

FINAL VERIFICATION REPORT FOR “Kamiranga Ceramic Fuel Switching Project”

**RINA**

Document Prepared By RINA Services S.p.A. (RINA)

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Summary:

RINA Services S.p.A. (RINA), commissioned by Sustainable Carbon – Projetos Ambientais Ltda, verified the greenhouse gas emission reductions reported for the project activity “Kamiranga Ceramic Fuel Switching Project” in Brazil, VCS Registration Reference N° 197, for the period 01/10/2013 to 31/03/2016, with regard to the relevant requirements for VCS and CDM activities.

The objective of the verification is to have an independent review ex post determination of the monitored reductions in GHG emission reductions, Verification was conducted using RINA procedures in line with the requirements specified in the VCS Version 3 Requirements, CDM M&P, the latest version of the CDM Validation and Verification Standard, and relevant decisions of the COP/MOP and the CDM EB and applying standard auditing techniques. The verification consisted of desk review, on-site assessment and the resolution of outstanding issues and the issuance of the final verification report and certification

The verification shall ensure that reported emission reductions are complete and accurate in accordance with applicable VCS Version 3 requirements, which refer to CDM rules, in order to be certified.

The project was validated by TÜV NORD CERT GmbH (validation report N° 8000376397 09/459 of 06/11/2009) and it was registered under the VCS registration reference N° 197.

The GHG emission reductions were calculated on the basis of the approved methodology AMS-I.E. Switch from Non-Renewable Biomass for Thermal Applications by the User, version 01 of 01/02/2008 and the monitoring plan included in the registered Project Design Document, version 2.3 of 27/10/2009.

In conclusion, it is RINA's opinion that the project activity “Kamiranga Ceramic Fuel Switching Project” in Brazil, VCS project ID 197, meets all relevant requirements for VCS standard and guidelines and correctly applies the baseline and monitoring methodology AMS-I.E. Switch from Non-Renewable Biomass for Thermal Applications by the User, version 01 of 01/02/2008. The monitoring system is in place and the emission reductions are calculated without material misstatement. Hence, RINA is able to certify that the emission reductions from the project during the monitoring period 01/10/2013 to 31/03/2016 amount to 108,187 tCO₂e

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1 INTRODUCTION

1.1 Objective

RINA has been commissioned by “Sustainable Carbon – Projetos Ambientais Ltda” to perform an independent verification of its VCS project, “Kamiranga Ceramic Fuel Switching Project”, already registered under VCS with Project ID. 197 for the reported GHG emission reductions for the given monitoring period 01/10/2013 to 31/03/2016. The VCS projects must undergo independent third party verification and certification of emission reductions as the basis for issuance of Voluntary Emission Reductions (VERs/VCUs).

The objectives of this verification exercise are, by review of objective evidence, to establish that:

- The project activity has been implemented and operated as per the project description (PD) and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place;
- Monitoring report and other supporting documents are complete;
- The data is recorded and stored as per the monitoring methodology and approved monitoring plan.
- To confirm that the monitoring system is implemented and fully functional to generate Voluntary Emission Reductions (VERs/VCUs) without any double counting, and
- To establish that the data reported are accurate, complete, consistent, transparent and free of material error or omission by checking the monitoring records and the emissions reduction calculation.

1.2 Scope and Criteria

The verification scope is:

- to verify that actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan;
- to evaluate the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emission reduction data is free from material misstatement;
- to verify that reported GHG emission data is sufficiently supported by evidence.

The project is assessed against the requirements of VCS version 3 and related rules and guidance. RINA has, based on the recommendations in the latest version of CDM Validation and Verification Manual, and employed a rule-based approach (as criteria) in the verification, focusing on the identification of significant reporting rules and the reliability of project monitoring.

Verification is not meant to provide any consultancy towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the monitoring.

1.3 Level of Assurance

All the revisions of the verification report before being submitted to the client were subjected to an independent internal technical review to confirm that all verification activities had been completed according to the pertinent RINA instructions, with reasonable level of assurance.

The technical review was performed by a technical reviewer(s) qualified in accordance with RINA's qualification scheme for VCS and CDM validation and verification.

The verification team and the technical reviewers consist of the following personnel.

Role	Last Name	First Name	Country
Team Leader, Verifier & Technical Expert	Carvalho	Thaís	Brazil
Technical reviewer	Menon	Rekha	India

1.4 Summary Description of the Project

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 project's objective is to stop using the native wood, which is a non-renewable fuel, and completely replace it with renewable biomasses to feed the kilns and fire their ceramic units, thus minimizing environmental impacts related to the native forest deforestation and consumption.

This fuel switching project reduces greenhouse gas (GHG) emissions through the replacement of native wood for renewable biomasses to generate thermal energy.

The main information of the project activity is summarized in the table below:

Project Participant(s)	Cerâmica Kamiranga Indústria e Comércio Ltda. Sustainable Carbon – Projetos Ambientais Ltda		
Project Title	Kamiranga Ceramic Fuel Switching Project		
Location of the project	Estrada Santa Rita, km 04 Zona Rural, São Miguel do Guamá – PA, Brazil		
Methodology(ies)	AMS-I.E. Switch from Non-Renewable Biomass for Thermal Applications by the User, version 01 of 01/02/2008		
Sectoral Scope(s)	1	RINA's Technical Area(s)	1.1
Registered PD	version 2.3 of 27/10/2009		
Starting date of the crediting period	01/01/2008		

Project's crediting period	01/01/2008 to 31/12/2017
Project documentation link	http://www.vcsprojectdatabase.org/#/project_details/197 ; accessed on 25/05/2016

2 VERIFICATION PROCESS

The project was validated by TÜV NORD CERT GmbH (VCS validation report number 8000376397 09/459 of 06/11/2009) and it was registered under the VCS registration reference No 197 /08/. This is the sixth verification assessment for the monitoring period 01/10/2013 to 31/03/2016 by RINA.

2.1 Method and Criteria

Verification was conducted using RINA procedures in line with the requirements specified in the VCS Requirements, i.e. VCS Program Guide, VCS Version 3 (v3.5), Requirements Document of 08/10/2013 and VCS Standard, VCS Version 3 (v3.5), Requirements Document of 25/03/2015. The GHG emission reductions are on the basis of the approved Baseline and monitoring methodology AMS-I.E. Switch from Non-Renewable Biomass for Thermal Applications by the User, version 01 of 01/02/2008.

The verification consisted of the following three phases

- Document review;
- On-site assessment including Interviews and Site Inspections;
- Resolution of Any Material Discrepancy and the issuance of the final verification report and certification.

The following sections outline each step in more detail.

2.2 Document Review

The monitoring report (MR) version 3 of 19/08/2016 and previous versions/01/, the emission reduction calculations spreadsheet (VCS MR Calculation Kamiranga_period 06_01 10 13_31 03 2016_v03.xlsx) version 3 19/08/2016 and previous version/03/, were assessed as part of the verification. In addition the registered Project Design Document (CDM PDD) /02/ in particular the baseline estimations and the monitoring plan for the project were reviewed.

/01/	Sustainable Carbon – Projetos Ambientais Ltda: VCS monitoring report for the project activity “Kamiranga Ceramic Fuel Switching Project”, version 1.0 of 30/04/2016 for the monitoring period 01/10/2013 to 31/03/2016; version 2 of 05/08/2016; version 3 of 19/08/2016 (final version)
/02/	Sustainable Carbon – Projetos Ambientais Ltda: Registered VCS project description for project activity “Kamiranga Ceramic Fuel Switching Project” in Brazil, version 2.3 of 27/10/2009
/03/	Sustainable Carbon – Projetos Ambientais Ltda: Emission Reduction spreadsheet titled * “CS MR Calculation Kamiranga_period 06_01 10 13_31 03 2016_v01.xlsx” version 01 of 30/04/2016; * VCS MR Calculation Kamiranga_period 06_01 10 13_31 03 2016_v02.xlsx, version 2 of

	05/08/2016 VCS MR Calculation Kamiranga_period 06_01 10 13_31 03 2016_v03.xlsx, version 3 of 19/08/2016 (final version)
/04/	VCS: VCS Program Guide, VCS Version 3 (v3.5), Requirements Document of 08/10/2013
/05/	VCS: VCS Standard, VCS Version 3 (v3.5), Requirements Document of 25/03/2015
/06/	CDM Executive Board: Approved consolidated baseline and monitoring methodology AMS-I.E. Switch from Non-Renewable Biomass for Thermal Applications by the User, version 01 of 01/02/2008
/07/	VCS: Monitoring report form (MONITORING REPORT: VCS Version 3) , version 03.3 dated 08/10/2013
/08/	VCS project page available at < http://www.vcsprojectdatabase.org/#/project_details/197 > accessed on 25/05/2016
/09/	TÜV NORD CERT GmbH validation report for the project number No: 8000376397 09/459 of 06/11/2009
/10/	IBOPE Instituto Brasileiro de Opinião Pública e Estatística Ltda. Verification report for the fifth period, number 00066_2013 of 13/12/2013
/11/	- Departamento Nacional de Produção Mineral, DNPM no 851.581/2011, valid until October 10th, 2019. - State Secretary of the Environment (SEMA) Water Grant: nº 235/2013, dated 28/08/2013 valid until 27/08/2017 (Outorga de Água 1.jpg; Outorga de Água 2.jpg) - Federal Technical Registry (CTF): Regular. The CTF is a document emitted by the Brazilian Institute of Environment and the Natural Renewable Resources - State Secretary of the Environment (SEMA) clay extraction license nº 9520/2015, dated 17/09/2015, valid until 16/09/2017 (Argila - val.16.09.2017.pdf) - Municipal Secretary of the Environment (SEMMA) Operation license, dated 02/06/2016 valid until 02/06/2017 (L.O. - val 02.06.2017 (frente).jpg; L.O. - val 02.06.2017 (verso).jpg)
/12/	Kamiranga receipts of the acquisition of biomass, which describes the type of biomass, amount and price for the monitoring period
/13/	Raw data control data spreadsheet (biomass and ceramic production): Version 1: Cer Kamiranga planilha de monitoramento 2013.xlsm Cer Kamiranga planilha de monitoramento 2014.xlsm Cer Kamiranga planilha de monitoramento 2015.xlsm Cer Kamiranga planilha de monitoramento 2016.xls Version 2: Cer Kamiranga planilha de monitoramento 2013.v2.xlsm (final version) Cer Kamiranga planilha de monitoramento 2014.v2.xlsm (final version) Cer Kamiranga planilha de monitoramento 2015.v2.xlsm Cer Kamiranga planilha de monitoramento 2016.v2.xls(final version) Version 3 Cer Kamiranga planilha de monitoramento 2015.v3.xlsm (final version)
/14/	Kamiranga internal production control (hard copies), for the monitoring period
/15/	IPCC 2006 Guidelines for National Greenhouse Gas Inventories. Available at: < http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf >. Page 2.18. Table 2.3, accessed on 04/05/2016
/16/	QUIRINO, W. F. et al. Poder Calorífico da Madeira e de Resíduos Lignocelulósicos. Biomassa & Energia, v.1, n.2, p. 173-182, 2004. Available at: < http://www.renabio.org.br/06-B&E-v1-n2-2004-173-182.pdf >.
/17/	CNUC/MMA Ministério do Meio Ambiente, 2016: Uniddes de conservação por bioma (Conservation units per biome). Available at:

	http://www.mma.gov.br/images/arquivo/80112/CNUC_PorBiomaFev16.pdf accessed on 01/06/2016
/18/	PADILHA et al. Avaliação do Potencial dos Caróços de Açaí para a geração de energia. Biomassa & Energia, v. 2, n. 3, p. 231-239, 2005. Available at : < http://www.renabio.org.br/07-B&E-029-JLPadilha-2005-p231-239.pdf >. Accessed on 09/06/2016
/19/	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 >. accessed on on: 09/06/2016
/20/	CNUC/MMA Ministério do Meio Ambiente, 2016: Uniddes de conservação por bioma (Conservation units per biome). Available at: http://www.mma.gov.br/images/arquivo/80112/CNUC_PorBiomaFev16.pdf accessed on 15/07/2016
/21/	Pictures of the ceramic pieces weight, including the identification of the calibrated balance used (Tijolo maciço.jpg; Tijolo 6 furos.jpg; Tijolo 6 furos meio.jpg; Combongo - 6 furos.jpg; 8 furos 9x19x29.jpg; 8 furos 9x19x19.jpg; Balança.jpg; Balança2.jpg; Balança3.jpg; Balança4.jpg)
/22/	Forest residues evidence (sawdust and wood residues): Sustainable Carbon spreadsheet to control the origin of the biomass, including the print screen of SEMA web site (Environmental Information System of the state of Pará) (Origin of renewable biomass from Kamiranga v2.xls; Renewable Biomass - Kamiranga (2013-2016)v2.xlsx), for the monitoring period
/23/	Thermal energy calculations: Reduction.xlsx VCS MR Calculation Kamiranga_period 01_01 01 08_30 06 09_v3.1.xls VCS MR Calculation Kamiranga_period 02 07 09_30 01 10_v4.xlsx VCS MR Calculation Kamiranga_period 03_01 02 10_28 02 11_v3.xlsx VCS MR Calculation Kamiranga_period 04_01 03 11_30 04 2012_v02.0.xlsx VCS MR Calculation Kamiranga_period 05_01 05 12_30 09 2013_v02.xlsx

2.3 Interviews

The key personnel interviewed and the main topics of the interviews are summarized in the table below:

	Date	Name and Role	Organization	Topic
/a/	17/05/2016	Ms. Fernanda Sayuri Suzuki - technical analyst	Sustainable Carbon	Monitoring report; VERs calculation, QA/QC procedures
/b/	17/05/2016	Ms Barbara Bastos Fernandes- Saude e Seguran	Kamiranga	Data for the social carbon
/c/	17/05/2016	Gleydson Vieira Moura-manager	Kamiranga	Data for the social carbon and VCS report (production); Stakeholder interview- CIPA representative
/d/	17/05/2016	Abdon Willame Castro Rocha-	Kamiranga	Ceramic information, project description, project

		auxiliar administrative		implementation, data recording and storage
/e/	17/05/2016	Raimundo Nonato Lima- production	Kamiranga	Data for the social carbon, environmental aspects

2.4 Site Inspections

On 17/05/2016, RINA visited Cerâmica Kamiranga located at Estrada Santa Rita, km 04, Zona Rural, São Miguel do Guamá – PA, Brazil. During the on-site assessment of the project, there were no hindrance and all the equipment's and the systems were accessible. RINA assessed the implementation and operation of the proposed project activity, reviewed the information flows for generating, aggregating and reporting the monitoring parameters, interviewed key personnel of the plant to confirm the operational and data collection procedures, cross-checked between information provided in the monitoring report and data plant, checked the monitoring equipment, reviewed calculations and assumptions made in determining the GHG data and emission reductions, checked the quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

2.5 Resolution of Findings

The objective of this phase of the verification is to resolve any outstanding issues, which need to be clarified for RINA's positive conclusion on the monitoring report and emission reductions.

To guarantee transparency a verification protocol has been customized for the project. The protocol shows in a transparent manner the requirements, means of verification and the results from verifying the identified criteria. The verification protocol consists of three tables; the different columns in these tables are described in the figure below (see Figure 1). The completed verification protocol is enclosed in Appendix A to this report.

A corrective action request (CAR) is raised if one of the following occurs:

- Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;
- Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impair the estimate of emission reductions;
- Issues identified in a FAR during validation to be verified during verification have not been resolved by the project participants.

A clarification request (CR) is raised if information is insufficient or not clear enough to determine whether the applicable VCS requirements, which refer to CDM rules, have been met.

CARs, CRs identified are included in the verification protocol in Appendix A of this report.

Figure 1 Verification protocol tables

Verification Protocol, Table 1 - Requirement checklist
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Checklist Question	Ref.	MoV	Comments	Draft Conclusion	Final Conclusion
Checklist questions organized in seven different sections.	Makes reference to documents where the answer to the checklist question or item is found.	Explain how conformance with the checklist question is investigated. Examples are document review (DR), interview or any other follow-up actions (I), cross checking (CC) with available information relating to projects, (N/A) means not applicable.	The discussion on how the conclusion is arrived at and the conclusion on the compliance with checklist question so far.	For CAR, CR and FAR see the definitions above.	OK is used if the information and evidence provided is adequate to demonstrate compliance with VCS requirements which refer to CDM rules.

Verification Protocol, Table 2: Resolution of Corrective Action Requests and Clarification			
Corrective action requests and/or clarification requests	Reference to Table 1	Response by project participants	Verification Conclusion
The CAR and/or CRs raised in table 1 are repeated here.	Reference to the checklist question number in Table 1 where the CAR or CR is explained.	The responses given by the project participants to address the CARs and/or CRs.	The verification team's assessment and final conclusion of the CARs and/or CRs.

Verification Protocol, Table 3 - Forward Action Requests		
Forward action request	Reference to Table 1	Response by project participants Verification Conclusion
The FAR raised in table 1 is repeated here.	Reference to the checklist question number in Table 1 where the FAR is explained.	Response by the project participants on how forward action request will be addressed.

2.5.1 Forward Action Requests

N/A

2.6 Eligibility for Validation Activities

The project activity is registered under VCS registration reference Number 197 /1/, hence this section is not applicable.

3 VALIDATION FINDINGS

The project was validated by TÜV NORD CERT GmbH (No: 8000376397 09/459 of 06/11/2009) and it was registered under the VCS registration reference No-197. This is the sixth verification assessment for the monitoring period *01/10/2013 to 31/03/2016* by RINA.

3.1 Participation under Other GHG Programs

Not applicable.

3.2 Methodology Deviations

There were no methodology deviations during this monitoring period.

3.3 Project Description Deviations

RINA verified that in the current monitoring period there is a deviation in the monitoring of the parameter $Q_{\text{renbiomass}}$. The registered VCS PD version 2.3 establishes that the project proponent (meaning the ceramic owner) would monitor the amount of renewable biomass (parameter $Q_{\text{renbiomass}}$) in accordance to the weight described in the receipts or invoices from the providers. However, the ceramic owner used an indirect method of measurement of $Q_{\text{renbiomass}}$ involving measuring the dimensions of the vehicles trucks that delivery the biomass. With this information, staff from Kamiranga Ceramic issues a receipt describing the total volume of biomass (in m^3), the biomass provider and the price paid. This receipt is used as an internal control and also used for the monitoring of $Q_{\text{renbiomass}}$ during the current monitoring report. The deviation did not impact the applicability of the methodology, additionality or the appropriateness of the baseline scenario.

Moreover, RINA verified in the previous monitoring period two kilns not described in the registered PD, were constructed. The additionality assessment was described in the previous monitoring report and assessed in the correspondent verification report /10/. In the current monitoring period there was no new circumstance in the project activity, therefore, the project design as described in the previous monitoring period is still applicable to the current monitoring period /10/.

3.4 Grouped Project

This project is not a grouped project. Hence, this section is not applicable.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

RINA verified that in accordance with VCS PD version 2.3, during the validation process the production at Kamiranga Ceramic encompassed two Paulista kilns and one Hoffman kiln /02/.

During the third monitoring period, Kamiranga ceramic factory has constructed two new Paulista kilns that were not mentioned in the VCS PD. The production of this new kiln was excluded from the third monitoring period since it was not possible to perform the additionality assessment due to the lack of data. In the fourth monitoring period both kilns have operated on a regular basis /10/. The kilns 3 and 4 started to operate in January 2nd, 2012, and January 8th, 2012, respectively.

Based on the onsite inspection and checking the above documents, RINA confirm that during the monitoring period the project activity has been implemented and it is in operation as described above in accordance with the project activity in the registered PD and previous verification /10/. The technical design is in accordance with the reported in the previous verification /10/

PP has provided the environmental licenses applicable to the project activity /11/:

Departamento Nacional de Produção Mineral, DNPM no 851.581/2011, valid until October 10th, 2019.

- State Secretary of the Environment (SEMA) Water Grant: nº 235/2013, dated 28/08/2013 valid until 27/08/2017
- Federal Technical Registry (CTF): Regular. The CTF is a document emitted by the Brazilian Institute of Environment and the Natural Renewable Resources
- State Secretary of the Environment (SEMA) clay extraction license nº 9520/2015, dated 17/09/2015, valid until 16/09/2017
- Municipal Secretary of the Environment (SEMMA) Operation license, dated 02/06/2016 valid until 02/06/2017

4.2 Accuracy of GHG Emission Reduction and Removal Calculations

In accordance with the applied methodology AMS-I.E. Switch from Non-Renewable Biomass for Thermal Applications by the User, version 01 of 01/02/2008 the emission reduction is calculated as baseline emissions (BE_y) minus project emissions (PE_y) minus leakage emissions (LE_y). Since no project and leakage emissions are identified according to the applied methodology, baseline emissions are equal to the amount of emission reduction.

Baseline emissions

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

Where:

- ER_y : Emission reductions during the year y in tCO₂e
- B_y : Quantity of biomass that is substituted or displaced in tonnes
- $f_{NRB,y}$: Fraction of non-renewable biomass (wood) used in the absence of the project activity in year y
- $NCV_{biomass}$: Net calorific value of non-renewable biomass in TJ/tonne
- $EF_{projected\ fossil\ fuel}$: Emission factor for the projected fossil fuel consumption in the baseline in tCO₂/TJ¹.

B_y is determined using the option:

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

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

Where:

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

η_{old} : Efficiency of the system being replaced

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

Where:

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

PR_y : Amount of product produced in year y in tons of ceramic units

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

Where:

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

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

Where:

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

Using the Equations 3, 4 and 5 in the Equation 1, it results to:

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

¹ The fossil fuel likely to be used by similar consumers is taken the IPCC default value of residual fossil fuel.

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

RINA has cross checked the Kamiranga internal control for the amount of ceramic pieces produced during the monitoring /14/ and biomass evidences /12/ against the spreadsheet control data /13/ used to calculate the VERs /03/. No error was found.

Moreover, as a QA/QC procedure, PP calculated that the thermal energy generated per thousand of ceramic units produced at Kamiranga Ceramic for the current monitoring period the monitored period was around 66% higher than estimated in the VCS PD. PP also presented an table with historic data of the thermal energy used in the project activity to demonstrate the difference between the monitoring periods /23/:

MR	TJ/Tonne of ceramic units fired	% relative to baseline
Baseline	0.00176	100%
1	0.00198	113%
2	0.00275	157%
3	0.00322	183%
4	0.00343	195%
5	0.00315	179%
6	0.00293	166%

The monitoring report describes that it is important to notice that the data on the VCS PD did not consider the use of Açaí pits and wood residues. The different calorific properties of biomass considered in this assessment are likely one of the causes of the difference observed on energy levels, verified in the registered PD /01/ and VERs spreadsheet /03/ and biomass evidences/12/. Moreover, in the third monitoring period, it was constructed a shed to store the biomass and energy levels are calculated based on the amount of biomass purchased (and not directly based on the amount of biomass fed to the kilns), therefore, the increase of stock also affects the analysis causing an increase of energy generation. RINA verified the shed and biomass used during the onsite visit.

Project emissions

The applied methodology does not include any source of project emissions. Verified during the on-site visit that project activity does not involve the use of equipment with significant use of fossil fuels or electricity or any other relevant sources of emissions

Leakage

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

Verified that the PP has accessed the possible three sources of leakage predicted in the Category AMS-I.E

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

Verified in the biomass evidences /12/ /13/ that the project activity uses less than 2% of the total of forest residues available (sawdust, wood Residues), less than 1% of acai pits, therefore no leakage needs to be considered /01/ /02/ /03/

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

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

- Use/diversion of non-renewable biomass saved under the project activity by non-project households/users who previously used renewable energy sources. If this leakage assessment quantifies an increase in the use of non-renewable biomass used by the non-project households/users attributable to the project activity then baseline is adjusted to account for the quantified leakage.
- Use of non-renewable biomass saved under the project activity to justify the baseline of other project activities can also be potential source of leakage. If this leakage assessment quantifies a portion of non-renewable biomass saved under the project activity that is used as the baseline of other project activity then baseline is adjusted to account for the quantified leakage.
- Increase in the use of non-renewable biomass outside the project boundary to create non-renewable biomass baselines can also be potential source of leakage. If this leakage assessment quantifies an 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 facilities 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, confirmed through interview during the onsite visit. 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 the baseline for this project activity will not be saved for other project activities, since other ceramic facilities were already consuming non-renewable biomass, which is a common practice in the region, confirmed through interview during the onsite visit. 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, confirmed through interview during the onsite visit. 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 as there was no transference of equipment, in spite of new equipment had to be acquired.

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

4.3 Quality of Evidence to Determine GHG Emission Reductions and Removals

During the onsite visit RINA verified that Cerâmica Kamiranga has adequate monitoring mechanisms and uses the required parameters to monitor on a monthly basis. The amount of renewable biomass used in the project activity is from Cerâmica Kamiranga receipts of the acquisition of biomass, which describes the type of biomass, amount and price /12/. The production of ceramic units per month (PRy) are from the internal control sheets used by Cerâmica Kamiranga, which are organized per month and daily filled according to data based on ceramic units burned in the kilns, and data from production process directly coming from factory /14/.

Monitored data from the ceramic is transferred to a spreadsheet /13/ that is used to input data in the VERs spreadsheet /03/. During the onsite visit RINA has cross checked the original documents /12/ /14/ against the spreadsheet /13/ to confirm the correct data transference. Cerâmica Kamiranga is responsible for the monitoring of the parameters. There is a spreadsheet where data is described and this spreadsheet /13/ is the basis for the VERs calculation /03/.

The MR describes that 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 for the monitoring period was available during the onsite visit.

The following parameters were available at validation as per the registered VCS PD/02/ and the validation report /09/:

DATA/PARAMETER Unit	Source of data	Reported value for the project period	Assessment/Observation
EF_{projected_fossilfuel} (tCO₂/TJ)- CO₂ Emission factor of residual fuel oil	Registered PD describes that was taken from the IPCC 2006 Guidelines for National Greenhouse Gas Inventories./15/	77.4	RINA verified, it is in accordance with the value described in the registered PD /02/ and IPCC /15/
NCV_{biomass} (TJ/tonne)- Net Calorific Value	Registered VCS PD /02/ describes that it was taken from Brazilian study developed by QUIRINO, W.F. /02/ /16/.	0.0182	RINA verified that the value applied is in accordance with the registered PD and it corresponds to the Amazon biome /16/, applicable to the project activity
p_{wood} (Tonnes/m³)- Specific gravity of non-renewable biomass	Registered VCS PD /02/ describes that it was taken from Brazilian study developed by QUIRINO, W.F. /02/	0.67	RINA verified that the value applied is in accordance with the registered PD and it corresponds to the Amazon biome /16/, applicable to the project activity

	/16/.		
BF_y (Tonnes of native wood per tonnes of ceramic units fired)- Baseline consumption of non-renewable biomass per tonnes of ceramic units produced in year y	Registered PD describes that it was defined using Historical data from the ceramic owner /02/	0.81	RINA verified that the value applied is in accordance with the registered PD /02/

Parameters monitored ex post:

Data/Parameter	Q _{renbiomass}																												
Data Unit	Tonnes per month																												
Description	Amount of renewable biomass used																												
Source of data to be used	Measured by the biomass providers and monitored by the ceramic owner. /12//13/.																												
Value of monitored parameter for the monitoring period	<table><tr><th colspan="4">Q_{renbiomass} (tonnes)</th></tr><tr><th>Period/Biomass</th><th>Sawdust</th><th>Açaí Pits</th><th>Wood Residue</th></tr><tr><td>Total Oct – Dec 2013</td><td>1,470.15</td><td>-</td><td>35.31</td></tr><tr><td>Total 2014</td><td>8,551.37</td><td>-</td><td>61.86</td></tr><tr><td>Total 2015</td><td>8,514.13</td><td>137.37</td><td>812.27</td></tr><tr><td>Total Jan – Mar 2016</td><td>2,743.37</td><td>125.80</td><td>386.96</td></tr><tr><td>Total in the period (tonnes)</td><td>21,279.01 /12//13/</td><td>263.17 /12/ /13/</td><td>1,296.39 /12/ /13/</td></tr></table> RINA verified that the amount of biomass is controlled by the project owner through the measurement of the dimensions of the truck that delivers the biomass. With this information a receipt is issued containing the total volume of biomass and the price paid, as an internal control /12/. Data is transferred to a spreadsheet /13/ that is used to input data in the VERs spreadsheet /03/. During the onsite visit RINA has cross checked the original documents /12/ against the spreadsheet /13/ to confirm the correct data transference. OBS: the Specific Gravity of sawdust used is in accordance with data in the registered PD = 0.35 ton/m³ /02/. For the açai pits it is equal 0.723 ton/m³ /18/ and 0.7575 ton/m³ for the wood residues /19/.	Q _{renbiomass} (tonnes)				Period/Biomass	Sawdust	Açaí Pits	Wood Residue	Total Oct – Dec 2013	1,470.15	-	35.31	Total 2014	8,551.37	-	61.86	Total 2015	8,514.13	137.37	812.27	Total Jan – Mar 2016	2,743.37	125.80	386.96	Total in the period (tonnes)	21,279.01 /12//13/	263.17 /12/ /13/	1,296.39 /12/ /13/
Q _{renbiomass} (tonnes)																													
Period/Biomass	Sawdust	Açaí Pits	Wood Residue																										
Total Oct – Dec 2013	1,470.15	-	35.31																										
Total 2014	8,551.37	-	61.86																										
Total 2015	8,514.13	137.37	812.27																										
Total Jan – Mar 2016	2,743.37	125.80	386.96																										
Total in the period (tonnes)	21,279.01 /12//13/	263.17 /12/ /13/	1,296.39 /12/ /13/																										

Monitoring equipment	No monitoring equipment is used to determine this parameter. Values are from the receipts.
Accuracy of the monitoring equipment	Not applicable.
Measuring/Reading/Recording frequency	In accordance with registered PD parameter is monitored monthly. Verified during the on site visit that all biomass is controlled and registered by PP.
Calculation method (if applicable)	Not applicable.
Calibration	
Calibration frequency/interval Is the calibration interval in line with the monitoring plan of the PDD?	Calibration is not applicable.
Does the calibration cover the monitoring period? Has the calibration frequency been respected?	Calibration is not applicable.
Calibration certificates	Calibration is not applicable.

Data/Parameter	PRy	
Data Unit	Tonnes of ceramic units fired per month	
Description	Production of ceramic units	
Source of data to be used	Controlled by the project proponent (ceramic company) /14/ /13/	
Value of monitored parameter for the monitoring period	Period	tonnes of ceramic units
	October-December 2013	9,912.70
	Total 2014	45,628.50
	Total 2015	48,371.50
	January to March 2016	10,558.10
	Total in Monitoring Period	114,470.80
	RINA has cross checked the Kamiranga internal control /14/ against the spreadsheet control data /13/ used to calculate the VERs /03/. Moreover, PP has provided the evidences of the types of ceramic units weights /21/	
Monitoring equipment	Not applicable. Parameter is controlled manually (counted) by a trained personnel on ceramic factory.	
Accuracy of the monitoring equipment	Not applicable. Parameter is controlled manually (counted) by a trained personnel on ceramic factory.	
Measuring/Reading/Recording frequency	In accordance with registered PD parameter is monitored monthly. Verified during the on site visit that the production is controlled and registered by PP daily, and aggregated on a monthly and yearly basis.	

Calculation method (if applicable)	Not applicable.
Calibration	
Calibration frequency/interval Is the calibration interval in line with the monitoring plan of the PDD?	Calibration is not applicable.
Does the calibration cover the monitoring period? Has the calibration frequency been respected?	Calibration is not applicable.
Calibration certificates	Calibration is not applicable.

Data/Parameter	Origin of renewable biomass
Data Unit	Not applicable
Description	Renewable origin of the biomass
Source of data to be used	Controlled by the project proponent
Value of monitored parameter for the monitoring period	Value is not applicable In the current monitoring period it was used sawdust, wood residues and açai pits. During the verification PP has provided an control spreadsheet with the main sawdust and wood residues providers (around 80% of the forest residues used in the monitoring period) confirming the origin of biomass and/or legal status of the providers /22/.
Monitoring equipment	Not applicable.
Accuracy of the monitoring equipment	Not applicable.
Measuring/Reading/Recording frequency	Each crediting period
Calculation method (if applicable)	Not applicable.
Calibration	
Calibration frequency/interval Is the calibration interval in line with the monitoring plan of the PDD?	Calibration is not applicable.
Does the calibration cover the monitoring period? Has the calibration frequency been respected?	Calibration is not applicable.
Calibration certificates	Calibration is not applicable.

Data/Parameter	Renewable biomass surplus
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Data Unit	tonnes or m³		
Description	Amount of renewable biomass available		
Source of data to be used	monitored		
Value of monitored parameter for the monitoring period	Parameter used to calculate leakage of the project activity. In the monitoring period no leakage needs to be accounted.		
	Biomass	Surplus	Project activity/leakage
	Forest Residues in m³ (2007)	1,999,833 m³ in accordance with the registered PD /01/	Leakage is not applicable, project activity. In the current monitoring period Kamiranga Ceramic consumed approximately 24,318 m³ of sawdust per year and 684 m³ of wood residues per year /12/ /13/ (forest residues) which represented around 1.25% of the biomass availability. For the açai pits, the project consumed around 105 tonnes per year, which represents less than 1% of the biomass availability. RINA verified the biomass consumed in the project activity /12/ /13/ to confirm that leakage is not applicable and biomass availability in the region is more than 25% of the requirement to the project activity
	Açai pits	79,715.5 tonnes in accordance with the registered PD /01/	
Monitoring equipment	Not applicable.		
Accuracy of the monitoring equipment	Not applicable.		
Measuring/Reading/Recording frequency	Annually		
Calculation method (if	Not applicable.		

applicable)	
Calibration	
Calibration frequency/interval Is the calibration interval in line with the monitoring plan of the PDD?	Calibration is not applicable.
Does the calibration cover the monitoring period? Has the calibration frequency been respected?	Calibration is not applicable.
Calibration certificates	Calibration is not applicable.

Data/Parameter	Leakage of non-renewable biomass
Data Unit	tCO ₂ e
Description	Leakage resulted from the non-renewable biomass
Source of data to be used	Monitored
Value of monitored parameter for the monitoring period	0 RINA verified that that there was no leakage from non-renewable biomass. Refer to the assessment described in the section 4.2: Leakage
Monitoring equipment	Not applicable.
Accuracy of the monitoring equipment	Not applicable.
Measuring/Reading/Recording frequency	Annually
Calculation method (if applicable)	Not applicable.
Calibration	
Calibration frequency/interval Is the calibration interval in line with the monitoring plan of the PDD?	Calibration is not applicable.
Does the calibration cover the monitoring period? Has the calibration frequency been respected?	Calibration is not applicable.
Calibration certificates	Calibration is not applicable.

Data/Parameter	$f_{NRB,y}$
Data Unit	Percentage
Description	Fraction of biomass (wood) used in the absence of the project activity in year y that can be established as non-renewable biomass using survey methods

Source of data to be used	Survey methods
Value of monitored parameter for the monitoring period	0.8284 RINA verified that PP has used the latest data available by the Environmental Ministry updated in 26/02/2016 /20/
Monitoring equipment	Not applicable.
Accuracy of the monitoring equipment	Not applicable.
Measuring/Reading/Recording frequency	Annually
Calculation method (if applicable)	Not applicable.
Calibration	
Calibration frequency/interval Is the calibration interval in line with the monitoring plan of the PDD?	Calibration is not applicable.
Does the calibration cover the monitoring period? Has the calibration frequency been respected?	Calibration is not applicable.
Calibration certificates	Calibration is not applicable.

The data presented in the monitoring report /01/ were assessed by reviewing in detail project documentation, collection of monitored data, observation of established monitoring and reporting practices and assessment of the reliability of monitoring equipment. Sufficient evidence was presented and verified by RINA for the reported emission reductions as listed in the above Section 3.

4.4 Non-Permanence Risk Analysis

Not applicable as it is a non-AFOLU project.

5 VERIFICATION CONCLUSION

RINA Service S.p.A (RINA) has performed verification of the emission reductions reported for the project activity “Kamiranga Ceramic Fuel Switching Project” in Brazil, VCS Registration Reference ID - 197, for the VCS monitoring period from 01/10/2013 to 31/03/2016, with regard to the relevant requirements for VCS and CDM rules.

The project participants Cerâmica Rio Negro Ltda and Sustainable Carbon – Projetos Ambientais Ltda of the project “Kamiranga Ceramic Fuel Switching Project” are responsible for:

- The preparation of greenhouses gas emissions data and the reported greenhouse gas emission reductions from the project on the basis set out in the monitoring plan contained in the registered VCS Registration Reference ID - 197, for the VCS monitoring period from 01/10/2013 to 31/03/2016.
- The development and maintenance of records and reporting procedures in accordance with that plan, including the calculation and determination of greenhouse gas emission reductions of the project.

It is the responsibility of RINA to express an independent verification opinion about the project's conformity with the VCS requirements and procedures and on the reported greenhouse gas emission reductions from the project.

Based on documented evidence and corroborated by an on-site assessment RINA can confirm that:

- The project has been implemented and operated as per the registered VCS PD;
- The monitoring plan in the registered VCS-PD is as per the applied baseline and monitoring methodology.
- The monitoring report and other supporting documents provided are complete and verifiable and in accordance with the applicable VCS and CDM requirements

It is RINA's opinion that the GHG emission reduction stated in the VCS monitoring report version 3 of 19/08/2016 for the “Kamiranga Ceramic Fuel Switching Project” in Brazil for the period 01/10/2013 to 31/03/2016 are fairly stated. The GHG emission reductions were calculated correctly on the basis of the baseline and monitoring methodology, AMS-I.E. Switch from Non-Renewable Biomass for Thermal Applications by the User, version 01 of 01/02/2008.

Hence, RINA is able to certify that the emission reductions from the project during the monitoring period 01/10/2013 to 31/03/2016 amount to 108,187 tCO₂e.

Reporting period: From 01/10/2013 to 31/03/2016

Verified GHG emission reductions and removals in the above verification period:

Year Month	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)
2013 (October to December)	9,369	0	0	9,369
2014	43,124	0	0	43,124
2015	45,716	0	0	45,716
2016 (January to March)	9,978	0	0	9,978
Total	108,187	0	0	108,187

APPENDIX A

VERIFICATION PROTOCOL

TABLE 1 REQUIREMENTS CHECK LIST

Checklist Question		Reference	MoV ²	Comments	Conclusion
A Monitoring Report					
A.1	Does the used project title clearly enable the reader to identify the unique VCS activity? Is there an indication of a revision number, the date of the revision and the monitoring period?	/1/ /2/	/DR/ /CC/	Yes; the title of the project activity is “Kamiranga Ceramic Fuel Switching Project” in the Monitoring Report which enables the reader to identify the unique VCS activity. The title is also in line with the validated VCS PD and Validation Report. The monitoring period for the project activity is 01/10/2013 to 31/03/2016.	OK
A.2	Does the project comply with the applicable requirements for completing the Monitoring Reports (latest version available)?	/1/ /2/ /5/ /6/ /7/ /8/ /9/	/DR/ /CC/	Yes, the project applies the Monitoring Report Template (v 3.3), VCS version 3, dated 08/10/2013.	OK
A.3	Does the MR comply with the template available (latest version)?	/1/ /2/ /5/ /6/ /7/ /8/ /9/	/DR/ /CC/	Yes, the project applies the Monitoring Report Template (v 3.3), VCS version 3, dated 08/10/2013.	OK
B Description of Project Activity					
B.1	Title of the project activity, revision	/1/ /2/	/DR/ /CC/	The title of the project activity is “Kamiranga Ceramic Fuel Switching Project” version 1.0 of	OK

² MoV: DR document review, I interview, CC cross checking

Checklist Question		Reference	MoV ²	Comments	Conclusion
	number and date of Monitoring Report			30/04/2016 and the same is found to be in line with the registered VCS PD.	
B.2	Is the actual implementation and operation of the proposed project activity in accordance with the project activity in the registered VCS-PD?	/1/ /2/	DR//CC	An onsite visit was performed on 17/05/2016 to verify the real implementation of the project against the description in the registered VCS PD. Rina verified that there are 4 Paulista kilns (2 were implemented in the third monitoring period and) and 1 Hoffman kiln. The changes in the project design were analysed in the fourth monitoring period. Besides the MR describes the monitoring period of the changes, in accordance with the guide to complete the MR template, it is requested to present the relevant implementation dates (eg, dates of construction, commissioning, and continued operation periods)	CR-1
A.3	Methodology applied for the registered project activity	/1/ /2/ /6/	DR/CC	Project activity applies the methodology AMS-I.E. Switch from Non-Renewable Biomass for Thermal Applications by the User, version 01 of 01/02/2008.	OK
B Monitoring					
B.1 Monitoring plan					
B.1	Is the actual implementation and operation of the proposed project activity in accordance with the project activity in	/1/ /2/	DR//CC	The project was validated by TÜV NORD CERT GmbH (06/11/2009) and it was registered under the VCS registration reference N° 197. This is the verification of the 6 th monitoring period of the	OK

Checklist Question	Reference	MoV ²	Comments	Conclusion
the registered VCS-PD?			project activity.	
B.2 In case of deviation between the registered project and the actual implementation/operation, do they comply with the requirements of the Project Standards?	/1/ /2/	DR//CC	In accordance with the guideline to complete the MR, in the section 2.2.2, PP is requested to describe any project description deviations applied during this monitoring period and explain the reasons for the deviation. Identify whether the deviation impacts the applicability of the methodology, additionality or the appropriateness of the baseline scenario and provide an explanation of the outcome. <u>Describe and report on any project description deviations applied in previous monitoring reports.</u>	CAR-1
B.3 For project activity that consist of more than one site: - describe the status of the implementation and starting date of operation of each site; For project activity with phased implementation: - describe the progress of the proposed project activity achieved in each phase number; - if the phased implementaion is delayed, described the reasons and the expected impenetation	/1/ /2/	DR//CC	Not applicable. Just one site is included in the project activity	OK

Checklist Question		Reference	MoV ²	Comments	Conclusion
	dates.				
B.4	Methodology and methodological tool applied for the registered project activity	/1/ /2/	DR//CC	The approved methodology AMS-I.E. Switch from Non-Renewable Biomass for Thermal Applications by the User, version 01 of 01/02/2008 is applied for the registered project activity as per the registered PD.	OK
C Compliance of the monitoring activities with the registered monitoring plan / Compliance of the monitoring plan with the monitoring methodology and methodological tool					
C.1 Monitoring plan					
C.1.1	Does the monitoring plan included in the registered VCS project activity comply with the applied methodology?	/1/ /2/	DR/CC	Yes. The monitoring plan included in the registered VCS-PD complies with the applied methodologies as the plan includes all the monitoring parameters as required by the methodology applied.	OK
C.1.2	Does the monitoring comply with the monitoring plan in the registered VCS-PD?	/1/,/2/,	DR/CC	Yes. The monitoring complies with monitoring plan included in the registered VCS-PD.	OK
C.2 Data and parameters fixed ex-ante or at renewal crediting period					
C.2.1	Which parameters were available at validation and how were they verified?	/1/ /2/	DR/CC/I	The parameters available at the time of validation are as follows: EF_{projected fossil fuel}: CO₂ Emission factor of residual fuel oil. The value for this parameter is 77.4 tCO₂/TJ fixed as per the registered VCS PD that describes that it was taken from the IPCC 2006 Guidelines for National Greenhouse Gas	OK

Checklist Question	Reference	MoV ²	Comments	Conclusion
			Inventories. /02/ /15/ NCV_{biomass}: Net Calorific Value of non-renewable biomass. The value for this parameter is 0.0182 TJ/tonne and fixed as per the registered VCS PD that describes that it was taken from Brazilian study developed by QUIRINO, W.F. /02/ /16/ ρ_{wood} : Specific gravity of non-renewable woody. The value for this parameter is 0.67 tonne/m³ of biomass and fixed as per the registered VCS PD that describes that it was taken from Brazilian study developed by QUIRINO, W.F. /02/ /16/ BF_y: Baseline consumption of non-renewable biomass per tonnes of ceramic units produced in year y. The value for this parameter is 0.81 tonnes of native wood per tonnes of ceramic unit fired and fixed as per the registered VCS PD that describes that it was defined using Historical data from the ceramic owner. The values of the above parameters are derived from the registered PD and are consistent with the value in the validation report, the value of the parameter will be fixed during the whole fixed crediting period.	
C.2.2 What default data were selected and applied?	/1/ /2/	DR/CC/I	Please refer sector C.2.1 above	OK

Checklist Question		Reference	MoV ²	Comments	Conclusion
C.3 Data and parameters monitored ex-post					
C.3.1	Which parameter have been monitored during the monitoring period? (Data/Parameter monitored / Data unit / Description / Source of data to be used / Value data for the monitoring period)	/1/ /2/ /3/ /12/ /13/ /14/ /17/	DR/CC/I	The following are the parameters monitored during the monitoring period. Data/Parameter: $Q_{renbiomass}$ Data unit: Tonnes per month Description: Amount of renewable biomass Source of data: PP is requested to clearly describe the source of data/ description of measurements methods and procedures to be applied of the parameter $Q_{renbiomass}$, in accordance with the methods verified during the onsite visit and applied during the monitoring period. Values of monitored parameter: RINA verified that during the monitoring period sawdust, açai pits and wood residues were used /12/ /13/. RINA verified the biomass evidences /12/ and the following inconsistencies were found: The amount of biomass described in the days; 12/01/2015; 05/01/2015; 10/01/2015 are not in accordance with the values described in the receipts -the biomass type described in the day 26/03/2016 is not in accordance with the evidence It was not included the receipt from 29/11/2013; NF 868 of 18/01/2014; NF 882 of 28/01/2014; 31/03/2016; 13/03/2016; 26/03/2016 Not provided the evidences described in the days	OK CAR-2 CAR-3

Checklist Question	Reference	MoV ²	Comments	Conclusion
			10/01/2014; 11/01/2014; 30/01/2014; 31/01/2014 Cross check: The amount of biomass is controlled through the receipts of the acquisition of biomass or the invoice, which describes the type of biomass, amount and price /12/. Data is transferred to a spreadsheet /13/ that is used to input data in the VERs spreadsheet /03/. During the onsite visit RINA has cross checked the original documents /12/ against the spreadsheet /13/ to confirm the correct data transference. Verified that data is provided in m³ and is converted using the specific gravity described in the registered PD equal to 0.35 tons/m³ for the sawdust; PP is requested to provide further information for the thermal energy used in the project activity, providing an analysis of the loss of efficiency when compared to the baseline and estimative of the project in the PD, considering that section 1.9 of the registered PD describes “The expected level of activities is to achieve an increase in the burning efficiency due to the use of a dried biomass and its semiautomatic injection”. PP is requested to provide the evidences to confirm the consistency of the humidity applied in the NCV of the sawdust	CR-2 CR-3

Checklist Question	Reference	MoV ²	Comments	Conclusion
			----- Data/Parameter: PRy Data unit: Tonnes of ceramic units fired per month Description: Production of ceramic devices Source of data: Controlled by the project proponents Values of monitored parameter: PP is requested to provide the evidences of the weight (tonne/ceramic device) applied to convert the ceramic units to tonnes. RINA verified the production internal control evidences /14/ and the following inconsistencies were found: - data is double accounted in the days 01/10/2013; 02/10/2013; 03/10/2013; 04/10/2013; 05/10/2013; 06/10/2013 -it was not presented in the spreadsheet data of the days 27/03/2014; 22/07/2014; 24/07/2014 -data is different from the evidences presented in the days 02/07/2014; 20/04/2015; 19/04/2015 -there is no evidences for the data presented in the days 13/02/2016; 07/02/2016 Cross check: RINA has cross checked the Kamiranga internal control /14/ against the spreadsheet control data /13/ used to calculate	CR-4 CAR-4

Checklist Question	Reference	MoV ²	Comments	Conclusion
			the VERs /03/. ----- Data/Parameter: Origin of renewable biomass Data unit: Not applicable Description: Renewable origin of the biomass Source of data: Controlled by the project developer Values of monitored parameter: Not applicable. MR version 1 does not describe the measures and evidences to confirm that the biomass used in the project activity is renewable biomass, taking into account the provisions described in the registered PD. ----- Data/Parameter: Renewable biomass surplus Data unit: tonnes or m³ Description: Amount of renewable biomass available Source of data: monitored	CAR-5

Checklist Question	Reference	MoV ²	Comments	Conclusion
			Values of monitored parameter: The forest residues and açai pits surplus were evaluated ex-ante: 9,090,150 m³ and the 79,715.5 m³ respectively in accordance with data presented in the registered PD. ----- Data/Parameter: Leakage of non-renewable biomass Data unit: tCO₂e Description: Leakage resulted from the non-renewable biomass Source of data: Monitored Values of monitored parameter: 0 RINA verified that that there was no leakage from non-renewable biomass. Refer to the assessment described in the section 4.2: Leakage ----- Data/Parameter: $f_{NRB,y}$ Data unit: Percentage Description: Fraction of biomass (wood) used in the absence of the project activity in year y that	

Checklist Question		Reference	MoV ²	Comments	Conclusion
				can be established as non-renewable biomass using survey methods Source of data: Survey methods Values of monitored parameter: PP is requested to clarify data used to calculate the parameter "$f_{NRB,y}$". In accordance with data provided by the Environmental Ministry updated in 26/02/2016 the total area of the Amazon biome is 4,198,551 Km² and the area with integral protection is 417,493 Km² and sustainable use 719,706 Km². Moreover, the spreadsheet presents data for indigenous land from 2014 that is not used in the calculation.	CR-5
C.3.2	Is the measurement equipment described? Is the accuracy of the measurement equipment addressed and deemed appropriate?	/1/, /2/, /3/, /12/ /13/ /14/	DR/CC/I	Measurement equipment is not applicable to the project activity /12/ /13/ /14/	OK
C.3.3	Is the measuring/reading/recording frequency adequate for all monitoring parameters? Is it in line with the registered monitoring plan?	/1/ /2/ /3/	DR/CC/I	Please, refer to the section C.3.1 above.	OK
C.4 Calibration requirements					
C.4.1	Are the requirements for maintenance and calibration of measurement equipment described and deemed appropriate?	/1/ /2/	DR/ CC	Calibration is not applicable.	OK

Checklist Question		Reference	MoV ²	Comments	Conclusion
C.4.2	Does the calibration cover the monitoring period?	/1/ /2/	DR/ CC	Calibration is not applicable.	OK
C.4.3	Has the calibration frequency been respected?	/1/ /2/	DR/ CC	Calibration is not applicable.	OK
C.4.4	In case of delay, describe the applied maximum permissible error	/1/ /2/	DR/ CC	Calibration is not applicable.	OK
C.5 Monitoring of the sustainable indicators					
C.5.1	Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host Country?	/1/ /2/	DR/CC	PP is applying the Social Carbon Standard. The monitoring of the indicator is being verified in parallel to the verification, presented in a separate report.	OK
C.6 Management system and quality control					
C.6.1	How has it been assessed that the monitoring arrangements described in the monitoring plan are feasible within the project design?	/1/ /2/ /3/ /12/ /14/	DR/ I/CC	During the onsite visit verified that Cerâmica Kamiranga has adequate monitoring mechanisms to monitor the biomass and production on a monthly basis. The amount of renewable biomass used in the project activity is from receipts of the acquisition of the biomass and invoices /12/. The production of ceramic units per month (PRy) are from the internal control sheets used by Cerâmica Kamiranga, which are organized per month and daily filled according to data based on ceramic units burned in the kilns, and data from production	OK

Checklist Question		Reference	MoV ²	Comments	Conclusion
				process directly coming from factory /14/.	~~CAR 3~~
				Please, also refer to CAR 4; CAR 3	~~CAR 4~~
C.6.2	Are procedures identified for day-to-day record handling (including what records to keep, storage area of records and how to process performance documentation)? Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later?	/1/ /2/ /03/ /12/ /13/ /14/	DR/I/CC	Yes, monitored data from the ceramic is transferred to a spreadsheet /13/ that is used to input data in the VERs spreadsheet /03/. During the onsite visit RINA has cross checked the original documents /12/ /14/ against the spreadsheet /13/ to confirm the correct data transference. The MR describes that 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	~~OK~~
C.6.3	Are the data management and quality assurance and quality control procedures sufficient to ensure that the emission reductions achieved by/resulting from the project can be reported ex post and verified?	/1/ /2/ /3/	DR/I /CC	Yes. The data management, quality assurance and quality control procedures followed at site ensure that the emission reductions achieved by/resulting from the project can be reported ex post and verified.	~~OK~~
C.6.4	Are the responsibilities and authorities for monitoring and reporting in accordance with the responsibilities and authorities stated in the monitoring plan?	/1/ /2/ /03/ /11/ /14/	DR/I /CC	Yes. Cerâmica Kamiranga is responsible for the monitoring of the parameters. There is a control spreadsheet for each year where data is controlled and described. This spreadsheet /13/ is the basis for the VERs calculation /03/.	~~OK~~
C.6.5	Does data management (from monitoring equipment to emission reduction	/01/ /02/	DR/I /CC	Yes, data to cross check the monitored parameters	~~OK~~

Checklist Question		Reference	MoV ²	Comments	Conclusion
	calculation) ensure correct transfer of data and reporting of emission reductions?	/03/		are available at the Kamiranga office.	
D.1 Assessment of data and calculation of emission reductions/Accuracy of emission reduction calculations					
D.1.1	How were the values in the monitoring report verified and cross-checked?	/01/ /02/ /03/	DR// CC	Please refer to section C.3.1.	~~CAR 3~~ ~~CAR 4~~
D.1.2	If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	/01/ /02/ /03/	DR// CC	VERs was based on monitored data.	OK
D.1.3	Emission reductions reported	/01/ /02/ /03/	DR// CC	Additional information is requested to the VERs calculation. Please, refer to the section C.3.1 RINA verified in the CERs spreadsheet that some cells have comments different from the information presented in the cell, for example, sheet <i>fNRB,y</i>: D18; M18 RINA verified that the amount of sawdust used in the VERs spreadsheet in the year 2013 is different from the raw data spreadsheet. Moreover, the production is different in January 2016.	OK ~~CAR 3; CAR 4~~ ~~CAR 6~~ ~~CAR 7~~

Checklist Question		Reference	MoV ²	Comments	Conclusion
D.1.4	Difference between the emission reductions estimated in the registered PD and the emission reductions reported for the monitoring period.	/01/ /02/ /03/	DR// CC	PP is requested to clarify the difference between the emission reduction estimated in the registered PD and the emission reductions reported for the monitoring period.	OK ~~CR-6~~

TABLE 2 RESOLUTION OF CORRECTIVE ACTION REQUESTS AND CLARIFICATION REQUESTS

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
CAR-1 In accordance with the guideline to complete the MR, in the section 2.2.2, PP is requested to describe any project description deviations applied during this monitoring period and explain the reasons for the deviation. Identify whether the deviation impacts the applicability of the methodology, additionality or the appropriateness of the baseline scenario and provide an explanation of the outcome. <u>Describe and report on any project description deviations applied in previous monitoring</u>	B.2	The deviation was described in the section 2.2.2., explaining the method of measurement of biomass. It is important to note that this deviation did not impact the applicability of the methodology, additionality or the appropriateness of the baseline scenario. On the other hand, this new method increased the quality of measurements of the parameter Qrenbiomass. 2º Round The deviation related to the construction of two new kilns, during the third MR, was described on section 2.2.2 of the current MR.	PP has correctly described the project deviation applicable to the current monitoring period, regarding the measurement of the biomass. RINA verified that it does not impact the applicability of the methodology, additionality or the appropriateness of the baseline scenario. However, in accordance with the MR guide, it is also requested to describe the project description deviations applied in previous monitoring reports. Revised MR does not describe the approved project deviation from the previous verifications (2 kilns not described in the registered PD). This CAR remains open

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
<u>reports.</u>			2nd round MR version 3 was revised and presents the deviation from the previous monitoring period in the section 2.2.2. This CAR is closed
CAR-2 PP is requested to clearly describe the source of data/ description of measurements methods and procedures to be applied of the parameter $Q_{renbiomass}$, in accordance with the methods verified during the onsite visit and applied during the monitoring period.	C.3.1	The informations of "Source of Data" and "Description of measurements methods and procedures to be applied" was rewritten in accordance with the methods verified during the visit.	MR was revised to describe the methods used during the monitoring period: <i>The amount of biomasses was monitored in accordance to the volume measured from the truck dimensions . The values in the receipts may be described in m³, therefore it is necessary the conversion to tonnes through the specific gravity of each biomass.</i> This CAR is closed
CAR-3 RINA verified the biomass evidences /12/ and the following inconsistencies were found: The amount of biomass described in the days; 12/01/2015; 05/01/2015; 10/01/2015 are not in accordance with the values described in the receipts -the biomass type described in the day 26/03/2016 is not in accordance with the evidence	C.3.1	The spreadsheets were updated according to the pointments made and the evidencies required were made aviable. The data of days 30/01/2014 and 31/03/2014 doesn't exist, so this informations were disconsidered.	Documents were correctly revised This CAR is closed

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
It was not included the receipt from 29/11/2013; NF 868 of 18/01/2014; NF 882 of 28/01/2014; 31/03/2016; 13/03/2016; 26/03/2016 Not provided the evidences described in the days 10/01/2014; 11/01/2014; 30/01/2014; 31/01/2014			
CAR-4 RINA verified the production internal control evidences /14/ and the following inconsistencies were found: - data is double accounted in the days 01/10/2013; 02/10/2013; 03/10/2013; 04/10/2013; 05/10/2013; 06/10/2013 -it was not presented in the spreadsheet data of the days 27/03/2014; 22/07/2014; 24/07/2014 -data is different from the evidences presented in the days 02/07/2014; 20/04/2015; 19/04/2015 -there is no evidences for the data presented in the days 13/02/2016; 07/02/2016	C.3.1	The spreadsheets were updated according to the pointments made and the evidencies required were made aviable.	Documents were correctly revised This CAR is closed
CAR-5 MR version 1 does not describe	C.3.1	The parameter "Origin of renewable biomass" was rewritten to describe the measures to confirm that the	PP has provided an analysis based on the government web site

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
the measures and evidences to confirm that the biomass used in the project activity is renewable biomass, taking into account the provisions described in the registered PD.		biomass used is renewable. Moreover, evidences were made available to confirm the origin of renewable biomass calculation. 2º Round The comment on "Origin of renewable biomass" was rewritten to make clear that 80% of biomass has the origin proved, as demonstrated on the analysis.	http://monitoramento.sema.pa.gov.br/simlam/index.htm to confirm that the sawmills are legal entities. The analisis provided tracked around 80 % of the biomass used in the project activity. However the revised MR describes <i>All the sawmills consulted on the website</i> <i><http://www.sectam.pa.gov.br/seiamlic> did not present any legal pending issues, providing indirectly the source of biomass. In this way all the renewable biomasses utilized are in accordance with definitions of renewable biomass set in the applied methodology</i> not in accordance with the results of the analysis. This CAR remains open 2nd round Monitoring report version 3 was revised accordingly. This CAR is closed
CAR 6 RINA verified in the CERs spreadsheet that some cells have comments different from the information presented in the	D.1.3	The comments of spreadsheets were reviewed and the information were corrected	Spreadsheet version 2 was correctly revised. This CAR is closed

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
cell, for example, sheet <i>fNRB,y</i> : D18; M18			
CAR-7 RINA verified that the amount of sawdust used in the VES spreadsheet in the year 2013 is different from the raw data spreadsheet. Moreover, the production is different in January 2016.	D.1.3	The amounts of biomass and production were corrected to be in accordance with the raw data. 2° Round Data from VES spreadsheet was updated and now it is in accordance with data presented in MR table 8. The data from sheet «Relatório Biomassa» were also revised.	Data for 2015 presented in the VES spreadsheet (sheet «Amount of renewable Biomass, column BH») is not in accordance with data presented in the revised MR, table 8. Moreover, in the raw data spreadsheet 2015, in the sheet «Relatório Biomassa» there is an #Value! In December 2015. This CAR remains open 2nd round Spreadsheet was revised accordingly. This CAR is closed
CR-1 Besides the MR describes the monitoring period of the changes, in accordance with the guide to complete the MR template, it is requested to present the relevant implementation dates (eg, dates of construction, commissioning,	B.2	According to the production spreadsheets, the kilns 3 and 4 started to operate in January 2nd, 2012, and January 8th, 2012, respectively with capacity to burn 36 and 37 thousand pieces each. This informations were updated at MR report.	Relevant dates were included in the revised report. This CR is closed

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
and continued operation periods)			
CR-2 PP is requested to provide further information for the thermal energy used in the project activity, providing an analysis of the loss of efficiency when compared to the baseline and estimative of the project in the PD, considering that section 1.9 of the registered PD describes “The expected level of activities is to achieve an increase in the burning efficiency due to the use of a dried biomass and its semiautomatic injection”.	C.3.1	The loss of efficiency in comparison with the VSC PD version 2.3 is due to the fact that in VSC PD it was not considered the use of <i>Açaí</i> pits and wood residue, and due to the construction of a shed to store the sawdust. Both of them caused the increase of thermal energy generated per tonne of ceramic units produced.	PP has clarified the difference of the thermal energy estimated in the PD and the one in the current monitoring period. Moreover, PP has compared it to the previous monitoring period to confirm data coherence. This CR is closed
CR-3 PP is requested to provide the evidences to confirm the consistency of the humidity applied in the NCV of the sawdust	C.3.1	The NCV considered in the calculation is 0.0147TJ/ton (referring to 20% of humidity). The value of 0.0084 TJ/ton appears in the control sheet to make a conservative estimate of the calculation of the energy generated by biomass therefore does not reflect the reality of the biomass used. According to Abreu, pg. 18, section 1.4.3 Chemistry Characteristics, (http://www.engwhere.com.br/empreiteiros/formas_aproveitamento_residuos_madeira.pdf) the composition of firewood is 40% to 50% of water. If dried in open air can	RINA verified that the NCV considered in the revised spreadsheet is in accordance with the evidences provided, taking into account 20% of water (the sawdust in the project activity is dried in open air) This CR is closed

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
		reach the composition of 20% of water.	
CR-4 PP is requested to provide the evidences of the weight (tonne/ceramic device) applied to convert the ceramic units to tonnes.	C.3.1	Evidences of the ceramic units weight were made available.	PP has provided the evidences of the weights (pictures of the weight using calibrated balance). This CR is closed
CR-5 PP is requested to clarify data used to calculate the parameter " $f_{NRB,y}$ ". In accordance with data provided by the Environmental Ministry updated in 26/02/2016 the total area of the Amazon biome is 4,198,551 Km ² and the area with integral protection is 417,493 Km ² and sustainable use 719,706 Km ² . Moreover, the spreadsheet presents data for indigenous land from 2014 that is not used in the calculation.	C.3.1	The parameter $f_{NRB,y}$ was updated in accordance with the Environmental Ministry and the "Indigenous Land" data was disregarded since it is not used in the calculation.	RINA verified that PP has used the latest data available by the Environmental Ministry updated in 26/02/2016 This CR is closed
CR-6 PP is requested to clarify the difference between the emission reduction estimated in the registered PD and the emission reductions reported for the monitoring period.	D.1.4	The difference between the ERY registered in PD and the ERY of the current monitoring report were clarified in the MR, section 4.4.	PP clarified that the increase in the ER is due to the increase in the ceramic production due to the market conditions. Value is consistent through the monitoring periods. This CR is closed.

TABLE 3 FORWARD ACTION REQUEST

Forward action request	Reference to Table 2	Response by project participants Verification Conclusion

CERTIFICATO DI QUALIFICA PER GLI SCHEMI VOLONTARI* QUALIFICATION CERTIFICATE FOR VOLUNTARY SCHEMES*

Si attesta che il sig./sig.ra:
We declare that Mr/Mrs/Ms:

Thais De Lima Carvalho

è qualificato come:
is qualified as:

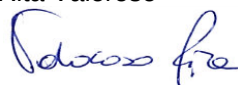
TEC, VAL, VER, TL, ITRP

per le seguenti aree tecniche:
for the following technical areas:

AREE TECNICHE TECHNICAL AREAS	DESCRIZIONE DELL'AREA TECNICA TECHNICAL AREA DESCRIPTION	SCOPO SETTORIALE SECTORAL SCOPE
1.1	Thermal energy generation	1
1.2	Renewables	1
2.1	Electricity distribution	2
13.1	Solid waste and wastewater	13

REVISIONE REVISION	DATA DATE	MOTIVAZIONI PER LA REVISIONE REASON FOR THE REVISION
0	19/07/2016	First issue with new template (this certificate is linked to CDM qualification)

Responsabile di schema
Scheme Leader
Rita Valoroso



*SCHEMI VOLONTARI/ VOLUNTARY SCHEMES: ACR American Carbon Registry, CCB The Climate, Community & Biodiversity Alliance, GS Gold Standard, JI Joint Implementation, SCS Social Carbon Standard, VCS Verified Carbon Standard.

TEC: Technical expert; VAL: Validator; VER: Verifier; TL: Team leader; FIN EXP: Financial Expert; ITRP: Independent technical reviewer

RINA Services S.p.A. è accreditato/riconosciuto da
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UNFCCC	quale Entità Operativa Designata (DOE), per condurre la Validazione e la Verifica di Progetti CDM <i>as Designated Operational Entity (DOE), to carry out Validation and Verification of CDM Projects</i>
VCSA	per condurre la Validazione e la Verifica di Progetti VCS <i>to carry out Validation and Verification of VCS Projects</i>
GS Foundation	per condurre la Validazione e la Verifica di Progetti GS <i>to carry out Validation and Verification of GS Projects</i>
Ecologica Institute	per condurre la Validazione e la Verifica di rapporti SCS <i>to carry out Validation and Verification of SCS Reports</i>
American Carbon Registry ACR	per condurre la Validazione e la Verifica di Progetti ACR <i>to carry out Validation and Verification of ACR projects</i>
The Climate, Community & Biodiversity Alliance CCB	per condurre la Validazione e la Verifica di Progetti co-benefit CCB <i>to carry out Validation and Verification of co-benefit CCB projects</i>

CERTIFICATO DI QUALIFICA PER GLI SCHEMI VOLONTARI* QUALIFICATION CERTIFICATE FOR VOLUNTARY SCHEMES*

Si attesta che il sig./sig.ra:
We declare that Mr/Mrs/Ms:

Rekha Menon

è qualificato come:
is qualified as:

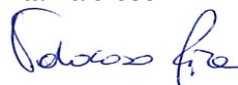
TEC, VAL, VER, TL, ITRP

per le seguenti aree tecniche:
for the following technical areas:

AREE TECNICHE TECHNICAL AREAS	DESCRIZIONE DELL'AREA TECNICA TECHNICAL AREA DESCRIPTION	SCOPO SETTORIALE SECTORAL SCOPE
1.2	Renewables	1
2.1	Electricity distribution	2
13.1	Solid waste and wastewater	13
13.2	Manure	13
14.1	Afforestation and reforestation	14

REVISIONE REVISION	DATA DATE	MOTIVAZIONI PER LA REVISIONE REASON FOR THE REVISION
0	19/07/2016	First issue with new template (this certificate is linked to CDM qualification)

Responsabile di schema
Scheme Leader
Rita Valoroso



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