

VERIFICATION REPORT



Document Prepared By TÜV Rheinland do Brasil Ltda. (On behalf of TÜV Rheinland (China) Ltd.)

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Summary:

The purpose and scope of verification

TÜV Rheinland has performed the 3rd periodic verification of the project: “Argibem, São Sebastião and Vulcão Ceramics Fuel Switching Project” according to the Verified Carbon Standard – VCS Version 3. This verification covers the period from July 01st, 2011 to February 28th, 2013.

The project was validated under VCS 2007.1 by Designated Operational Entity TÜV Nord Cert GmbH, which also verified the first period verification from April 1st, 2006 to September 30th, 2008. The second period verification from October 1st, 2008 to June 30th, 2011 was verified by Bureau Veritas Certification.

The verification includes confirming the implementation of the monitoring plan of the VCS PD and the application of the CDM small scale methodology “AMS-I.C.: “Thermal energy for the user with or without electricity”, version 13.

A brief description of the verification and the project

The project activity is the project of Argibem, São Sebastião and Vulcão Ceramics, which is an enterprise that produces structural ceramic devices such as bricks. It is located in the city of Bemposta, Barra do Piraí and Queimados, respectively, in Rio de Janeiro State, southeast of Brazil. Before the project activity implementation, the fuel employed to fire the ceramic devices was heavy oil from petrol reserves, which is a common practice in the region.

The project activity consists on utilizing sawdust, afforestation wood and wood residues to feed the kilns instead of using heavy oil from petrol reserves.

By utilizing renewable biomasses for the generation of thermal energy for industrial use, this project activity directly helps in reducing the Brazilian deforestation rates, the main source of greenhouse gas emissions in Brazil.

The method and criteria used for verification

The verification team has reviewed the Monitoring Report against the criteria established in the VCS Version 3 Program Guide and the CDM Validation and Verification Standard. In line with the criteria included in the VCS Version 3 Program Guide, the verification is meant to ensure that the reported emission reductions are real, measurable, transparent and conservative.

The verification consisted of a desk review and on-site visits (April 16th, 2013 and April 19th, 2013) where interviews with the key personnel from the project company Argibem, São Sebastião and Vulcão Ceramics and the PD developer Sustainable Carbon – Projetos Ambientais Ltda were conducted. The verification team also confirmed that the monitoring procedures were correctly applied and the emission reductions were correctly calculated.

Summary of the verification conclusion

The Monitoring Report is considered to be in compliance with VCS Program Guide, the approved methodology “AMS-I.C.: “Thermal energy for the user with or without electricity”, version 13 and the Monitoring Plan presented in the Project Description.

During the monitoring period from July 01st, 2011 to February 28th, 2013 the project generated the following GHG emission reductions: **31,521** tCO₂ equivalents.

TÜV Rheinland does not take any responsibility towards the issuance and utilization of the emission reductions hereby verified and certified. Request for issuance of VCUs shall be made by the project proponent to an approved VCS Program Registry based on the requirements set out under the most recent version of the VCS Program Guidelines clause on VCS Registration. The verification of reported emission reductions is based on the information made available to us and the engagement conditions detailed in this report. TÜV Rheinland cannot guarantee the accuracy or correctness of this information. Hence, TÜV Rheinland cannot be held liable by any party for decisions made or not made based on this report.

Table of Contents

1	Introduction	5
1.1	Objective.....	5
1.2	Scope and Criteria.....	5
1.3	Level of assurance	5
1.4	Summary Description of the Project.....	6
2	Verification Process	6
2.1	Method and Criteria.....	9
2.2	Document Review	9
2.3	Interviews.....	9
2.4	Site Inspections.....	17
2.5	Resolution of Any Material Discrepancy.....	18
3	Verification Findings	18
3.1	Project Implementation Status.....	19
3.2	Accuracy of GHG Emission Reduction or Removal Calculations	19
3.3	Quality of Evidence to Determine GHG Emission Reductions or Removals.....	20
3.4	Management and Operational System.....	22
4	Verification conclusion	22
5	APPENDIX A – VERIFICATION PROTOCOL	26

1 INTRODUCTION

1.1 Objective

Sustainable Carbon – Projetos Ambientais LTDA has commissioned TÜV Rheinland to verify the 3rd periodic verification of the emission reductions reported for the VCS “Argibem, São Sebastião and Vulcão Ceramics Fuel Switching Project” with regard to the relevant requirements for VCS program as per the Verified Carbon Standard Version 3.

The objective of the the 3rd periodic verification is to verify that the actual monitoring systems and procedures are in compliance with the monitoring system and procedures described in the Monitoring Plan that is presented in the PD as well as with the Monitoring Manual. In addition, the periodic verification evaluates the greenhouse gas (GHG) emissions data presented in the Monitoring Report and expresses a conclusion about whether the presented GHG emissions data is free off material misstatements and sufficiently supported by evidence.

1.2 Scope and Criteria

The verification comprises a review of the monitoring report over the monitoring period from July 01st, 2011 to February 28th, 2013, based on the registered Project Description (PD) in part of the project design, monitoring parameters, monitoring plan, emission reduction calculation, monitoring methodology and all related evidences provided by project participant. Those documents have been reviewed and verified against VCS Version 3 requirements, UNFCCC rules and associated interpretations. The verification is based on validated project design document including baseline calculations.

The main scopes of this verification are:

- Verify whether the emission reductions generated by the project are in line with the VCS Verification Protocol and the information provided by the project participants contains all the necessary information to evidence the project’s compliance with all criteria in the VCS.
- Verify that the project has been implemented as described in the Project Design (PD) during the verification period.
- Confirm that the monitoring plan was implemented and fully functional to generate voluntary emission reductions (VCU) without any double counting during the whole verification period.
- Give a conclusion whether reported data are accurate, complete, consistent, and transparent, with a high level of assurance and free of material error or misstatement.

In particular, the project baseline, monitoring plan and the project compliance with relevant applicable protocols and criteria (i.e. UNFCCC, VCS, host Party and others) are to be validated in order to confirm that the project design, as documented, is sound and reasonable and meets the applicable criteria.

The correct application of the CDM small scale methodology: “AMS-I.C.: “Thermal energy for the user with or without electricity”, version 13 was already validated by TÜV Nord Cert GmbH, documented in its Validation Report of May 22nd, 2009.

An explicit review of the validation and its underlying assumptions made and conclusion of TÜV Nord Cert GmbH are not scope of this verification.

1.3 Level of assurance

As the VCS Version 3 recognizes verified emission reductions, TÜV Rheinland has focused on providing a reasonable level of assurance that the emission reduction calculation methodology is appropriate and correctly applied, and that emission reductions have been accurately monitored. The implementation can be considered sustainable and no indications were observed leading to the assumption of high risks beyond common project specific challenges in relation to the likelihood of continual removal of GHG emission reduction through the project. This judgment is based on the document review, on site checks and consistency checks.

In the case it is required, TÜV Rheinland may discount verified emission reductions or requests a discount of these by using conservative assumptions for uncertainties in emission reduction calculations that cannot be fully quantified or that cannot give a desired level of assurance. For verifying/certifying VCUs, the desired level of assurance was based on the combined quantitative assessment of the accuracy of monitoring project performance and the identification of material risks.

1.4 Summary Description of the Project

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

The Argibem, São Sebastião and Vulcão Ceramics Company is located in the city of Bemposta, Barra do Piraí and Queimados, respectively, in Rio de Janeiro State, southeast of Brazil. Argibem, São Sebastião and Vulcão Ceramics are enterprises that produce structural ceramic devices such as bricks.

The purpose of this project is to promote a fuel switch in Argibem, São Sebastião and Vulcão Ceramics by utilizing renewable biomasses, like sawdust, afforestation wood and wood residues instead of heavy oil from petrol reserves, as validated by TÜV Nord Cert GmbH (section 2.5 of the Validation Report / 5 /). The switching fuel project reduces Greenhouse Gases (GHG) emissions, by replacing heavy oil with renewable biomass for thermal energy generation.

As described in the VCS PD / 4 /, Argibem, São Sebastião and Vulcão Ceramics comprises 1 Tunnel kiln, and 2 Hoffman kilns, distributed as per Table 1, which were confirmed through the onsite visit carried out on April 16th, 2013 and April 19th, 2013. The project has been fully operational in this monitoring period. This means the ceramics is operating using exclusively renewable biomass, thus mitigating their baseline emissions.

Table 1: Kilns and drying processes verified onsite.

Ceramic Name	Kilns in VCS PD / 4 /	Kilns in this monitoring period	Drying Process
Ceramic	01 Tunnel	01 Tunnel	Continuous artificial (sheltered)
São Sebastião	01 Hoffman	01 Hoffman	Natural and artificial

Ceramic Name	Kilns in VCS PD / 4 /	Kilns in this monitoring period	Drying Process
Vulcão	01 Hoffman	01 Hoffman	Natural (open and sheltered areas) and a new artificial furnace



Figure 1: Automatic biomass feeding machine at Argibem Ceramic.



Figure 2: Continuous artificial process for ceramic drying at Argibem Ceramic.

At São Sebastião Ceramic there is one (01) Hoffman kiln (Figure 3), which is manually fed by the ceramic employees, and the ceramic pieces are dried through natural (Figure 4) and artificial process. During the onsite visit, the verification team was able to confirm that the new Tunnel kiln is being finalized, which did not start its operation yet and can be seen on Figure 5.



Figure 3: Hoffman kiln at São Sebastião Ceramic.



Figure 4: Natural drying process of ceramic pieces at São Sebastião Ceramic.



Figure 5: New Tunnel kiln which is being finalized at São Sebastião Ceramic.

At Vulcão Ceramic there is one (01) Hoffman kiln (Figure 6), which is manually fed by the ceramic employees, and the ceramic pieces are dried through a new artificial (Figure 7) and natural process in open and sheltered areas (Figure 8).



Figure 6: Hoffman kiln at Vulcão Ceramic.



Figure 7: Artificial drying process of ceramic pieces at Vulcão Ceramic.



Figure 8: Natural sheltered drying process of ceramic pieces at Vulcão Ceramic.

As per VCS Version 3, this project is not considered a grouped project, since it does not allow expansions and none of the ceramics exceed the capacity limits to which the project was submitted. The “grouping” or the expression “grouped project” were mentioned in the VCS PD / 4 /, Validation Report issued by TÜV NORD CERT GmbH / 5 /, Monitoring Report / 8 /, since they followed the VCS Version 2007.1. This version of the standard defined grouped project as “a number of projects and their related methodologies included in a single VCS Project Description (VCS PD) at the time of the validation”, which is associated with the meaning of “bundle” or “union”. In the current monitoring report / 11 / and verification report, following VCS Version 3, this project is not deemed a “grouped project”, but a bundled one.

The fuel utilized in the baseline scenario to fire the ceramic units was heavy oil (a fossil fuel), which is a common practice in the region, as validated by TÜV NORD CERT GmbH (section 3.2 of the Validation Report / 5 /). The switching fuel project reduces Greenhouse Gases (GHG) emissions, by replacing heavy oil from petrol reserves with renewable biomass, such as sawdust, afforestation wood and wood residues for thermal energy generation.

This 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. Also,

the cost of fuel represents a barrier, since renewable biomass is more expensive than native firewood on an energy basis.

By utilizing renewable biomasses for effective generation of thermal energy for captive consumption, this project activity directly helps in reducing the Brazilian deforestation rates, the main source of greenhouse gas emissions in Brazil.

During the monitoring period from July 01st, 2011 to February 28th, 2013 the project generated the following GHG emission reductions: **31,521** tCO₂ equivalents. In addition, this project contributes to sustainable development by applying the SOCIALCARBON® Standard, which monitors six main aspects: carbon, biodiversity, social, financial, human and natural.

As part of the site visit the verification team was able to confirm that the project implementation is in accordance with the project description contained in registered VCS PD version 03, 15/05/2009, with the exception of the deviation of the monitoring of parameter Q_{renbiomass}.

2 VERIFICATION PROCESS

2.1 Method and Criteria

The verification is based on validated project description including baseline and monitoring report. These documents are reviewed against VCS Version 3 requirements. TÜV Rheinland has, based on the recommendations in the Validation and Verification Standard, employed a risk-based approach in the verification, focusing on the identification of significant risks and reliability of project monitoring and generation of emission reductions.

The verification includes the following steps: desk review of the project design documents and monitoring report; on-site visit and follow-up interviews and resolution of outstanding issues and the issuance of the final verification report and opinion.

2.2 Document Review

The following table outlines the documentation reviewed during the verification process:

/ 1 / UNFCCC, Clean Development Mechanism Validation and Verification Standard, Version 03.0
/ 2 / UNFCCC, CDM small scale methodology “AMS-I.C.: “Thermal energy for the user with or without electricity”, version 13.
/ 3 / “General guidance on leakage in biomass project activities” (attachment C of appendix B), Version 03.0 (EB 21, Annex 22)
/ 4 / VCS PD registered, Version 03, dated May 15 th , 2009
/ 5 / VCS Validation Report – TÜV Nord Cert GmbH - May 22 nd , 2009
/ 6 / VCS Verification Report (1 st periodic verification) - TÜV Nord Cert GmbH - May 22 nd , 2009

/ 7 / VCS Verification Report (2 nd periodic verification) - Bureau Veritas Certification – December 8 th , 2011
/ 8 / VCS Monitoring Report (1 st periodic verification), Version 03, dated May, 15 th , 2009
/ 9 / VCS Monitoring Report (2 nd periodic verification), Version 03, dated November, 09 th , 2011
/ 10 / VCS Monitoring Report - Version 01.1 – First Version –April 5 th , 2013
/ 11 / VCS Monitoring Report - Version 06 – Last version –July 30 th , 2013
/ 12 / Emission Reductions Calculation - Spreadsheet “VCS MR Calculation Argibem_ São Sebastião_Vulcão_v_6”
/ 13 / Study from UNICAMP - Faculty of Mechanical Engineering. Available at: < http://www.fem.unicamp.br/~em672/GERVAP2.pdf >. Last visit on: April, 2012.
/ 14 / IPCC - Intergovernmental Pannel on Climate Change: Source. Available at: < http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf >, table 1.2. Last visit on: April, 2012.
Documents of Argibem Ceramic
/ 15 / Internal Dropbox Spreadsheets of Argibem Ceramic for 2011
/ 16 / Internal Dropbox Spreadsheets of Argibem Ceramic for 2012
/ 17 / Internal Dropbox Spreadsheets of Argibem Ceramic for 2013
/ 18 / State of Rio de Janeiro, Permit License N° 3.720.8.0191 of Argibem Ceramic, dated 10/10/1986
/ 19 / State Foundation of Environmental Engineering, Operating license N° FE008251 for production of ceramic devices at Argibem Ceramic, issued on 30/03/2005, valid until 30/03/2010.
/ 20 / State Institute of the Environment, Protocol of Renewal of the Operating license for production of ceramic devices at Argibem Ceramic N° E-07/200808/2003, issued on 27/11/2009.
/ 21 / State Foundation of Environmental Engineering, Operating license N° IN015529 for clay extraction for Argibem Ceramic, issued on 10/02/2011, valid until 18/01/2016.
/ 22 / Invoice for the purchase of woody residues from supplier Silveira e Rena for the period between 01/07/2011 – 31/12/2011
/ 23 / Invoice for the purchase of woody residues from supplier Rural Prestadora for the period between 01/07/2011 – 31/12/2011
/ 24 / Invoice for the purchase of sawdust from supplier Vanderlei Alfenas for the period between 01/07/2011 – 31/12/2011
/ 25 / Invoice for the purchase of sawdust from supplier Silveira e Rena for the period between 01/07/2011 – 31/12/2011
/ 26 / Invoice for the purchase of sawdust from supplier Rural Prestadora for the period between 01/07/2011 – 31/12/2011
/ 27 / Invoice for the purchase of sawdust from supplier GA de Andrade for the period between 01/07/2011 – 31/12/2011
/ 28 / Invoice for the purchase of sawdust from supplier Felipe de Oliveira for the period between 01/07/2011 – 31/12/2011
/ 29 / Invoice for the purchase of sawdust from supplier Betinho for the period between 01/07/2011 – 31/12/2011
/ 30 / Invoice for the purchase of sawdust from supplier André Ricardo for the period between 01/07/2011 – 31/12/2011
/ 31 / Invoice for the purchase of woody residues from supplier Rural Prestadora for the period between 01/01/2012 – 31/12/2012
/ 32 / Invoice for the purchase of woody residues from supplier GA de Andrade for the period between 01/01/2012 – 31/12/2012

/ 33 / Invoice for the purchase of woody residues from supplier Felipe de Oliveira for the period between 01/01/2012 – 31/12/2012
/ 34 / Invoice for the purchase of woody residues from supplier Comércio Lopas for the period between 01/01/2012 – 31/12/2012
/ 35 / Invoice for the purchase of woody residues from supplier Chaco-Vaco for the period between 01/01/2012 – 31/12/2012
/ 36 / Invoice for the purchase of sawdust from supplier Silveira e Rena for the period between 01/01/2012 – 31/12/2012
/ 37 / Invoice for the purchase of sawdust from supplier Recitrans UBA for the period between 01/01/2012 – 31/12/2012
/ 38 / Invoice for the purchase of sawdust from supplier GA de Andrade for the period between 01/01/2012 – 31/12/2012
/ 39 / Invoice for the purchase of sawdust from supplier Felipe de Oliveira for the period between 01/01/2012 – 31/12/2012
/ 40 / Invoice for the purchase of sawdust from supplier Comércio Lopas for the period between 01/01/2012 – 31/12/2012
/ 41 / Invoice for the purchase of sawdust from supplier Chaco-Vaco for the period between 01/01/2012 – 31/12/2012
/ 42 / Invoice for the purchase of sawdust from supplier Andre Ricardo for the period between 01/01/2012 – 31/12/2012
/ 43 / Invoice for the purchase of woody residues from supplier Felipe de Oliveira - ME for the period between 01/01/2013 – 28/02/2013
/ 44 / Invoice for the purchase of sawdust from supplier Recitrans UBA for the period between 01/01/2013 – 28/02/2013
/ 45 / Invoice for the purchase of sawdust from supplier GA de Andrade for the period between 01/01/2013 – 28/02/2013
/ 46 / Invoice for the purchase of sawdust from supplier Felipe de Oliveira - ME for the period between 01/01/2013 – 28/02/2013
/ 47 / Invoice for the purchase of sawdust from supplier Chaco-Vaco for the period between 01/01/2013 – 28/02/2013
Documents of São Sebastião Ceramic
/ 48 / Internal Dropbox Spreadsheets of São Sebastião Ceramic for 2011
/ 49 / Internal Dropbox Spreadsheets of São Sebastião Ceramic for 2012
/ 50 / Internal Dropbox Spreadsheets of São Sebastião Ceramic for 2013
/ 51 / State Foundation of Environmental Engineering, Operating license N° FE010616 for production of ceramic devices at São Sebastião Ceramic, issued on 31/03/2006, valid until 31/03/2011.
/ 52 / State Institute of the Environment, Protocol of Renewal of the Operating license for production of ceramic devices at São Sebastião Ceramic N° E-07/510540/2010, issued on 19/11/2010.
/ 53 / State Institute of the Environment, Clay extraction license of São Sebastião Ceramic N° FE011229, issued on 28/06/2006, valid until 28/06/2011.
/ 54 / State Institute of the Environment, Protocol of Renewal of clay extraction license for São Sebastião Ceramic N° E-07/501786/2011, issued on 21/02/2011.
/ 55 / Invoice for the purchase of woody residues from supplier GRI Gerenciamento de Resíduos for the period between 01/07/2011 – 31/12/2011
/ 56 / Invoice for the purchase of woody residues from supplier BR Metals Fundições for the period between 01/07/2011 – 31/12/2011
/ 57 / Invoice for the purchase of woody residues from supplier Cielrei Reciclagem for the period between 01/07/2011 – 31/12/2011
/ 58 / Invoice for the purchase of woody residues from supplier Schweitzer Mauduit for the period between 01/07/2011 – 31/12/2011

/ 59 / Invoice for the purchase of woody residues from supplier Karded Comércio de Sucatas for the period between 01/07/2011 – 31/12/2011
/ 60 / Invoice for the purchase of woody residues from supplier Rimet Empreendimentos Industriais for the period between 01/07/2011 – 31/12/2011
/ 61 / Invoice for the purchase of woody residues from supplier MTB International for the period between 01/07/2011 – 31/12/2011
/ 62 / Invoice for the purchase of woody residues from supplier JPJ Madeiras Empresarial for the period between 01/07/2011 – 31/12/2011
/ 63 / Invoice for the purchase of woody residues from supplier ST Lima Materiais de Construção for the period between 01/07/2011 – 31/12/2011
/ 64 / Invoice for the purchase of woody residues from supplier Reluz Logística Reversa for the period between 01/07/2011 – 31/12/2011
/ 65 / Invoice for the purchase of wood from afforestation from supplier Alta Floresta Plantação for the period between 01/07/2011 – 31/12/2011
/ 66 / Invoice for the purchase of wood from afforestation from supplier Josias Lopes da Silva for the period between 01/07/2011 – 31/12/2011
/ 67 / Invoice for the purchase of wood from afforestation from supplier Arlete Maria de Ramos for the period between 01/07/2011 – 31/12/2011
/ 68 / Invoice for the purchase of wood from afforestation from supplier Antonio Lopes for the period between 01/07/2011 – 31/12/2011
/ 69 / Invoice for the purchase of wood from afforestation from supplier Valdelino Ferreira for the period between 01/07/2011 – 31/12/2011
/ 70 / Invoice for the purchase of wood from afforestation from supplier Rural Mirtalves for the period between 01/07/2011 – 31/12/2011
/ 71 / Invoice for the purchase of wood from afforestation from supplier Juarez Nunes de Souza for the period between 01/07/2011 – 31/12/2011
/ 72 / Invoice for the purchase of wood from afforestation from supplier S M da Silva Guimarães for the period between 01/07/2011 – 31/12/2011
/ 73 / Invoice for the purchase of wood from afforestation from supplier Flora Comércio e Transporte de Eucalipto for the period between 01/07/2011 – 31/12/2011
/ 74 / Invoice for the purchase of wood from afforestation from supplier Marco Ind e Com de Madeiras for the period between 01/07/2011 – 31/12/2011
/ 75 / Invoice for the purchase of wood from afforestation from supplier Emannuel Jose Romeu Gomes Roque for the period between 01/07/2011 – 31/12/2011
/ 76 / Invoice for the purchase of wood from afforestation from supplier Valdelino Ferreira for the period between 01/01/2012 – 31/12/2012
/ 77 / Invoice for the purchase of wood from afforestation from supplier São Gonçalo Empreendimentos for the period between 01/01/2012 – 31/12/2012
/ 78 / Invoice for the purchase of wood from afforestation from supplier Sandro Vieira Nordskog for the period between 01/01/2012 – 31/12/2012
/ 79 / Invoice for the purchase of wood from afforestation from supplier S M da Silva Guimarães for the period between 01/01/2012 – 31/12/2012
/ 80 / Invoice for the purchase of wood from afforestation from supplier Rural Mirtalves for the period between 01/01/2012 – 31/12/2012
/ 81 / Invoice for the purchase of wood from afforestation from supplier Milena Marin Rivas Gomes for the period between 01/01/2012 – 31/12/2012
/ 82 / Invoice for the purchase of wood from afforestation from supplier Manuel Jorge Martins de Barros for the period between 01/01/2012 – 31/12/2012
/ 83 / Invoice for the purchase of wood from afforestation from supplier Magid Breves Muniz for the period between 01/01/2012 – 31/12/2012
/ 84 / Invoice for the purchase of wood from afforestation from supplier Juarez Nunes de Souza for the period between 01/01/2012 – 31/12/2012
/ 85 / Invoice for the purchase of wood from afforestation from supplier Josias Lopes da Silva for the period between 01/01/2012 – 31/12/2012

/ 86 / Invoice for the purchase of wood from afforestation from supplier José Geraldo Vasconcelos Coelho for the period between 01/01/2012 – 31/12/2012
/ 87 / Invoice for the purchase of wood from afforestation from supplier José Carlos Barbosa for the period between 01/01/2012 – 31/12/2012
/ 88 / Invoice for the purchase of wood from afforestation from supplier AE Comércio e Serviços for the period between 01/01/2012 – 31/12/2012
/ 89 / Invoice for the purchase of woody residues from supplier Schweitzer Mauduit for the period between 01/01/2013 – 28/02/2013
/ 90 / Invoice for the purchase of woody residues from supplier Rimet Empreendimentos Industriais for the period between 01/01/2013 – 28/02/2013
/ 91 / Invoice for the purchase of woody residues from supplier Reluz Logística Reversa for the period between 01/01/2013 – 28/02/2013
/ 92 / Invoice for the purchase of woody residues from supplier OJM Lorena ME for the period between 01/01/2013 – 28/02/2013
/ 93 / Invoice for the purchase of woody residues from supplier Markobras Ambiental Ltda for the period between 01/01/2013 – 28/02/2013
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/ 95 / Invoice for the purchase of woody residues from supplier Carboos Resende Química for the period between 01/01/2013 – 28/02/2013
/ 96 / Invoice for the purchase of woody residues from supplier BR Metals Fundições for the period between 01/01/2013 – 28/02/2013
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/ 98 / Invoice for the purchase of wood from afforestation from supplier S. M. da Silva Guimarães Comércio de Madeiras for the period between 01/01/2013 – 28/02/2013
/ 99 / Invoice for the purchase of wood from afforestation from supplier Maria do Carmo Souza Moraes for the period between 01/01/2013 – 28/02/2013
/ 100 / Invoice for the purchase of wood from afforestation from supplier Manuel Jorge Martins de Barros for the period between 01/01/2013 – 28/02/2013
/ 101 / Invoice for the purchase of wood from afforestation from supplier Juarez Nunes de Souza e outro for the period between 01/01/2013 – 28/02/2013
/ 102 / Invoice for the purchase of wood from afforestation from supplier Fazenda Paineiras for the period between 01/01/2013 – 28/02/2013
/ 103 / Invoice for the purchase of wood from afforestation from supplier Antonio Lopes for the period between 01/01/2013 – 28/02/2013
Documents of Vulcão Ceramic
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/ 105 / Internal Dropbox Spreadsheets of Vulcão Ceramic for 2012
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/ 107 / State Institute of the Environment, Operating license for production of ceramic devices at Vulcão Ceramic Nº IN016221, issued on 06/04/2011, valid until 06/04/2019.
/ 108 / State Foundation of Environmental Engineering, Clay extraction license of Vulcão Ceramic Nº FE002859, issued on 25/08/2004, valid until 25/08/2009.
/ 109 / State Institute of the Environment, Protocol of Renewal of clay extraction license for Vulcão Ceramic Nº E-07/501077/2009, issued on 17/04/2009.
/ 110 / Invoice for the purchase of woody residues from supplier Workshore for the period between 01/07/2011 – 31/12/2011
/ 111 / Invoice for the purchase of woody residues from supplier Sevan Marine for the period between 01/07/2011 – 31/12/2011

/ 112 / Invoice for the purchase of woody residues from supplier Serip Moveis for the period between 01/07/2011 – 31/12/2011
/ 113 / Invoice for the purchase of woody residues from supplier Seadril Serv. Petroleo for the period between 01/07/2011 – 31/12/2011
/ 114 / Invoice for the purchase of woody residues from supplier Schahin Eng. for the period between 01/07/2011 – 31/12/2011
/ 115 / Invoice for the purchase of woody residues from supplier Rassini NHK for the period between 01/07/2011 – 31/12/2011
/ 116 / Invoice for the purchase of woody residues from supplier Projotec for the period between 01/07/2011 – 31/12/2011
/ 117 / Invoice for the purchase of woody residues from supplier Pacific for the period between 01/07/2011 – 31/12/2011
/ 118 / Invoice for the purchase of woody residues from supplier Lubrizol for the period between 01/07/2011 – 31/12/2011
/ 119 / Invoice for the purchase of woody residues from supplier Incopre Ind. for the period between 01/07/2011 – 31/12/2011
/ 120 / Invoice for the purchase of woody residues from supplier Graham Packaging for the period between 01/07/2011 – 31/12/2011
/ 121 / Invoice for the purchase of woody residues from supplier Gafisa for the period between 01/07/2011 – 31/12/2011
/ 122 / Invoice for the purchase of woody residues from supplier G.V. Demolidora e Locadora for the period between 01/07/2011 – 31/12/2011
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/ 125 / Invoice for the purchase of wood from afforestation from supplier Quincas for the period between 01/07/2011 – 31/12/2011
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/ 127 / Invoice for the purchase of wood from afforestation from supplier Flavio for the period between 01/07/2011 – 31/12/2011
/ 128 / Invoice for the purchase of woody residues from supplier Workshore for the period between 01/01/2012 – 31/12/2012
/ 129 / Invoice for the purchase of woody residues from supplier Sevan Marine for the period between 01/01/2012 – 31/12/2012
/ 130 / Invoice for the purchase of woody residues from supplier Serip Moveis for the period between 01/01/2012 – 31/12/2012
/ 131 / Invoice for the purchase of woody residues from supplier Seadril Serv Petroleo for the period between 01/01/2012 – 31/12/2012
/ 132 / Invoice for the purchase of woody residues from supplier Rassini NHK for the period between 01/01/2012 – 31/12/2012
/ 133 / Invoice for the purchase of woody residues from supplier Phitoteraphia Laboratorial for the period between 01/01/2012 – 31/12/2012
/ 134 / Invoice for the purchase of woody residues from supplier Pacific Drilling Brasil for the period between 01/01/2012 – 31/12/2012
/ 135 / Invoice for the purchase of woody residues from supplier Odebrecht for the period between 01/01/2012 – 31/12/2012
/ 136 / Invoice for the purchase of woody residues from supplier Ocean do Brasil Serv Petroleo for the period between 01/01/2012 – 31/12/2012
/ 137 / Invoice for the purchase of woody residues from supplier Lubrizol for the period between 01/01/2012 – 31/12/2012
/ 138 / Invoice for the purchase of woody residues from supplier ITA Rio Motos for the period between 01/01/2012 – 31/12/2012

/ 139 / Invoice for the purchase of woody residues from supplier Incopre for the period between 01/01/2012 – 31/12/2012
/ 140 / Invoice for the purchase of woody residues from supplier Diretoria Geral Marinha for the period between 01/01/2012 – 31/12/2012
/ 141 / Invoice for the purchase of woody residues from supplier Comanda Marinha DGMM for the period between 01/01/2012 – 31/12/2012
/ 142 / Invoice for the purchase of woody residues from supplier V Trum Cristais Temperados LTDA for the period between 01/01/2012 – 31/12/2012
/ 143 / Invoice for the purchase of woody residues from supplier Triunfo Logistica for the period between 01/01/2012 – 31/12/2012
/ 144 / Invoice for the purchase of woody residues from supplier Trans Carioca - BRT for the period between 01/01/2012 – 31/12/2012
/ 145 / Invoice for the purchase of woody residues from supplier Skanska for the period between 01/01/2012 – 31/12/2012
/ 146 / Invoice for the purchase of woody residues from supplier Procosa for the period between 01/01/2012 – 31/12/2012
/ 147 / Invoice for the purchase of woody residues from supplier Prefeitura Municipal de Itaguaí for the period between 01/01/2012 – 31/12/2012
/ 148 / Invoice for the purchase of woody residues from supplier Petrobras for the period between 01/01/2012 – 31/12/2012
/ 149 / Invoice for the purchase of woody residues from supplier Parana S.A. for the period between 01/01/2012 – 31/12/2012
/ 150 / Invoice for the purchase of woody residues from supplier Ocean do Brasil Serv. Petróleo for the period between 01/01/2012 – 31/12/2012
/ 151 / Invoice for the purchase of woody residues from supplier Nucleobras for the period between 01/01/2012 – 31/12/2012
/ 152 / Invoice for the purchase of woody residues from supplier Mizu S.A. for the period between 01/01/2012 – 31/12/2012
/ 153 / Invoice for the purchase of woody residues from supplier Mat S.A. for the period between 01/01/2012 – 31/12/2012
/ 154 / Invoice for the purchase of woody residues from supplier Libra Terminal Rio S.A. for the period between 01/01/2012 – 31/12/2012
/ 155 / Invoice for the purchase of woody residues from supplier JZ Engenharia for the period between 01/01/2012 – 31/12/2012
/ 156 / Invoice for the purchase of woody residues from supplier G.V. Demolidora for the period between 01/01/2012 – 31/12/2012
/ 157 / Invoice for the purchase of woody residues from supplier Estaleiro Brasfels for the period between 01/01/2012 – 31/12/2012
/ 158 / Invoice for the purchase of woody residues from supplier Eco RJ Gestão Ambiental for the period between 01/01/2012 – 31/12/2012
/ 159 / Invoice for the purchase of woody residues from supplier Empresa Brasileira de Solda Elétrica for the period between 01/01/2012 – 31/12/2012
/ 160 / Invoice for the purchase of woody residues from supplier Deep Sea Supply Nav Marinha for the period between 01/01/2012 – 31/12/2012
/ 161 / Invoice for the purchase of woody residues from supplier Construtora Fonseca e Mercadante for the period between 01/01/2012 – 31/12/2012
/ 162 / Invoice for the purchase of woody residues from supplier Consorcio Novo Cenpes for the period between 01/01/2012 – 31/12/2012
/ 163 / Invoice for the purchase of woody residues from supplier Cepel for the period between 01/01/2012 – 31/12/2012
/ 164 / Invoice for the purchase of woody residues from supplier Bellaforma for the period between 01/01/2012 – 31/12/2012
/ 165 / Invoice for the purchase of wood from afforestation from supplier Flavio for the period between 01/01/2012 – 31/12/2012

/ 166 / Invoice for the purchase of wood from afforestation from supplier Gildo for the period between 01/01/2012 – 31/12/2012
/ 167 / Invoice for the purchase of wood residues from supplier Vila Real for the period between 01/01/2013 – 28/02/2013
/ 168 / Invoice for the purchase of wood residues from supplier Universidade Federal do Rio de Janeiro - Rural for the period between 01/01/2013 – 28/02/2013
/ 169 / Invoice for the purchase of wood residues from supplier Triunfo Logística for the period between 01/01/2013 – 28/02/2013
/ 170 / Invoice for the purchase of wood residues from supplier Transpetro for the period between 01/01/2013 – 28/02/2013
/ 171 / Invoice for the purchase of wood residues from supplier Top Road Motos for the period between 01/01/2013 – 28/02/2013
/ 172 / Invoice for the purchase of wood residues from supplier Serip Moveis for the period between 01/01/2013 – 28/02/2013
/ 173 / Invoice for the purchase of wood residues from supplier Rassini NHK for the period between 01/01/2013 – 28/02/2013
/ 174 / Invoice for the purchase of wood residues from supplier Projotec for the period between 01/01/2013 – 28/02/2013
/ 175 / Invoice for the purchase of wood residues from supplier Phitoteraphia Laboratorial for the period between 01/01/2013 – 28/02/2013
/ 176 / Invoice for the purchase of wood residues from supplier Petrobras for the period between 01/01/2013 – 28/02/2013
/ 177 / Invoice for the purchase of wood residues from supplier Odebrecht for the period between 01/01/2013 – 28/02/2013
/ 178 / Invoice for the purchase of wood residues from supplier Nuclebras for the period between 01/01/2013 – 28/02/2013
/ 179 / Invoice for the purchase of wood residues from supplier Mizu S.A. for the period between 01/01/2013 – 28/02/2013
/ 180 / Invoice for the purchase of wood residues from supplier Mat S.A. for the period between 01/01/2013 – 28/02/2013
/ 181 / Invoice for the purchase of wood residues from supplier Lubrizol for the period between 01/01/2013 – 28/02/2013
/ 182 / Invoice for the purchase of wood residues from supplier Lacca Ind Com Moveis for the period between 01/01/2013 – 28/02/2013
/ 183 / Invoice for the purchase of wood residues from supplier Bellaforma for the period between 01/01/2013 – 28/02/2013
/ 184 / Invoice for the purchase of wood residues from supplier ITVA Rio Motos for the period between 01/01/2013 – 28/02/2013
/ 185 / Invoice for the purchase of wood residues from supplier Incopre for the period between 01/01/2013 – 28/02/2013
/ 186 / Invoice for the purchase of wood residues from supplier Estaleiro Brasfels for the period between 01/01/2013 – 28/02/2013
/ 187 / Invoice for the purchase of wood residues from supplier Eletronuclear for the period between 01/01/2013 – 28/02/2013
/ 188 / Invoice for the purchase of wood residues from supplier Eletrobras for the period between 01/01/2013 – 28/02/2013
/ 189 / Invoice for the purchase of wood residues from supplier Eco RJ Gestão Ambiental for the period between 01/01/2013 – 28/02/2013
/ 190 / Invoice for the purchase of wood residues from supplier Empresa Brasileira de Solda Eletr. for the period between 01/01/2013 – 28/02/2013
/ 191 / Invoice for the purchase of wood residues from supplier Diretoria Geral Material Marinha for the period between 01/01/2013 – 28/02/2013
/ 192 / Invoice for the purchase of wood residues from supplier Construtora A. Gutierrez for the period between 01/01/2013 – 28/02/2013

/ 193 / Invoice for the purchase of wood residues from supplier Consorcio Transcarioca BRT for the period between 01/01/2013 – 28/02/2013
/ 194 / Invoice for the purchase of wood residues from supplier Consorcio Novo Cenpes for the period between 01/01/2013 – 28/02/2013
/ 195 / Invoice for the purchase of wood residues from supplier Comando da Marinha do Brasil for the period between 01/01/2013 – 28/02/2013
/ 196 / Invoice for the purchase of wood residues from supplier C. S. Marcenaria for the period between 01/01/2013 – 28/02/2013
/ 197 / Invoice for the purchase of wood residues from supplier ... for the period between 01/01/2013 – 28/02/2013
/ 198 / BGE (Brazilian Institute of Geography and Statistics), Production of wood in Rio de Janeiro State in 2007. Available at: http://www.sidra.ibge.gov.br/bda/silvi/default.asp?t=2&z=t&o=29&u1=1&u3=1&u4=1&u2=30 . Last visit on: May, 2013
/ 199 / IBGE (Brazilian Institute of Geography and Statistics), Production of wood in São Paulo State in 2007. Available at: http://www.sidra.ibge.gov.br/bda/silvi/default.asp?t=2&z=t&o=29&u1=1&u3=1&u4=1&u2=31 . Last visit on: May, 2013
/ 200 / Sustainable Carbon, Internal Audit Procedure
/ 201 / Sustainable Carbon, Spreadsheet of production and biomass internal audits
/ 202 / Sustainable Carbon, Spreadsheet of São Sebastião Ceramic production for VCS PD estimations

2.3 Interviews

The verification team has performed an on-site visit on April 16th, 2013 and April 19th, 2013, where the operations of the ceramics were reviewed. During the audit inspections the verification team conducted interviews with the following representatives of the project companies *Cerâmica Argibem LTDA.*, *Olaria São Sebastião LTDA.*, *Cerâmica Vulcão LTDA.* and the Sustainable Carbon – Projetos Ambientais Ltda who prepared the VCS PD and the VCS Monitoring Report.

- Mr. Cedenir Fernando Barbosa Lima, director and owner of Argibem Ceramic;
- Ms. Maria Teresa de Oliveira Golçalves Carvalho, monitoring data responsible of São Sebastião Ceramic;
- Mr. Cesar Virgílio, director of São Sebastião Ceramic;
- Mr. Cláudio Pelegrini, monitoring data responsible of Vulcão Ceramic;
- Mr. Afonso Claudio, director of Vulcão Ceramic;
- Mrs. Cecília de Oliveira S. Garcia, consultant of Sustainable Carbon – Projetos Ambientais Ltda

2.4 Site Inspections

An on-site inspection was conducted on April 16th, 2013 and April 19th, 2013 with the purpose to clarify whether the project had been carried out as described in the VCS PD, assessment of documents and interview people in order to verify the project conditions.

The on-site visit at the ceramic confirmed that the monitoring and reporting is carried out consistently and in line with established procedures and as per the requirements of the monitoring plan mentioned in the registered VCS PD, except for the monitoring of parameter Qrenbiomass.

2.5 Resolution of Any Material Discrepancy

This process is aimed at resolving any outstanding issues which need to be clarified prior to the TÜV Rheinland conclusion on the project design and monitoring results. In order to ensure transparency a verification protocol is customized for the project. The protocol shows in transparent manner criteria (requirements), means of verification and their results against the identified criteria.

Findings established during the verification can either be seen as a non-fulfillment of CDM criteria and VCS Version 3, or where a risk to the fulfillment of project objectives is identified. Corrective action requests (CAR) issued where mistakes have been made with a direct influence on project results. Moreover, clarifications (CL) were requested where additional information is needed to fully clarify an issue.

During the course of this Verification, the consistency check using the internal daily records of the production of ceramic units (PRy) against the Calculation Spreadsheet used to calculate the ER revealed that the internal daily records did not represented the actual indicated on the Calculation Spreadsheet. This issue has been resolved as requested on CAR 2 and 3 (Table 2 of Verification Protocol). The PPs revised all the data, provided the appropriate evidences and the verification team confirmed the accuracy of the revision.

There is one FAR from the previous verification with relation to internal auditing and non-conformities handling procedures. This FAR was raised in the verification report (version 02, dated 08/12/2011) / 9 / from the 2nd periodic verification:

FAR01: PPs are required to better describe their procedures for handling internal auditing and non-conformities. Time is given so that improved procedures can be established. Procedures do not need to be documented, however, it is likely recommended PPs do so, in order to make it easier for everyone involved to follow them correctly.

During the onsite assessment carried out on April 16th, 2013 and April 19th, 2013, and also through interviews with *Argibem, São Sebastião and Vulcão Ceramics* employees, it was not identified procedures for internal auditing and non-conformities. Hence, FAR 01 is still **OPEN** for the next periodic verification.

3 VERIFICATION FINDINGS

The findings of the verification are stated in the following sections. The verification criteria (requirements), the means of verification and its results against the identified criteria are documented in more detail in the verification protocol in Appendix A.

3.1 Project Implementation Status

The project consists in fuel switching, substitution of native wood for renewable biomasses to generate thermal energy, feeding the kilns and fire the ceramic units from the Argibem, São Sebastião and Vulcão Ceramics, according to the VCS PD / 4 /.

During the on-site visit, it was physically observed by the verification team that only renewable biomasses were seen onsite, such as sawdust, afforestation wood and wood residues which have been employed on the kilns of the Argibem, São Sebastião and Vulcão Ceramics for energy supply.

The project implementation status has follows:

Start date:	Argibem Ceramic: September 1st, 2003 São Sebastião Ceramic: January 1 st, 2004 Vulcão Ceramic: January 1st, 2004
First crediting period (10 years, twice renewable)	April 1 st , 2006 to March 31 st , 2016 Total Emission Reductions estimated for the period: 208,144 tCO ₂ e
1 st Periodic Verification	April 1st, 2006 to September 30th, 2008 Emission Reductions: 2006: 12,787 tCO ₂ e 2007: 17,380 tCO ₂ e 2008: 14,879 tCO ₂ e Total: 45,046 tCO ₂ e
2 nd Periodic Verification	October 01st, 2008 to June 30th, 2011 Emission Reductions: 2008: 3,369 tCO ₂ e 2009: 15,329 tCO ₂ e 2010: 15,552 tCO ₂ e 2011: 7,347 tCO ₂ e Total: 41,597 tCO ₂ e

This monitoring period comprises from July 01st, 2011 to February 28th, 2013, on which 38,524,927 ceramic units were produced at Argibem Ceramic, 16,849,412 at São Sebastião Ceramic and 25,176,600 at Vulcão Ceramic. The verification team checked the internal control sheets / 15 – 17 // 48 – 50 // 104 – 106 / that contains the quantity of ceramic pieces fired per month. Compared to estimates in the registered PD / 4 /, the production decreased 4%, which explains the decrease of 12% in the emission reductions of this periodic verification compared to the estimated in the VCS PD / 4 /. The comparison of the emission reductions and production between the actual monitoring period and the estimations in VCS PD / 4 / of the ceramics individually are demonstrated in the calculation spreadsheet / 12 /. The

production at Argibem and Vulcão ceramics decreased 4% and 21% in comparison with the VCS PD / 4 /, while at São Sebastião ceramic the production increased 40%. It occurred due to an increase in the market demand and also due to a faster process to produce the ceramic pieces, as a consequence of the start of operation of the artificial dryer (which was built in the previous verification period, as per MR of the 2nd periodic verification / 9 /).

According to the VCS PD, in order to maintain the project in accordance with local laws, it must run with licenses under valid time. During the on-site visit at Argibem, São Sebastião and Vulcão Ceramics, the verification team checked the operating licenses / 19 // 51 // 107 /, renewal of operating licenses / 20 // 52 /, clay extraction licenses / 21 // 53 // 108 / and renewal of clay extraction licenses / 54 // 109 / and they were valid during this monitored period, confirming the project compliance with the local laws.

As stated on the VCS MR, a deviation from the monitoring plan regarding the measurement the amount of renewable biomasses used (parameter $Q_{renbiomass}$) was done. The registered VCS PD / 4 / establishes that the project proponent (meaning the ceramic owner) would measure the amount of renewable biomasses used (parameter $Q_{renbiomass}$). However, during the entire monitored period this parameter was monitored through all the receipts and invoices of biomass received by the ceramic industry. This means the amount of renewable biomass is measured by each provider and controlled by the ceramic owners by storing receipts and invoices. The verification team checked the receipts and invoices of biomass and considered the deviation acceptable and reliable since they clearly present the amount in weight or volume (kg, tonnes or m³), and each of them present a single number of invoice or DOF (Document of Forest Origin) / 22 /- 47 // 55 /- 103 // 110 /- 197 / to avoid double-counting.

3.2 Accuracy of GHG Emission Reduction or Removal Calculations

The verification team has checked the emission reduction calculation and confirmed that the Baseline Emissions have been calculated according to the formulas in the PD and following the approved CDM baseline and monitoring methodology “AMS-I.C.: “Thermal energy for the user with or without electricity”, version 13.

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.

$$BE_y = HG_y * EFCO_2 / \eta_{th}$$

$$HG_y = Q_{oil} \times NCV \times \rho_{oil}$$

Where:

BE_y: The baseline emissions from steam/heat displaced by the project activity during the year y in tCO₂e.

HG_y: The net quantity of heat supplied by the project activity during the year y in TJ.

EFCO₂: The CO₂ emission factor per unit of energy of the fuel that would have been used in the baseline plant in (tCO₂ / TJ), obtained from reliable local or national data if available, otherwise, IPCC default emission factors are used.

η_{th} : The efficiency of the plant using fossil fuel that would have been used in the absence of the project activity.

Q_{oil}: Amount of oil (L)

NCV: Net calorific value of oil (TJ/t) (source: IPCC values / 13 /)

poil: Specific gravity of oil (t/L) (source: study from UNICAMP / 14 /)

There are two types of leakage to be considered in this project, the leakage due to the substitution of non-renewable biomass by renewable biomass and the leakage due to transfer of equipment (AMS-I.C, V.13, paragraph 17) / 2 /.

The first source is the leakage of non-renewable biomass predicted in paragraph 8 of the applied methodology AMS-I.C (v.13) / 2 / was monitored in accordance with the “General guidance on leakage in biomass project activities” (attachment C of appendix B) / 3 /. As per this guidance / 3 /, the possible source of leakage is the competing use of biomass, and it was demonstrated in section 4.3 of MR / 11 / applying national and internal sources / 198 // 199 / that there is a surplus of the applied biomass in the specific region of the project activity, which is demonstrated in Table 2.

Table 2: Renewable biomass surplus in the region of the project activity.

Biomass	Renewable biomass surplus (per year)	Used in the project per year (in this monitoring period)	Percentage of biomass used compared to the available quantity in the region
Wood from afforestation	7,776,095 m ³	5,995.09 m ³	0.08 %
Woody residues	5,737,174.08 m ³	45,160.95 m ³	0.79 %

The data from Table 2 is based on publicly available information (IBGE - Brazilian Institute of Geography and Statistics / 198 // 199 /) referenced in the last version of MR / 11 /.

The Brazilian Institute of Geography and Statistics - IBGE is the main provider of data and information in the country, serving the needs of various segments of civil society, as well as organs of governmental federal, state and municipal. As this is still the latest publicly available data, this is therefore accepted by verification team.

Since the quantity of biomass utilized in the project is lower than 25% for all types of biomass, there is no leakage to be included due to competing use.

The second source of leakage is determined on paragraph 17 of AMS-I.C. (V.13) / 2 /: “If the energy generating equipment is transferred from another activity or if the existing equipment is transferred to another activity, leakage is to be considered”. No energy generation equipment is transferred from another activity nor existing equipment is transferred to another activity because it is not possible to transfer kilns, and hence, no leakage is considered.

As a result, a total of 0 (zero) tCO₂e was estimated for this monitoring period.

Emission reductions were correctly calculated through the quantity of heavy oil that is substituted or displaced in tonnes of ceramic units multiplied by fraction of non-renewable biomass (wood) used in the absence of the project activity in year y multiplied by net calorific value of non-renewable biomass multiplied by the emission factor for the projected fossil fuel consumption in the baseline.

3.3 Quality of Evidence to Determine GHG Emission Reductions or Removals

TÜV Rheinland was able to verify that Argibem, São Sebastião and Vulcão Ceramics have adequate monitoring mechanisms where the required parameters have been monitored on a monthly basis. This was verified during the on-site visit when the plant records were verified to assess the correctness of the reported data.

The amount of renewable biomass employed was checked by accessing all the receipts and invoices of biomass received by the ceramic.

The production of ceramic units was checked by accessing the internal control sheets / 15 – 17 // 48 – 50 // 104 – 106 / used by Argibem, São Sebastião and Vulcão Ceramics, which are organized per month and daily filled according to data based ceramic units burned in the kilns.

At Argibem Ceramic the monitoring of ceramic devices is daily performed by ceramic employees after the process of molding machine, before and after the burn process.

At São Sebastião Ceramic the production is daily monitored by ceramic employees before and after the ceramic pieces are burned in the Hoffman kiln. There is also an automatic meter after the process of molding machine. The amount of pieces burned at São Sebastião Ceramic were multiplied by conversion factors to adjust the quantity to equivalents of the standard brick (type 9x19x19), which were revised and apply the most conservative value as per CL 1 (table 2 of this report).

At Vulcão Ceramic, the production is daily monitored by ceramic employees before entering the kilns and through automatic meter after the process of molding machine.

All this data is annotated by hand and after transferred to the dropbox files / 15 – 17 // 48 – 50 // 104 – 106 / without internal audits. These files are protected with a password in order to avoid modifications in the inserted data. The responsible for the monitoring data has 60 days to include the information, after gathering all invoices and production data.

The two sources of leakage (the leakage due to the substitution of non-renewable biomass by renewable biomass and the leakage due to transfer of equipment (AMS-I.C, V.13, paragraph 17) / 2 /) were properly monitored, and as a result, no leakage was considered for this monitoring period.

The Emission Reductions have been correctly calculated. A complete set of data for the specified monitoring period was available and verified while undertaking site visit plant records maintained at site. As no further uncertainties or quality restriction affect the calculations the verification team has reviewed the above-mentioned evidences and considered that calculations are in line with VCS v.3 requirements.

3.4 Management and Operational System

Through the on-site visit and interviews, the verification team checked that the quality management for the project is in place. As confirmed by the project proponent, the monitoring plan has been implemented as per the registered VCS PD, except for the monitoring of the parameter $Q_{renbiomass}$, which was initially determined that it would be measured by the project proponents, but in this monitoring period it was used

the amount informed by the biomass providers. It was accepted by the verification team since this information is used for commercial purposes.

The according responsibilities of the personnel mentioned in the Monitoring Report are consistent with the current monitoring plan, served as the basis of the monitoring activity, except for the monitoring of parameter $Q_{renbiomass}$.

During the on-site visit, the verification team interviewed Mr. Cedenir Fernando Barbosa Lima, Ms. Maria Teresa de Oliveira Golçalves Carvalho and Mr. Cláudio Pelegrini (director and owner of Argibem Ceramic and monitoring data responsible of São Sebastião and Vulcão Ceramics, respectively) who are aware and in charge for monitoring data, 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. Then, it was concluded that they are familiar with the project monitoring procedures.

4 VERIFICATION CONCLUSION

The verification team of TÜV Rheinland has performed a Verification for the Argibem, São Sebastião and Vulcão Ceramics Fuel Switching Project in Brazil on the basis of VCS Version 3 and UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The verification team concluded that the project as described in the VCS Monitoring Report (version 06, July 30th, 2013), meets all relevant requirements of the above-defined criteria. TÜV Rheinland therefore issues a positive Verification opinion.

The verified Emission Reductions during the concerned monitoring period (July 01st, 2011 to February 28th, 2013) are displayed as follows:

Table 3: Emission Reductions of Argibem Ceramic during the monitoring period.

Period	PR _y (units)	Qoil (liters)	BE _y (tCO ₂ e)	PE _y (tCO ₂ e)	LE _y (tCO ₂ e)	ER _y (tCO ₂ e)
2011	10,888,448	1,064,455	3,253	0	0	3,253
2012	23,687,901	2,315,729	7,077	0	0	7,077
2013	3,948,578	386,013	1,180	0	0	1,180
Total Monitoring Period	38,524,927	3,766,197	11,510	0	0	11,510

Table 4: Emission Reductions of São Sebastião Ceramic during the monitoring period.

Period	PR _y (units)	Qoil (liters)	BE _y (tCO ₂ e)	PE _y (tCO ₂ e)	LE _y (tCO ₂ e)	ER _y (tCO ₂ e)
2011	5,680,480	1,136,096	3,472	0	0	3,472
2012	9,580,767	1,916,153	5,854	0	0	5,854
2013	1,588,165	317,633	970	0	0	970
Total Monitoring Period	16,849,412	3,369,882	10,296	0	0	10,296

Table 5: Emission Reductions of Vulcão Ceramic during the monitoring period.

Period	PR _y (units)	Qoil (liters)	BE _y (tCO ₂ e)	PE _y (tCO ₂ e)	LE _y (tCO ₂ e)	ER _y (tCO ₂ e)
2011	8,450,800	1,067,471	3,261	0	0	3,261
2012	14,737,200	1,861,544	5,687	0	0	5,687
2013	1,988,600	251,192	767	0	0	767
Total Monitoring Period	25,176,600	3,180,207	9,715	0	0	9,715

GHG Emission Reductions or Removals	tCO ₂ e
Baseline Emissions	31,521
Project Emissions	0
Leakage	0
Net GHG emission reductions or removals	31,521

Assessment of actual emission reductions with the estimate reductions in the Project Description:

Estimated Emission Reduction as per Registered/Approved PD:	Argibem Ceramic: 8,995 tCO ₂ e/ annum São Sebastião Ceramic: 4,403 tCO ₂ e/ annum Vulcão Ceramic: 7,416 tCO ₂ e/ annum Total: 20,814 tCO ₂ e/ annum
Actual Emission Reduction for the	2011: 9,987 tCO ₂ e

Monitoring Period	Argibem Ceramic: 3,253 tCO₂e São Sebastião Ceramic: 3,472 tCO₂e Vulcão Ceramic: 3,261 tCO₂e 2012: 19,188 tCO₂e Argibem Ceramic: 7,077 tCO₂e São Sebastião Ceramic: 5,854 tCO₂e Vulcão Ceramic: 5,687 tCO₂e 2013: 2,917 tCO₂e Argibem Ceramic: 1,180 tCO₂e São Sebastião Ceramic: 970 tCO₂e Vulcão Ceramic: 767 tCO₂e Total: 31,521 tCO₂e Argibem Ceramic 11,510 tCO₂e São Sebastião Ceramic: 10,296 tCO₂e Vulcão Ceramic: 9,715 tCO₂e
Is any increase of CER's occurred?	No
Reason for Increase of CER's	Not applicable

5 APPENDIX A – VERIFICATION PROTOCOL

Table 1: Verification Requirements					
Checklist question	Ref.	MoV ¹	Findings, comments, references, data sources	Draft conclusion	Final conclusion
1. Implementation					
1.1 Have all physical features proposed in the registered PDD been implemented at the project site? § 187 of CDM Project Standard	VVS	DR, PSI, I	During the onsite visit carried out on 16/04/2013 and 19/04/2013 it was possible to confirm that Argibem Ceramic produces bricks in 1 Tunnel kilns; São Sebastião Ceramic produces bricks in 1 Hoffman kiln; and Vulcão Ceramic produces bricks in 1 Hoffman kiln, respectively.	OK	OK
1.2 Has the project activity been operated in accordance with the project scenario described in the registered PDD and relevant guidance? Reference: < http://cdm.unfccc.int/EB/033/eb33rep.pdf >, §75 § 188 of CDM Project Standard	VVS	DR	Yes, the project has been operated as per the registered VCS PD, except for the deviation presented in section 2.2 of MR. This deviation is due to the monitoring of parameter Qrenbiomass, which was accepted by the verification team as per section 3.1 of this report.	OK	OK
1.3 If the project activity is implemented on a number of different locations, has the Monitoring report provided the verifiable starting dates for each site? § 188 of CDM Project Standard	VVS	DR	Yes, the project activity is implemented in 3 different places, and the start dates are September 1st, 2003 for Argibem Ceramic, January 1st, 2004 for São Sebastião Ceramic, and January 1st, 2004 for Vulcão Ceramic.	OK	OK
1.4 Is the start date of monitoring period consistent?	VVS	DR	Yes, the start of this monitoring period is consistent, since it follows the monitoring period of the previous verification processes, which properly followed the start date of the crediting period stated in the VCS PD.	OK	OK

¹ MoV = Means of Verification, DR = Document Review, I = Interview, www = internet search.

Table 1: Verification Requirements					
Checklist question	Ref.	MoV¹	Findings, comments, references, data sources	Draft conclusion	Final conclusion
1.5 Is the monitoring report consistently filled with respect to all sections as required by its guideline of filling the monitoring report?	VVS	DR, www	Yes, the monitoring report is in accordance with the last available template (v3.2) in the VCS website, and is properly filled.	OK	OK
1.6 Does the CER's obtained for the monitoring period within the limit of estimate in the registered PDD? Is the claimed CER's justifiable?	VVS	DR	Yes, it's within the limit and justifiable. In the VCS PD it was estimated 35,842 tCO ₂ e for 2011 (6 months) 2012 (12 months) and 2013 (2 months), and in the MR it was calculated a total of 32,092tCO ₂ e for the same period. There was a decrease in the ER of 10.5%. This difference is due to a reduction of 8% (average of the 3 ceramics) between the estimated production and the produced in this monitoring period.	OK	OK
1.7 Is the monitoring system provided in line diagrams showing all relevant monitoring points?	VVS	DR, PSI	The monitoring system is clearly described in the VCS PD, MR and was confirmed during the onsite visit.	OK	OK
2. Monitoring plan and methodology					
2.1 Is the monitoring plan established in accordance with the monitoring methodology? § 186 of CDM Project Standard	VVS	DR	Yes, the monitoring plan established is in accordance with the monitoring methodology, except for the deviation presented in section 2.2 of MR. This deviation is due to the monitoring of parameter Qrenbiomass, which was accepted by the verification team as per section 3.1 of this report.	OK	OK
2.2 In case the implemented monitoring plan defers from the monitoring methodology, has any requests for revision to or deviation from the monitoring methodology been officially communicated to the CDM EB? Reference: < http://cdm.unfccc.int/EB/033/eb33rep.pdf > , §84, §58 § 193 of CDM Project Standard	-	-	Not applicable. Please see item 2.1.	OK	OK

Table 1: Verification Requirements					
Checklist question	Ref.	MoV ¹	Findings, comments, references, data sources	Draft conclusion	Final conclusion
2.2.1 Have the above changes to the monitoring plan been approved by the CDM EB?	-	-	Not applicable. Please see item 2.1.	OK	OK
3. Monitoring and the monitoring plan					
3.1 Is monitoring established in full compliance with the monitoring plan, contained in the registered PDD (or new monitoring plan approved by the CDM EB)? § 191 of CDM Project Standard	VVS	DR	Yes, except for the deviation presented in section 2.2 of MR. This deviation is due to the monitoring of parameter Qrenbiomass, which was accepted by the verification team as per section 3.1 of this report.	OK	OK
3.2 Are all baseline emission parameters monitored and updated in accordance with monitoring plan, monitoring methodology and relevant CDM EB decisions?	VVS	DR	Vide item 3.1.	OK	OK
3.2.1 Was the monitoring equipment for baseline emission parameters controlled and monitoring results recorded as per approved frequency?	VVS	DR	No monitoring equipment is used to determine the baseline emission parameters. The frequency of the parameters are in accordance with the monitoring plan. Please see item 4.1.	OK	OK
3.2.2 Was the monitoring equipment for baseline emission parameters calibrated in accordance with QA&QC procedures described in the registered monitoring plan?	-	-	Not applicable. No monitoring equipment is used to determine the baseline emission parameters.	OK	OK
3.3 Are all project emission parameters monitored and updated in accordance with monitoring plan, monitoring methodology and relevant CDM EB decisions?	-	-	Not applicable. There are no project emissions in this project activity.	OK	OK
3.3.1 Was the monitoring equipment for project emission parameters controlled and monitoring results recorded as per approved frequency?	-	-	Not applicable. Please see item 3.3.	OK	OK

Table 1: Verification Requirements					
Checklist question	Ref.	MoV ¹	Findings, comments, references, data sources	Draft conclusion	Final conclusion
3.3.2 Was the monitoring equipment for project emission parameters calibrated in accordance with QA&QC procedures described in the registered monitoring plan?	-	-	Not applicable. Please see item 3.3.	OK	OK
3.4 Are all leakage emission parameters monitored and updated in accordance with monitoring plan, monitoring methodology and relevant CDM EB decisions?	VVS	DR	There is no leakage in this project activity since no energy generating equipment was transferred from another activity; neither any existing equipment was transferred to another activity.	OK	OK
3.4.1 Was the monitoring equipment for leakage emission parameters controlled and monitoring results recorded as per approved frequency?	VVS	DR	No monitoring equipment is used to determine the leakage emission parameters.	OK	OK
3.4.2 Was the monitoring equipment for leakage emission parameters calibrated in accordance with QA&QC procedures described in the registered monitoring plan?	VVS	DR	Not applicable. Please see item 3.4.1.	OK	OK
3.5 Were all monitoring parameters available and verifiable through the whole monitoring period?	VVS	DR	Yes, all parameters were available and verifiable, which were checked during the onsite assessment. Some of them presented inconsistencies, and hence, CL 1, CAR 1, CAR 2 and CAR 3 were raised	CL-1 CAR-1 CAR-2 CAR-3	CLOSED CLOSED CLOSED CLOSED
3.5.1 In case, only partial monitoring data is available and PP(s) provide estimations or assumptions for the rest of data, was it possible to verify those estimations and assumptions? Reference: < http://cdm.unfccc.int/EB/026/eb26rep.pdf > , §109(b)	VVS	DR	Not applicable. Please see item 3.5.	OK	OK

Table 1: Verification Requirements					
Checklist question	Ref.	MoV ¹	Findings, comments, references, data sources	Draft conclusion	Final conclusion
3.6 Was management and operation system established and operated in accordance with the monitoring plan?	VVS	DR, PSI, I	The monitoring was carried out by Mr. Marcelo de Oliveira do Vale, Mrs. Maria Teresa de Oliveira Gonçalves Carvalho and Mr. Cláudio Pelegrini (monitoring data responsible of Argibem, São Sebastião and Vulcão Ceramics, respectively), as established in the MR. The monitoring plan was properly conducted.	OK	OK
3.7 Was it possible to verify that involved management and operation personal is fully aware of the responsibilities and perform all operations according to the registered monitoring plan and internally developed manuals?	VVS	DR, PSI, I	Yes. The responsible for the monitoring plan are Mr. Marcelo de Oliveira do Vale, Mrs. Maria Teresa de Oliveira Gonçalves Carvalho and Mr. Cláudio Pelegrini (monitoring data responsible of Argibem, São Sebastião and Vulcão Ceramics). Sustainable Carbon technical team (including those members described in Section 1.3 of MR) were also involved in the project monitoring.	OK	OK
3.8 Does the monitoring system provide organizational structure, role and responsibilities, emergency procedures?	VVS	DR, PSI, I	There is no need for an Emergency procedure, since it was checked through interviews that renewable biomass is always available for purchase, and also that it has not been applied in this monitoring period. In case non-renewable biomass is applied, this amount would not be included for ER.	OK	OK
3.9 Does any uncertainties identified and addressed?	VVS	DR, PSI, I	Upon closure of CAR 1, CAR 2 and CAR 3.	CAR 1 CAR 2 CAR 3	CLOSED CLOSED CLOSED
4. Parameters					
4.1 Monitored parameter Title: $Q_{renbiomass}$ Indication: Amount of renewable biomass Units: tonnes per month Estimated value (ex-ante): Argibem Ceramic (530), São Sebastião Ceramic (155) and Vulcão Ceramic (510)			CAR 1: For Argibem Ceramic, the amount of sawdust (Invoice #79) from 03/02/2012 is incorrect. It is 341.38 m³ instead of 344.38 m³. CAR 2: Vulcão Ceramic: (a) During the onsite visit, it was verified that the amount of biomass	CAR 1 CAR 2	CLOSED CLOSED

Table 1: Verification Requirements

Checklist question	Ref.	MoV ¹	Findings, comments, references, data sources	Draft conclusion	Final conclusion																														
Measured value (<i>ex-post</i>): Argibem Ceramic (sawdust: 11,881.19, afforestation wood: 948.03), São Sebastião Ceramic (sawdust: 2,878.16, afforestation wood: 1,336.85) and Vulcão Ceramic (sawdust: 9,261.81 , afforestation wood: 3,758.97)			from November and December 2011 were not inserted in the Dropbox spreadsheet. (b) The following data of woody residues (in the dropbox file) is inconsistent with the invoices of biomass purchase:																																
			<table><tr><th>Date</th><th>Invoice N°</th><th>Supplier</th></tr><tr><td>01/07/2011</td><td>0002/11</td><td>WORK SHORE</td></tr><tr><td>04/07/2011</td><td>WEM-2011-0233</td><td>SEADRIL</td></tr><tr><td>08/07/2011</td><td>009/2011</td><td>WORK SHORE</td></tr><tr><td>27/07/2011</td><td>010/2011</td><td>WORK SHORE</td></tr><tr><td>03/02/2012</td><td>26/dez</td><td>WORK SHORE</td></tr><tr><td>07/02/2012</td><td>0027-12</td><td>WORK SHORE</td></tr><tr><td>10/02/2012</td><td>N/C</td><td>INCOPRE</td></tr><tr><td>28/02/2012</td><td>00028-12</td><td>WORK SHORE</td></tr><tr><td>28/02/2012</td><td>BLS 2012 0026</td><td>SEADRIL SERV PETROLEO</td></tr></table>			Date	Invoice N°	Supplier	01/07/2011	0002/11	WORK SHORE	04/07/2011	WEM-2011-0233	SEADRIL	08/07/2011	009/2011	WORK SHORE	27/07/2011	010/2011	WORK SHORE	03/02/2012	26/dez	WORK SHORE	07/02/2012	0027-12	WORK SHORE	10/02/2012	N/C	INCOPRE	28/02/2012	00028-12	WORK SHORE	28/02/2012	BLS 2012 0026	SEADRIL SERV PETROLEO
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			<table> <tr><td>01/02/2013</td><td>844564</td><td>TRANSPETRO</td></tr> <tr><td>02/02/2013</td><td>117</td><td>CONSORCIO TRANSCARIOCA BRT</td></tr> <tr><td>02/02/2013</td><td>119</td><td>CONSORCIO TRANSCARIOCA BRT</td></tr> <tr><td>03/02/2013</td><td>1</td><td>TOP ROAD MOTOS</td></tr> <tr><td>05/02/2013</td><td>25</td><td>BELLAFORMA</td></tr> <tr><td>05/02/2013</td><td>25</td><td>BELLAFORMA</td></tr> <tr><td>07/02/2013</td><td>123</td><td>CONSORCIO TRANSCARIOCA BRT</td></tr> <tr><td>14/02/2013</td><td>N/C</td><td>CONSORCIO TRANSCARIOCA BRT</td></tr> <tr><td>18/02/2013</td><td>27</td><td>BELLAFORMA</td></tr> <tr><td>18/02/2013</td><td>118</td><td>CONSORCIO TRANSCARIOCA BRT</td></tr> </table>	01/02/2013	844564	TRANSPETRO	02/02/2013	117	CONSORCIO TRANSCARIOCA BRT	02/02/2013	119	CONSORCIO TRANSCARIOCA BRT	03/02/2013	1	TOP ROAD MOTOS	05/02/2013	25	BELLAFORMA	05/02/2013	25	BELLAFORMA	07/02/2013	123	CONSORCIO TRANSCARIOCA BRT	14/02/2013	N/C	CONSORCIO TRANSCARIOCA BRT	18/02/2013	27	BELLAFORMA	18/02/2013	118	CONSORCIO TRANSCARIOCA BRT		
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Title: PRy Indication: Production of ceramic devices per month Units: Unity of ceramic devices Estimated value (<i>ex-ante</i>): Argibem Ceramic (2,000,000), São Sebastião Ceramic (600,000) and Vulcão Ceramic (1,600,000) Measured value (<i>ex-post</i>): Argibem Ceramic (38,524,927), São Sebastião Ceramic			CL 1: For São Sebastião, clarify the source of the following factors utilized for the conversion of ceramic pieces to equivalents of the standard brick (type 9x19x19): <table> <tr> <td>Type of brick</td> <td>Conversion Factor to 9x19x19</td> </tr> <tr> <td>20x30</td> <td>1.5</td> </tr> </table>	Type of brick	Conversion Factor to 9x19x19	20x30	1.5	CL 4 CAR 3	CLOSED CLOSED																										
Type of brick	Conversion Factor to 9x19x19																																		
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Table 1: Verification Requirements

Checklist question	Ref.	MoV ¹	Findings, comments, references, data sources	Draft conclusion	Final conclusion																								
(16,849,412) and Vulcão Ceramic (25,176,600)			<table><tr><td>L25</td><td>1.07</td></tr><tr><td>L12</td><td>1.82</td></tr><tr><td>L16</td><td>2.68</td></tr><tr><td>15x30</td><td>2.25</td></tr><tr><td>LM</td><td>1.00</td></tr><tr><td>Maciço</td><td>1.00</td></tr><tr><td>11,5x30</td><td>2.00</td></tr><tr><td>11,5x20</td><td>1.33</td></tr><tr><td>14x19x29</td><td>2.25</td></tr><tr><td>U Estrutural</td><td>2.25</td></tr><tr><td>J Estrutural</td><td>2.25</td></tr></table>	L25	1.07	L12	1.82	L16	2.68	15x30	2.25	LM	1.00	Maciço	1.00	11,5x30	2.00	11,5x20	1.33	14x19x29	2.25	U Estrutural	2.25	J Estrutural	2.25				
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			14x19x29	2.25																									
			U Estrutural	2.25																									
			J Estrutural	2.25																									
CAR 3: For Vulcão Ceramic, the following amount of pieces produced and listed in the dropbox file are inconsistent with the evidences provided onsite.																													
<table><tr><th>Date</th><th>Quantity of pieces produced</th><th>Type of brick</th></tr><tr><td>01/09/2011</td><td>58.440</td><td>20x30 1a</td></tr><tr><td>02/06/2012</td><td>19.800</td><td>20x20 1a</td></tr><tr><td>02/06/2012</td><td>11.200</td><td>20x30 1a</td></tr><tr><td>03/06/2012</td><td>2.800</td><td>20x20 1a</td></tr><tr><td>03/06/2012</td><td>26.400</td><td>20x30 1a</td></tr><tr><td>09/06/2012</td><td>21.000</td><td>20x30 1a</td></tr><tr><td>09/06/2012</td><td>22.000</td><td>20x20 1a</td></tr><tr><td>16/06/2012</td><td>24.200</td><td>20x20 1a</td></tr></table>			Date	Quantity of pieces produced	Type of brick	01/09/2011	58.440	20x30 1a	02/06/2012	19.800	20x20 1a	02/06/2012	11.200	20x30 1a	03/06/2012	2.800	20x20 1a	03/06/2012	26.400	20x30 1a	09/06/2012	21.000	20x30 1a	09/06/2012	22.000	20x20 1a	16/06/2012	24.200	20x20 1a
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Checklist question	Ref.	MoV ¹	Findings, comments, references, data sources	Draft conclusion	Final conclusion															
			<table><tr><td>16/06/2012</td><td>9.800</td><td>20x30 1a</td></tr><tr><td>17/06/2012</td><td>22.400</td><td>20x30 1a</td></tr><tr><td>23/06/2012</td><td>19.800</td><td>20x20 1a</td></tr><tr><td>23/06/2012</td><td>9.800</td><td>20x30 1a</td></tr><tr><td>24/06/2012</td><td>39.600</td><td>20x20 1a</td></tr></table>	16/06/2012	9.800	20x30 1a	17/06/2012	22.400	20x30 1a	23/06/2012	19.800	20x20 1a	23/06/2012	9.800	20x30 1a	24/06/2012	39.600	20x20 1a		
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23/06/2012	9.800	20x30 1a																		
24/06/2012	39.600	20x20 1a																		
Title: Origin of renewable biomass Indication: Renewable origin of the biomass Units: Not applicable Estimated value (<i>ex-ante</i>): Not applicable Measured value (<i>ex-post</i>): Not applicable	VVS	DR	It was confirmed that only the renewable biomass mentioned in the VCS PD and MR is applied. It was confirmed through the biomass receipts and invoices from biomass providers.	OK	OK															
Title: Renewable biomass surplus Indication: Amount of renewable biomass available Units: tonnes or m³ Estimated value (<i>ex-ante</i>): wood from afforestation (7,776,095 m³), woody residues (5,737,174.08 m³), industrial wood residues (749,839 t), rice husk (131,380 m³) and elephant grass (not measured) Measured value (<i>ex-post</i>): wood from afforestation (7,776,095 m³), woody residues (5,737,174.08 m³), industrial wood residues (749,839 t), rice husk (131,380 m³) and elephant grass (not measured)	VVS	DR	CAR 4: Include the demonstration of the monitoring of parameter “renewable biomass surplus” in the monitoring report and spreadsheet. CAR 5: The text in section 4.3 is inconsistent with section 3.2, parameter “renewable biomass surplus” (wood from afforestation 7,776,095 m³ in 2007). Also, footnote 6, 7 are not working. With regard to footnote 10, 11, 14,15 , there is 2011 data available. Update accordingly.	CAR 4 CAR 5	CLOSED CLOSED															
Title: Leakage of non-renewable biomass Indication: Leakage resulted from the non-renewable biomass Units: tCO _{2e} Estimated value (<i>ex-ante</i>): 0 Measured value (<i>ex-post</i>): 0	VVS	DR	Upon closure of CAR 4.	CAR 4	CLOSED															

Table 1: Verification Requirements

Checklist question	Ref.	MoV ¹	Findings, comments, references, data sources	Draft conclusion	Final conclusion
4.2 Default parameter Title: ρ_{oil} Indication: Specific gravity of fossil fuel Units: ton/L Default/Used value: 0.000978 Title: NCV_{oil} Indication: Net Calorific Value Units: TJ/ton of oil Default/Used value: 0.0404 Title: BF_y Indication: Consumption of fossil fuel per thousand of ceramic devices produced per year Units: Litters of oil per thousand of devices Default/Used value: Argibem Ceramic (97.76), São Sebastião Ceramic (200), Vulcão Ceramic (126.316) Title: n_{th} Indication: The efficiency of the ceramics using fossil fuel that would have been used in the absence of the project activity Units: Percentage Default/Used value: 100% for Argibem, São Sebastião and Vulcão Ceramic Title: EF_{CO_2} Indication: CO₂ Emission factor of residual fuel oil Units: tCO₂/TJ Default/Used value: 77.40			The verification team cross-check the independent sources of data and confirmed that all the references were correctly applied.	OK	OK

Table 1: Verification Requirements					
Checklist question	Ref.	MoV ¹	Findings, comments, references, data sources	Draft conclusion	Final conclusion
5. Calculations					
5.1 Have all the calculations related to the baseline emissions been carried according to the formulae and methods described in the registered PDD and applied methodology? § 194 of CDM Project Standard	VVS	DR	The formulae and methods for baseline emissions described in the MR are in accordance with the registered VCS PD. Also, they were properly applied in the spreadsheet calculation.	OK	OK
5.2 Have all the calculations related to the project emissions been carried according to the formulae and methods described in the registered PDD and applied methodology?	-	-	Not applicable. Please see item 3.3.	OK	OK
5.3 Have all the calculations related to the leakage emissions been carried according to the formulae and methods described in the registered PDD and applied methodology?	-	-	Not applicable. Please see item 3.4.	OK	OK

Table 2: List of Requests for Corrective Action (CAR) and Clarification (CL)																														
No .	Type of request	Observation	Reference (Table 1)	Summary of project owner response	Verification team conclusion																									
1.	CL	CL 1: For São Sebastião, clarify the source of the following factors utilized for the conversion of ceramic pieces to equivalents of the standard brick (type 9x19x19):	4.1	First Response	1st Conclusion: The conversion factors of the following ceramics are not consistent with the calculation: L12, L16, 11.5x20, 15x30, U Estrutural, J Estrutural and 11.5x30. CL is OPEN. 2nd Conclusion: Since PPs adopted the most conservative value in the spreadsheet, CL is CLOSED.																									
		<table><tr><th>Type of brick</th><th>Conversion Factor to 9x19x19</th></tr><tr><td>20x30</td><td>1.5</td></tr><tr><td>L25</td><td>1.07</td></tr><tr><td>L12</td><td>1.82</td></tr><tr><td>L16</td><td>2.68</td></tr><tr><td>15x30</td><td>2.25</td></tr><tr><td>LM</td><td>1.00</td></tr><tr><td>Maciço</td><td>1.00</td></tr><tr><td>11,5x30</td><td>2.00</td></tr><tr><td>11,5x20</td><td>1.33</td></tr><tr><td>14x19x29</td><td>2.25</td></tr><tr><td>U Estrutural</td><td>2.25</td></tr><tr><td>J Estrutural</td><td>2.25</td></tr></table>		Type of brick		Conversion Factor to 9x19x19	20x30	1.5	L25	1.07	L12	1.82	L16	2.68	15x30	2.25	LM	1.00	Maciço	1.00	11,5x30	2.00	11,5x20	1.33	14x19x29	2.25	U Estrutural	2.25	J Estrutural	2.25
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		Maciço		1.00																										
		11,5x30		2.00																										
		11,5x20		1.33																										
		14x19x29		2.25																										
		U Estrutural		2.25																										
		J Estrutural		2.25																										
<table><tr><th>Type of brick</th><th>Dimensions (cm)</th><th>Volume (m³)</th><th>Conversion ($V_p/V_{standard}$)</th><th>Conversion factor to 9x19x19</th></tr><tr><td>20x20 (Standard brick)</td><td>09x19x19</td><td>0.0032</td><td>1</td><td>1</td></tr><tr><td>20X30</td><td>09x19x29</td><td>0.005</td><td>1.5625</td><td>1.5</td></tr><tr><td>L25</td><td>07x25x20</td><td>0.0035</td><td>1.09375</td><td>1.07</td></tr><tr><td>L12</td><td>11,5x25x20</td><td>0.0058</td><td>1.8125</td><td>1.82</td></tr><tr><td>L16</td><td>15.5x25x20</td><td>0.0078</td><td>2.4375</td><td>2.68</td></tr></table>	Type of brick	Dimensions (cm)	Volume (m³)	Conversion ($V_p/V_{standard}$)	Conversion factor to 9x19x19	20x20 (Standard brick)	09x19x19	0.0032	1	1	20X30	09x19x29	0.005	1.5625	1.5	L25	07x25x20	0.0035	1.09375	1.07	L12	11,5x25x20	0.0058	1.8125	1.82	L16	15.5x25x20	0.0078	2.4375	2.68
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				<table><tr><td>11.5x20</td><td>11.5x19x19</td><td>0.0042</td><td>1.3125</td><td>1.33</td></tr><tr><td>15x30</td><td>14x19x29</td><td>0.0077</td><td>2.40625</td><td>2.25</td></tr><tr><td>U Estrutural</td><td>14x19x29</td><td>0.0077</td><td>2.40625</td><td>2.25</td></tr><tr><td>J Estrutural</td><td>14x19x29</td><td>0.0077</td><td>2.40625</td><td>2.25</td></tr><tr><td>11.5x30</td><td>11.5x19x29</td><td>0.0063</td><td>1.96875</td><td>2</td></tr></table> The bricks LM and Maciço have similar weights to the standard brick, so its conversion factor is 1 (one). Second Response: Since some of the conversion factors used by the ceramic were not conservative, a new production value (PRy) has been calculated based on the more conservative of the two conversion factors (either the real one or the one adopted by the ceramic). Therefore, the production value always represents the most conservative value in the present calculations. The PRy table has been updated accordingly.	11.5x20	11.5x19x19	0.0042	1.3125	1.33	15x30	14x19x29	0.0077	2.40625	2.25	U Estrutural	14x19x29	0.0077	2.40625	2.25	J Estrutural	14x19x29	0.0077	2.40625	2.25	11.5x30	11.5x19x29	0.0063	1.96875	2	
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11.5x30	11.5x19x29	0.0063	1.96875	2																										
2.	CAR	CAR 1: For Argibem Ceramic, the amount of sawdust (Invoice #79) from 03/02/2012 is incorrect. It is 341.38 m³ instead of 344.38 m³.	4.1	The amount of sawdust was corrected to 341.38 m³ as requested.	Correction made. CAR is CLOSED.																									
3.	CAR	CAR 2: Vulcão Ceramic: (a)	4.1		1st Conclusion: a)																									

During the onsite visit, it was verified that the amount of biomass from November and December 2011 were not inserted in the Dropbox spreadsheet. (b) The following data of woody residues (in the dropbox file) is inconsistent with the invoices of biomass purchase:

Date	Invoice N°	Supplier
01/07/2011	0002/11	WORK SHORE
04/07/2011	WEM-2011-0233	SEADRIL
08/07/2011	009/2011	WORK SHORE
27/07/2011	010/2011	WORK SHORE
03/02/2012	26/dez	WORK SHORE
07/02/2012	0027-12	WORK SHORE
10/02/2012	N/C	INCOPRE
28/02/2012	00028-12	WORK SHORE
28/02/2012	BLS 2012 0026	SEADRIL SERV PETROLEO
04/05/2012	N/C	INCOPRE

First Response

a) The amount of biomass from October, November and December 2011 was inserted in the Dropbox Spreadsheet. Also, the parameter Qrenbiomass was corrected in the VCS MRversion 02.0 and in the VCS MR spreadsheet version 02.0.

b) Data regarding the amount of woody residues were corrected in the Dropbox Spreadsheets.

c) The invoices selected were sent to the verification team. The invoice number 25 is duplicated so 12 invoices were sent in total.

Second Response

a) The requested evidence has been sent to the verification team. Also, data regarding the selected invoices were corrected in the "Cer Vulcão planilha de monitoramento 2011" Dropbox Spreadsheet.

c) The invoice n° 44, from ITVA, is already with the volume of 15m³. The invoice n° 117, from Consorcio transcarioca had its volume changed to zero, as the invoice n/c from consorcio transcarioca. Also, one of the invoices n° 25 was removed from the "Cer Vulcão planilha de monitoramento 2011" Dropbox Spreadsheet since there were two of it.

Provide the evidences of the following suppliers: GILDO, QUINCAS, FLAVIO, SERIP MOVEIS (invoice N° 500.143), PACIFIC (invoice N° PML 2011 0006), SEVAN MARINE (invoice N° SS 74 2011 0191), INCOPRE IND. (invoice N° N/C, dated 16/12/2011). Also, correct the following:

Dae	Invoice N°	Supplier
07/10/2011	0016/11	WORK SHORE
21/10/2011	0017/11	WORK SHORE
03/11/2011	0018/11	WORK SHORE
09/11/2011	0019/11	WORK SHORE
11/11/2011	N/C	INCOPRE IND.
14/11/2011	0020/11	WORK SHORE
17/11/2011	0021/11	WORK SHORE

		<table><tr><td>22/05/2012</td><td>N/C</td><td>INCOPRE</td></tr><tr><td>23/05/2012</td><td>N/C</td><td>INCOPRE</td></tr><tr><td>06/02/2013</td><td>121</td><td>CONSORCIO TRANSCARIO CA BRT</td></tr><tr><td>19/02/2013</td><td>856896</td><td>SERIP MOVEIS</td></tr><tr><td>26/02/2013</td><td>862120</td><td>MAT S.A</td></tr><tr><td>26/02/2013</td><td>863070</td><td>MAT S.A</td></tr></table> (c) Send to the verification team the invoices of the following amounts of woody residues: <table><tr><th>Date</th><th>Invoice N°</th><th>Supplier</th></tr><tr><td>28/02/2012</td><td>44</td><td>ITVA RIO MOTOS</td></tr><tr><td>21/05/2012</td><td>CN 1301</td><td>DIRETORIA GERAL MARINHA</td></tr><tr><td>01/02/2013</td><td>25</td><td>BELLAFORMA</td></tr><tr><td>01/02/2013</td><td>844564</td><td>TRANSPETRO</td></tr><tr><td>02/02/2013</td><td>117</td><td>CONSORCIO TRANSCARIOC A BRT</td></tr></table>	22/05/2012	N/C	INCOPRE	23/05/2012	N/C	INCOPRE	06/02/2013	121	CONSORCIO TRANSCARIO CA BRT	19/02/2013	856896	SERIP MOVEIS	26/02/2013	862120	MAT S.A	26/02/2013	863070	MAT S.A	Date	Invoice N°	Supplier	28/02/2012	44	ITVA RIO MOTOS	21/05/2012	CN 1301	DIRETORIA GERAL MARINHA	01/02/2013	25	BELLAFORMA	01/02/2013	844564	TRANSPETRO	02/02/2013	117	CONSORCIO TRANSCARIOC A BRT	Third Response The spreadsheet and the Monitoring Report v 04 were corrected. One of the invoice N° SS 74 2011 0191 of SEVAN MARINE was removed from the spreadsheet.	<table><tr><td>01/12/2014</td><td>0022/4</td><td>WORK SHORE</td></tr><tr><td>07/12/2014</td><td>0023/4</td><td>WORK SHORE</td></tr><tr><td>07/12/2014</td><td>WTA 2011 0373</td><td>SEADRILL</td></tr><tr><td>13/12/2014</td><td>0024/4</td><td>WORK SHORE</td></tr><tr><td>16/12/2014</td><td>BLS 2011 0088</td><td>SEADRILL</td></tr><tr><td>27/12/2014</td><td>WEM 2011 0517</td><td>SEADRILL</td></tr></table> b) Correction made. c) Please do the following correction: invoice N° 44, from ITVA is 15m³. Invoice N° 117, from Consorcio transcarioca is dated 02/02/2013; invoice n/c/ from consorcio transcarioca, dated 14/02/2013 have no amount of biomass, please set it as zero. The invoice 25 is duplicated in	01/12/2014	0022/4	WORK SHORE	07/12/2014	0023/4	WORK SHORE	07/12/2014	WTA 2011 0373	SEADRILL	13/12/2014	0024/4	WORK SHORE	16/12/2014	BLS 2011 0088	SEADRILL	27/12/2014	WEM 2011 0517	SEADRILL
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4.	CAR	CAR 3: For Vulcão Ceramic, the following amount of pieces produced and listed in the dropbox file are inconsistent with the evidences provided onsite. <table><thead><tr><th>Date</th><th>Quantity of pieces produced</th><th>Type of brick</th></tr></thead><tbody><tr><td>01/09/2011</td><td>58.440</td><td>20x30 1a</td></tr><tr><td>02/06/2012</td><td>19.800</td><td>20x20 1a</td></tr><tr><td>02/06/2012</td><td>11.200</td><td>20x30 1a</td></tr><tr><td>03/06/2012</td><td>2.800</td><td>20x20 1a</td></tr><tr><td>03/06/2012</td><td>26.400</td><td>20x30 1a</td></tr><tr><td>09/06/2012</td><td>21.000</td><td>20x30 1a</td></tr><tr><td>09/06/2012</td><td>22.000</td><td>20x20 1a</td></tr><tr><td>16/06/2012</td><td>24.200</td><td>20x20 1a</td></tr><tr><td>16/06/2012</td><td>9.800</td><td>20x30 1a</td></tr><tr><td>17/06/2012</td><td>22.400</td><td>20x30 1a</td></tr><tr><td>23/06/2012</td><td>19.800</td><td>20x20 1a</td></tr><tr><td>23/06/2012</td><td>9.800</td><td>20x30 1a</td></tr><tr><td>24/06/2012</td><td>39.600</td><td>20x20 1a</td></tr></tbody></table>	Date	Quantity of pieces produced	Type of brick	01/09/2011	58.440	20x30 1a	02/06/2012	19.800	20x20 1a	02/06/2012	11.200	20x30 1a	03/06/2012	2.800	20x20 1a	03/06/2012	26.400	20x30 1a	09/06/2012	21.000	20x30 1a	09/06/2012	22.000	20x20 1a	16/06/2012	24.200	20x20 1a	16/06/2012	9.800	20x30 1a	17/06/2012	22.400	20x30 1a	23/06/2012	19.800	20x20 1a	23/06/2012	9.800	20x30 1a	24/06/2012	39.600	20x20 1a		First Response The amounts of pieces produced, described in the table at left, were removed from the spreadsheet and all the values were updated in the VCS MR version 02.0. Second Response The amount of pieces produced on 01/09/2011 was removed.	1st Conclusion: The amount of pieces produced on 01/09/2011 (58.440 of 20x30 1a) was not removed. CAR is still OPEN. 2nd Conclusion: Amount removed. CAR is CLOSED.
Date	Quantity of pieces produced	Type of brick																																													
01/09/2011	58.440	20x30 1a																																													
02/06/2012	19.800	20x20 1a																																													
02/06/2012	11.200	20x30 1a																																													
03/06/2012	2.800	20x20 1a																																													
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23/06/2012	9.800	20x30 1a																																													
24/06/2012	39.600	20x20 1a																																													
5.	CAR	CAR 4: Include the demonstration of the monitoring of parameter “renewable biomass surplus” in the monitoring report and spreadsheet.	4.1	A table was included demonstrating the monitoring of the parameter “renewable biomass surplus” in the VCS MR Version 02.0 and VCS Calculation spreadsheet version 02.0 as requested.	CAR is CLOSED.																																										
6.	CAR	CAR 5: It is unclear how it is ensured that a reliable data collection and monitoring	-	The internal audit will be performed following the <u>Sustainable Carbon Internal Auditing Procedure</u>. To ensure that biomass and production data are being	Since a procedure has been established /200/ /201/, FAR 1, which was																																										

		system will be in place in the next verification. Furthermore, as required by FAR 1 of the previous verification report, the action was not implemented (<i>"FAR01: PPs are required to better describe their procedures for handling internal auditing and non-conformities. Time is given so that improved procedures can be established. Procedures do not need to be documented, however, it is likely recommended PPs do so, in order to make it easier for everyone involved to follow them correctly."</i>).		correctly filled, a biomass and production audit spreadsheet will be used. Both documents has been sent to the verification team.	raised in the previous verification is still OPEN to be verified in the next verification period.
7.	CAR	CAR 6: The GPS coordinates for figures 1 to 4 in Section 1.7, project location in the MR need to be revised	/ 11 /	First response: The GPS coordinates for figures 1 to 4 in Section 1.7 have been revised and converted to decimal degrees. Second Response: The first geographical coordinate has been properly converted.	1st Conclusion: The first geographical coordinate (22°08'24"S, 43°05'46"W) of Figure 1 was not properly converted. CAR is still OPEN. 2nd Conclusion: Correction made. CAR is CLOSED.
8.	CAR	CAR 7: Include a demonstration in the spreadsheet of the individual production decrease/increase for transparency purposes.	/ 12 /	First response: A demonstration of individual production decrease/increase have been included in the VCS	1st Conclusion: The calculus applied in cells K36 – K38 need to be revised. They are not considering the correct

				Calculation spreadsheet version 05.0 Second Response: The comparison in percentage has been added and the calculus applied in cells K36 and K38 have been revised.	monitoring period. CAR is still OPEN. 2nd Conclusion: Correction made. CAR is CLOSED.
9.	CAR	CAR 8: The emission reduction calculation spreadsheet needs to be further reviewed for comparison between actual emission reduction and estimated in VCS PD for transparency purposes: summary of Pry, Qoil, BEy, PEy and LEy for Argibem, São Sebastião and Vulcão Ceramics.	/ 12 /	The summary of Pry, Qoil, BEy, PEy and LEy for Argibem, São Sebastião and Vulcão Ceramics and the comparison between actual emission reduction and estimated in VCS PD have been included in the calculation spreadsheet.	Summary included. CAR is CLOSED.
10	CAR	CAR 9: As per VCS PD, there does not seem to be any need to introduce a conversion of ceramic pieces to equivalents of the standard brick (type 9x19x19) in São Sebastião Ceramic.	/ 4 /	At the time of validation of the VCS PD version 03.0, São Sebastião industry used to control its monthly production based on the standard brick (9x19x19). This can be seen at the Ceramic's production control spreadsheet, which was used to develop the VCS PD. This spreadsheet has been sent to the verification team. Although São Sebastião factory controls the production per ceramic type, the parameter PRy in the VCS PD was measured based on the conversion to the standard brick (9x19x19 type), an usual practice among the Ceramic Industry to standardize the production to the main ceramic type produced.	The production control spreadsheet /202/ is stating that the production was converted to equivalents of the standard brick (type 9x19x19, which is the same as "20x20", mentioned in /202/). Also, it was verified during the onsite visit that the conversion of the

					production to the standard brick is part of their procedure. Hence, CAR is CLOSED.
11	CL	CL 2: Clarify why São Sebastião Ceramic increased its production on 40%.	-	The production increase in São Sebastião factory is justified by an increase in the market demand. Furthermore, during the current monitored period, a new dryer chamber started operating in São Sebastião factory, replacing the natural drying process of ceramic devices. This change resulted in a productivity increase by reducing the time required for drying the ceramic pieces, as well as reducing the necessary area required for natural drying. The fuel switch project did not have any impact on this increasing production. Although this dryer did not exist at the baseline scenario, its operation does not affect any of the baseline parameters.	ADD RESPONSE!!!

Table 3: List of forward action requests (FARs)				
FAR number	Observation	Reference	Summary of project participants' response	Verification team conclusion
FAR 01	FAR01: PPs are required to better describe their procedures for handling internal auditing and non-conformities. Time is given so that improved procedures can be established. Procedures do not need to be documented, however, it is likely recommended PPs do so, in order to make it easier for everyone involved to follow them correctly.	-	The procedure of Internal auditing will be implemented in the next monitoring period. Project developer will perform an audit every monitoring period, verifying if biomass and production data are being correctly filled in the Dropbox Spreadsheets and correcting it when necessary. Sustainable Carbon is also responsible for training the staff of each Project Proponent for proper supply of information, in order to minimize data management errors and ensure a reliable data collection. In case of personnel change, a Sustainable Carbon responsible will be in charge of training the new staff	FAR will be followed-up in the verification period.