Heavy vehicles</td><td>129</td></tr> <tr> <td>Light vehicles</td><td>245</td></tr> </table>	Vehicle class	Vehicle class Emission factor (g CO2/t km)	Heavy vehicles	129	Light vehicles	245
Vehicle class	Vehicle class Emission factor (g CO2/t km)						
Heavy vehicles	129						
Light vehicles	245						
Justification of choice of data or description of measurement methods and procedures applied	The emission factor has been derived based on custom design transient speed-time-gradient drive cycle (adapted from the international FIGE cycle), vehicle dimensional data, mathematical analysis of loading scenarios, and dynamic modelling based on engine power profiles, which, in turn, are a function of gross vehicle mass (GVM), load factor, speed/acceleration profiles and road gradient						
Purpose of Data	This parameter is utilized to calculate the project emission due to the freight transportation of biomass from the suppliers to the ceramic industry.						
Comments	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.						

4.2 Data and Parameters Monitored

Data / Parameter	PR _y		
Data unit	Tonnes of ceramic units fired per month		
Description	Production of ceramic units		
Source of data	Controlled by the project proponent		
Description of measurement methods and procedures to be applied	The measurement was done by an internal control sheet, filled daily, with the amount of ceramic units burned in the kilns and monitored by the project proponent. Data was aggregated on a monthly and yearly basis. It was considered the data from the kiln loading was used, since the amount of ceramic units fired it is related to the energy required.		
Frequency of monitoring/recording	Monthly		
Value monitored	Production of ceramic pieces		
	Period		Kamiranga Ceramic (tonnes of ceramic units)
	2018	January	4,910
		February	3,855
		March	5,271
		April	4,583
		May	4,580
		June	5,434
		July	5,381
		August	5,470
		September	5,195
		October	5,863
		November	5,051
		December	4,629
	Total 2018		60,222
	2019	January	4,899
		February	4,133
		March	4,231
		April	4,290
		May	4,252
		June	4,124
		July	5,212
		August	5,339
September		5,435	
October		5,486	

		November	5,258
		December	5,530
	Total 2019		58,187
	2020	January	5,279
		February	4,242
		March	4,645
		April	3,835
		May	4,373
		June	4,943
		July	5,405
		August	5,886
		September	5,298
		October	5,181
		November	4,825
		December	4,869
	Total 2020		58,782
	2021	January	4,391
		February	3,309
		March	2,674
	Total 2021		10,374
	Total in the monitoring period		187,565
For more detailed information, please see VCS MR Calculation Kamiranga spreadsheet.			
Monitoring equipment	No monitoring equipment was used to determine this parameter. Production was counted by trained personnel on the ceramic company.		
QA/QC procedures to be applied	Data concerning PR measurement was inputted in a spreadsheet used by Kamiranga Ceramic as an internal control. Information on this spreadsheet was organized per month and daily filled according to date based on ceramic units loaded in the kilns.		
Purpose of the 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 VCS PD (QA/QC table).		
Calculation method	In the current monitoring period, the production process of Kamiranga Ceramic factory encompassed one Hoffman kiln and four <i>Paulista</i> kilns, which are daily fed with renewable biomass, such as: sawdust, açai pits and wood residues. The weights of the ceramic units produced in this monitoring period were described in the table below. These values are used to convert production from units to tonnes.		

		Types of ceramic units	Weight (Tonnes per unit)
		6 holes	0.0021858
		8 holes (9x19x29)	0.0042175
		Solid	0.0028502
Comments	Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.		

Data / Parameter	NCV _{biomass}
Data unit	TJ/tonne of wood
Description	Net Calorific Value of non-renewable woody biomass that is substituted
Source of data	AMS-I.E.: Switch from non-renewable biomass for thermal applications by the user - Version 7.0. Available at: https://cdm.unfccc.int/filestorage/J/2/H/J2H1I470Y38ZS6WFC EOPM5NBVRG9QX/EB90_repan12_AMS-I.E._%28v07.0.%29.pdf?t=REx8cXR5MGJwfDDI1hd9mNP737ACH Fx20fhp . Last visited on May 27 th , 2021. The value informed in the applied methodology is based on IPCC default for wood fuel.
Description of measurement methods and procedures to be applied	This parameter is record by the ceramic in a sheet with the distance between the ceramic and the furnisher. Information in section 5.2 – Project Emissions
Frequency of monitoring/recording	In case of this project activity the default value is being applied. Annual monitoring is just required in case of briquette is used as project fuel, as per methodology, which is not the case of this project activity.
Value monitored	0.015
Monitoring equipment	No monitoring equipment is used to determine this parameter.
QA/QC procedures to be applied	-
Purpose of the data	This value provides the energy generated by the amount of wood that would be used in the absence of the project.
Calculation method	-
Comments	Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.

Data / Parameter	$Q_{renbiomass}$												
Data unit	Tonnes per month												
Description	Amount of renewable biomass utilized												
Source of data	The ceramic owner measures the dimensions of the trucks that delivery the biomass and with this information a receipt is issue by ceramic employees containing the total volume of biomass and the price paid, as an internal control.												
Description of measurement methods and procedures to be applied	The amount of biomass was monitored in accordance to the volume measured from the truck dimensions. The VCS PD establishes that values in the receipts described in m^3 (when applicable), shall be converted into tonnes through the specific gravity of each biomass. The specific gravity values of each renewable biomasses used in this project are: <table data-bbox="636 825 1417 1211"> <tr> <th>Biomass</th><th>Specific gravity (tonnes/m^3)</th></tr> <tr> <td>Sawdust</td><td>0.35</td></tr> <tr> <td>Wood residue</td><td>0.76</td></tr> <tr> <td>Açaí pits</td><td>0.72</td></tr> <tr> <td>Native wood from Forest Management</td><td>0.67</td></tr> <tr> <td>Brazilian nut husk</td><td>0.24</td></tr> </table> Sources of data: <u>Sawdust:</u> SIMIONI. F. J. Análise diagnóstica e Prospectiva da cadeia produtiva de energia de biomassa de origem florestal no planalto sul de Santa Catarina. Curitiba. 2007. Available at: <http://hdl.handle.net/1884/10294>. Last visit on May 27th, 2021. <u>Wood Residue:</u> SILVA, S.A.M., et AL. Avaliação da distribuição da densidade em MDF a partir da técnica da onda de ultra-som. Scientia Forestalis. n. 74, p. 19-26, junho 2007. The values are available at: <http://www.ipef.br/publicacoes/scientia/nr74/cap02.pdf>. Last visit on May 27th, 2021. <u>Açaí Pits:</u>	Biomass	Specific gravity (tonnes/ m^3)	Sawdust	0.35	Wood residue	0.76	Açaí pits	0.72	Native wood from Forest Management	0.67	Brazilian nut husk	0.24
Biomass	Specific gravity (tonnes/ m^3)												
Sawdust	0.35												
Wood residue	0.76												
Açaí pits	0.72												
Native wood from Forest Management	0.67												
Brazilian nut husk	0.24												

	PADILHA et al. Avaliação do Potencial dos Caroços de Açaí para a geração de energia. Biomassa & Energia. v. 2. n. 3. p. 231-239. 2005. Available at: <https://www.abcm.org.br/anais/encit/2006/arquivos/Combustion%20and%20Fuels/CIT06-0826.pdf>. Last visit on May 27th, 2021 <u>Native wood from forest management</u> Considered to be the same as for native firewood. Please check parameter ρ_{wood} on section 4.1 of the VCS PD for more information. <u>Brazilian nut husk</u> Available at: <http://www.proceedings.scielo.br/img/eventos/agrener/n6v1/035t01.gif>. Last visit on May 27th, 2021.																												
Frequency of monitoring/recording	Monthly																												
Value monitored	Total amount during this monitoring period (tonnes): <table><tr><th>Period/ Biomass</th><th>Sawdust</th><th>Açaí Pits</th><th>Wood Residue</th></tr><tr><th></th><th>Tonnes</th><th>Tonnes</th><th>Tonnes</th></tr><tr><td>2018</td><td>8,801.74</td><td>0.00</td><td>6,482.34</td></tr><tr><td>2019</td><td>11,478.36</td><td>54.23</td><td>6,258.68</td></tr><tr><td>2020</td><td>8,947.68</td><td>0.00</td><td>5,709.75</td></tr><tr><td>2021¹⁵</td><td>2,181.55</td><td>0.00</td><td>1,040.18</td></tr><tr><td>Total in the period</td><td>31,409.34</td><td>54.23</td><td>19,490.94</td></tr></table> For more detailed information, please see VCS MR Calculation Kamiranga spreadsheet.	Period/ Biomass	Sawdust	Açaí Pits	Wood Residue		Tonnes	Tonnes	Tonnes	2018	8,801.74	0.00	6,482.34	2019	11,478.36	54.23	6,258.68	2020	8,947.68	0.00	5,709.75	2021 ¹⁵	2,181.55	0.00	1,040.18	Total in the period	31,409.34	54.23	19,490.94
Period/ Biomass	Sawdust	Açaí Pits	Wood Residue																										
	Tonnes	Tonnes	Tonnes																										
2018	8,801.74	0.00	6,482.34																										
2019	11,478.36	54.23	6,258.68																										
2020	8,947.68	0.00	5,709.75																										
2021 ¹⁵	2,181.55	0.00	1,040.18																										
Total in the period	31,409.34	54.23	19,490.94																										
Monitoring equipment	No monitoring equipment is used to determine this parameter.																												
QA/QC procedures to be applied	The ceramic has monthly records of the quantity of biomass acquired. It will be rechecked according to the receipts of purchase.																												
Purpose of the data	This parameter will be used to: a. Compare the total energy produced in the current credit period to the thermal energy that would be necessary according to the VCS PD estimates (QA/QC table);																												

¹⁵ From January to March.

	b. Demonstrate that the Project fits in small scale category for biomass renewable energy projects (capacity <45MWth); Calculation of leakage emissions due to competing use of biomass.
Calculation method	The energy generated by the amount of renewable biomass during the current monitoring period was calculated based on the Net Calorific Value of each biomass, as can be seen on the VCS MR Calculation spreadsheet. The amount of biomasses was monitored in accordance to the volume measured from the truck dimensions. The values in the receipts are described in m³, therefore it was necessary to do the conversion to tonnes through the specific gravity of each biomass. The specific gravity values of the renewable biomasses utilized in this project is described under the item "Description of measurement methods and procedures to be applied".
Comments	Data was measured from each purchase/acquisition of biomass and aggregated monthly. Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.

Data / Parameter	Origin of renewable biomass
Data unit	Not applicable
Description	Renewable origin of the biomass
Source of data	Controlled by the project proponent
Description of measurement methods and procedures to be applied	This information was given by the biomass's providers. The guarantee of acquiring renewable biomass was achieved by invoices from the providers. The biomasses used by this project are considered renewable as fulfilling the options described in the methodology applied.
Frequency of monitoring/recording	Each monitoring period
Value monitored	Not applicable.
Monitoring equipment	No monitoring equipment was used to determine this parameter.
QA/QC procedures to be applied	The biomasses were considered renewable as they were in accordance with the definition given by the Annex 18 of the 23rd

	meeting of the Executive Board from the Clean Development Mechanism ¹⁶ .
Purpose of the data	The objective of this data is monitoring the origin of the different types of biomasses utilized in the project.
Calculation method	Not applicable.
Comments	Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.

Data / Parameter	Leakage of non-renewable biomass
Data unit	tCO ₂ e
Description	Leakage resulted from the non-renewable biomass
Source of data	Monitored
Description of measurement methods and procedures to be applied	The three sources of leakages predicted in the applied methodology were monitored. Scientific articles, official statistical data, regional and national surveys were provided to ensure that there was no leakage from non-renewable biomass (or to estimate the leakage). Please see Section 5.3: "Leakage".
Frequency of monitoring/recording	Annually
Value monitored	0
Monitoring equipment	No monitoring equipment is used to determine this parameter.
QA/QC procedures to be applied	Data available regarding the ceramic industries fuel consumption were utilized to monitor the leakage.
Purpose of the 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.
Calculation method	Not applicable.
Comments	Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.

Data / Parameter	$f_{NRB,y}$
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¹⁶ CDM – Executive Board. Annex 18 definition of renewable biomass. EB 23. Available at: < https://cdm.unfccc.int/EB/023/eb23_repan18.pdf >. Last visit on May 27th, 2021.

Data unit	Percentage										
Description	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 or government data or approved default country specific fraction of non-renewable biomass (f_{NRB}) values available on the CDM website.										
Source of data	Survey methods. Data from official national sources on the Amazon Biome, such as the National Forest Information System (SNIF), National Institute for Space Research (INPE), Ministry of the Environment (MMA) and Brazilian Institute of Geography and Statistics (IBGE) were used to determine this parameter.										
Description of measurement methods and procedures to be applied	The monitoring of this parameter was based in national and international articles and database every monitoring period. The sources provided information about the availability of woody biomass in the Amazon biome.										
Frequency of monitoring/recording	Annually										
Value monitored	<table border="1"> <thead> <tr> <th>Year</th><th>$f_{NRB,y}$</th></tr> </thead> <tbody> <tr> <td>2018</td><td>93.84%</td></tr> <tr> <td>2019</td><td>93.77%</td></tr> <tr> <td>2020</td><td>93.65%</td></tr> <tr> <td>2021</td><td>94.25%</td></tr> </tbody> </table>	Year	$f_{NRB,y}$	2018	93.84%	2019	93.77%	2020	93.65%	2021	94.25%
Year	$f_{NRB,y}$										
2018	93.84%										
2019	93.77%										
2020	93.65%										
2021	94.25%										
Monitoring equipment	No monitoring equipment was used to determine this parameter.										
QA/QC procedures to be applied	The monitoring of this parameter was based in national and international articles and database every monitoring period. The sources provided information about the sustainable use of Amazon biome.										
Purpose of the data	The purpose of the data is to determine the fraction of biomass (wood) which would be used in the absence of the project activity in year y.										
Calculation method	The fraction of woody biomass used in the absence of the project activity in year y is essentially captured in the equation below: $f_{NRB} = \frac{NRB}{NRB + RB}$ Where: f_{NRB} Fraction of non-renewable biomass (fraction or %) NRB Non-renewable biomass (t/yr) RB Demonstrably renewable biomass (t/yr)										

	Calculations are in accordance to “Calculation of the fraction of non-renewable biomass” version 01.0.¹⁷ More detailed information please check the “<i>fNRB,y</i>” tab available in the “VCS MR Calculation Kamiranga” spreadsheet.
Comments	Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.

Data / Parameter	Renewable biomass surplus																	
Data unit	Tonnes or m³																	
Description	Amount of renewable biomass available																	
Source of data	Monitored																	
Description of measurement methods and procedures to be applied	It is used to calculate the leakage of renewable biomass. The sources of leakages predicted in “General guidance on leakage in biomass project activities” of Indicative Simplified Baseline and Monitoring Methodologies for Selected Small-Scale CDM Project Activity Categories were monitored. The measurement of the leakage was based in national and international articles and database every monitoring period. The sources provided information about the biomass availability in the project activity’s region. The bibliographic references are described on the section 5.3 “Leakage”.																	
Frequency of monitoring/recording	Annually																	
Value monitored	<table><tr><th>Year</th><th>Forest residues (m³)</th><th>Açaí Pits (tonnes)</th></tr><tr><td>2018</td><td>704,513.02</td><td>59,392.12</td></tr><tr><td>2019</td><td>697,160.79</td><td>59,337.89</td></tr><tr><td>2020</td><td>705,115.95</td><td>59,392.12</td></tr><tr><td>2021 (until March)</td><td>730,612.22</td><td>59,392.12</td></tr></table>			Year	Forest residues (m³)	Açaí Pits (tonnes)	2018	704,513.02	59,392.12	2019	697,160.79	59,337.89	2020	705,115.95	59,392.12	2021 (until March)	730,612.22	59,392.12
Year	Forest residues (m³)	Açaí Pits (tonnes)																
2018	704,513.02	59,392.12																
2019	697,160.79	59,337.89																
2020	705,115.95	59,392.12																
2021 (until March)	730,612.22	59,392.12																
	Detailed information in Section 5.3.:“Leakage”.																	
Monitoring equipment	No monitoring equipment is used to determine this parameter.																	

¹⁷ Available at: <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-30-v1.pdf>. Last visit on: 23/01/2023.

QA/QC procedures to be applied	Data available regarding the ceramic industries fuel consumption was employed to monitor the leakage
Purpose of the data	This parameter is used to determine if leakage emissions due to competing use of biomass should be calculated.
Calculation method	The amount of biomass used by the project activity in each year of the crediting period is compared to total biomass available, as estimated on the VCS PD.
Comments	According to the guidance applied, the project participant shall evaluate ex ante if there is a surplus of the biomass in the region of the project activity. If it is demonstrated at the beginning of each crediting period that, the quantity of available biomass in the region (e.g., 50 km radius), is at least 25% larger than the quantity of biomass that is utilized, including the project activity, then this source of leakage can be neglected. Value monitored, hence, represents the value determined ex ante at the beginning of the current crediting period. Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.

Data / Parameter	D _{f,m}												
Data unit	Kilometer												
Description	Return trip distance between the origin and destination of freight transportation activity f in monitoring period m												
Source of data	Registration of suppliers controlled by the project proponent												
Description of measurement methods and procedures to be applied	Determined once for each freight transportation activity f for a reference trip using the vehicle odometer or any other appropriate sources (e.g. on-line sources)												
Frequency of monitoring/recording	To be updated whenever the distance changes.												
Value monitored		<table><tr><th>Year</th><th>D_{f,m} (km)</th></tr><tr><td>2018</td><td>10,803.40</td></tr><tr><td>2019</td><td>10,215.00</td></tr><tr><td>2020</td><td>4,561.60</td></tr><tr><td>2021 (until March)</td><td>1,719.20</td></tr></table>	Year	D _{f,m} (km)	2018	10,803.40	2019	10,215.00	2020	4,561.60	2021 (until March)	1,719.20	
Year	D _{f,m} (km)												
2018	10,803.40												
2019	10,215.00												
2020	4,561.60												
2021 (until March)	1,719.20												
Monitoring equipment	No monitoring equipment is used to determine this parameter.												

QA/QC procedures to be applied	Data available regarding the ceramic industry freight of biomass transportation.
Purpose of the data	This parameter is used to calculate project emissions for freight that exceeds 200 km.
Calculation method	Information in section 5.2 – Project Emissions
Comments	This parameter was not monitored during the first crediting period. Values will be monitored at the Monitoring Report from now on. Data will be kept for two years after the end of the crediting period or the last issuance of carbon credits for this project activity, whichever occurs later.

Data / Parameter	FR_{f,m}				
Data unit	tonnes				
Description	Total mass of freight transported in freight transportation activity f in monitoring period m				
Source of data	Records by project participants or records by truck operators				
Description of measurement methods and procedures to be applied	This parameter is record by the ceramic in a sheets with the distance between the ceramic and the furnisher. Information in section 5.2 – Project Emissions				
Frequency of monitoring/recording	Annually				
Value monitored		FR_{f,m} in tonnes			
		Wood Residues	Sawdust	Açaí pits	Total
	2018	6,482.34	8,801.74	0.00	15,284.08
	2019	6,258.68	11,478.36	54.23	17,791.26
	2020	5,709.75	8,947.68	0.00	14,657.44
	2021 (until March)	1,040.18	2,181.55	0.00	3,221.73
Monitoring equipment	No monitoring equipment is used to determine this parameter.				
QA/QC procedures to be applied	Data available regarding the ceramic industry freight of biomass transportation.				
Purpose of the data	This parameter is used to calculate project emissions for freight that exceeds 200 km.				

Calculation method	Information in section 5.2 – Project Emissions
Comments	This parameter was not monitored during the first crediting period. Values will be monitored at the Monitoring Report from now on. 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.

4.3 Data Monitored and SOCIALCARBON

Indicator	Diversity
Data unit	Quantity of women, seniors (older than 60 years), disabled and illiterate employees.
Description	Evaluates the employment opportunities provided by the Ceramic industry to historically excluded social groups, such as: women, ex-convicts, the elderly, the indigenous, the illiterate and the disabled.
Source of data	RAIS (Annual Social Information Report), CAGED (General Register of Employed and Unemployed Persons) Social inclusion policies and programs that value diversity.
Description of methods to collect information and procedures to be applied	The Sustainable Carbon team conducts an interview with the ceramic personnel and applies a questionnaire, aimed to indirectly obtain information regarding the six SOCIALCARBON Standard resources. Moreover, the Sustainable Carbon team collects the evidence provided by the ceramic personnel. Then, a cross-check is made in order to guarantee that all documentations were sent and complies with the information provided during the interview. For more Information, please verify section 6.1 below.
Purpose of the data	Less than 15% of employees belong to a minority group.
Comments	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.

Indicator	Community development
Data unit	Quantity of initiatives, frequency and partnership with public entities and/or civil organizations.
Description	Evaluates the existence of management practices that contribute to local community development.
Source of data	Interviews and / or questionnaires. Complementary or supplementary evidence may include receipts, invoices, partnership contracts, statements.
Description of methods to collect information and procedures to be applied	The Sustainable Carbon team conducts an interview with the ceramic personnel and applies a questionnaire, aimed to indirectly obtain information regarding the six SOCIALCARBON Standard resources. Moreover, the Sustainable Carbon team collects the evidence provided by the ceramic personnel. Then, a cross-check is made in order to guarantee that all documentations were sent and complies with the information provided during the interview. For more Information, please verify section 6.1 below.
Purpose of the data	The factory supports community members or civil society organizations: - Regularly: one per month; OR - Significant: at least 10 different parties were benefited.
Comments	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.

Indicator	Employee satisfaction surveys
Data unit	Existence of a system to evaluate employee satisfaction.
Description	Evaluates existing systems for employee feedback (questions, suggestions and complaints) and the

	measures taken in response to the feedback to make improvements.
Source of data	Suggestion slips, suggestion box, employee satisfaction surveys, meeting attendance lists, photos.
Description of methods to collect information and procedures to be applied	The Sustainable Carbon team conducts an interview with the ceramic personnel and applies a questionnaire, aimed to indirectly obtain information regarding the six SOCIALCARBON Standard resources. Moreover, the Sustainable Carbon team collects the evidence provided by the ceramic personnel. Then, a cross-check is made in order to guarantee that all documentations were sent and complies with the information provided during the interview. For more Information, please verify section 6.1 below.
Purpose of the data	The system for employee consultation is being utilized, but is limited to a suggestion box.
Comments	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.

Indicator	Additional employee benefits
Data unit	Quantity of additional benefits, quantity of employees who receive additional benefits, and the existence award programs based on merit.
Description	Evaluates the additional benefits provided to employees. Benefits required by law are not considered.
Source of data	Questionnaires, invoices, receipts, statements, pay stubs and signed list by employees stating receipt of benefits.
Description of methods to collect information and procedures to be applied	The Sustainable Carbon team conducts an interview with the ceramic personnel and applies a questionnaire, aimed to indirectly obtain information regarding the six SOCIALCARBON Standard resources.

	Moreover, the Sustainable Carbon team collects the evidence provided by the ceramic personnel. Then, a cross-check is made in order to guarantee that all documentations were sent and complies with the information provided during the interview. For more Information, please verify section 6.1 below.
Purpose of the data	All employees receive more than one additional benefit monthly.
Comments	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.

Indicator	Health and safety practices
Data unit	Compliance to the Mandatory and/or complementary programs, and monitoring usage of PEE (Personal Protective Equipment).
Description	Evaluates the existing health and safety practices in the factories, including the distribution and supervised use of PPE (Personal Protective Equipment) by all employees as well as health and safety programs. Mandatory Programs: PPRA: Program for Prevention and Environmental Risks; PCMSO: Program for Controlling Medical and Occupational Health and CIPA: Internal Commission for Accident Prevention. Complementary programs: PPR: Respiratory Protection Program; PPRPS: Program for Protection from risks in presses and Similar and PCA: Hearing Conservation Program.
Source of data	Participatory meetings, interviews, PPE control records, health and safety programs (CIPA PCMSO, PPRA), supervised EPI use (warnings, suspension), participant sign-in lists for lectures, contracts with health and safety professionals.
Description of methods to collect information and procedures to be applied	The Sustainable Carbon team conducts an interview with the ceramic personnel and applies a questionnaire,

	aimed to indirectly obtain information regarding the six SOCIALCARBON Standard resources. Moreover, the Sustainable Carbon team collects the evidence provided by the ceramic personnel. Then, a cross-check is made in order to guarantee that all documentations were sent and complies with the information provided during the interview. For more Information, please verify section 6.1 below.
Purpose of the data	In addition to scenario 5, the factory develops complementary programs such as PPR, PPRPS and PCA; and/or The factory encourages physical activity or conducts activities for disease prevention.
Comments	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.

Indicator	Training and capacity building programs
Data unit	Training and capacity building programs.
Description	Evaluates whether the factory encourages and invests in the professional development of its employees.
Source of data	Contracts, certificates, statements, planning controls.
Description of methods to collect information and procedures to be applied	The Sustainable Carbon team conducts an interview with the ceramic personnel and applies a questionnaire, aimed to indirectly obtain information regarding the six SOCIALCARBON Standard resources. Moreover, the Sustainable Carbon team collects the evidence provided by the ceramic personnel. Then, a cross-check is made in order to guarantee that all documentations were sent and complies with the information provided during the interview. For more Information, please verify section 6.1 below.

Purpose of the data	Training courses were offered to individual employees, but not to all employees.
Comments	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.

Indicator	Biomass supply
Data unit	Control of the source and amount of renewable biomass.
Description	Evaluates the type, source and quantity of renewable biomass used as fuel, as well as the profile of suppliers.
Source of data	Questionnaires and monitoring report spreadsheets.
Description of methods to collect information and procedures to be applied	The Sustainable Carbon team conducts an interview with the ceramic personnel and applies a questionnaire, aimed to indirectly obtain information regarding the six SOCIALCARBON Standard resources. Moreover, the Sustainable Carbon team collects the evidence provided by the ceramic personnel. Then, a cross-check is made in order to guarantee that all documentations were sent and complies with the information provided during the interview. For more Information, please verify section 6.1 below.
Purpose of the data	The factory has total control of the source and amount of renewable biomass used and 100% of the fuel is coming from agro-industrial waste.
Comments	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.

Indicator	Planning and Control
Data unit	Financial planning and control spreadsheet.

Description	Evaluates the existence of financial planning and controls in regards to carbon credits sold by factory.
Source of data	Planning and control spreadsheets.
Description of methods to collect information and procedures to be applied	The Sustainable Carbon team conducts an interview with the ceramic personnel and applies a questionnaire, aimed to indirectly obtain information regarding the six SOCIALCARBON Standard resources. Moreover, the Sustainable Carbon team collects the evidence provided by the ceramic personnel. Then, a cross-check is made in order to guarantee that all documentations were sent and complies with the information provided during the interview. For more Information, please verify section 6.1 below.
Purpose of the data	The factory has organized controls of the income received from carbon credit sales, as well as of the destination for proceeds. However, the factory presents no future planning.
Comments	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.

Indicator	Carbon credit Investments
Data unit	Carbon Credit Investments Percentual.
Description	Evaluates whether proceeds from the sale of carbon credits was invested in factory improvements or activities that benefit the local community.
Source of data	Questionnaire and/or control spreadsheets.
Description of methods to collect information and procedures to be applied	The Sustainable Carbon team conducts an interview with the ceramic personnel and applies a questionnaire, aimed to indirectly obtain information regarding the six SOCIALCARBON Standard resources. Moreover, the Sustainable Carbon team collects the evidence provided by the ceramic personnel. Then, a

	cross-check is made in order to guarantee that all documentations were sent and complies with the information provided during the interview. For more Information, please verify section 6.1 below.
Purpose of the data	Between 80 and 100% of the income generated by carbon credit sales was invested the factory or in the community development.
Comments	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.

Indicator	Environmental Management
Data unit	Quantity of initiatives and implementation of environmental management system.
Description	Evaluates initiatives and structured/certified environmental management systems in regards to managing waste, water, air, soil, energy and nature conservation. Note: the use of renewable fuel shall not be deemed an initiative, since it is a prerequisite for becoming a carbon project.
Source of data	Questionnaires, interviews, photos, site visits. Complementary or supplementary evidence main include receipts, invoices, partnership contracts, statements among other documents.
Description of methods to collect information and procedures to be applied	The Sustainable Carbon team conducts an interview with the ceramic personnel and applies a questionnaire, aimed to indirectly obtain information regarding the six SOCIALCARBON Standard resources. Moreover, the Sustainable Carbon team collects the evidence provided by the ceramic personnel. Then, a cross-check is made in order to guarantee that all documentations were sent and complies with the information provided during the interview. For more Information, please verify section 6.1 below.

Purpose of the data	There are more than two initiatives to prevent / reduce the main environmental impacts caused by Ceramic factory.
Comments	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.

Indicator	Brazilian environmental legislation
Data unit	Updated Licenses.
Description	Evaluates whether the factory has a water grant (for those making use of a well or pond), - federal technical registry, operating license and license for clay extraction and is in compliance with the conditions established by the documents. It also evaluates the promotion and fulfillment of agreements with local stakeholders.
Source of data	Licenses.
Description of methods to collect information and procedures to be applied	The Sustainable Carbon team conducts an interview with the ceramic personnel and applies a questionnaire, aimed to indirectly obtain information regarding the six SOCIALCARBON Standard resources. Moreover, the Sustainable Carbon team collects the evidence provided by the ceramic personnel. Then, a cross-check is made in order to guarantee that all documentations were sent and complies with the information provided during the interview. For more Information, please verify section 6.1 below.
Purpose of the data	All licenses are up to date and all conditions established by them are being met.
Comments	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.

Indicator	Voluntary environmental initiatives
Data unit	Quantity of voluntary environmental initiatives and benefits extension.
Description	Evaluates voluntary environmental initiatives that improve or establish new environmental assets and services, as well as those that raise environmental awareness of workers, their families and the surrounding community.
Source of data	Questionnaires, interviews, invoices, partnership contracts, photos, and any document that evidence established projects/initiatives.
Description of methods to collect information and procedures to be applied	The Sustainable Carbon team conducts an interview with the ceramic personnel and applies a questionnaire, aimed to indirectly obtain information regarding the six SOCIALCARBON Standard resources. Moreover, the Sustainable Carbon team collects the evidence provided by the ceramic personnel. Then, a cross-check is made in order to guarantee that all documentations were sent and complies with the information provided during the interview. For more Information, please verify section 6.1 below.
Purpose of the data	In addition to the previous scenario, the benefits of the initiatives also extend to community members.
Comments	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.

Indicator	Technological advances to improve efficiency of the production process
Data unit	Not applicable.
Description	Evaluates the general condition of infrastructure and machinery/equipment used in the production process, in regards to the following:

	- Brick drying methods: The factory possesses a dryer that recycles the heat from kilns or a small drying furnace. - Efficiency of kilns: The factory utilizes continuous furnaces (ex: hoffman, mobile, tunel) or the factory uses intermittent kilns, but which are adapted to improve their efficiency. - Kiln temperature control: The factory keeps a record of thermocouples or uses digital controls. - Kiln feeds: The factory feeds kilns using automatic or semi-automatic equipment. - Production: The factory control and records production at different stages of the production process (eg sales, ceramic devices that enter in the kiln). - Infrastructure: During the period analysed, infrastructural improvements in the factory were carried out, for instance: construction/renovation of toilets, refectory, cloakroom lecture hall, among others.
Source of data	Interviews with staff, receipts, contracts, photos.
Description of methods to collect information and procedures to be applied	The Sustainable Carbon team conducts an interview with the ceramic personnel and applies a questionnaire, aimed to indirectly obtain information regarding the six SOCIALCARBON Standard resources. Moreover, the Sustainable Carbon team collects the evidence provided by the ceramic personnel. Then, a cross-check is made in order to guarantee that all documentations were sent and complies with the information provided during the interview. For more Information, please verify section 6.1 below.
Purpose of the data	The factory meets all of the characteristics described.
Comments	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.
Indicator	Technological advances to improve the general conditions of the working environment

Data unit	Not applicable.
Description	Evaluates the following general conditions of the working environment: cleanliness, noise, heat, lighting and appropriate signage. - Cleanliness: There is not excess dust and debris (ex: broken bricks and iron) around the factory. - Noise: The factory applies programs for noise control that comply with legislation. - Heat: The factory uses equipment to reduce employee exposure to heat (eg fans, exhaust, etc). - Lighting: The factory uses equipment to maintain a well-lit working environment (ex: translucent tiles, LED or mercury lamps, etc). - Appropriate signage: - Warning signs indicating danger, or caution; - Warning signs indicating inflammable liquids; - Warning signs encouraging PPE use; - Signs identifying and indicating location of fire fighting equipment.
Source of data	Questionnaires and interviews, on-site visits, evidence of existing respiratory protection, hearing conservation, or other relevant programs.
Description of methods to collect information and procedures to be applied	The Sustainable Carbon team conducts an interview with the ceramic personnel and applies a questionnaire, aimed to indirectly obtain information regarding the six SOCIALCARBON Standard resources. Moreover, the Sustainable Carbon team collects the evidence provided by the ceramic personnel. Then, a cross-check is made in order to guarantee that all documentations were sent and complies with the information provided during the interview. For more Information, please verify section 6.1 below.
Purpose of the data	The factory meets all of the characteristics described.

Comments	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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Indicator	Product quality
Data unit	Third party audit quality control reports.
Description	Evaluates whether the quality of the products was evaluated during the time period analyzed.
Source of data	Internal or third party audit reports.
Description of methods to collect information and procedures to be applied	The Sustainable Carbon team conducts an interview with the ceramic personnel and applies a questionnaire, aimed to indirectly obtain information regarding the six SOCIALCARBON Standard resources. Moreover, the Sustainable Carbon team collects the evidence provided by the ceramic personnel. Then, a cross-check is made in order to guarantee that all documentations were sent and complies with the information provided during the interview. For more Information, please verify section 6.1 below.
Purpose of the data	No efforts were made to analyze or improve product quality.
Comments	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.

Indicator	Stakeholder consultation
Data unit	Stakeholder consultation meetings.
Description	Evaluates the existence of a stakeholder consultation system (local community, workers, suppliers, local authorities, civil society organizations, and other social parties involved).

Source of data	Informative letter, satisfaction questionnaire, occurrence book, etc.
Description of methods to collect information and procedures to be applied	The Sustainable Carbon team conducts an interview with the ceramic personnel and applies a questionnaire, aimed to indirectly obtain information regarding the six SOCIALCARBON Standard resources. Moreover, the Sustainable Carbon team collects the evidence provided by the ceramic personnel. Then, a cross-check is made in order to guarantee that all documentations were sent and complies with the information provided during the interview. For more Information, please verify section 6.1 below.
Purpose of the data	During the time period analyzed, the factory conducted an informal (no records) stakeholder consultation.
Comments	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.

Indicator	Green Marketing
Data unit	Green marketing strategy efficiency <i>and quantity</i> .
Description	Evaluates whether the factory has marketing strategies geared towards selling their products based on highlighting socio-environmental practices.
Source of data	Questionnaires, interviews and marketing material.
Description of methods to collect information and procedures to be applied	The Sustainable Carbon team conducts an interview with the ceramic personnel and applies a questionnaire, aimed to indirectly obtain information regarding the six SOCIALCARBON Standard resources. Moreover, the Sustainable Carbon team collects the evidence provided by the ceramic personnel. Then, a cross-check is made in order to guarantee that all documentations were sent and complies with the information provided during the interview.

	For more Information, please verify section 6.1 below.
Purpose of the data	The factory markets their environmental practices only using one means of communication. Example: magazine advertisement.
Comments	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.

Indicator	Project Performance
Data unit	Level of satisfaction about the carbon project.
Description	Evaluates the factory's perception about the results of the project, considering the generation and sale of carbon credits and also external aspects of project.
Source of data	Questionnaires and interviews.
Description of methods to collect information and procedures to be applied	The Sustainable Carbon team conducts an interview with the ceramic personnel and applies a questionnaire, aimed to indirectly obtain information regarding the six SOCIALCARBON Standard resources. Moreover, the Sustainable Carbon team collects the evidence provided by the ceramic personnel. Then, a cross-check is made in order to guarantee that all documentations were sent and complies with the information provided during the interview. For more Information, please verify section 6.1 below.
Purpose of the data	In addition to the previous scenario, the factory considers the carbon project a competitive advantage for their business and encourages other factories to adopt similar practices.
Comments	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.

4.4 Monitoring Plan

The monitoring is done with the aim of determining the most approximate quantity of non-renewable wood that in the absence of the project would be used in the ceramic's kilns and consequently the amount of GHG that would be emitted in tonnes of CO₂e. Section 4.2 describes data and parameters monitored, as well as the procedures involved on the monitoring plan.

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

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

In the current monitoring period Sustainable Carbon performed an analysis to verify if biomass and production data are being correctly filled in the monitoring spreadsheets.

Analysis on production data is performed by a series of comparisons between different measurement points of production (molding machine, kiln loading and kiln unloading) to detect inconsistencies or suspicious data. Analysis on biomass data is performed by a series of comparisons between the amount of biomass and the cost over months to identify inconsistencies or unexpected variations in these parameters.

Sustainable Carbon is responsible for providing the required guidance to the ceramic factory, to register Biomass and Production data, in order to minimize errors, including assisting the factory in case the person in charge of the project monitoring is replaced.

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

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

Baseline emissions are estimated following procedures of the applied methodology: AMS-I.E.: Switch from Non-Renewable Biomass for Thermal Applications by the User – Version 07, valid from 22-July-16 to 31-October-17. The project activity in the current monitoring period (39 months) generated 235.34 TJ per year. Converting this number to MWh it was generated

65,372.53 MWh per year, which corresponds to the use of 7.46 MW_{thermal}. This is less than the limits of 45 MW_{thermal} for Type I Small scale project activities.

Baseline emissions were calculated according to equations below.

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

Where:

BE_y: Emission reductions during the year y in tCO₂e

B_y: Quantity of biomass that is substituted or displaced in tonnes. Please check section *Appendix I – “Table 13 – By Kamiranga (tonne)”*

f_{NRB,y}: Fraction of biomass (wood) used in the absence of the project activity in year y that can be established as non-renewable biomass using survey methods.¹⁸

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

EF_{projected_fossil fuel}: Emission factor for the projected fossil fuel consumption in the baseline in tCO₂/TJ¹⁹.

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

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

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

Where:

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

η_{old}: Efficiency of the system being replaced

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

Where:

¹⁸ According to Methodological Tool TOOL30 - Calculation of the fraction of non-renewable biomass - version 01.0. Document available at: <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-30-v1.pdf>. Last visit on: 23/01/2023. For detailed information please check the "f_{NRB,y}" tab available in the "VCS MR Calculation Kamiranga" spreadsheet.

¹⁹ The fossil fuel likely to be used by similar consumers is taken the IPCC default value of residual fossil fuel.

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

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

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

Where:

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

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

Where:

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

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

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

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

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

Example of BE_y calculation in the year 2021:

$$BE_y = B_y \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected_fossilfuel}$$

Where:

B_y (2021): Please check Table 3 below.

f_{NRB,y} (2021): 94.25%. Please check “f_{NRB,y}” tab in the VCS MR Calculation Kamiranga spreadsheet.

NCV_{biomass}: Fixed parameter = 0.015 TJ/tonne of wood.

EFprojected_fossil fuel: Fixed parameter = 81.60 tCO₂/TJ.

By was calculated according to equation:

$$B_y = PR_y \times BF_y$$

Where:

PR_y: Tonnes of ceramic units. Please check “8th period - VCUs Calculation” tab in the VCS MR Calculation Kamiranga spreadsheet.

BF_y: Fixed parameter = 0.81 tonnes of wood per tonnes of ceramic units fired.

Table 3: PR_y, B_y and BE_y values for Kamiranga ceramic in 2021.

Period		PR _y (tonnes of ceramic units)	B _y (tonne)	BE _y (tCO ₂ e)
2021	January	4,391	3.557	4.103
	February	3,309	2.680	3.092
	March	2,674	2.166	2.498
Total 2021		10,374	8.403	9.693

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

Table 4. Baseline emissions for Kamiranga ceramic.

Kamiranga Ceramic		
Period		BE _y (tCO ₂ e)
2018	January	4,568
	February	3,586
	March	4,903
	April	4,263
	May	4,261
	June	5,054
	July	5,006
	August	5,089
	September	4,833
	October	5,454

	November	4,698
	December	4,306
Total 2018		56,021
2019	January	4,554
	February	3,842
	March	3,933
	April	3,988
	May	3,952
	June	3,833
	July	4,845
	August	4,963
	September	5,052
	October	5,099
	November	4,887
	December	5,141
Total 2019		54,089
2020	January	4,901
	February	3,939
	March	4,313
	April	3,560
	May	4,060
	June	4,589
	July	5,018
	August	5,465
	September	4,919
	October	4,810
	November	4,479
	December	4,520
Total 2020		54,573
2021	January	4,103
	February	3,092
	March	2,498
Total 2021		9,693
Total in the monitored period		174,376

5.2 Project Emissions

According to applied Methodology²⁰ the project emissions could be a result of biomass transportation of a distance over 200Km or emissions from energy consumption associated with processing of biomass residue. If the biomass providers are located over a distance of 200 Km of the Ceramic factory, project emissions will be calculated using the Methodological tool “Project and leakage emissions from transportation of freight” – 0.1.1.0 where it will be use the option B “using conservative default values”. The emissions caused by transportation will be monitored during the verification to ensure the distance is less than 200Km; however, if it is over than 200km, project emissions will be calculated through the following equation.

$$PE_{TR,m} = \sum_f D_{f,m} \cdot FR_{f,m} \cdot EF_{CO_2,f} \cdot 10^{-6}$$

Where:

- $PE_{TR,m}$ = Project emissions from road transportation of freight monitoring period m (t CO₂)
- $D_{f,m}$ = Return trip road distance between the origin and destination of freight transportation activity f in monitoring period m (km)
- $FR_{f,m}$ = Total mass of freight transported in freight transportation activity f in monitoring period m (t)
- $EF_{CO_2,f}$ = Default CO₂ emission factor for freight transportation activity f (g CO₂ / t km)
- f = Freight transportation activities conducted in the project activity in monitoring period m

Example of $PE_{TR,m}$ calculation in the year 2021:

The $PE_{TR,m}$ was calculated based on the distance traveled by the biomass suppliers. Only distances greater than 200 km were considered. From the supplied quantities in tons of sawdust and wood residues purchased in 2021, the following was calculated:

$D_{f,m}$: > 200 Km Return trip distance (in kilometers)

$FR_{f,m}$: Sawdust 772.80 tonnes / Wood Residues 179.61 tonnes. Please check “Project emission” tab in the VCS MR Calculation Kamiranga spreadsheet.

$EF_{CO_2,f}$: Fixed Parameter = Heavy vehicles 129 g CO₂/t Km.

²⁰ Available at <<https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-16-v4.pdf>> Last visit on: May 27th, 2021.

Table 5: $D_{f,m}$, $FR_{f,m}$ and $PE_{TR,m}$ values for Kamiranga ceramic in 2021.

Suppliers	$D_{f,m}$ (km)	$FR_{f,m}$ (tonnes)		$PE_{TR,m}$ (tCO _{2e})
		Wood residues	Sawdust	
Rio Negro	306	124.90	37.80	6.42
Serraria São Luis	766	0.00	227.50	22.48
Wood Green	310	54.71	0.00	2.19
Xavier Madeiras	306	0.00	507.50	20.03
Total		179.61	772.80	51.12

Table 6. Project Emissions for Kamiranga Ceramic

Period	PE_y
2018	1,011
2019	888
2020	358
2021 (Until March)	51
Total	2,308

For detailed calculation please check “*Project Emissions*” tab available in the “VCS MR Calculation Kamiranga” spreadsheet.

5.3 Leakage

Leakage is estimated as 0 (zero) tCO_{2e} during the entire monitoring period.

The Methodology AMS-I.E v.7 and the General guidance on leakage in biomass project activities predicts the following possible three sources of leakage.

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

The leakage from biomass projects, like this project activity, should also be estimated according to the “General guidance on leakage in biomass project activities²¹” (attachment C of appendix B) of Indicative Simplified Baseline and Monitoring Methodologies for Selected Small-Scale CDM Project Activity Categories, which identifies different emission sources based on the type of biomass considered (described in the table below).

Table 7. Sources of leakage according to the type of the biomass

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

Observing table 7 the possible sources of leakage of the present project activity is the competing use of biomass residues, such as açai pits and forest residue like sawdust and wood residue. All these biomasses have enough availability as showed below, demonstrating the lack of leakage for each biomass.

Forest Residues (Sawdust, Wood residue)

Forest Residues are used for the ceramic devices burning. The production of wood generates a large amount of residues, which can be reused to generate thermal energy. Considering that

²¹ Document available at:

<http://cdm.unfccc.int/methodologies/SSCmethodologies/AppB_SSC_AttachmentC.pdf>. Last visited on May 27th, 2021.

around 55% of the wood produced generates forest residue²² and that the production of wood in the State of Pará (PA) was of 5,368,861 m³ ²³ in 2016, then the production of forest residues was around 2,952,873.55 m³ per year.

The annual project activity consumption of forest residues during this monitoring period is presented in table below. The values represent less than 2% of the total wood residues in Pará.

Table 8: Project activity average consumption of forest residues

Period	Project activity consumption (m ³)	Project Activity Consumption of the total wood residues in Pará (%)
2018	33,705.37	1.14
2019	41,057.60	1.39
2020	33,102.44	1.12
2021 (until March)	7,606.17	0.26

In addition, due to the usage of 75% of these residues in project region according to Imazon²⁴, it is demonstrated that there is a biomass surplus presented in table below.

Table 9: Biomass surplus of wood residues

Period	Biomass surplus (m ³)	Biomass surplus (%)
2018	704,513.02	31.33
2019	697,160.79	30.91
2020	705,115.95	31.37
2021 (until March)	730,612.22	32.88

This way, this renewable biomass did not have potential to generate leakage emissions due to its availability, even considering the forest residues consumption at both ceramic factories.

Açaí pits

In terms of açaí pits, the State of Pará is the largest producer of açaí (*Euterpe oleraceae*) in Brazil. The pits are easily found, once the açaí is the basis of the daily diet of the population in this state, where is widely cultivated. Nevertheless, its residues are still without adequate economic destination.

²² The value applied refers to the mean Volumetric Yield Coefficient of different types of log wood according to IBAMA according to IBAMA (Brazilian Institute of Environment and Renewable Natural Resources. Available at: http://www.ibama.gov.br/sophia/cnia/legislacao/CONAMA/RE0474_2-060416.pdf; Last visit on: 23/01/2023.

²³ According to IBGE (Geographic and Statistic Brazilian Institute). Available at: <https://cidades.ibge.gov.br/brasil/pa/pesquisa/16/12705>; Last visit on: 21/03/2018.

²⁴ According to Imazon (Amazon Institute of People and the Environment). 2009. Available at: <https://imazon.org.br/a-atividade-madeireira-na-amazonia-brasileira-producao-receita-e-mercados/amp/>; Last visited on: 23/01/2023

The production of açai in the State of Pará in the year of 2016 was 131.836 tonnes²⁵. The pit corresponds to 85% of the weight of açai²⁶; therefore the açai pit production was around 112,060 tonnes in the year of 2016.

The annual project activity consumption of açai pits during this monitoring period is presented in table below. The values represent 0.05% of the total açai pits in Pará.

Table 10: Project activity average consumption of açai pits

Period	Project activity consumption (tonnes)	Project Activity Consumption of the total açai pits in Pará (%)
2018	0.00	0.00
2019	54.23	0.05
2020	0.00	0.00
2021 (until March)	0.00	0.00

Moreover, considering that approximately 47% of the residues result in available biomass²⁷, it is observed that there is an excess of açai pits in the region even taking into account the quantity of biomass that is utilized by the project activity, as shown in table below. Hence, this renewable biomass did not have potential to generate leakage emissions.

Table 11: Biomass surplus of açai pits

Period	Biomass surplus (tonnes)	Biomass surplus (%)
2018	59,392.12	112.77
2019	59,337.89	112.55
2020	59,392.12	112.77
2021 (until March)	59,392.12	112.77

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

The following potential sources of this type of leakage were identified:

²⁵ IBGE. Extração vegetal e silvicultura 2007. Available at: <https://cidades.ibge.gov.br/brasil/pa/pesquisa/16/12705> ;. Last visit on: 21/03/2018.

²⁶ Source: <http://minhasfrutas.blogspot.com/2008/12/importancia-economica-do-aai.html>; Last visit on:21/03/2018.

²⁷ Source: Discarding and final destination of açai in the Oriental Amazon – Brazil, 2022. <https://doi.org/10.1590/1809-4422asoc2020138r2vu2022L2OA>. Last visit on: 25/07/2022.

- Use/diversion of non-renewable biomass saved under the project activity by non-project households/users who previously used renewable energy sources. If this leakage assessment quantifies an increase in the use of non-renewable biomass used by the non-project households/users attributable to the project activity then baseline is adjusted to account for the quantified leakage.
- Use of non-renewable biomass saved under the project activity to justify the baseline of other project activities can also be potential source of leakage. If this leakage assessment quantifies a portion of non-renewable biomass saved under the project activity that is used as the baseline of other project activity then baseline is adjusted to account for the quantified leakage.
- Increase in the use of non-renewable biomass outside the project boundary to create non-renewable biomass baselines can also be potential source of leakage. If this leakage assessment quantifies an increase in use of non-renewable biomass outside the project boundary then baseline is adjusted to account for the quantified leakage.

It is expected that the carbon credit revenues will stimulate the use of renewable biomass by other ceramic factories promoting sustainable development in the region. It is expected that the project activity will not displace the use of renewable biomass of a non-project user, since both renewable and non-renewable biomasses are widely available in the region. The fuel switch performed by the project is not expected to affect biomass prices, since the project consumption represents a small fraction of total biomass available in the market. Therefore, the project will have no impact on the fuel choice of non-project users.

The non-renewable biomass which is employed in this project activity will not be saved for other project activities, since other ceramic factories were already consuming non-renewable biomass, which is a common practice in the region. Also, other projects involving the use of non-renewable biomass in the baseline scenario by users different than ceramic factories are not being developed in the project region. Hence, there is no need to use the non-renewable biomass saved by the project activity to create baselines for future projects.

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

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

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

Table 12. Production – $Q_{\text{renbiomass}}$ - QA/QC Procedure

	VCS PD	Monitoring Period
Production (tonnes of ceramics units)	122,926	187,565
Sawdust Consumption (tonnes)	20,655	31,409

Açaí Pits Consumption (tonnes)	4,620	54
Wood Residue (tonnes)	4,963	19,491
Thermal Energy generated (TJ)	433	765
Thermal energy per tonne of pieces produced (TJ/tonnes of pieces)	0.00352	0.00408

As can be verified on Table 12, the thermal energy generated with the use of renewable biomass per tonne of ceramic units produced during the current monitoring period was higher than estimated on the VCS PD version 5.

The amount of renewable biomass consumed was higher on the monitoring period when it comes to Sawdust, but at the same time, it was lower regarding Açaí Pits, consequently balancing each other out. Biomass consumption in this monitoring period, however, was 24.5% higher than projected scenario on the VCS-PD. This occurred because (a) during the third monitoring period, more specifically in 2010, Kamiranga Ceramic built a shed to store sawdust; (b) during this monitoring period the Ceramic executed the expansion of the shed for storage and drying of raw materials. As energy levels are calculated based on the amount of biomass purchased (and not directly based on the amount of biomass fed to the kilns), the presence of a facility that allows an increase in the acquisition of biomass interfere directly on energy levels calculations since it allows the Ceramic to increase the amount of biomass stocked.

Therefore, based on Category AMS-I.E.: Switch from Non-Renewable Biomass for Thermal Applications by the User – Version 07, valid from 22-July-16 to 31-October-17, this project activity contributes to sustainable development once the ceramic company is using renewable biomass and applying the SOCIALCARBON methodology.

5.4 Net GHG emission reductions and removals

Table below summarizes the emission reductions for this monitoring period.

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2018	56,021	1,011	0	55,010
2019	54,089	888	0	53,201
2020	54,573	358	0	54,215

2021 ²⁸	9,693	51	0	9,642
Total	174,376	2,308	0	172,068

Table below summarizes the emission reductions estimated (ex-ante) and the achieved (ex-post)

Year	Estimated net GHG emission reductions or removals (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2018	29,828	55,010
2019	29,828	53,201
2020	29,828	54,215
2021	7,457	9,642
Total	96,941	172,068

The Net GHG emission reductions were around 77% higher in this monitoring period than the Estimated Net GHG for the period. This performance was due to the increase of approximately 53% in production. Since 2016, civil construction has grown, with a slight decline in 2020, due to the Covid-19 pandemic. In 2021, the construction industry had the best performance since 2015 with a growth of 9.7%²⁹. In the first five months of 2022, the segment accounted for a balance of 79,050 jobs, an increase of 284% in eight years³⁰. Updating the parameter f_{NRB} (fraction woody biomass used in the absence of project activity which is considered non-renewable biomass) also contributed to this difference in values.

To demonstrate the additionality of this project in terms of investment barrier, the table below shows that the use of renewable biomass is financially more expensive compared to non-renewable biomass. Despite the increase in fuel expenses after the implementation of the project activity, the use of renewable biomass still costs more per unit of energy generated.

²⁸ From January to March.

²⁹ SARAIVA, L. Sinduscon Pará atua de forma efetiva para o aquecimento da construção civil. 2022. Available at: <https://www.oliberal.com/estudio/sinduscon/sinduscon-para-atua-de-forma-efetiva-para-o-aquecimento-da-construcao-civil-1.562360>

³⁰ SINDUSCON PARÁ. Construção: setor no Pará volta apresentar resultados expressivos no saldo de empregos. Available at: <https://www.sindusconpa.org.br/post/constru%C3%A7%C3%A3o-setor-no-par%C3%A1-volta-apresentar-resultados-expressivos-no-saldo-de-empregos-segundo-o-ca>

Kamiranga ceramics spent BRL 4,531.62 per TJ with renewable biomass, while if it had used non-renewable wood it would have cost only BRL 1,639.59 per TJ. This suggests that the project activity still faces an investment barrier as it is more expensive to use renewable biomass than non-renewable alternatives. Therefore, project implementation is additional in terms of addressing investment barriers to the transition to sustainable energy.

Projected Baseline Cost of delivery heat (R\$ per tonne)	
Year	Cost (R\$ per tonne)
2011	R\$16.74
2012	R\$17.83
08° Monitoring Period	R\$24.59

Projected Baseline Cost (R\$ per tonne)	R\$24.59
Net Calorific Value (NCV) of non-renewable wood	0.0150
Projected Baseline Cost of delivered heat (R\$ per TJ)	R\$1,639.59
Period Analyzed: Cost of delivered heat (R\$ per TJ)	R\$4,531.62

6 SOCIALCARBON RESULTS

6.1 Results

6.1.1 Social Resource

Indicator	1. Diversity
Description	Evaluates the employment opportunities provided by the Ceramic industry to historically excluded social groups, such as: women, ex-convicts, the elderly, the indigenous, the illiterate and the disabled.

Situation	The Ceramic factory has 65 employees; around 17% of the workers are from excluded social groups.																									
	<table><tr><th colspan="2">Excluded social groups</th><th colspan="2">Number of workers</th></tr><tr><td colspan="2">Women employees</td><td colspan="2">6</td></tr><tr><td colspan="2">Senior employees</td><td colspan="2">4</td></tr><tr><td colspan="2">Disabled employees</td><td colspan="2">0</td></tr><tr><td colspan="2">Illiterate</td><td colspan="2">1</td></tr></table>						Excluded social groups		Number of workers		Women employees		6		Senior employees		4		Disabled employees		0		Illiterate		1	
	Excluded social groups		Number of workers																							
	Women employees		6																							
	Senior employees		4																							
	Disabled employees		0																							
Illiterate		1																								
There are currently no employees at the factory from minority groups and there are no plans to hire minorities.	There are currently no employees from minority groups, but the factory has made plans to hire minorities.	Less than 15% of employees belong to a minority group.	Between 15 ≤ 30% of employees are from minority groups.	More than 30% of employees are from minority groups.	In addition to more than 30% of employees being minorities, the factory presents initiatives or combat forms of discrimination.																					
Score	4 (four)																									
Prospects	With the end of the Covid-19 pandemic, the entrepreneur intends to increase the number of employees, prioritizing people from minority groups.																									

Indicator	2.Community development
Description	Evaluates the existence of management practices that contribute to local community development.
Situation	Kamiranga Ceramic factory makes monthly donations of financial resource and construction material to institutions, such as ABRINQ Foundation for the Rights of Children and Adolescents, NGO Doctors Without Borders, João Baroni Freemason's House Foundation and the Gente Livre Recovery Center, and community members. Beyond that, periodically, Kamiranga carries out a cleaning action in the community of São Miguel do Guamá - which doesn't

	have waste collection by the corresponding body - using its own equipment and employees.				
The factory has no initiatives/ activities planned that benefit the local community.	The factory responds to occasional (not continuous) requests for assistance.	The factory supports community members or civil society organizations : - Regularly: one per month; OR - Significant: at least 10 different parties were benefited.	In addition to scenario 3, the factory lends out equipment, space and/or provides manpower for activities that benefit the local community.	The factory is formally involved in the development and implementation of social and/or environmental projects in partnership with public entities and/or civil society organizations .	In addition to scenario 5, the factory has formalized planning in order to maximize their contribution to local community development , through survey with the community, establishing new partnerships, etc.
Score	4 (four)				
Prospects	There are currently no foreseen improvements.				

Indicator	3. Employee satisfaction surveys				
Description	Evaluates existing systems for employee feedback (questions, suggestions and complaints) and the measures taken in response to the feedback to make improvements.				
Situation	The Ceramic factory has a suggestion box to consult the workers' opinions. To discuss suggestions, the factory holds a meeting with the employees' participation during CIPA's reunions. That way, the ceramic owner can improve the factory working system and increase the employees' satisfaction.				
Lack of a consultation system for	There are attempts to implement an employee	The system for employee consultation is being	In addition to scenario 3, the factory has	The factory promotes periodic satisfaction	In addition to scenario 5, the factory has

employee feedback.	consultation system but it is not being properly utilized. Example: There is a suggestion box, but employees do not use it.	utilized, but is limited to a suggestion box.	implemented or is currently implementing one or more suggestions made by employees.	surveys among employees. Example: monthly meetings, book for documenting information, etc.	stipulated targets and timelines for solutions to employee complains.
Score	3 (three)				
Prospects	There are currently no foreseen improvements.				

6.1.2 Human Resource

Indicator	4. Additional employee benefits				
Description	Evaluates the additional benefits provided to employees. Benefits required by law are not considered.				
Situation	The Ceramic factory offers to all the employees: - Life insurance for all employees; - Discounts for employees on ceramics products; - Some of the workers receive food staples in comemoratives dates; - Uniform for all employees; - Commission for bricks produced.				
The factory offers no additional benefits to employees.	Some employees receive an additional benefit.	All employees receive sporadic additional benefits, independent of frequency.	All employees receive an additional benefit monthly.	All employees receive more than one additional benefit monthly.	All employees receive more than one additional benefit monthly and there are also award programs based on merit.

Score	4 (Four)
Prospects	There are currently no foreseen improvements.

Indicator	5. Health and safety practices
Description	Evaluates the existing health and safety practices in the factories, including the distribution and supervised use of PPE (Personal Protective Equipment) by all employees as well as health and safety programs. Mandatory Programs: PPRA: Program for Prevention and Environmental Risks; PCMSO: Program for Controlling Medical and Occupational Health and CIPA: Internal Commission for Accident Prevention. Complementary programs: PPR: Respiratory Protection Program; PPRPS: Program for Protection from risks in presses and Similar and PCA: Hearing Conservation Program.
Situation	The Kamiranga Ceramic factory accomplishes all the mandatory programs and some complementary programs as follows: - PPRA: Program for Prevention and Environmental Risks; - PCMSO: Program for Controlling Medical and Occupational Health; - CIPA: Internal Commission for Accident Prevention; - PPR: Respiratory Protection Program; - PCA: Hearing Conservation Program. The company has a safety engineer called Barbara Bastos Fernandes, which goes once a week in the Ceramic to ensure best practices in the company, and offers all the personal protective equipment necessary for the workers to carry out their activities safely. Also, she monitors the use of PPEs by the workers and files all control forms of delivery and return. The ceramic factory provides lectures, trainings and courses to the Ceramic factory employees regarding security in the workplace.

There is no control of PPE distribution. None of the health and safety programs required by	PPE distribution is being controlled OR there is at least one health and safety program	The factory meets all legal requirements .	The factory meets all legal requirements and: (a) penalizes employees who do not properly use	There is no control of PPE distribution. None of the health and safety programs required by	PPE distribution is being controlled OR there is at least one health and safety program
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law are being implemented .	required by law being implemented		the PPE and/or	law are being implemented .	required by law being implemented
Score	6 (six)				
Prospects	The ceramic owner intends to provide vaccination for the employees.				

Indicator	6.Training and capacity building programs.				
Description	Evaluates whether the factory encourages and invests in the professional development of its employees.				
Situation	The ceramic factory offered weekly lectures on health and security themes to all employees, with a visit from an occupational health and safety professional. In addition, some training courses to individual employees.				
The company has not invested in lectures nor professional training courses for staff.	The factory organized occasional lectures.	Training courses were offered to individual employees, but not to all employees.	In addition to item 3, the individual employees who were contemplated by the training courses replicate the knowledge via lectures to other employees; and/or Regular lectures were offered to employees (at least two per semester).	In addition to scenario 4, the factory has an internal campaign to encourage employees to complete their high school education; and/or The factory promotes a literacy program for youth and adults.	In addition to scenario 5, the Ceramic factory has established a strategic plan regarding training and capacity building programs.

Score	4 (Four)
Prospects	The ceramic factory intends to keep investing in training and capacity building programs to the workers.

6.1.3 Financial Resource

Indicator	7. Biomass supply				
Description	Evaluates the type, source and quantity of renewable biomass used as fuel, as well as the profile of suppliers.				
Situation	Kamiranga Ceramic factory uses sawdust, açai pits and wood residues as fuel: 100% comes from agro-industrial waste.				
The factory has no control of the source and amount of biomass used; and/or the factory is using non-renewable fuel in the production process.	The factory only has partial control of the source and amount of biomass used.	The factory has total control of the source and amount of renewable biomass used, however 100% of the biomass comes from renewable wood.	The factory has total control of the source and amount of renewable biomass used and less than 50% of the fuel is coming from agro-industrial waste.	The factory has total control of the source and amount of renewable biomass used and more than 50% of the fuel is coming from agro-industrial waste.	The factory has total control of the source and amount of renewable biomass used and 100% of the fuel is coming from agro-industrial waste.
Score	6 (six)				
Prospects	There are currently no foreseen improvements.				

Indicator	8. Planning and control
Description	Evaluates the existence of financial planning and controls in regards to carbon credits sold by factory.

Situation	The factory has control of the income received from carbon credit sales, as they are aware of the destination of the income. The Ceramic factory has control of the expenses from the carbon project, and the income was used mostly in investments of the ceramic infrastructure and donations to community members and institutions.				
The factory has no organized controls of the income received from carbon credit sales nor the destination for proceeds.	The factory has partial control of the income received from carbon credit sales and the destination for proceeds.	The factory has organized controls of the income received from carbon credit sales, but control of the destination for proceeds is partial.	The factory has organized controls of the income received from carbon credit sales, as well as of the destination for proceeds. However, the factory presents no future planning.	The factory has organized controls of the income received from carbon credit sales, as well as of the destination for proceeds. However, the factory presents incomplete future planning.	The factory has organized controls of the income received from carbon credit sales, as well as of the destination for proceeds. The factory presents satisfactory future planning (timeline, budget, responsible involved and benefits).
Score	4 (four)				
Prospects	The entrepreneur intends to evaluate and plan its investments and future donations for the development of the ceramic factory and local community.				

Indicator	9. Carbon credit investments				
Description	Evaluates whether proceeds from the sale of carbon credits was invested in factory improvements or activities that benefit the local community.				
Situation	The Ceramic factory has control of the expenses of the carbon project. In the period analyzed Kamiranga invested in factory improvements.				
The income generated by	Less than 20% of the	Between 20 and 40% of	Between 40 and 60% of	Between 60 and 80% of	Between 80 and 100% of

carbon credit sales was not invested in the factory nor in the community, or there are no organized controls of the allocation of proceeds.	income generated by carbon credit sales was invested the factory or in the community development .	the income generated by carbon credit sales was invested the factory or in the community development .	the income generated by carbon credit sales was invested the factory or in the community development .	the income generated by carbon credit sales was invested the factory or in the community development .	the income generated by carbon credit sales was invested the factory or in the community development .
Score	6 (Six)				
Prospects	There are currently no foreseen improvements.				

6.1.4 Natural Resource

Indicator	10.Environmental management
Description	Evaluates initiatives and structured/certified environmental management systems in regards to managing waste, water, air, soil, energy and nature conservation. Note: the use of renewable fuel shall not be deemed an initiative, since it is a prerequisite for becoming a carbon project.
Situation	The company does not have a formalized environmental management system; however, its voluntary initiatives to reduce the main environmental impacts caused by the ceramic factory, allow for the achievement of an important elements of an EMS, the continuous improvement. The main initiatives carried out by Kamiranga Ceramic Factory are: - The residues not burned are returned into the clay mixture and reused in the production process; - The ashes and broken ceramic pieces generated in the productive process are used in maintenance of roads; - The ceramic has selective collection; - The ceramic factory has a water reuse system; - The ceramic buy energy from renewable sources, reducing its impacts through energy consumption.

There are no environmental management initiatives.	There are up to two specific initiatives to prevent/reduce the main environmental impacts caused by the Ceramic factory.	There are more than two initiatives to prevent / reduce the main environmental impacts caused by Ceramic factory.	In addition the scenario 3, the factory is structuring an environmental management system in the company.	The factory has implemented a formal environmental management system.	The factory's environmental management system has been certified by a third party.
Score	4 (Four)				
Prospects	The ceramic factory intends to elaborate a study to assess the possibility of implementing an environmental management system in the next years.				

Indicator	11.Brazilian environmental legislation
Description	Evaluates whether the factory has a water grant (for those making use of a well or pond), federal technical registry, operating license and license for clay extraction and is in compliance with the conditions established by the documents. It also evaluates the promotion and fulfillment of agreements with local stakeholders.
Situation	The Ceramic factory possess all the mandatory licenses: - Operating License (LO): nº 045/2020 emitted by the Municipal Secretary of the Environment (SEMA) on August 11th, 2020, valid until November 11th of 2022. - Clay Extraction License: nº 40/2020 emitted by the State Secretary of the Environment and Sustainability (SEMA/PA) on June 25th of 2020, valid until October, 26th of 2022. - Water Grant: declaration of waiver of water grant nº 2303/2018 emitted by the State Secretary of the Environment and Sustainability (SEMAS/PA) in February 2018, valid until June, 20th of 2023. - Federal Technical Registry (CTF): Regular. The CTF is a document emitted by the Brazilian Institute of Environment and the Natural Renewable Resources.

The factory does not possess any of the following: -operating license -license for clay extraction -water grant - federal technical registry	The factory only possesses two of the following: -operating license -license for clay extraction -water grant - federal technical registry	The factory only possesses three of the following: -operating license -license for clay extraction -water grant - federal technical registry	The factory possesses all of the following: -operating license -license for clay extraction -water grant - federal technical registry However, they do not meet all the conditions established by them.	All licenses are up to date and all conditions established by them are being met.	In addition to the previous scenario, the factory collaborates with public administration and/or civil society organizations for cooperation with environmental projects.
Score	5 (five)				
Prospects	There are currently no foreseen improvements.				

Indicator	12.Voluntary environmental initiatives				
Description	Evaluates voluntary environmental initiatives that improve or establish new environmental assets and services, as well as those that raise environmental awareness of workers, their families and the surrounding community.				
Situation	The factory has constructed a rainwater collection and reuse system and has waste collection program. Besides, the ceramic reduces the generation of waste by allocating ashes and shards of ceramic pieces for the maintenance of highway roads, helps with public cleaning of the city and carried out the planting of 160 seedlings in the region. In addition, from 2018 onwards, Kamiranga ceramic factory began to buy certified bioenergy from the free market.				
The factory is not involved in voluntary	The factory has implemented only one	The factory has implemented more than	The factory has implemented more than	In addition to the previous scenario, the benefits of	In addition to the previous scenario, the factory

environmental initiatives.	internal environmental initiative. Example: Planting ten tree saplings on factory grounds.	one internal initiative or is showing continuity for an existing Initiative. Example: Periodic planting of saplings on factory grounds.	one initiative or ongoing initiative whose benefits extend to workers families.	the initiatives also extend to community members.	promotes voluntary environmental initiatives with civil society organizations and/or public administration.
Score	5 (five)				
Prospects	There are currently no foreseen improvements.				

6.1.5 Biodiversity/Technology Resource

Indicator	13.Technological advances to improve efficiency of the production process
Description	Evaluates the general condition of infrastructure and machinery/equipment used in the production process, in regards to the following: - Brick drying methods: The factory possesses a dryer that recycles the heat from kilns or a small drying furnace. - Efficiency of kilns: The factory utilizes continuous furnaces (ex: hoffman, mobile, tunel) or the factory uses intermittent kilns, but which are adapted to improve their efficiency. - Kiln temperature control: The factory keeps a record of thermocouples or uses digital controls. - Kiln feeds: The factory feeds kilns using automatic or semi-automatic equipment. - Production: The factory control and records production at different stages of the production process (egsales, Ceramic devices that enter in the kiln). - Infrastructure: During the period analysed, infrastructural improvements in the factory were carried out, for instance: construction/renovation of toilets, refectory, cloakroom lecture hall, among others.
Situation	The factory meets the following characteristics described:

- Brick drying methods: The factory possesses eight caipira dryers and two dryers that recycles the heat from kilns; - Kiln temperature control: The Ceramic controls the temperature of the kilns in the firing process using an electronic thermometer in each kiln (in this monitoring period, the ceramics purchased 20 units of thermometers). The monitoring system of the burning is manual, all data is filed in the Kamiranga office; - Efficiency of kilns: The Ceramic operates with four "Paulista" kilns which is a medium efficiency kiln and one Hoffman kiln that is considered a high efficiency kiln; - Kiln feeds: The Hoffman kiln has infrastructure for semi-automatic feeding, while the Paulista kiln are fed manually; - Infrastructure: The ceramic owner made some improvements in the factory infrastructure. In this monitoring period, it is possible to mention (I) the renovation and maintenance of the kilns for improvement and efficiency in the burning process; (II) the expansion of the shed for storage and drying of raw materials; and (III) the readjustment of the sanitary facilities, in compliance with the instructions of the Ministry of Labor, in prevention and control of the COVID 19 pandemic.					
The factory does not meet any of the characteristics described.	The factory meets one of the characteristics described.	The factory meets 2-3 of the characteristics described.	The factory meets 4 of the characteristics described.	The factory meets all of the characteristics described.	In addition to scenario 5, the factory has organized planning to improve general conditions of the production process.
Score	5 (five)				
Prospects	There are currently no foreseen improvements.				
Indicator	14. Technological advances to improve the general conditions of the working environment				

Description	Evaluates the following general conditions of the working environment: cleanliness, noise, heat, lighting and appropriate signage.				
	- Cleanliness: There is not excess dust and debris (ex: broken bricks and iron) around the factory. - Noise: The factory applies programs for noise control that comply with legislation. - Heat: The factory uses equipment to reduce employee exposure to heat (eg. Fans, exhaust, etc). - Lighting: The factory uses equipment to maintain a well-lit working environment (ex: translucent tiles, LED or mercury lamps, etc). - Appropriate signage: ☐ Warning signs indicating danger, or caution; ☐ Warning signs indicating inflammable liquids; ☐ Warning signs encouraging PPE use; ☐ Signs identifying and indicating location of fire fighting equipment.				
Situation	- Cleanliness: The ceramic factory has selective collection and all metal from productive process is forwarded to a recycling company. Also, there is a cleaning team that cleans the whole factory every day to result in less dust. In addition, employees use specific PPE, such as a filtering semi-facial mask to protect the respiratory tract against dust; - Noise control: Kamiranga has a Hearing Conservation Program to evaluate and control the noise in the factory. - Heat: The Ceramic factory has fans in the productive process that reduces the employees' exposure to a warm environment. In addition, Kamiranga ceramics offer EPIs for visual protection in green acrylic (which also helps protect the eyes when working close to the kilns) and a long-handled nozzle shovel, preventing flame approach; - Lighting: The Ceramic factory has translucent tiles to maintain a well-lit working environment. - Appropriate signage: The factory uses signing according to the applicable norms				
The factory does not meet any of the characteristics described.	The factory meets one of the characteristics described.	The factory meets 2-3 of the characteristics described.	The factory meets 4 of the characteristics described.	The factory meets all of the characteristics described.	In addition to scenario 5, the factory has organized planning to improve

					general conditions of the working environment.
Score	5 (five)				
Prospects	There are currently no foreseen improvements.				

Indicator	15.Product quality				
Description	Evaluates whether the quality of the products was evaluated during the time period analyzed.				
Situation	Kamiranga has a quality control lab and a trained employee conduct the tests of flatness, squareness, strength and water absorption in two of the three products offered by the ceramic factory.				
No efforts were made to analyze or improve product quality.	Samples of some products were evaluated by quality tests.	Samples of all products were evaluated by quality tests.	Some of the products have quality certification.	All products have quality certification.	In addition to scenario 5, the factory has an in-house quality lab.
Score	2 (Two)				
Prospects	The entrepreneur intends to include all products in the quality test.				

6.1.6 Carbon Resource

Indicator	16. Stakeholder Consultation				
Description	Evaluates the existence of a stakeholder consultation system (local community, workers, suppliers, local authorities, civil society organizations, and other social parties involved).				
Situation	During the present monitoring period the ceramic Kamiranga did not conducted a stakeholder consultation.				
During the time period	During the time period	During the time period	During the time period	As well as the previous	As well as the previous

analyzed, the factory did not conduct a stakeholder consultation.	analyzed, the factory conducted an informal (no records) stakeholder consultation.	analyzed, the factory conducted a formal (with records) stakeholder consultation; however negative comments were made regarding the project.	analyzed, the factory conducted a formal (with records) stakeholder consultation, and no negative comments were made regarding the project.	scenario, there are continuous means of communication with stakeholders.	scenario, the next consultation is being planned together with stakeholders.
Score	1 (one)				
Prospects	The entrepreneur intends to conduct a new stakeholders consultation.				

Indicator	17. Green marketing				
Description	Evaluates whether the factory has marketing strategies geared towards selling their products based on highlighting socio-environmental practices.				
Situation	Kamiranga ceramic factory benefits from the marketing strategies used by Sustainable Carbon, such as the project's page on the company's website and the carbon project presentation video.				
The factory does not have marketing strategies based on their environmental practices.	The factory markets their environmental practices only using one means of communication. Example: magazine advertisement.	The factory markets their environmental practices using more than one means of communication. Example: magazine advertisement and billboard.	The factory has an established green marketing strategy, but still has not seen positive results.	The factory has an established green marketing strategy and sees positive results.	As well as the previous scenario, the factory has plans to invest in Green marketing.
Score	2 (two)				
Prospects	There are currently no foreseen improvements.				

Indicator	18. Project performance				
Description	Evaluates the factory’s perception about the results of the project, considering the generation and sale of carbon credits and also external aspects of project.				
Situation	The Ceramic owner is satisfied with the project because since it was implemented the ceramic factory is more organized and the workers are happier with the benefits they receive. Also, now he is aware about the importance of the environment and the sustainability.				
The factory is very dissatisfied and threatens to abandon the carbon project.	The factory is dissatisfied, but does not plan to abandon the carbon project.	The factory is indifferent about the carbon project.	The factory believes the carbon project is something positive, but has complaints.	The factory is very satisfied with the carbon project.	In addition to the previous scenario, the factory considers the carbon project a competitive advantage for their business and encourages other factories to adopt similar practices.
Score	5 (five)				
Prospects	There are currently no foreseen improvements.				

6.2 Analysis of Results

6.2.1 Current Performance

Resource	Critical	Satisfactory	Sustainable	Average	Performance
Social	0.0%	100.0%	0.0%	3.7	Satisfactory
Human	0.0%	66.7%	33.3%	4.7	Satisfactory
Financial	0.0%	33.3%	66.7%	5.3	Sustainable
Natural	0.0%	33.3%	66.7%	4.7	Satisfactory
Technology	33.3%	0.0%	66.7%	4.0	Satisfactory
Carbon	66.7%	0.0%	33.3%	2.7	Critical
General	17%	39%	44%	4.2	Satisfactory

6.2.2 Historical Performance

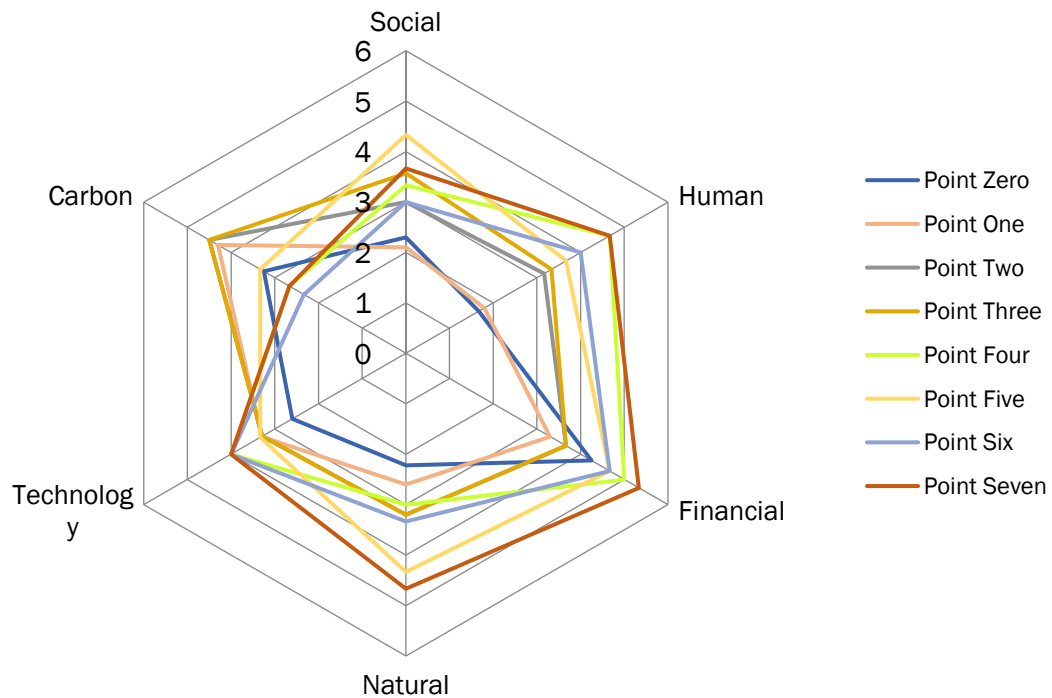
In the Point Zero, One, Two and Three it was used “Indicators for Industries of the Ceramic Sector”. The current report (Point 07) uses the “Brazilian Red Ceramic Factories Indicators”, which are under public consultation. The new indicators resulted in a different score.

The new indicators were developed based on six years of experience in performance monitoring, project evaluation as well as numerous stakeholder consultations. The goal is to measure the contribution of the project to the sustainable development of Ceramics factories more accurately and efficiently.

Social	Point Zero	Point One	Point Two	Point Three	Point Four	Point Five	Point Six	Point Seven
	2.3	2.1	3.0	3.6	3.3	4.3	3.0	3.7
Historic Analysis:	Kamiranga had an increase in the Social Resource comparing to the last report due to the increase of people from minority groups in the factory staff and also to the numerous contributions to the local community made during this monitoring period.							
Human	Point Zero	Point One	Point Two	Point Three	Point Four	Point Five	Point Six	Point Seven
	1.7	1.8	3.2	3.3	4.7	3.7	4.0	4.7
Historic Analysis:	Kamiranga had an increase in the Human Resource. Besides having an excellent occupational health and safety plan, the ceramic factory also provided courses offered to some employees, in addition to weekly follow-up by a health and safety professional to monitor the organization's activities and instruct all employees.							
Financial	Point Zero	Point One	Point Two	Point Three	Point Four	Point Five	Point Six	Point Seven
	4.3	3.3	3.7	3.7	5.0	4.7	4.7	5.3
Historic Analysis:	The Ceramic increased its Financial Resource performance, achieving a sustainable scenario. During the present monitoring period, aside from maintaining the maximum score in two indicators, Kamiranga also showed better organization of the cash flow from sales of carbon credits.							

Natural	Point Zero	Point One	Point Two	Point Three	Point Four	Point Five	Point Six	Point Seven
	2.2	2.6	3.2	3.2	3.0	4.3	3.3	4.7
Historic Analysis:		The ceramic factory had an increase in the Natural resource performance, especially due to the voluntary environmental initiatives provided not only for ceramic employee but also for the community.						
Technology	Point Zero	Point One	Point Two	Point Three	Point Four	Point Five	Point Six	Point Seven
	2.6	3.3	3.3	3.3	4.0	3.3	4.0	4.0
Historic Analysis:		Although the ceramics does not perform quality tests in all products anymore, the investments made to improve the factory infrastructure were sufficient to maintain its performance in the Technology resource comparing to the last monitoring period.						
Carbon	Point Zero	Point One	Point Two	Point Three	Point Four	Point Five	Point Six	Point Seven
	3.3	4.3	4.5	4.5	2.7	3.3	2.3	2.7
Historic Analysis:		Kamiranga showed a small growth in its performance in the Carbon Resource, generated by the use of Sustainable Carbon's marketing strategies by the entrepreneur. However, it remains in a critical scenario (according to the SocialCarbon methodology).						

6.2.3 Performance Hexagon



6.3 Prospect Status

6.3.1 Achieved Prospects

Social	
Indicator	Community development
Prospect	The entrepreneur intends to have a formal planning of their events for community.
Details	The Ceramic owner has a financial plan with all the fixed contributions the project offers to the community, whether donations or community events.

Human	
Indicator	Training and capacity building programs
Prospect	The ceramic factory intends to invest in training and capacity building programs to the workers.

Details	Ceramic employees received various trainings and lectures during the last monitoring period, in addition to being monitored weekly by an Occupational Health and Safety professional.
Technology	
Indicator	Product quality
Prospect	The entrepreneur intends to keep quality tests sheets and certify some products.
Details	The ceramic factory continues performing quality tests on some products and intends to include more products in the test sheet.

6.3.2 Not Achieved Prospects

Carbon	
Indicator	Stakeholder consultation:
Prospect	The entrepreneur intends to conduct a new stakeholder consultation.
Details	There were no consultations with project stakeholders during the last monitoring period. Part of the reason is due to the Covid-19 pandemic that has taken place worldwide since the beginning of 2020.

6.3.3 Identified Prospects

Social	
Indicator	With the end of the Covid-19 pandemic, the entrepreneur intends to increase the number of employees, prioritizing people from minority groups.
Responsible	Entrepreneur
Timescale	December, 2023
Human	
Indicator	The ceramic factory intends to keep investing in training and capacity building programs to the workers.

Responsible	Entrepreneur
Timescale	December, 2023

Financial	
Indicator	The entrepreneur intends to evaluate and plan its investments and future donations for the development of the ceramic factory and local community.
Responsible	Entrepreneur
Timescale	December, 2023

Natural	
Indicator	The ceramic factory intends to elaborate a study to assess the possibility of implementing an environmental management system in the next years.
Responsible	Entrepreneur
Timescale	December, 2023

Technology	
Indicator	The entrepreneur intends to include all products in the quality test.
Responsible	Entrepreneur
Timescale	December, 2023

Carbon	
Indicator	The entrepreneur intends to conduct a new stakeholders consultation during the next monitoring period.
Responsible	Entrepreneur
Timescale	December, 2023

APPENDIX I:

Table 13 – By Kamiranga (tonne)

<i>Kamiranga Ceramic</i>		
Period		By (tonne)
2018	January	3,977
	February	3,122
	March	4,269
	April	3,712
	May	3,710
	June	4,401
	July	4,359
	August	4,431
	September	4,208
	October	4,749
	November	4,091
	December	3,749
Total 2018		48,780
2019	January	3,968
	February	3,348
	March	3,427
	April	3,475
	May	3,444
	June	3,340
	July	4,222

	August	4,325
	September	4,402
	October	4,443
	November	4,259
	December	4,479
Total 2019		47,131
2020	January	4,276
	February	3,436
	March	3,763
	April	3,106
	May	3,542
	June	4,004
	July	4,378
	August	4,768
	September	4,292
	October	4,197
	November	3,908
	December	3,944
Total 2020		47,613
2021	January	3,557
	February	2,680
	March	2,166
Total 2021		8,403
Total in the monitored period		151,927

Table 14 – SocialCarbon Indicators

Social Resource		Score	Analysis	Human Resource		Score	Analysis	Financial Resource		Score	Analysis
1°	Diversity	4	SA	4°	Additional employee benefits	4	SA	7°	Biomass supply	6	SU
2°	Community development	4	SA	5°	Health and safety practices	6	SU	8°	Planning and control	4	SA
3°	Employee satisfaction surveys	3	SA	6°	Training and capacity building programs	4	SA	9°	Carbon credit investments	6	SU
Average		3.7	SA	Average		4.7	SA	Average		5.3	SU
Indicators evaluated		3		Indicators evaluated		3		Indicators evaluated		3	
C	Critical	0	0.0%	C	Critical	0	0.0%	C	Critical	0	0.0%
SA	Satisfactory	3	100.0%	SA	Satisfactory	2	66.7%	SA	Satisfactory	1	33.3%
SU	Sustainable	0	0.0%	SU	Sustainable	1	33.3%	SU	Sustainable	2	66.7%
Natural Resource		Score	Analysis	Technology Resource		Score	Analysis	Carbon Resource		Score	Analysis
10°	Environmental management	4	SA	13°	Efficiency of the production process	5	SU	16°	Stakeholder consultation	1	C
11°	Brazilian environmental legislation	5	SU	14°	Working environment	5	SU	17°	Green marketing	2	C
12°	Voluntary environmental initiatives	4	SA	15°	Product quality	2	C	18°	Project performance	5	SU
Average		4.3	SA	Average		4.0	SA	Average		2.7	C
Indicators evaluated		3		Indicators evaluated		3		Indicators evaluated		3	
C	Critical	0	0.0%	C	Critical	1	33.3%	C	Critical	2	66.7%
SA	Satisfactory	2	66.7%	SA	Satisfactory	0	0.0%	SA	Satisfactory	0	0.0%
SU	Sustainable	1	33.3%	SU	Sustainable	2	66.7%	SU	Sustainable	1	33.3%