



Voluntary Carbon Standard 2007 Validation Report

19 November 2007

Project-No: 6078 – 08/520

Validation Report:

Name of Validation company:	Date of the issue:
TÜV NORD CERT GmbH	January 13 th , 2009
Report Title:	Approved by:
Final Validation Report KITAMBAR CERAMIC	Mr. Eric Krupp
Client:	Project Title:
Social Carbon	"Kitambar Ceramic Fuel Switching Project"
Summary:	
The Social Carbon has commissioned the TÜV NORD JI/CDM Certification Program to validate the project: "KITAMBAR CERAMIC FUEL SWITCHING PROJECT" with regard to the relevant requirements of the VCS 2007 Standard. The project activity consists of switching non-renewable to renewable biomass fuel for end-user thermal energy generation. A risk-based approach has been followed to perform this validation. In the course of the draft validation 14 Corrective Action Requests (CARs) and 21 Clarification Requests (CRs) were raised and successfully closed. The review of the project design documentation and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and review of comments by parties, stakeholders and NGOs have provided TÜV NORD JI/CDM CP with sufficient evidence to validate the fulfilment of the stated criteria. In detail the conclusions can be summarised as follows: - The project is in line with all relevant host country criteria (Brazil) and all relevant VCS 2007 Standard criteria. - The project additionality is sufficiently justified in the VCS PD. - The monitoring plan is transparent and adequate. - The calculation of the project emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of 416,186 t CO_{2e} is most likely to be achieved within the 10 years (renewable) crediting period. The conclusions of this report shows, that the project, as it was described in the project documentation, is in line with all criteria applicable for the validation.	
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1 Introduction

1.1 Objective

The purpose of this validation is to have an independent third party assessment on the project design. In particular the project's baseline, the monitoring plan (MP), and the project's compliance with the requirements of:

- VCS 2007 Standard
- other relevant rules, including the host country (Brazil)
- legislation and sustainability criteria

are validated in order to confirm that the project design as documented is sound and reasonable and meets the stated requirements and identified criteria. Validation is seen as necessary to provide assurance to stakeholders on the quality of the project and its intended generation of Voluntary Carbon Units (VCUs).

1.2 Scope and Criteria

The validation scope is given as an independent and objective review of the project design, the project's baseline study and monitoring plan (based on AMS-I.E: Switch from non-renewable biomass for thermal applications by the user - Version 01, February 1st 2008 onwards), which are included in the VCS PD and other relevant supporting documents.

The items covered in the validation are described below:

- Project Description
- Project Baseline
- Monitoring Plan
- Calculation of GHG Emissions
- Environmental Impacts
- Stakeholder Consultation

1.3 VCS project Description

Located in Caruaru, Pernambuco state, this project comprises the enterprise, Kitambar ceramic, which produce red ceramic devices. The project activity involves fuel switching from native firewood to algaroba wood coming from legal released extraction areas, cashew tree wood originated from sustainable managed firewood areas used to feed the ceramic kilns; thus GHG emission reduction is achieved. Other types of renewable sources of biomass can be applied during the project activity, as coconut husk from industrial residues, sawdust derivate from saw mill industries, sugar cane bagasse originated from sugar and alcohol mills and elephant grass coming from grassland in abandoned areas.

Before the replacement of the biomass, Kitambar produced 925,000.00 devices per month and it consumed 2,400.00 m³ of native firewood monthly in its eight "Round" kilns.

The total replacement occurred in December 2006, and now, the ceramic is using its eight "Round" kilns to produce 1,050,000.00 ceramic devices and consuming 1.714 m³ of renewable biomass (70% of algaroba wood and 30% of cashew trees) per month.

Due to the project activity investments were necessary to maintain the facility productions, such as: new mechanical burners to feed the kilns, adjustments in the kilns entrance that were adapted to the native firewood fuel, construction of a shed to store the renewable biomass and staff training regarding the new fuel adoption.

The project contributes to the sustainable development as due to its activity it will: diversify and improve sources of thermal energy generation, make possible new renewable biomass thermal energy generation technologies to be applied in the ceramic sector or other similar process, reuse biomass waste material, utilize renewable sources of biomass for thermal energy generation and contributes to the local biome preservation.

The estimated annual GHG emission reduction is 41,619 tCO₂e during the 10 years of the project activity, two times renewable.

1.4 Level of assurance

The validation report is based on VCS PD and documents provided by the project proponent, as well as information obtained from the on-site visit. The validation opinion is assured provided the credibility of all above.

2 Methodology

The validation of the project was carried out from November 2008 to December 2008.

Preparations: 2008-10-11 to 2008-10-14

On-site visit: 2008-10-15

Draft Reporting: 2008-11-14

(Final) Reporting: 2009-01-13

The validation consists of the following three phases:

- a desk review of the project design and the baseline and monitoring methodology
- follow-up interviews
- the resolution of outstanding issues and the issuance of the final validation report and opinion.

According to the VCS 2007 policy validations shall be completed within two years of the project start date, or within 1 year of 19 November 2007, whichever is later. The Policy announcement from the VCS Association (10 September 2008) extends this validation deadline. There it is stated, that proof of contracting prior to 19 November 2008 shall be provided. The signed contract between the parts is prior to the defined date on 30 December 2008.

2.1 Review of Document

VCS PD and proof of title submitted by Kitambar Ceramic, as well as the supporting documents were reviewed. Refer to Table 5-1.

The draft VCS PD^{PD/} submitted by Kitambar Ceramic and background documents related to the project design and baseline were reviewed.

Furthermore, the validation team used additional documentation by third parties like host party legislation, and technical data based on the project design provided by the company.

Afterwards, this report show the documents considered during the validation process and listed as follows:

- Documents provided by the project proponent (Table 5-1)
- Background investigations and assessment documents (Table 5-2)
- Websites consulted (Table 5-3)

2.2 Follow-up Interviews

Before and during the on-site visit on 2008-10-15, the verifier of TÜV NORD performed interviews with the project participants to confirm selected information and to resolve issues identified in the document review.

Kitambar Ceramic's owners and Social Carbon's consultants were interviewed. The main topics of the interviews are summarised in Table 5-4 and the participant's information is addressed in table 5-5.

2.3 Resolution of any material discrepancy

The report includes Corrective action and Clarification Requests (CAR and CR) identified in the course of this validation.

A Corrective Action Request is established if:

- mistakes have been made in assumptions or the project documentation which directly will influence the project results,
- the requirements deemed relevant for validation of the project with certain characteristics have not been met or
- there is a risk that the project would not be registered by the UNFCCC or that emission reductions cannot be verified and certified.

A Clarification Request is issued where information is insufficient, unclear or not transparent enough to establish whether a requirement is met.

After resolution of these CARs and CRs by the project proponent the validator will issue the (final) validation report and opinion.

14 CARs and 21 CRs were found during pre-validation. Please refer to Section 3.

3 Validation Findings

3.1 Project Design

The project comprehends the use of renewable biomass instead of non-renewable sources of biomass to generate thermal energy to feed the kilns and producing ceramic devices. Prior to the project implementation the ceramic used native firewood from unsustainable production as fuel to feed their kilns that nowadays was switched to different types of renewable biomass. The ceramic will preferably apply algarroba and cashew tree wood offered by the providers addressed in the VCS PD. In case of lack of providers other renewable biomasses sources such as coconut husk, elephant grass and sugar cane bagasso may also be employed.

The identified project boundary is the limits of the ceramic facility, in accordance with the applied methodology. The GHGs considered within the project boundary is the CO₂ emission from the combustion of native firewood used to occur in the baseline scenario. No other sources of GHG emission, sinks or reservoirs were identified.

Key parameters of the project are as below:

Table 3-1: Key parameters of the proposed project activity

Parameter	Value
Average burning cycle per month	22
Number of kilns entrance	6 entrance x 8 kilns = 48 entrances
Number of mechanic burners	24
Number of round kilns operating	8
Average temperature of the kilns	920 °C
Average production per month	1,050,000.00 ceramic pieces

Table 3-2: Project Location

Item	Project Scope
Host Country	Brazil
Region:	Eastern region of Pernambuco State, Brazil
Project location address:	Kitambar Ceramic Road BR 232 KM 136 without number Industrial District Postal Code 55000-000 Caruaru – PE– Brazil
Latitude:	8° 18' 16" S
Longitude:	35° 58' 25" W
Telephone:	+55 (81) 3726-1668

This project does not participate in any other project emission trade program and was not rejected in other GHG programme.

This project is eligible under the VCS methodology, so it fulfils all applicability criteria of the methodology used. The project consists of thermal appliances (ceramic kilns) that displace the use of native firewood by introducing renewable sources of biomass as fuel for end-user energy generation. As the energy generation necessary for the ceramic pieces production occur only in the ceramic facility, the validation team assumed that the plant is the end-user for the thermal energy generated. The native firewood utilized in the baseline scenario can be considered as non-renewable biomass as its extraction is illegal and no sustainable management plan is adopted. The renewable sources of biomass could be evidenced as follows:

- Algaroba wood – this cultivation started to be adopted in the Northeast region of Brazil during the 40's decade. This specie adapted very well to the climate of the region and, due to its competitive skills, rapidly spreads all over the Northeast region. This plant is well known as an invasive exotic plant which can cause many environmental impacts. Due to this reason its extraction is necessary to maintain the specie population under control and it is legally approved by Brazilian legislation. The source has been verified by the validation team.
- Cashew tree wood – it was provided by the cashew tree supplier a declaration informing that its cultivation follows sustainable management methodology from EMBRAPA (Brazilian Agricultural Research Corporation's) in the culture area. Please refer to table 5-1.
- Elephant grass – if adopted by the project activity its cultivations will follow sustainable management methodologies.
- Sugar cane bagasse – the sugar cane is necessary to maintain the production of sugar and alcohol mills in the region. Its cultivation can be assumed as sustainable because the sugar and alcohol facilities demands yearly incoming of sugar cane, thus it is necessary to maintain the cultivation area. The sustainability of these areas will be controlled by the verification team in each verification.
- Coconut husk – as coconut is a product from the coconut palm only the fruit will be harvested and used. The coconut producers must maintain its cultivations area sustainable in order to keep its productions. Therefore the validation team can assume that a sustainable management methodology is adopted in the coconut cultivation. This will be controlled in each verification.

There are no similar CDM projects activities in the regions as could be evidenced in the UNFCCC website. Moreover the project participants could prove the use of non-renewable biomass since 31 December 1989 using survey methods. Firewood is a well known fuel used in Brazil since the colonial period and its unsustainable management is the most common practice. The both information above could be evidenced through the sources provided in VCS PD. It was provided to the validations team reliable scientific researches demonstrating that wood is the most common fuel used in the ceramic sector and that the majority of wood comes from unsustainable managed areas. Please see detailed source in the reference table and sources 17, 18, 19 and 20 of VCS PD.

The project reduces the greenhouse gases (GHG) by switching from non renewable firewood as fuel to renewable biomass. It will also contribute for the sustainable development. The participation is voluntary.

The project duration is: 10 years, two times renewable.

Crediting period is 01/01/2007– 31/12/2016.

Project start date is 01/12/2006

Kitambar and Social Carbon have ownership of the proposed project. Proof of title was submitted to the validators.

The emission reduction was not double counted.

In the course of validation 05 CAR and 08 CRs were raised and could be successfully closed.

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
CAR 01 It is necessary to send the Operation License and the Clay Extraction License to the validation team.	VCS PD section 1.4	The Operation Licenses and the Clay Extraction Installation License (protocol) were sent to the validation team.		Ok, It was sent to the validation team. Please refer to table 5.1 of this report. The Clay extraction license was issued in 1/10/2008, although the crediting period starts January of 2007.
CAR 02 During the On-site visit the ceramic owner said that coconut husk is no longer used in the ceramic kilns. Please correct the project description.	VCS PD section 1.4	It was corrected in the project the information regarding the actual use of coconut husks.		It was included in the PDD that the coconut husk can be applied in the project activity, but due to technological difficulties its use was diminish.
CAR 03 The justification of the choice of the methodology shall be more detailed and include all applicability criteria of the methodology. Project participants shall show that there is no similar small-scale CDM	VCS PD section 2.2	The section 2.2 was revised.		OK, the methodology applicability was properly addressed. The end-user technology, use of firewood from unsustainable sources since 1989, the fuel switching from

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
project activity in the same region as the proposed project activity. In addition project participants shall show that the non-renewable biomass has been used since 31 December 1989.				biomass to renewable biomass and the inexistence of similar CDM projects in the region were justified.
CAR 04 A calculation should justify that the project will generate less than 45 MWthermal.	VCS PD section 3.1	There is a calculation in the VCU's spreadsheet which shows that the project generates 44.21 MWthermal, i.e. less than 45 MWthermal.		The calculation provided is correct. As the limit for small scale projects is 45 MW thermal and the capacity of this project is 44.21 MW thermal the verification team will check the ongoing correctness of this value during verification.
CAR 05 Justification shall be provided that the biomass used in the project activity fulfils one of the five conditions of renewable biomass as indicated in AMS. I.E. para 7. Corresponding evidences shall be provided to the validation team. This applies for all types of biomass considered in the project activity.	VCS PD section 2.2	It was added on VCS PD according to the options described in the methodology AMS I.E and the references were addressed.		Cashew tree (option II) – a) justified by the demand increase of the cashew tree cultivation (see source Nordeste Rural). b) and c) see declaration of the ceramist stating that it is applied a sustainable management methodology from EMBRAPA in the culture

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
				area. The industrial residues biomasses (sawdust, coming from sustainable managed areas) sugar cane bagasse and coconut rice husk) were correctly identified in option V of renewable biomass.
CR 01 Please indicate that it is a voluntary project.	VCS PD section 1.2	It was included in the section 1.2 that the project activity is voluntary project.		OK, included in PDD section.
CR 02 According to the Voluntary Carbon Standard Project Description Template the GPS project boundaries have to be included. In the VCS PD only the geographical coordinates of the city are named. Please fill in the needed information.	VCS PD section 1.5	It was included in the section 1.5 the GPS project boundaries.		OK, included in PDD section.
CR 03 Please inform the main event adopted to identify the project starting date and the date of terminating the project.	VCS PD sections 1.6 and 7	It was included in the sections 1.6 and 7: As the complete fuel-switch occurred by the end of December of 2006, the crediting period start date was defined as the date when the ceramic has begun to use 100% of biomasses as fuel.		OK, included in PDD section. Project lifetime is 10 years until December 2016.

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
CR 04 It is necessary to provide the sources of the information provided in section 1.7. Please clarify which are the renewable biomasses accumulated in open dumps. Is this issue regard to all renewable biomasses presented in the second paragraph of the same section?	VCS PD section 1.7	Information provided was modified. The affirmation "the biomasses would be disposed in open dumps" was modified to "the renewable biomasses could be disposed in open dumps" since the renewable biomasses utilized in the project are residue and this kind of solid waste disposal site is common in Brazil.		OK, information was revised.
CR 05 It is indicated in VCS PD that there are options for the renewable biomass used in the project activity that can be applied in case of lack of providers. Please clearly indicate the specific biomasses option of the project region.	VCS PD section 1.9	The main kinds of biomasses were already described. It was added in this section the: Elephant Grass which can be cultivated only for thermal energy appliances; the sugar cane bagasse that is an important crop in the region; the sawdust is a possibility, as there are industries that produce this biomass as residue; and the coconut husk is quite available as it is a typical fruit tree in the northeast region of the country		Ok, the biomasses options in the region of the project activity were informed.
CR 06 Table 3 should be duly filled. Please justify why other GHG sources, except for CO ₂ in the baseline scenario, are not included in the	VCS PD section 2.3	The table 4 was duly filled and it was justified why the CH ₄ and N ₂ O emissions were not considered. In the baseline scenario they were excluded for simplification and conservative reason. In		OK, table was duly filled.

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
project boundary / are not applicable.		the project activity they were excluded for simplification once these emission sources are assumed to be very small.		
CR 07 Please note that the methodology correct name, version and date should be addressed every time the methodology is cited in the VCS PD. Please correct sections 3.1, 3.3 and 4.1.	VCS PD section 3.1, 3.3 and 4.1	The methodology name was corrected.		OK, the sections were revised.
CR 08 Justification of the gap of time between project start and the Validation report date need to be provided. What happened in between should also be described.	VCS PD section 7	The gap between the project start and the Validation report date occurs as an adaptation period due to the use of new biomass and its technology encompassing, for example, tests using the new biomasses and technological adaptations such as the installation of molten iron grills in all six "Round" kiln entrances. Furthermore, it encompass period to get the necessary information and documents to validate the project activity.		OK, justification is accepted and sounds plausible.

Minor Change

- It is necessary to correct the section 1.13 of the VCS PD. The letter was issued from BRTÜV. This project was not assessed under the Q-27 Standard; therefore this information is not necessary.

3.2 Baseline

The proposed project used CDM approved methodology Category AMS-I.E: Switch from non-renewable biomass for thermal applications by the user - Version 01, February 1st 2008 onwards; this methodology has been select by the project developer since contemplate the switching of non renewable biomass for renewable biomass.

The baseline scenario is the continuation of the common practice in the region, which is the use of native firewood from unsustainable management to feed the ceramic kilns contributing for the deforestation of the Caatinga biome. In the past, the ceramic used approximately 2,400.00 m³ of native firewood in order to produce 925,000.000 ceramic pieces monthly, according to historical data of the organizations owner. As the ceramics increased its production due to the market demand, the considered baseline consumption of native wood will be adjusted to its actual production capacity, which is 1,050,000.00 pieces per month. To do so, an efficiency factor of native wood consumption per pieces production was calculated (2,6 m³ of native firewood / ceramic pieces). Applying this efficiency factor, the native firewood consumption in the baseline is 2,725.00 m³ for the ceramic facility.

The baseline identification was assessed considering the data made available to the validation team. The most possible baseline scenarios would be the use of wood, fuel oil and natural gas respectively, as information checked in the Brazilian Energy Balance in the ceramic sector for the year 2007. The fuel oil was discarded as a candidate because its high price when compared with the use of wood. Despite of the fact that the fuel oil presents a higher net calorific value when compared with wood its costs for the ceramic facility are higher because of its expensive price, as show in a reliable university study (please refer to PDD source 27). The natural gas was disconsidered as a possible baseline scenario due to the inconstant surplus of this fuel, as information provided in source 27 of VCS PD. According to experience data of the ceramic owner the kiln efficiency (m³ of native firewood / thousand of ceramic pieces) using native firewood could be identified, as could be evidenced during the On-site visit. With the kiln efficiency utilizing native firewood the consumption of native firewood that would occur in the absence of the project activity based on the actual production of the ceramic could be identified. Therefore the validation team concludes that the identified baseline scenario could be properly assessed and it was correctly identified.

The project attends satisfactorily all the requested tests according to the V-C-S program. It is not enforced by Brazilian legislation; the barriers met were real and verified and the use of native firewood is very common in the ceramic sector.

The additionality was assessed using the project test (1) of section 5.8 of the VCS 2007 Standard. The project activity is not mandatory by any enforced applicable federal, state and municipal law, thus passing through step 1. The implementations barriers identified were:

- Technological
 - Kilns adjustment – As the kilns are now fed with mechanical burners, adjustments in the kilns entrances were necessary to the correct fit of the machinery. Without the adjustments a significant lost of thermal energy would occur. The adjustments could be evidenced during the On-site visit.
 - Use of the new mechanical burners – The ceramic had to learn how to manage the new machinery to get the most efficient activity. It could be

evidenced during the On-site visit that the ceramist experiences some difficulties with the equipments as maintenance and bad working when applying bigger pieces of renewable biomass. Moreover it was necessary to train the staff responsible for the kiln feeding.

- Use of the new fuel – During the fuel switching the ceramic facility had to deal with the difficulty of establishing the total amount of new fuel necessary to get the proper kiln temperature. Due to this reason the ceramic pieces get cracked or altered its final colour. It was evidenced that the ceramic production decays significantly during the initial fuel switching period.
- Storage of the renewable biomass – It was evidenced during on-site visit that the use of the new fuel had to be done with the proper humidity and therefore a new storage logistic was necessary. The renewable biomass has to be left drying for a certain period before it could be use in the process. The cashew wood has a phloem which has to be removed from the wood before it is burned; otherwise it may potentially obstruct the air escapement from inside the kilns to outside. That is not the case for the native wood which can be left in the open and still be readily used, once it only gets wet on the outside part of the logs but the humidity does not penetrate inside the wood. This has been confirmed by the validation team in several site visits performed in other ceramics in Brazil.

▪ Financial

- Renewable biomass purchase – As it is clear indicate in the VCS PD and the financial spreadsheet the cost with the renewable biomass is higher when compared with native firewood. The new fuel implicates in higher costs due to its transportation, storage and higher price. The native firewood price was evidenced during the On-site visit according to experience data of the ceramic owner and the renewable biomass price was checked trough the buying receipts. The transportation costs are higher when using the new fuel due to the high distance from the suppliers. Please refer to the financial spreadsheet.
- Kilns firing entrance adjustments – Although the price for the kilns adjustments are small it is also considered as a barrier.
- Staff training courses – it was necessary to provide resources for the staff training.
- Maintenance costs – costs related to the maintenance of the new mechanical burners acquired. It was evidenced during the On-site visit that this equipment frequently needs to be repaired.
- Mechanical burners acquired – the price paid for the new machinery used in the project activity could be evidenced through buying receipts.
- Electrical consumptions cost due to the new mechanical burners – before the project activity the costs with electricity consumption was smaller compared with the baseline scenario. It was evidenced through electricity consumption receipts.
- It is important to mention that although there was a small increase in production of the ceramic this was due to market conditions resulting in slight sales level fluctuation and does not imply that the fuel switch represent an increase in the production capacity, nor in the quality of the final product or its

price. The same production level could have been achieved using native firewood.

▪ Institutional

- Introduction of new technology in the facility process – As stated above the new fuel was an unknown process to the ceramic. The insecurity of changing a well known process for a new one represents a risk for the ceramist. The uncertainty regarding the new biomass surplus can be considered the major insecurity for the project activity.
- Increase in the renewable biomass price due the upcoming demand – As the use of renewable biomasses in the ceramic sector is an innovation the future demand of these fuels is difficult to foresee. Although there is currently a great amount of these biomasses available, there is a possibility that the prices will increase.

The validation team believe that the most impacting barrier for the proposed project activity are the new fuel used, production difficulties experienced due to the new fuel applied, renewable biomass purchase, mechanical biomass acquired and the uncertain of the renewable biomass supply in the future. The presented technical and financial barrier is sufficient to properly address step 2 requests.

For the common practice analyse it was used the GHG Protocol criteria assessment. As show in VCS PD the most common practice in the region is the use of native firewood as fuel in the ceramics sector. The data available for the common practice analyse was the same presented for the baseline identification, thus the validation assessment was carried out in the same manner. The high levels of deforestation rates in the project region and the practices in the ceramic sector support this conclusion.

The validation team is convinced that the project is additional, as shown in the comments above. However 04 CARs and 03 CRs were opened.

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
CAR 06 The production of ceramic devices has been increased compared to the time before implementing the project activity. Clarification is required whether the fuel demand associated to the increased rate of production could also be met in the baseline scenario. Respective	VCS PD section 2.5	The production increased during the beginning of the project activity in order to compensate the investments performed. The production during the baseline scenario could increase, since there is no lack of non-renewable wood offer. The high devastation rate of Caatinga Biome makes available large amounts of wood.		Ok, information provided in section 2.5. In the baseline scenario there will be sufficient native firewood to maintain the increased ceramic production.

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
information shall be included in the VCS PD and corresponding evidences shall be provided.		According to ASPAN, the major industries, mainly the steel, plasterer and ceramic industries are primarily responsible for the use of native firewood as fuel in their productions. Currently there is remaining 50% of its original structure, even with 365.000 hectare of annual loss of all the biome ^{WEB5/} . Therefore, wood would be enough to ensure the increase in Ceramics production for at least the next 15 years, which is over the project activity life-time ^{WEB6/} .		
CAR 07 The technology barriers in the PD are not convincing so far. A technological barrier might occur e.g. if a less technology advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions. Please provide additional information.	VCS PD section 2.5	The Technological Barrier in the VCS PD was rechecked and it is according to 'EB. Best practice examples' were included such as the demonstration of non-availability of human capacity to operate and maintain the technology, lack of infrastructure to utilize the technology, unavailability of the technology and high level of technology risk.		OK, the section was revised and the technological barriers were properly justified.

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
CAR 08 The argumentation of the investment barriers is not convincing so far. Please provide detailed information of costs demonstrating that the project faces capital return constraints that can be overcome by the additional revenues by VCU. The cost of renewable biomass in comparison to native firewood as well as the cost for transportation for both fuels shall be considered. The sources of all data considered shall be provided.	VCS PD section 2.5	The main investments necessities in order to start the project implementation and its maintenance are demonstrated in the VCS PD in a table of costs. Please see the PDD.		Ok, a simple cost analysis has been provided. The financial spreadsheet was checked and the assessment of the financial inputs was OK.
CAR 09 In step 3 of the project test the common practice is demonstrated based on the GHG Protocol for Project Accounting. However, requested steps are not fully applied. E.g. in step 3 the geo-graphic area used to identify baseline candidates was not justified and steps 4 and 5 were not addressed. Revision is required. Please make sure that all data and values considered are addressed	VCS PD section 2.5	The topic 3, 4 and 5 were rechecked. In topic 3 it was justified the geographic area used and topics 4 and 5 were addressed.		Ok, the steps 3, 4 and 5 were properly addressed in the revised PDD.

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
properly.				
CR 09 Evidence shall be provided substantiating the statement that use of fuel oil is not a viable baseline scenario due to higher prices of fuel oil compared to non-renewable biomass.	VCS PD section 2.4	It was added on PDD, comparing the fuel oil with the wood in terms of price and technology, using reference guide.		Ok, it was provided a study from reliable source indicating that the oil is much more expensive than wood for the energy generation. Please refer to section 2.4.
CR 10 Justification for sustainability of Algaroba wood needs to be explained as it is an invasive species that has no management plan and the area of extraction is not defined.	VCS PD section 1.9	The algarroba plant is an invasive species that sprouts again after cutting. The use of the plant avoids the invasion of this species into the native forest. The use of this plant is legal and sustainable according to Brazilian legislation. The PDD has been revised accordingly.		OK, the sustainable use of the Algaroba plant could be justified.
CR 11 Table 5 shows possible baseline scenarios. Wood was identified as the most used fuel in the ceramic sector, although there is any information regarding	VCS PD section 2.5	Detailed information was added to prove that the use wood and its non-renewable fraction were identified as the most fuel used in the ceramic sector.		OK, it was show by scientific sources that the most common practice use of wood in Brazil is

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
the <u>non-renewable use of wood</u> . The information in table 5 is not sufficient to identify the non-renewable use of wood as the most used fuel in the ceramic sector. Clarification is required.				originated from non-sustainable managed areas. Please refer to sections 2.2 and 2.5. /WEB9/

3.3 Monitoring Plan

The proposed project used CDM approved methodology Category AMS-I.E: Switch from non-renewable biomass for thermal applications by the user - Version 01, February 1st 2008 onwards. The project satisfies all criteria for the applied methodology. The application of monitoring methodology was assessed as correct.

The monitoring plan provides detailed information related to the collection, archiving and monitoring of all relevant data needed to:

- Estimate or measure emissions occurring from GHG sources, sinks and reservoirs
- Determine the baseline emissions
- Estimate changes in emissions from the site

The parameters to be monitored it will be responsibility of Ms. Antônio Marcos, ceramics' owner. He will be responsible for registration, monitoring, measurement and reporting.

Parameters that will be monitored:

- Amount of renewable biomass employed (tonnes) - measured by the project developer, monthly. The parameter will be monitored through the buying receipts of the renewable biomasses. The specific gravity of each renewable biomass can be used for unit conversion. The QAQC procedure is realized through the energy balance of the quantity of energy generated by the bought renewable biomass and the energy necessary to maintain the monthly production;
- Production of ceramic devices (units per month) - controlled by the project developer, monthly – The ceramic maintain an internal spreadsheet for the production controlling that is fed daily. The QAQC procedure consists of a rigorous register of the daily production. The ceramic must have an internal control of the production for the internal financial balance;
- Renewable origin of the biomass - controlled by the project developer, annually. The project participant will only buy renewable biomass from the list of its reliable supplier. Depending on the renewable biomass type different criteria must be applied as state in section 3.1 of this report;

- Renewable biomass surplus – In order to estimate the leakage emission of the renewable biomass the project participant will monitor the renewable biomass surplus in the specific region of the project activity, yearly. The measurement will be based on national and internal sources.
- Leakage of non-renewable biomass – All three sources of leakage predicted in the applied methodology will be monitored, annually. It will be provided information regarding the non-renewable biomass availability in the specific project region.
- Fraction of native wood used in the absence of the project activity – Data applied from the ceramic owner. Before the project activity the ceramic uses wood with a fraction of 99,7 % of non-renewable wood to maintain its production. The fraction could be verified with following source ^{/WEB8/}.

The QAQC procedures of the monitored parameters are clearly described and it was considered adequate. The amount of non-renewable biomass that would be used in the absence of the project activity will be calculated according option “b” of the applied methodology. The kiln efficiency (m³ of renewable biomass / thousands of pieces) before the project implementation multiplied by the monthly production will reach to the amount of non-renewable biomass that would be utilized.

The fixed parameters for the project activity are:

- NCV non-renewable biomass – IPCC value applied. It was considered an average of the typical Caatinga biome trees, as can be checked in the calculation spreadsheet.
- Wood specific gravity – IPCC value applied. It was considered an average of the typical Caatinga biome trees, as can be checked in the calculation spreadsheet.
- EF projected fossil fuel – As show above, the most probable fossil fuel in the absence of wood it would be the heavy oil. IPCC 2006 value was applied.
- Tons of wood per thousand of devices – Value adopted from ceramic owner experience. This value is in accordance with other ceramics with the same fuel and kiln used.

Besides of that, 03 CARs and 08 CRs were raised.

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
CAR 10 It is informed that the B _y will be calculated according both options suggested in the methodology (a and b). Just one option shall be used. Please adopt the most plausible option applicable to the project activity. Corresponding	VCS PD sections 3.2., 3.3. and 4.1.	The amount of non-renewable biomass (B _y) was determined according to the option “b” of the applied methodology once option “a” was designed for really small appliances like household stoves and		Ok, option “b” was applied to the project activity. Furthermore all applicable parameters were revised.

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
information shall be addressed in section 4.1. of VCS PD. After choosing one option the determination of the monitoring parameters shall be revised considering option related monitoring parameter only. Please revise accordingly parameters that are determined in the course of validation and remains fixed throughout the monitoring period.		does not fit for the kind of projects in question. Thus, monitoring via option "a" is not recommended as it does not serve the purpose for accurate monitoring.		
CAR 11 The annual check of all appliances shall be included in the monitoring plan as requested by AMS I.E.	VCS PD section 3.3	Added on PDD – section 3.4: Monitoring Plan		Ok, the PRy parameter is being applied for this monitoring procedure. According to the production of the ceramic it is possible to quantify burning cycles of the kilns and consequently their operation.
CAR 12 The leakage emission will be monitored, although it was not identified any	VCS PD section 3.3	It was added on VCS PD.		OK, the leakage consideration is now properly addressed. Please refer

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
relevant parameter to do such measurement. ▪ Please differentiate between leakages related to the use of renewable and non-renewable biomass. ▪ Indicate clearly the measurement methods and procedure and parameters to monitor and estimate the leakage emission. ▪ The leakage considerations must be conducted for all types of renewable biomasses considered in the project activity.				to section 3.3 and 4.1. Section 4.4 provides detailed information regarding the leakage consideration for all biomasses considered in the project activity.
CR 12 Additional information is required concerning the measurement method and procedure to monitor the parameter "Biomass origin". Please specify the documents that will be available to do the assessment.	VCS PD section 3.3	It was included in the VCS PD: The guarantee of acquiring renewable wood will be achieved by invoices from the providers		OK, it was indicated in the respectively section the documents that will be available.
CR 13 In the parameter	VCS PD section 3.3	Please refer to the revised		The parameter

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
Q _{renbiomass} please indicate who will be responsible for the truck weighing, the ceramic owner or the biomass provider?		parameter. It will not be necessary to weigh the trucks.		was revised and the weighing is no longer necessary.
CR 14 It is necessary to indicate the species considered for the calculation of the NCV _{biomass} and "Specific gravity of non-renewable biomass" (ρ_{wood}). Please provide additional information concerning the monitoring procedure of NCV _{renbiomass} . Clarification is required how this parameter can be monitored regularly while applying literature values.	VCS PD section 3.3	A spreadsheet containing all the species used to calculate the "Specific gravity of non-renewable biomass" (ρ_{wood}), their respective values associated and the involved calculations was included in the file ^{/XCS1/} All these parameters are fixed thus, not monitored.		OK, it is indicated in the calculations spreadsheet. Moreover the parameter NCV _{renbiomass} is no longer applied for monitoring.
CR 15 Clarification is required regarding the use of the parameter $\rho_{renbiomass}$ in the context of the project activity.	VCS PD section 3.3	The amount of renewable biomass that arrives by trucks in the ceramic is occasionally measured by volume units. So the $\rho_{renbiomass}$ is necessary to the conversion. Changed on the respective table of this section on VCS PD.		This parameter is no longer applied in monitoring of the project activity. The $\rho_{renbiomass}$ is just used for unit conversion and the values used are clear indicated in the

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
				measurement procedure of the $Q_{renbiomass}$ parameter.
CR 16 Additional information is required concerning the measurement method and procedure to monitor the 'unity of ceramic pieces' (CD_y).	VCS PD section 3.3	The nomenclature was changed from CD_y to PR_y according to the new procedure of calculations. As the ceramic must have an internal control of the production and sale at the end of every month, the PR_y value cannot be manipulated which ensures the reliability of this information. Changed on the respective table of this section on VCS PD.		OK, the parameter was revised and the measurement procedure is convincing.
CR 17 Please clearly indicate the assumptions made to adopt the heavy oil emission factor as the $EF_{projected_fossilfuel}$.	VCS PD section 3.3	The fossil fuel likely to be used by similar consumers is taken the IPCC default value of residual fossil fuel. It was rechecked and added on VCS PD		OK, it is clear indicate in section 2.4 the assumption made to adopt the residual oil as the $EF_{projected_fossilfuel}$. As show in table 5 the residual oil is the second fuel

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
				most used in the ceramic sector. The most common fuel applied is wood.
CR 18 Please provide detailed information about the survey method applied to determine the parameter $f_{NRB,y}$.	VCS PD section 3.3	Around 0.3% of Caatinga biome can be considered from sustainable forest management plans, the fraction of non-renewable biomass will be therefore 99.7% /WEB8/ 94,287 km² = 942.87ha of areas with sustainable management plans. Percentage of areas with sustainable forest management plan = 942.87/340,000 ha = 0.3%.		Ok, the provided information is sufficient to close the CR.

3.4 Calculation of GHG Emissions

GHG emission reduction is calculated as baseline emissions minus project emissions minus leakage emissions. As no project and leakage emissions are identified according to the applied methodology, baseline emissions are equal to the amount of emission reduction. The project activity will also avoid the decomposition of the renewable biomass and the possible release of methane to the atmosphere. The renewable biomass that was left to decay in open dumps before the project implementation is now burned in the kilns to generate thermal energy. Despite of that, the avoided methane emissions are not considered in the emission reduction calculation.

Emission reduction is calculated through the estimate value of native wood that would be consumed in the absence of the project activity in year y (according option “b” of applied methodology as state in section 3.3 of this report) multiplied by the 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 EF of the projected fossil fuel adopted. The approach used for the emission reduction calculation was considered to be in accordance with the applied methodology.

According to the applied methodology leakage emissions regarding the project activity are to be considered. The methodology requests due to the identification of potentially significant sources of leakage emission were properly addressed in the VCS PD and its emission is considered to be zero.

In the course of validation 03 CRs were raised and could be successfully closed.

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
CR 19 The efficiency of the system being replaced is not properly addressed. It is defined as the ratio between the useful energy in the process and the fuel energy needed to generate this amount of energy. Correction is required.	VCD PD sections 3.3 and 4.1	It was rechecked and it was defined as the ratio between the useful energy in the process and the fuel energy needed to generate this amount of energy		OK, parameter was revised and the CR is closed.
CR 20 The identification of potentially significant sources of leakage due to competing use of the renewable biomass shall be demonstrated specifically for the region of the project activity (cp. General guidance on leakage in biomass project activities). However nationwide data were considered in	VCS PD section 4.1	Added on VCS PD on the respective section.		OK, leakage consideration was revised and regional data for all sources of biomasses was used.

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
the justification. Revision is required.				
CR 21 AMS I.E requires the use of the IPCC default value for wood fuel (0.015 TJ/t) for $NCV_{biomass}$. Revision of ER calculation is required.	VCS PD sections 3.3, 4.1 and /XCS1/	Another $NCV_{biomass}$ value was utilized once the methodology description, already contained in the PDD (section 3.3), affirms: "IPCC default values shall be used only when country or project specific data are not available or difficult to obtain, according to "Guidance on IPCC default values" (Extract of the report of the twenty-fifth meeting of the Executive Board, paragraph 59)." Therefore, as specific data was available, other $NCV_{biomass}$ value was obtained. A spreadsheet containing all the species, their respective values associated and the involved calculations was included in the file /XCS1/		OK the justification is accepted and the CR properly addressed.

3.5 Environmental Impact

The project will use renewable biomass for its firing process (e.g. sawdust and wood deriving from sustainable management forest). The origin of the biomass will be monitored regularly and is included in the monitoring plan. A table that shows possible negative impacts to the environment has been included to the PD. There are no additional negative environmental impacts due to the project activity expected. An EIA (*Estudo de Impacto Ambiental* – Environment Impact Assessment) is not required by the environment federal authority. All mandatory licences for the project activity were available at the time of validation^{/OL//OL1//OL2/}.

In the course of validation 01 CAR was raised and could be successfully closed.

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
CAR 13 Environmental impacts: The information should contain all possible environmental impacts. It should be included a list of impacts and a judgment if the impact is seen significant or not.	VCS PD section 5	A list of impacts and a judgment if the impacts are significant or not were reinserted in the section 5		OK, table has been included to the PD.

3.6 Comments by stakeholders

Different stakeholders as local government, the ceramic sector association and the employees were consulted through an opinion invitation letter. The comments were received during a period of twenty days after the letters were sent. There has been one comments received concerning the project activity, which expresses the positive impact of the project activity.

In the course of validation 01 CAR was raised and could be successfully closed.

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
CAR 14 It is necessary to send stakeholders comments invitation proof for the validation team.	VCS PD section 6	The invitation proof is being provided and it will be sent as soon as possible		Ok, it was consulted the ceramic sector association and the ceramic company employees.

4 Validation conclusion

Social Carbon has commissioned the TÜV NORD JI/CDM Certification Program to validate the project: “KITAMBAR CERAMIC FUEL SWITCHING PROJECT” with regard to the relevant requirements of the VCS 2007 Standard.

The project activity consists of switching from non-renewable to renewable biomass fuel for end-user thermal energy generation. A risk-based approach has been followed to perform this validation. In the course of the draft validation 14 Corrective Action Requests (CARs) and 21 Clarification Requests (CRs) were raised and successfully closed.

The review of the project design documentation and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and review of comments by parties, stakeholders and NGOs have provided TÜV NORD JI/CDM CP with sufficient evidence to validate the fulfilment of the stated criteria.

In detail the conclusions can be summarised as follows:

- The project is in line with all relevant host country criteria (Brazil) and all relevant VCS 2007 Standard criteria.
- The project additionality is sufficiently justified in the PDD.
- The monitoring plan is transparent and adequate.
- The calculation of the project emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of 416,186 t CO_{2e} is most likely to be achieved within the 10 years (renewable) crediting period.

The conclusions of this report show, that the project, as it was described in the project documentation, is in line with all criteria applicable for the validation.

Sao Paulo, 2009-01-13



Ricardo Lopes

TÜV NORD JI/CDM CP

Verification Team Leader

Essen, 2009-01-13



Eric Krupp

TÜV NORD JI/CDM CP

Final approval

5 References

Table 5-1: Documents provided by the project proponent

Reference	Document
/PD/	Project Design Document “Kitambar fuel switching project” Version 02 – December 17 th , 2008.
/XCS1/	Calculation spreadsheet of baseline study and emission reduction in “estimativas” - Version 03 – December 17 th , 2008
/XCS2/	Financial spreadsheet – Version 02 - December 17 th , 2008
/ML1/	Municipal License to Kitambar Ceramic – municipal register: 2008/002581, issued on 2008-03-29. Valid until 2009-03-29
/POL1/	Previous Operation License – Valid from 2004/6/8 to 2005/6/8
/POL2/	Previous Operation License – Valid from 2006/2/8 to 2007/2/8
/CEL/	Clay extraction license issued in 1/10/2008.
/WEB1/	Website consult – Source 17 of VCS PD: http://www.teses.usp.br/teses/disponiveis/86/86131/tde-14052008-113901/
/WEB2/	Website consult – Source 18 of VCS PD: http://www.scielo.br/scielo.php?pid=S0103-40142007000100015&script=sci_arttext&lng=ES
/WEB3/	Website consult – Source 19 of VCS PD: https://ben.epe.gov.br/BEN2007_Capitulo3.aspx
/WEB4/	Website consult – Source 27 of VCS PD: http://www.abcm.org.br/xi_creem/resumos/TE/CRE04-TE01.pdf
/WEB5/	Website consult: http://www.faunabrasil.com.br/sistema/modules/wfsection/article.php?articleid=47
/WEB6/	Website consult: http://www.aspan.org.br/
/WEB7/	Website consult – Source 20 of VCS PD: http://www.teses.usp.br/teses/disponiveis/86/86131/tde-14052008-113901/

Reference	Document
/WEB8/	http://www.cnip.org.br/planos_manejo.html
/WEB9/	http://www.mme.gov.br/download.do?attachmentId=16555&download http://www.anicer.com.br/anicer2008/index.asp?pg=institucional.asp&secao=3&categoria=60&selMenu=3

Table 5-2: Background investigation and assessment documents

Reference	Document
/AMS-I.C./	AMS-I.E: Switching Biomass for thermal applications by the user, version 01, February 1 st , 2008.
/GHG Protocol/	GHG Protocol for Project Accounting 2005.
/IPCC-GP/	IPCC Good Practice Guidance & Uncertainty Management in National Greenhouse Gas Inventories, 2000
/IPCC/	2006 IPCC Guidelines for National Greenhouse Gas Inventories: General Guidance and Reporting
ISO 14064-1:2006	Greenhouse gases - Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals
ISO 14064-2:2006	Greenhouse gases - Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements.
ISO 14064-3:2006	Greenhouse gases - Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions
ISO 14065:2007	Greenhouse gases - Requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition
/KP/	Kyoto Protocol (1997)
/CONAMA 279/	Resolution CONAMA 279 (2001) – Environmental National Board
/VCS/	Voluntary Carbon Standard Program Guideline 2007.

Table 5-3: Websites used

Reference	Link	Organization
/CETESB/	http://www.cetesb.sp.gov.br	Companhia de Tecnologia de Saneamento Ambiental
/MCT/	http://www.mct.gov.br	Ministério da Ciência e Tecnologia – Technology and Science Department
/UNFCCC/	http://unfccc.int	United Nations Framework Convention on Climate Change
/VCS/	http://www.v-c-s.org	Voluntary Carbon Standard
/CESP/	http://www.cesp.com.br/	São Paulo Energy Company
/DNPM/	http://www.dnrm.gov.br	National Department of Mineral Production

Table 5-4: Interviewed persons and interview topics

Interviewed Persons / Entities	Interview topics
Mr. Antônio Marcos – Kitambar Ceramic owner Mr. Marcelo Haddad CO2e Brasil	▪ Desk review findings ▪ General aspects of the project ▪ Project design, Commissioning and implementation ▪ Technical equipment and operation of the project ▪ Performance of the project ▪ Involved personnel and responsibilities ▪ Training and practice of the operational personnel ▪ Implementation of the monitoring plan ▪ Monitoring and measurement equipment ▪ QA/QC Testing and calibration procedures ▪ Monitored data management ▪ Data quality, archiving and reporting procedures ▪ Data uncertainty and residual risks ▪ GHG calculation ▪ Procedural aspects of the verification

Table 5-5: List of interviewed people

Reference	Mol ¹		Name	Organization / Function
/IM01/	V	☒ Mr. ☐ Ms.	Antônio Marcos	Kitambar Ceramic owner
/IM01/	E, V	☒ Mr. ☐ Ms.	Marcelo Haddad	CantorCO2e Brazil - Technical Analyst

¹⁾ Means of Interview: (Telephone, E-Mail, Visit)

²⁾ Means of Interview: (Telephone, E-Mail, Visit)