



Voluntary Carbon Standard 2007.1 Validation Report

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Final Validation Report ARGIBEM, SAO SEBASTIAO AND VULCAO CERAMIC	Mr. Eric Krupp (FA)
Client:	Project Title:
Carbono Social Serviços Ambientais Ltda	"Argibem, Sao Sebastiao and Vulcao Ceramic Switching Fuel Project"
Summary:	
The Carbono Social Serviços Ambientais Ltda has commissioned the TÜV NORD JI/CDM Certification Program to validate the bundling project: "ARGIBEM, SAO SEBASTIAO AND VULCAO CERAMIC SWITCHING FUEL PROJECT" with regard to the relevant requirements of the VCS 2007.1 Standard. The project activity consists of switching from fossil fuel 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 07 Corrective Action Requests (CARs) and 15 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 2007.1 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 208,144 t CO₂e is most likely to be achieved within the 10 years (renewable) crediting period. The conclusions of this report is, that the project, as it was described in the project documentation, is in line with all criteria applicable for the validation.	
Work carried out by:	Number of pages:
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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 2007.1 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.C: Thermal energy for the user with or without electricity - Version 13 from March 14th 2008), 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

This project comprises three ceramics in the State of Rio de Janeiro: Argibem, located in Bem Posta (Três Rios District), Sao Sebastiao in Barra do Piraí and Vulcao in Queimados, which produce red ceramic devices. The project activity involves fuel switching from heavy oil to renewable biomass coming from wood residues, wood from sustainable afforestation sites and sawdust, thus GHG emission reduction is achieved. Other types of renewable sources of biomass can be applied during the project activity, as elephant grass coming from grassland in abandoned areas.

Before the replacement of the biomass, Argibem produced 19,200,000 devices per year and it consumed 1,877,000 liters per year, Sao Sebastiao produced 7,200,000 and consumed 1,440,000 liters and Vulcao produced 11,400,000 devices and it consumed 1,440,000 liters of oil per year in their "Tunnel", "Hoffman" and "Hoffman" kiln respectively.

The total replacement occurred in April 2006, and now, Argibem, Sao Sebastiao and Vulcao are using their kilns to produce 2,000,000, 600,000, and 1,600,000 ceramic devices and consuming 530, 155, 510 tonnes of renewable biomass per month, respectively.

Due to the project activity investments were necessary to maintain the facility productions, such as: new mechanical burners to feed the kilns, alterations in the kilns to use the new biomass (the pipelines and the injectors were deactivated), construction of sheds 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 petrol reserves.

The estimated annual GHG emission reduction is 20,814 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: 2008-09-04 to 2008-09-14

On-site visit: 2008-09-23 (Sao Sebastiao), 2008-09-22 (Argibem) and
2008-09-15 (Vulcao)

Draft Reporting: 2009-03-05

(Final) Reporting: 2009-05-22

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 2007.1 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 was checked and it is prior to the defined date^{/PRO/}.

2.1 Review of Document

VCS PD^{VCS PD/} and proof of title submitted by Argibem, Sao Sebastiao and Vulcao Ceramic, as well as the supporting documents were reviewed. Refer to Table 5-1.

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 visits on 2008-09-23 (Sao Sebastiao), 2008-09-22 (Argibem) and 2008-09-15 (Vulcao), the verifier of TÜV NORD performed interviews with the project participants to confirm selected information and to resolve issues identified in the document review.

Argibem, Sao Sebastiao and Vulcao Ceramic's owners and Carbono Social Serviços Ambientais Ltda'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.

7 CARs and 15 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 to generate thermal energy to feed the kilns and producing ceramic devices. Prior to the project implementation the ceramic used heavy oil as fuel to feed their kilns that nowadays was switched to different types of renewable biomass. The ceramic will preferably apply wood from afforestation, wood residues and sawdust offered by the providers addressed in the VCS PD. In case of lack of providers other renewable biomasses sources such as elephant grass 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 heavy oil 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

Parameters of Argibem	Value	
Average number of burning cycles	24 per month	
Average firing temperature of the kilns	900 °C	
Burning cycle duration	Kiln loading	8h
	Burning and cooling cycle	30h
	Pieces storage, kiln cleaning and preparation for next cycle	8h
	Total	46h
Kiln capacity	2,98 MW	
Number of kilns entrance	58	
Number of mechanic burners operating	12	
Number of 'Tunnel' kilns operating	1	
Production capacity	83.330 pieces/kiln	

Parameters of Sao Sebastiao	Value	
Average number of burning cycles	12 per month	
Average firing temperature of the kilns	900 °C	
Burning cycle duration	Kiln loading	6h
	Burning and cooling cycle	60h
	Pieces storage, kiln cleaning and preparation for next cycle	6h

	Total	72h
Kiln capacity	0,93 MW	
Number of kilns entrance	270	
Number of mechanic burners operating	Not applicable	
Number of 'Hoffman' kilns operating	1	
Production capacity	50,000 pieces/kiln	

Parameters of Vulcao	Value	
Average number of burning cycles	12 per month	
Average firing temperature of the kilns	900 °C	
Burning cycle duration	Kiln loading	6h
	Burning and cooling cycle	60h
	Pieces storage, kiln cleaning and preparation for next cycle	6h
	Total	72h
Kiln capacity	3,07 MW	
Number of kilns entrance	330	
Number of mechanic burners operating	Not applicable	
Number of "Hoffman" kilns operating	1	
Production capacity	133,330 pieces/kiln	

Table 3-2: Project Location

Item	Project Scope
Host Country	Brazil
Region:	Western region of Rio de Janeiro State, Brazil
Project location address:	ARGIBEM CERAMIC Rua Matheus Salzano, 16 Bemposta, Três Rios, RJ Postal Code: 25.840-000
Latitude:	22°08'24" S
Longitude:	43°05'46" W
Telephone:	+55 (24) 2258-2127

Item	Project Scope
Host Country	Brazil
Region:	Western region of São Paulo State, Brazil
Project location address:	SAO SEBASTIAO CERAMIC Rodovia Ministro Lúcio Meira, BR 393, Km 280 Barra do Piraí, RJ Postal Code: 27.165-000.

Latitude:	22°28'12" S
Longitude:	43°49'32" W
Telephone:	+55 (24) 3346-6544

Item	Project Scope
Host Country	Brazil
Region:	Western region of São Paulo State, Brazil
Project location address:	VULCAO CERAMIC Estrada Campo Alegre, 200 B. Nanci Queimados, RJ Postal Code: 26.317-180.
Latitude:	22°42'58" S
Longitude:	43°33'19"W
Telephone:	+55 (21) 3698-8915

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

This project is eligible under the VCS 2007.1 methodology, so it fulfils all applicability criteria of the methodology used. The project consists of thermal appliances (ceramic kilns) that displace the use of heavy oil 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 oil utilized in the baseline scenario can be considered as non-renewable source as its extraction is from petrol reserves. The renewable sources of biomass could be evidenced as follows:

- Sawdust – the sawdust used in the project activity is originated from sawmills industries which utilizes wood coming from sustainable forest management as it can be checked in the invoices. As the sawdust is an industrial residue it falls therefore under the renewable biomass criteria of the applied methodology.
- Afforestation wood – it is the wood that comes from the management of Eucalyptus and Pinus, in the region of Rio de Janeiro. In Brazil the areas with afforestation have been increasing because of the demand and consequently the residues increases. The sustainability will be provided through the environmental licenses, invoices and cutting authorization.
- Wood Residues – wood remaining in the afforestation side after harvesting. This kind of biomass doesn't include dead wood, litter or any carbon pool.
- Elephant grass – if adopted by the project activity its cultivations will follow sustainable management methodologies. The elephant grass will be exclusively cultivated for the purpose to supply fuel to the project activity. The ceramic owner will be responsible to maintain a sustainable management production. Until now the

ceramic did not use elephant grass for their project. A detailed justification on sustainability will be provided, when it will be adopted first during a verification period.

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 fossil fuel since 31 December 1989 using survey methods. Heavy oil is a well known fuel used in Brazil in the region of Rio de Janeiro for a long time. The use of oil is the most common practice in the ceramic sector in this region because of Petrobras incentives/VCS PD/.

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

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

Crediting period is 01/04/2006– 31/03/2016.

Project start date is 01/04/2006

Argibem, Sao Sebastiao and Vulcao and Carbone Social Serviços Ambientais Ltda have ownership of the proposed project. Proof of title was submitted to the validators /PFT/.

The emission reduction was not double counted.

In the course of validation 05 CARs and 13 CRs were raised:

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
CAR 01 Insert a topic that says that it is a grouped project, because the template asks for it.	VCS PD item 1.2	It was included a topic informing that it is a grouped project.	VCS PD item 1.2	OK. The topic was included and it's clear.
CAR 02 The geographical coordinates are indicated in figure 1, 2, 3 and 4. Please, add these numbers in the first paragraph of the item.	VCS PD Item 1.5	The coordinates of the cities of the project activity were added in the first paragraph of this section. The coordinates of the ceramic companies were added in the table 2 in the same section.	VCS PD Item 1.5	OK. The coordinates were correctly indicated.
CAR 03 There is no explanation of the methodology choices.	VCS PD Item 2.1	It was included in this section: "This methodology is applicable for project activities that avoid	VCS PD Item 2.1	Ok. It is right according to VCS template.

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
		greenhouse gases emissions by using renewable biomass instead of fossil fuels, in order to generate thermal energy.” Furthermore, it was also included: “This category comprises renewable energy technologies that supply individual households or users with thermal energy that displace fossil fuels.”		
CAR 04 Please, round down the values of BEy.	VCU-spreadsheet	In the VCU spreadsheet, it was added a decimal place in all values in the “total VCUs” sheet. In the VCS PD, the “total emission reductions” for each ceramic were rounded down.	VCU-spreadsheet	OK. The values were rounded down.
CAR 05 The documentation to evidence the financial costs and the origin of renewable biomass were not sent to the	Financial Barrier spreadsheet	1.PP response: These documents will be sent to the validation team.	Financial Barrier spreadsheet	OK. Some documentation for the evidence of renewable biomass is missing.

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
DOE.		2. PP response: The Authorization of cut and the invoices were sent to the DOE.		OK. The documentation has been sent in form of receipts and cutting authorizations. For all providers of wood a cutting authorization could be evidenced. One provider of eucalyptus wood did not provide a evidence on the sustainability of the wood. The amount of biomass from this provider has been subtracted from the ER calculations. This procedure has been accepted by the validator.
CR 01 The source 7 could not be found.	VCS PD Item 1.9	The source 12 (old source 7): InfoMoney, was found. Last visit in: March 18 th , 2009. Available at: http://web.infomoney.com.br/templates/news/vi	VCS PD Item 1.9	OK. The source was found.

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
		ew.asp?codigo=1145289&path=/suasfinancas/i moveis/compra/		
CR 02 It is necessary to improve information provided in section 1.9. and VCU spreadsheet. Please clarify the burning cycle information regarding kiln loading, warming, burning cycle, cooling cycle, pieces storage, kiln cleaning and preparation for next cycle. Also clarification on kiln capacity is necessary.	VCS PD Item 1.9	It was added a table named: "Technical parameters of the kilns utilized in the ceramic industries" regarding information about the kilns' features, time of loading, unloading, burning cycle and average production per burning cycle. These information were also added in the VCU spreadsheet.	VCS PD Item 1.9	OK. All the information needed was provided. It was clarified the warming, cooling and the others in the VCS spreadsheet. The kilns are different and it is explained in the VCS PD.
CR 03 The point: "closing of the ceramic" is not a risk that may affect the emission reductions, because if the ceramic fabric closes there won't be emissions at all.	VCS PD Item 1.11	This point was corrected in the VCS PD: If the ceramic companies close, other ceramic would probably supply the products consuming heavy oil, which is the common practice of the region.	VCS PD Item 1.11	Ok. It was clarified.
CR 04 The full company name should be provided, as Carbono Social Serviços Ambientais Ltda.	VCS PD Item 1.15	The name of the company in the section 1.15 was correctly provided as Carbono Social Serviços	VCS PD Item 1.15	OK. The full name of the company was provided.

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
		Ambientais LTDA.		
CR 05 City gardening is not an industrial activity	VCS PD Item 2.2	This point was corrected at the section 2.2: “The woody residues (wood chips, pallets, city garden residues, wood industries residues, construction residues among others) are either industrial residues or municipal waste.”	VCS PD Item 2.2	Ok. It was explained and clarified.
CR 06 Please, adjust Table 6, because it is not formatted correctly	VCS PD Item 2.3	The table 7 (old table 6) was correctly formatted in the section 2.3.	VCS PD Item 2.3	Ok. The table is correct.
CR 07 Exchange the first paragraph with the second one, because it should be “the most” and after that “another”.	VCS PD item 2.4	The first and second paragraphs of the section 2.4 were exchanged.	VCS PD item 2.4	Ok. Now it makes sense.
CR 08 When the substitution of the “Hoffman kiln” will be done in Sao Sebastiao Ceramic? Explain why it will be substituted.	VCS PD item 2.5	The information regarding the reason that the kiln is being constructed and when it will begin to operate were added in the section 2.5.	VCS PD item 2.5	Ok. It is clear. They are constructing another type of kiln to start the burning in it in the second semester of 2009. For the next verification period the verifier will make sure

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
				that no efficiency improve of the new kiln will lead to increase of emission reductions.
CR 09 In table 10: the quantity of production is different than the beginning of the VCS PD. In the financial barrier, the freight is a barrier, why in the table the cost is zero?	VCS PD item 2.5	In table 10, the production of <i>Argibem</i> Ceramic is different than in the beginning of the VCS PD due to the forecast of its production for 2009. It was corrected. The characteristics of the biomass transportation, such as the costs with freight, were excluded from the VCS PD as they are not applicable for all the ceramic companies.	VCS PD item 2.5	OK. It is correct.
CR 10 VCU spreadsheet must be full written in English.	VCU-spreadsheet	The VCU spreadsheet was corrected and all information were translated into English.	VCU-spreadsheet	OK. It was translated.
CR 11 Standard the parameters in the tables. Example: Energy or Apparent fuel consumption. Put the same name that is in the	VCU-spreadsheet	The parameters in the tables in the VCU spreadsheet were standardized according to the methodology	VCU-spreadsheet	Ok. It is in line with the methodology.

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
methodology.		applied.		
CR 12 The annual fuel consumption in the spreadsheet is not in line with PDD. Please, check it.	VCU-spreadsheet and VCS PD	The value of annual fuel consumption of <i>Argibem</i> ceramic was corrected in VCU spreadsheet and in VCS PD. The emission reductions of <i>Argibem</i> ceramic were corrected. The total emission reductions of the project activity was also corrected and rounded down.	VCU-spreadsheet and VCS PD	Ok. It was checked and corrected.
CR 13 Why the number of burning cycles in Sao Sebastiao and Vulcao are not completed?	VCU-spreadsheet – thermal energy of the kilns	The numbers of burning cycles of the “Hoffman” kilns of the both ceramics were completed in the table.	VCU-spreadsheet – thermal energy of the kilns	OK. The numbers were completed.

Minor Change

- In the item 1.9, change the word “via” for though or by.
- In the item 1.9, São Sebastião Ceramic, correct the word “ax” for “axe”.
- Change did not represented for represent. Page 18, item 2.4
- It can be termopares besides thermocouples.
- In table 9 and 12, exclude the yellow number.
- In table 10, exclude the words in the parentheses.

Minor Changes has been corrected according.

3.2 Baseline

The proposed project used CDM approved methodology Category AMS-I.C: Thermal energy for the user with or without electricity - Version 13 from March 14th 2008; this methodology has been select by the project developer since contemplate the displace of fossil fuel to provide thermal energy.

The baseline scenario is the continuation of the common practice in the region, which is the use of heavy oil from petrol reserves to feed the ceramic kilns contributing for the conservation of petrol reserves. In the past, the ceramics used approximately 6,211,260 liters of oil per year in order to produce 37,800,000 ceramic pieces per year, according to ceramic owner experience^{/IMO1/}, which could be evidenced during on-site visits. Such data make it possible to calculate the efficiency factor of heavy oil consumption per thousand pieces production of each ceramic facility. Applying this efficiency factor, the identified heavy oil consumption in the baseline scenario is 6,211,260 liters for the three ceramic facilities per year.

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, natural gas respectively and renewable biomass (without VCS project activity), as information checked in the Brazilian Energy Balance in the ceramic sector for the year 2007^{/WEB1/}. The fuel oil has a low price (as can be checked in the invoices, the price is about R\$0.17) when compared with the use of wood residues and wood from afforestation areas and sawdust. Despite of the fact that the fuel oil presents a higher net calorific value when compared with wood and the costs for the biomass in two of the ceramic facility are higher because of its expensive price. The natural gas was disconsidered as a possible baseline scenario due to the inconstant distribution in the project activity region^{/WEB2/}.

The use of renewable biomass in the baseline (not carried out as a VCS project) has also been addressed as one possible baseline candidate. Due to some barriers that will be explained in the next step of additionality assessment this baseline scenario can also be excluded from the list.

Due to information above, the most possible identified and only remaining baseline scenario to occur in the absence of the project activity would be the use of wood. Additionally could be evidenced that the use of wood was the most important national energy source until the 70's decade, when the use of petrol assumed the first position. Because of the high deforestation in this Biome, the areas became preserved by the Government and the wood became a difficult source to find^{/WEB9/}. Although, when assessing exclusively the ceramic sector in this region of Rio de Janeiro, the use of oil is the most important fuel adopted and its source is originated from unsustainable sources (petrol reserves).

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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 heavy oil is very common in the ceramic sector in this region.

The additionality was assessed using the project test (1) of section 5.8 of the VCS 2007.1 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 loss of thermal energy would

occur. The adjustments could be evidenced during the On-site visit as well as the invoices and sales receipts^{/FAE/}

- Use of the new mechanical burners – The ceramics 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 ceramists experiences some difficulties with the equipments as maintenance. Moreover it was necessary to train the staff responsible for the kiln feeding^{/IM01/}
- Use of the new fuel – During the fuel switching the ceramics 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 ceramics production decays significantly during the initial fuel switching period^{/IM01/}.
- 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^{/FAE/}. The renewable biomass was storage in the shed, just to protect it, before it could be use in the process.

The technical barrier has been validated and found to be significant for the additionality of the small-scale project activity.

▪ Financial (variable costs)

- Renewable biomass purchase – As it is clear indicated in the VCS PD and the financial spreadsheet that the variable cost with the renewable biomass is higher when compared with heavy oil. The new fuel implicates in higher costs due to its transportation and high biomass price. The heavy oil price was evidenced during the On-site visit according to the receipts presented to the auditor. The transportation costs are higher when using the new fuel, as evidenced in the invoices. All values used for the calculations could be evidenced and properly assessed^{/FAE/}. Please refer to the financial spreadsheet.
- Electrical consumptions cost due to the new mechanical burners – before the project activity the costs with electricity consumption were smaller compared with the baseline scenario. It was evidenced through electricity consumption receipts.

The financial barrier due to variable costs has been validated and found to be significant for Vulcao and Argibem. This barrier could not be evidenced for Sao Sebastiao because the variable costs are slightly lower within the project activity than before.

▪ Financial (investment)

- Kilns firing entrance adjustments – Although the price for the kilns adjustments are small it is also considered as a barrier^{/FAE/}.
- 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^{/FAE/}.
- Mechanical burners, thermocouples and exhausters acquired – the price paid for the new machinery used in the project activity could be evidenced through buying receipts^{/FAE/}.

- Costs with transportation – the freight is expensive as can be checked in the financial spreadsheet. Kilns construction and reforms – the kilns needed to be adapted to the the new biomass.

The financial barrier due to investment cost has been validated to be true but found not to be significant for the additionality of the small-scale project activity as no financial analysis has been carried out.

Another barrier has been addressed that might be faced in the future:

- 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.

This barrier related to the price has been validated to be true but found not to be significant for the additionality of the small-scale project activity.

The validation team believe that the most impacting barrier for the proposed project activity are the new fuel used (technical barrier) including the production difficulties experienced due to the new fuel applied, renewable biomass purchase, mechanical biomass burners acquired and the uncertain of the renewable biomass supply due its possible upcoming demand in the future and the higher amount of variable costs (financial barrier). 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 shown in VCS PD the most common practice in the region is the use of heavy oil 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.

During the validation 1CAR was raised:

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
CAR 6 Step 5: Identify a final list of baseline candidates: Also the use of renewable biomass is a baseline candidate in case it is not performed as a VCS project activity. So it must be included in the list of candidates.	VCS PD Item 2.5	A topic encompassing the possibility of renewable biomass as a baseline candidate was included in the step 5 of item 2.5 of the VCS PD.	VCS PD Item 2.5	OK. The information was included.

3.3 Monitoring Plan

The proposed project used CDM approved methodology Category AMS-I.C: Thermal energy for the user with or without electricity – Version 13 from March 14th 2008. 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 Mr. Marcelo de Oliveira do Vale from Argibem Ceramic; Mrs. Maria Delmina Oliveira Gonçalves from São Sebastião ceramic; and Mr. Cláudio Pelegrini from Vulcão ceramic. They 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 weight indicated in the buying receipts of the renewable biomasses providers. These values will be crosschecked with internal records on biomass they received. The specific gravity of each renewable biomass can be used for unit conversion^{/WEB3/}
- 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^{/IM01/};
- 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. The sustainability of the biomass has been proved by the operating licence of the client. If the ceramic obtain their biomass from other suppliers than listed now in the PD they will check the origin of the biomass and provide evidence to the verification team.
- 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.

During the project activity no equipment is transferred from another activity nor it is transferred from the project to another activity. It has not to be considered in this project.

The QAQC procedures of the monitored parameters are clearly described and it was considered adequate. The amount of oil that would be used in the absence of the project activity will be calculated according to section 3.2 of the VCS PD. The kiln efficiency (quantity of renewable biomass / thousands of pieces) before the project implementation multiplied by the monthly production will reach to the amount of oil that would be utilized.

The fixed parameters for the project activity are:

- NCV oil – an average value from IPCC was applied. It can be checked in the calculation spreadsheet ^{/WEB5/}.
- Fossil fuel specific gravity – an average value from an article was applied. It was considered the value of BPF, as can be checked in the calculation spreadsheet ^{/WEB4/}.
- EF projected fossil fuel – it can be found in IPCC 2006.
- Tons of fossil fuel per thousand of devices – Value adopted from ceramic owner experience. This value could be cross-checked with other ceramics with the same fuel and kiln used.
- The efficiency of the plant using fossil fuel that would have been used in the absence of the project activity – in this project the efficiency is 100%.

During the validation 1CAR and 1 CR were raised:

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
CAR 7 Justification for EF _{CO2} and nth parameters is necessary.	VCS PD Item 3.3	The justifications for both parameters were included in the respective tables of the section 3.3 in the VCS PD.	VCS PD Item 3.3	OK. The justification was added in the tables.
CR 14 Include the source the parameter EFCO2.	VCS PD Item 3.3	The source was addressed.	VCS PD Item 3.3	Ok. The source was included in the table.

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 minimize the damages caused by the use of fossil fuels and contributes to reduce fossil fuel consumption and preserve the reserves. Emission reduction is calculated through the estimate value of oil that would be consumed in the absence of the project activity in year y multiplied by the efficiency of the plant using fossil fuel in the absence of the project activity in year y multiplied by Net calorific value of oil 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 leakage emission was assessed according to the “General guidance on leakage in biomass project activities” of Indicative Simplified Baseline and Monitoring Methodologies for Selected Small-Scale CDM Project Activity Categories.

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. Using the same assumptions and considerations as for the baseline identification as in VCS PD, it can be assumed that the most employed fuel used in the region is the fuel oil. Thus no leakage emissions due to the non-renewable sources should be considered. Despite of that, if this source of leakage emission is assessed to be significant in the further crediting period, the baseline will be identified to neutralize the leakage emission identified. All possible biomasses were considered in this assessment ^{/BRI//WEB6//WEB7//WEB8/}.

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, except the ashes from the burning of wood residues and afforestation wood. 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 ^{/OL1//OL2//OL3/}.

3.6 Comments by stakeholders

The considered stakeholders for this project activity were the ceramic sector national association and the ceramic employees. It was sent a letter to them informing about the project. Comments were received from the Brazilian Ceramic Center concerning the project activity, which expresses the positive impact of the project.

During the validation 1CAR was raised:

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
CR 15 What were the opinions or doubts regarding the project?	VCS PD Section 6	ANICER (ceramic sector national association) sent three letters (one for each ceramic) stating their support to the present project activity. These letters will be sent to the	VCS PD Section 6	Ok. The letters were sent to DOE to evidence the opinions.

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
		validation team. No opinion or doubt came from the letter posted in the ceramics' facilities.		

4 Validation conclusion

Carbono Social Serviços Ambientais Ltda has commissioned the TÜV NORD JI/CDM Certification Program to validate the project: “ARGIBEM, SAO SEBASTIAO AND VULCAO CERAMIC SWITCHING FUEL PROJECT” with regard to the relevant requirements of the VCS 2007.1 Standard.

The project activity consists of switching from non-renewable fuel to renewable biomass for end-user thermal energy generation. A risk-based approach has been followed to perform this validation. In the course of the draft validation 07 Corrective Action Requests (CARs) and 15 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 2007.1 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 208,144 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.

Essen, 2009-05-22



Rainer Winter
TÜV NORD JI/CDM CP
Verification Team Leader

Essen, 2009-05-22



Eric Krupp
TÜV NORD JI/CDM CP
Final approval

5 References

Table 5-1: Documents provided by the project proponent

Reference	Document
/BRI/	BRITO EO. Estimativa da produção de Resíduos na Indústria Brasileira de Serraria e Laminação de Madeira. Rev. da Madeira. v.4. n.26. 1995, pp. 34-39. – “Estimative waste production in the brazilian industries”
/ECR/	Electric consumptions receipts checked during on-site visit. It could be evidenced that the electric consumption and costs are higher than before of the project activity.
/ECT/	Employee’s certificates for training realized regarding process for the project activity.
/FAE/	Financial assessment evidences. Please refer to invoice receipts for the assessment of the pertinent financial data used in the financial spreadsheet calculation.
/OLce1/	Operational Licence of Clay extraction of Sao Sebastiao – municipal register: FE 011229, issued on 2006-06-28 and valid until 2011-06-28.
/OLce2/	Operational Licence of Clay extraction of Argibem – municipal register: FE 397/07, issued on 1997-11-26 and valid until 2002-11-26. New protocol: 09856/29 in July.
/OLce3/	Operational Licence of Clay extraction of Vulcao – municipal register: FE 002859, issued on 2004-08-25 and valid until 2009-08-25.
/OL1/	Operational Licence of Vulcao – FE010162. Valid until 2010-10-20
/OL2/	Operational Licence of Sao Sebastiao– FE010613 Valid until 2011-03-31
/OL3/	Operational Licence of Argibem – FE008251 Valid until 30/03/2010
/ML1/	Municipal Licence to Argibem Ceramic – municipal register: 3720.8.0/91. There’s no valid date.
/ML2/	Municipal Licence to Sao Sebastiao Ceramic – municipal register: 19349.6, issued on 1995-08-31.
/ML3/	Municipal Licence to Vulcao Ceramic – municipal register: 0046302, issued on 2008-06-27.

Reference	Document
/PFT/	Contract signed between Carbono Social Serviços Ambientais Ltda. and Argibem, Sao Sebastiao and Vulcao ceramic stating their ownership of the project.
/PRO/	Signed BRTÜV proposal issued for the project activity. It is clear stated the date of contracting for the validation and verification process. Date 31/07/2008.
/TAP/	TAPIA, R. E. C. et al. Manual para a indústria de cerâmica vermelha. Rio de Janeiro: SEBRAE/RJ, 2000. – “Manual for red ceramics industries”
/VCS PD/	Project Design Document “Argibem, Sao Sebastiao and Vulcao switching fuel project” Version 03– May 15 th , 2009.
/WEB1/	http://www.mme.gov.br/download.do?attachmentId=16555&download
/WEB2/	http://ecen.com/eee51/eee51p/gn_bolivia.htm http://www.dep.fem.unicamp.br/boletim/BE31/artigo.htm
/WEB3/	SIMIONI, F. J. Análise diagnóstica e prospectiva da cadeia produtiva de energia de biomassa de origem florestal no planalto sul de Santa Catarina -Curitiba: UFPR, 2007. 132p.: il; http://dspace.c3sl.ufpr.br/dspace/handle/1884/10294 ; http://www.cca.org.nz/pdf/Masses.pdf
/WEB4/	http://www.fem.unicamp.br/~em672/GERVAP2.pdf
/WEB5/	http://www.ipccnggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf , table 1.2
/WEB6/	http://www.rbma.org.br/anuario/mata_01_mataconhecemos.asp
/WEB7/	http://ecen.com/eee51/eee51p/gn_bolivia.htm
/WEB8/	http://www.dep.fem.unicamp.br/boletim/BE31/artigo.htm
/WEB9/	http://mapas.sosma.org.br/site_media/download/mapas_a3/uf_rio_de_ja_neiro_A3.pdf http://www.rbma.org.br/anuario/mata_01_mataconhecemos.asp

Reference	Document
/XCS1/	Calculation spreadsheet of baseline study and emission reduction in “estimativas” - Version 03

Table 5-2: Background investigation and assessment documents

Reference	Document
/AMS-I.C/	AMS-I.C: Thermal energy for the user with or without electricity - Version 13 from March 14th 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
/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
/FEEMA/	http://www.feema.rj.gov.br/	Fundação Estadual de Engenharia e Meio Ambiente
/DNPM/	http://www.dnpm.gov.br	National Department of Mineral Production

Table 5-4: Interviewed persons and interview topics

Interviewed Persons / Entities	Interview topics
Mr Marcelo de Oliveira do Vale from Argibem Ceramic, Mrs Maria Delmina Oliveira Gonçalves from São Sebastiao and Mr Claudio Pelegrini from Vulcao Ceramic. Ms. Flávia Takeuchi – Carbono Social Serviços Ambientais Ms. Raquel Linares Couto and Mr Rafael Kupper - Carbono Social Serviços Ambientais	▪ 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.	Mr Marcelo de Oliveira do Vale, Mrs Maria Delmina Oliveira Gonçalves and Mr Claudio Pelegrini	Ceramics owner
/IM01/	E, V	☐ Mr. ☒ Ms.	Flávia Yumi Takeuchi	Carbono Social Serviços Ambientais Ltda - Technical Coordinator
/IM01/	V	☒ Mr. ☒ Ms.	Ms Raquel Linares Couto and Mr Rafael Kupper	Carbono Social Serviços Ambientais Ltda - Technical Analysts

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

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