



**Verified Carbon
Standard**

IMPROVED COOKSTOVES FOR BURUNDI RESTAURANTS



Document Prepared By: 4K Earth Science Private Limited

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Version	03
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Report Title	Improved cookstoves for Burundi restaurants
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Prepared By	4K Earth Science Private Limited
Contact	No.20, 'SNS Arcade', Basement Floor, Old Airport Main Road, Konena Agrahara, Bangalore-560017, Karnataka, India

	Email: doe@4kearthscience.com , 4kearthscience@gmail.com Website: http://www.4kearthscience.com/
Approved by	Chandrakala R Director
Work carried out by	Mr. Chetan Swaroop Sharma (Team Leader and Technical Expert 1.1, 3.1) Prof Dr Pierre-Celestin KARANGWA (Local Expert) Mr. Ma Paa Puratchikkanal (Technical Reviewer 1.1, 3.1)

Summary:

AERA Group has commissioned “4K Earth Science Private Limited” to carry out the Validation of the project “Improved cookstoves for Burundi restaurants”, with regard to the relevant requirements of VCS Standard Version 4.1.

OBEN E.A.C (SA) developed an improved cookstoves project for restaurants¹ of Burundi. The proposed VCS project activity aims at:

1. Distributing institutional improved cookstoves (ICS) in restaurants of Burundi to replace currently used traditional open fire three-stone system (and traditional stoves); and
2. Switching from non-renewable wood fuel to a sustainable energy supply: briquettes made of renewable biomass waste. Compared to the currently used three-stone fires or traditional stoves, the advanced technology of ICS allows quicker heating-up, longer cooking and heat retaining with less wood-fuel as well as lower combustion fumes. It results in saving wood-fuel and associated expenses.

Along with the diffusion of such a stove to replace currently inefficient cooking systems, a renewable biomass supply-chain was set up, by sourcing unutilized biomass residues to produce renewable biomass briquettes and market it to the participating restaurants in replacement of their non-renewable wood fuel. OBEN will ensure a competitive and attractive price for using briquettes together with improved cook stoves to give incentives to the restaurants to switch 100% from the previous costly non-renewable wood fuel to the innovative briquettes made of renewable biomass wastes.² OBEN will ensure through a sale agreement and robust supply strategy that no shortage of briquettes will appear as discussed during the interviews.

¹ One restaurant should be understood as any commercial entities preparing meals. Bars and Hostels are covered under the proposed project and assimilated as restaurants.

² Thanks to ICS cook stoves, OBEN expect to replace 1 stere of wood by in average 20 kg of briquettes (based on experiences done in police camp (an average of 22 kg of briquettes per stere) and schools (an average of 18 kg of briquettes per stere)

The distribution of up to six thousand ICS to restaurants supplied with renewable biomass briquettes, and the associated awareness and training campaigns will help halving these commercial entities' fuel use³ and turning it 100% renewable. Thus, the project will reduce greenhouse gas emissions by reducing the use of non-renewable biomass within the country, therefore slowing down deforestation.

The expected annual amount of greenhouse gas reductions averages 661,007 tCO₂ eq and the total amount of greenhouse gas emissions reductions for the chosen crediting period is 4,627,048 tCO₂ eq.

Validation is a requirement for all VCS projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of estimated verified emission reductions (VERs).

A risk-based approach has been followed to perform this validation. In the course of the validation 02 Corrective Action Requests (CAR) and 03 Clarification Requests (CL) were raised and successfully closed out. No FAR is raised.

The validation is based on the VCS PD, additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and supporting documents made available to the validation team by project proponent.

The objective of this validation activity is to have an independent third party for the assessment of the project design, estimated ER sheet and to ensure a thorough assessment of the proposed project activity against the applicable CDM and VCS requirements. As a result of the validation, the validation team confirms that:

- The project fulfils criteria of VCS Standard Version 4.1.
- The project is in line with all relevant VCS requirements.
- The project additionality is sufficiently justified in the PD.
- The monitoring plan is transparent, adequate and in line with applied baseline and monitoring methodology AMS-I.E. Version 12.0.
- The calculation of the Baseline emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of 4,627,048 tCO₂e is most likely to be achieved within the 7 years of first crediting period.
- The projects compliance with the requirements of Article 12 of the Kyoto Protocol, the CDM Modalities and Procedures as agreed in the Marrakech Accords under decision 3/CMP.1, the annexes to this decision, subsequent decisions and guidance made by COP/MOP & CDM Executive Board and other relevant rules, including the Host Country legislation and sustainability criteria.

No restrictions or uncertainties were identified related to the validation.

depending on Lower Heating Value of raw material used for the briquettes (indicative information is 3,300 kcal/kg briquettes for briquettes made of sugar mill wastes against 4,800 kcal/kg briquettes for briquettes made of pine needles). The report of test has been provided to DOE. Actually, one stère of wood is ~~at~~ about 15,000 FBU and one bag of charcoal of 23 kg at 30,000 FBU whereas OBEN E.A.C SA plans to sell 1 kg of briquettes at 378 FBU (indicative price); satisfying the same thermal energy need, will thus cost from two to ten times less than in baseline situation according to one-site visit interviews.

³ Experiments to estimate the approximate renewable briquettes consumption per cookstove have been conducted and recorded, evidencing savings up to 90% in quantity and 50% time. Communities will save fuel and time

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1 INTRODUCTION

1.1 Objective

4KES has been contracted by AERA Group to undertake the validation of the project titled “Improved cookstoves for Burundi restaurants” (VCS ID 2540).

The purpose of this validation is to have an independent third party assessment of whether the project activity conforms to the qualification criteria set out in the VCS standard Version 4.1 /08/ to attain real, measurable, additional and permanent emission reductions. The validation statement/opinion is a written assurance that:

- The project complies with all the applicable VCS requirements and has the ability to generate the emission reductions stated over the project’s crediting period.
- The validation followed the requirements of the current version of the VCS Standard Version 4.1 /08/ and VCS program guide 4.0 /07/ to ensure the quality and consistency of the validation work and the report.

1.2 Scope and Criteria

The validation scope is given as an independent and objective review of the project design and monitoring plan which is included in the VCS PD and other relevant supporting documents.

The scope of work covered in the validation is described below:

- To validate whether the project activity meets the requirements of VCS Standard Version 4.1 /08/ and VCS program guide 4.0 /07/ including additionality and compliance with local laws.
- To evaluate whether the baseline and monitoring plan are in conformance with the applied methodology from the VCS approved GHG program.
- To confirm that the information presented are completed, consistent, transparent and free of omission or material error.
- Background investigation and follow up interviews.
- Issuance of draft validation report with CARs, CLs & FARs, if any.
- Final validation opinion.

The information in the VCS PD is reviewed against the criteria of VCS Standard 4.1 /08/, VCS program guide 4.0 /07/ and the approved baseline and monitoring CDM methodology AMS-I.E. Version 12.0.

4KES has performed validation based on a risk based approach focusing mainly on the significant risks to meet the qualification criteria and the ability to generate Verified Carbon Units (VCUs).

The validation is not meant to provide any consulting towards the client. However, stated request for clarifications and/or corrective actions may provide input for improvement of the project design.

1.3 Level of Assurance

The validation report is based on VCS-PD /02/, Monitoring plan, supporting documents made available to the validator and information collected through performing interviews during the audit. Based on the process and procedures conducted, 4KES states with a reasonable level of assurance that information in the VCS PD:

- is materially correct and is a fair representation of the actual project details, and
- is prepared in accordance with VCS requirements and the applied CDM methodology for information pertaining to additionality, GHG qualification, monitoring and reporting

The validation work is carried out as per this requirement and the validation opinion is assured provided the credibility of all above. Details are presented in the Validation statement in section 4 below.

☒ Reasonable level of assurance

☐ Limited level of assurance.

1.4 Summary Description of the Project

OBEN E.A.C (SA) developed an improved cookstoves project for restaurants⁴ of Burundi. The proposed VCS project activity aims at:

1. Distributing institutional improved cookstoves (ICS) in restaurants of Burundi to replace currently used traditional open fire three-stone system (and traditional stoves); and
2. Switching from non-renewable wood fuel to a sustainable energy supply: briquettes made of renewable biomass waste. Compared to the currently used three-stone fires or traditional stoves, the advanced technology of ICS allows quicker heating-up, longer cooking and heat retaining with less wood-fuel as well as lower combustion fumes. It results in saving wood-fuel and associated expenses.

Along with the diffusion of such a stove to replace currently inefficient cooking systems, a renewable biomass supply-chain was set up, by sourcing unutilized biomass residues to produce renewable biomass briquettes and market it to the participating restaurants in replacement of their non-renewable wood fuel. OBEN will ensure a competitive and attractive price for using briquettes together with improved cook stoves to give incentives to the restaurants to switch 100% from the previous costly non-renewable wood fuel to the innovative briquettes made of renewable biomass wastes.⁵ OBEN will ensure through a sale

⁴ One restaurant should be understood as any commercial entities preparing meals. Bars and Hostels are covered under the proposed project and assimilated as restaurants.

⁵ Thanks to ICS cook stoves, OBEN expect to replace 1 stere of wood by in average 20 kg of briquettes (based on experiences done in police camp (an average of 22 kg of briquettes per stere) and schools (an average of 18 kg of briquettes per stere) depending on Lower Heating Value of raw material used for the briquettes (indicative information is 3,300 kcal/kg briquettes for

agreement and robust supply strategy that no shortage of briquettes will appear as discussed during the interviews.

The distribution of up to six thousand ICS to restaurants supplied with renewable biomass briquettes, and the associated awareness and training campaigns will help halving these commercial entities' fuel use⁶ and turning it 100% renewable. Thus, the project will reduce greenhouse gas emissions by reducing the use of non-renewable biomass within the country, therefore slowing down deforestation.

The expected annual amount of greenhouse gas reductions averages 661,007 tCO₂ eq and the total amount of greenhouse gas emissions reductions for the chosen crediting period is 4,627,048 tCO₂ eq.

2 VALIDATION PROCESS

2.1 Method and Criteria

The validation process is undertaken by validation team that involves the following:

- The desk review of documents and evidences submitted by the project proponent in context of the reference VCS rules and guidelines,
- Undertaking audit, interview or interactions with the representative of the project proponent,
- Reporting audit findings with respect to clarifications and non-conformities and the closure of the findings, as appropriate and
- Preparing a draft validation report
- Resolution of outstanding issues and the issuance of final validation report and opinion

In order to ensure transparency, a validation protocol was prepared for the project according to the VVS for PAs version 03.0 verification requirements and VCS Standard version 4.1 /08/. The Clarification Requests (CL) were issued where additional information was needed to clarify issues, and Forward Action Requests (FAR) for issues relating to project implementation that required review during the first verification of the project activity.

Duration of Validation:

briquettes made of sugar mill wastes against 4,800 kcal/kg briquettes for briquettes made of pine needles). The report of test has been provided to DOE. Actually, one stère of wood is ~~val~~ at about 15,000 FBU and one bag of charcoal of 23 kg at 30,000 FBU whereas OBEN E.A.C SA plans to sell 1 kg of briquettes at 378 FBU (indicative price); satisfying the same thermal energy need, will thus cost from two to ten times less than in baseline situation according to one-site visit interviews.

⁶ Experiments to estimate the approximate renewable briquettes consumption per cookstove have been conducted and recorded, evidencing savings up to 90% in quantity and 50% time. Communities will save fuel and time

Verification Contract	08/12/2021
Remote/On-site audit	28/12/2021 and 29/12/2021 (On-site interviews by Local Expert) 30/12/2021 (Zoom interviews by Chetan Swaroop Sharma)
Findings raised	08/01/2022
Draft Verification Report	30/01/2022
Final Verification Report	18/04/2022

2.2 Document Review

The validation team has conducted the validation using the VCS Standard and the applied methodology AMS-I.E. Version 12.0 as the reference criteria. The validation team had done the completeness check of VCS PD submitted by the PP as per the VCS standard Version 4.1 /08/ requirements. Furthermore, a desk review was also carried out to assess the following:

- Information of project details in compliance with VCS PD template
- Appropriateness of methodology AMS-I.E. Version 12.0 applied to the project activity
- Compliance with relevant laws and regulations
- Correctness of application of baseline and monitoring methodology
- Demonstration of additionality
- Monitoring plan described in the VCS PD
- Stakeholder consultation
- Proof of listing of project under pipeline
- Calculation of grid emission factor, etc. where applicable.

The VCS PD version 01 dated 06/12/2021 /01/ was initially reviewed and the PP requested to submit the revised documents along with the supporting information and documents. The revised documents and additional supporting documents were further assessed by the validation team during desk review. During the validation process, the revised VCS PD (version 1.2, dated 18/04/2022) /02/ and the supporting documents were assessed to confirm the actions taken by the PP to the CARs and CLs issued.

The validation team has reviewed the final version of the VCS PD (i.e. Version 1.2 dated 18/04/2022) to confirm that all changes agreed have been incorporated adequately.

Further, prior to the audit, it was verified by the validation team that the project was listed in the VCS pipeline in line with the requirements (Section 3, Registration and Issuance process, version 4.0 /09/) Ref: <https://registry.verra.org/app/projectDetail/VCS/2540>

The documents that were considered during the validation process are given in Appendix of this report.

2.3 Interviews

Due to worldwide COVID-19 spread and air travel restrictions, Validation team could not conduct the site visit. Since the date of closure of lockdown is uncertain due to the increase spread of COVID-19 and hence VVB did not conduct site visit for this project activity. However, the team performed the Zoom/Email/On-site interview with the PP representatives, site persons, restaurants and stakeholders and reviewed documents to achieve a reasonable level of assurances. This is in line with Section 4.1.2 of the VCS Standard, v4.1 which does not explicitly mandate site visits as part of the validation and verification process, only that VVBs must achieve a reasonable level of assurance on all validations and verifications.

VVB has checked the Baseline practice and usage, ICS distribution method, fuel usage, carbon rights etc. during the physical site visit by Local Expert from the random check of the restaurants selected from the

Monitoring survey conducted by PP in 2020 and forms were filled by VVB. The Number of samples i.e. 15 were selected as per table 2 of the standard “Sampling and surveys for CDM project activities and programmes of activities” 09.0 on random basis and interviews were conducted which is also as per para 54 of Guidelines for sampling and surveys for CDM project activities and programmes of activities 04.0. Validation team has checked the VVB samples results and found in compliance with the Monitoring survey /25/ conducted by PP and hence accepted. Kindly find below names of the persons interviewed.

Dates	28/12/2021 and 29/12/2021 (On-site interviews by Prof Dr Pierre-Celestin KARANGWA)		
	30/12/2021 (Zoom interviews by Chetan Swaroop Sharma)		
Key points discussed	Name of person, interviewed	Designation, Organization	Interview conducted by
Implementation, Monitoring, Operational data, baseline, Calibration, Data collection, QA/QC procedures, Calculation of ERs, VCS requirements, Stakeholder meeting, on-going mechanism	NDIZEYE CLAVER	Legal Representative	Chetan Swaroop Sharma
	RWEMERA Pascal	Deputy Legal Representative	Prof Dr Pierre-Celestin KARANGWA (Zoom Call)
	NKURUNZIZA Thierry	ENGINEER (Production)	Prof Dr Pierre-Celestin KARANGWA (Physical on-site visit)
	NYABUZANA Christian	WEBMASTER/ LOGISTIC (Distribution)	
	JEREMIE	Trainer of users	
	SUMIYE LOIC ANSELME	World Vision, NGO Operating in Bujumbura and 4 provinces (Muyinga, Ngozi, Bubanza and Rumonge)	

Serial Number	Name	Identification number of restaurant sampled	Interview conducted by
1.	Joséphine BUTOYI	BQS0036GIT	Prof Dr Pierre-Celestin KARANGWA (Physical on-site visit)
2.	EAST AFRICA Restaurant	BQS0017NGO	
3.	HOTEL LE PARADIS	BQS0002KAY	
4.	HATUNGIMANA ASHURA	BQS0483BUJ	
5.	NZEYIMANA MARIAM	BQS0054BUJ	

6.	CHEZ MUKITO	BQS0097BUJ	
7.	HATUNGIMANA Marthe	BQS0505BUJ	
8.	RESTAUTANT EDEN	BQS0189BUJ	
9.	NSABIMANA Diomède	BQS0214BUJ	
10.	VYIZIGIRO Thimoté	BQS0527BUJ	
11.	RURYORYO Sicaire	BQS0243BUJ	
12.	NTAHIZANIYE Elisabeth	BQS0270BUJ	
13.	BAR CHEZ MASUMBUKO	BQS0287BUJ	
14.	RESTAURANT BARCELONA	BQS0310BUJ	
15.	MANIRAKIZA Vénérand	BQS0338BUJ	

2.4 Site Inspections

Due to worldwide COVID-19 spread and air travel restrictions, Validation team could not conduct the site visit. Since the date of closure of lockdown is uncertain due to the increase spread of COVID-19 and hence VVB did not conduct site visit for this project activity. However, the team performed the Zoom/Email/On-site interview with the PP representatives, site persons, restaurants and stakeholders and reviewed documents to achieve a reasonable level of assurances in the validation. This is in line with Section 4.1.2 of the VCS Standard, v4.1 which does not explicitly mandate site visits as part of the validation and verification process, only that VVBs must achieve a reasonable level of assurance on all validations and verifications.

VVB has checked the Baseline practice and usage, ICS distribution method, fuel usage, carbon rights etc. during the physical site visit by Local Expert from the random check of the restaurants selected from the Monitoring survey conducted by PP in 2020 and forms were filled by VVB. The Number of samples i.e. 15 were selected as per table 2 of the standard “Sampling and surveys for CDM project activities and programmes of activities” 09.0 on random basis and interviews were conducted which is also as per para 54 of Guidelines for sampling and surveys for CDM project activities and programmes of activities 04.0. Validation team has checked the VVB samples results and found in compliance with the Monitoring survey /25/ conducted by PP and hence accepted.

2.5 Resolution of Findings

As an outcome of the validation process, the team can raise different types of findings:

A Clarification Request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable VCS requirements have been met

Where a non-conformance arises the team leader shall raise a Corrective Action Request (CAR). A CAR is issued, where:

- The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;
- The VCS requirements have not been met;
- There is a risk that emission reductions cannot be monitored or calculated.
- The validation process may be halted until this information has been made available to the team leader's satisfaction. Failure to address a CL may result in a CAR. Information or clarifications provided as a result of a CL may also lead to a CAR.

During the validation process, total 02 CAR and 03 CL were raised and resolved satisfactorily. The list of CARs/CLs/FARs raised and the response provided, the mean of validation, reasons for their closure and references to correction in the relevant documents are provided in Appendix of this report.

2.5.1 Forward Action Requests

A Forward Action Request (FAR) is raised during validation that require review during the first verification of the project activity. FARs shall not relate to the VCS requirements for registration.

No FAR is raised during the validation.

3 VALIDATION FINDINGS

3.1 Project Details

OBEN E.A.C (SA) developed an improved cookstoves project for restaurants⁷ of Burundi. The proposed VCS project activity aims at:

1. Distributing institutional improved cookstoves (ICS) in restaurants of Burundi to replace currently used traditional open fire three-stone system (and traditional stoves); and
2. Switching from non-renewable wood fuel to a sustainable energy supply: briquettes made of renewable biomass waste. Compared to the currently used three-stone fires or traditional stoves, the advanced technology of ICS allows quicker heating-up, longer cooking and heat retaining with less wood-fuel as well as lower combustion fumes. It results in saving wood-fuel and associated expenses.

⁷ One restaurant should be understood as any commercial entities preparing meals. Bars and Hostels are covered under the proposed project and assimilated as restaurants.

Along with the diffusion of such a stove to replace currently inefficient cooking systems, a renewable biomass supply-chain was set up, by sourcing unutilized biomass residues to produce renewable biomass briquettes and market it to the participating restaurants in replacement of their non-renewable wood fuel. OBEN will ensure a competitive and attractive price for using briquettes together with improved cook stoves to give incentives to the restaurants to switch 100% from the previous costly non-renewable wood fuel to the innovative briquettes made of renewable biomass wastes.⁸ OBEN will ensure through a sale agreement and robust supply strategy that no shortage of briquettes will appear as discussed during the interviews.

The distribution of up to six thousand ICS to restaurants supplied with renewable biomass briquettes, and the associated awareness and training campaigns will help halving these commercial entities' fuel use⁹ and turning it 100% renewable. Thus, the project will reduce greenhouse gas emissions by reducing the use of non-renewable biomass within the country, therefore slowing down deforestation.

The expected annual amount of greenhouse gas reductions averages 661,007 tCO₂ eq and the total amount of greenhouse gas emissions reductions for the chosen crediting period is 4,627,048 tCO₂ eq.

In the baseline scenario (identical to the scenario existing prior to the implementation of the project activity), the prevailing technology in operation is the basic three stones cookstoves or traditional stoves broadly used in most Central African's urban settlements, fueled by non-renewable woodfuel. Three stone cooking fires and traditional stoves are the cheapest methods of cooking.

Technology to be implemented under the project activity

Three (03) types of stoves are being distributed: a Turkish-manufactured robust design available in medium (48 cm diameter) and large sizes (78 cm), and a locally manufactured Matawi stove.



⁸ Thanks to ICS cook stoves, OBEN expect to replace 1 stère of wood by in average 20 kg of briquettes (based on experiences done in police camp (an average of 22 kg of briquettes per stère) and schools (an average of 18 kg of briquettes per stère) depending on Lower Heating Value of raw material used for the briquettes (indicative information is 3,300 kcal/kg briquettes for briquettes made of sugar mill wastes against 4,800 kcal/kg briquettes for briquettes made of pine needles). The report of test has been provided to DOE. Actually, one stère of wood is ~~val~~at about 15,000 FBU and one bag of charcoal of 23 kg at 30,000 FBU whereas OBEN E.A.C SA plans to sell 1 kg of briquettes at 378 FBU (indicative price); satisfying the same thermal energy need, will thus cost from two to ten times less than in baseline situation according to one-site visit interviews.

⁹ Experiments to estimate the approximate renewable briquettes consumption per cookstove have been conducted and recorded, evidencing savings up to 90% in quantity and 50% time. Communities will save fuel and time

Improved Institutional cookstove with briquettes (left: Turc Medium, right: Matawi)

Improved cookstoves are designed by the Turkish company SOBAH and manufacturer specifications.

SOBAH's and Matawi institutional improved cookstoves specifications

	Medium Turc ICS	Large Turc ICS	Matawi
Diameter	48 cm	78 cm	20 cm
Weight	46 kg (stove in box)	115 kg (stove in box)	7.5 kg
Cooking power output	2.49 kWth	4.82 kWth	2.074 kWth
Adoption	traditional cooking styles and posture		
Lifetime	5 years warranty		8 years
Age at the time of implementation	new		New

Three production sites (Bujumbura, Rutana and Gitega) are expected to be set up for the supply of all restaurants of Burundi with briquetting machines Jumbo 90¹⁰. The current supply is ensured by local wood-fuel suppliers that will be included in supplying strategy of OBEN E.A.C SA.

Validation team has checked the technical specification of the project ICS from Summary description and production process for project cookstoves /17/. PP has an established production process to produce the consistent quality of cookstoves as checked during the interviews and also from the supportive document /17/. Validation team has checked the capacities and lifetime of the project cookstoves from the supportive documents i.e. WBT conducted /33/, /34/.

Validation team has done the remote interviews to confirm the project description mentioned in the VCS-PD/02/.

The project activity is not a grouped project as mentioned under section 1.4 of the VCS-PD /02/ and found OK.

The project participants involved in the project are as per below tables.

Project participant:

Organization name	OBEN EAC (S.A.)
Contact person	Claver NDIZEYE
Title	Mr.

¹⁰ The details description and technical specification of briquetting machines are put in appendix 1 as they are not included within the project boundaries because each production site will supply independently the closest cities' restaurants and not any production site will be dedicated specifically to one city's restaurants. Therefore, emissions due to electricity consumption from the briquetting machines will be accounted as project emissions

Address	B.P.4942, Bujumbura, Burundi
Telephone	0025776602600
Email	loicqueen@yahoo.fr

Other Entities Involved in the Project:

Organization name	AERA Group
Role in the project	Carbon consultant and trader
Contact person	Alexandre Dunod
Title	Mr.
Address	28 Cours Albert 1er, 75008 Paris, France
Telephone	+33 1 42 18 02 02
Email	a.dunod@aera-group.fr

“OBservatoire pour l’Environnement et la Nature” (also referred to as OBEN EAC (E.A.C. SA)) is the project implementer and supplier of the improved cookstoves and renewable biomass, which retains the right of use of ER credits which is verified from the end user contract /19/, transfer of ownership from Burundi Quality Stoves S.A. to OBEN /18/. The chain of ownership onwards to Aera Group is itself agreed upon by Emission Reduction Purchase Agreement /30/.

The start date of the project activity is 03-February-2020 (The start date has been determined as the date of distribution of stoves and renewable briquettes starting on 03-February-2020) /19/. Validation team has checked the end user contract /19/ to confirm and found the start date in compliance with section 3.7 of the VCS standard Version 4.1 /08/. Also as per section 3.7.1 of the VCS standard version 4.1 /08/, projects shall complete validation within two years of the project start date which is also fulfilled.

The first crediting period of project activity starts from 03-February-2020 until 02-February-2027 (7 years) and can be renewed twice in accordance with section 3.8.1 of the VCS Standard Version 4.1 /08/.

Although this project activity is a large scale project as per VCS Standard v4.1 /08/ para 3.9.1 that states that large projects are projects achieving annual ERs of more than 300,000 tCO₂e however as per CDM rules, this project is a small scale project as the project capacity is less than 45MWth (as demonstrated under section 3.3.5 of this validation report) and hence small-scale methodology and methodology tools have been applied. The expected annual amount of greenhouse gas reductions to the project activity

averages 661,007 tCO₂ eq and the total amount of greenhouse gas emissions reductions for the chosen crediting period is 4,627,048 tCO₂ eq.

The project location is the Republic of Burundi. The project is to take place in restaurants in Burundi urban centers, starting with Bujumbura city.

There is no mandatory law or regulation in the host country requiring the introduction of ICS in Burundi, therefore the project is a voluntary effort by the project proponent. The project is following relevant laws, statutes, and other regulatory frameworks. Therefore, the project does not violate any laws, statutes, or other regulatory frameworks in Burundi. Further no EIA is required for the project activity as explained under section 3.2.3 of this report.

Project comes under Sectoral scope: Energy industries (renewable - / non renewable sources) (Sectoral Scope 1). VVB has this sectoral scope to validate this project. Project eligibility has been mentioned under section 1.3 of the VCS-PD /02/ in accordance with the VCS Standard V.4.1 /08/ and found OK. Also the project activity is not excluded as per para 2.1.1 of the VCS Standard v 4.1 /08/.

Project was originally registered under the CDM by its former developers¹¹, it was postponed and re-designed by its new developers, for certification and verification under the VCS only. The project has been successfully deregistered from CDM on 08/03/2022 as per CDM website¹². The project is not registered (or seeking registration) under any other GHG program or rejected by any other GHG program, validation team reviewed the websites of other GHG schemes to verify the same.

The project does not reduce GHG emissions from activities that are included in an emissions trading program or any other mechanism that includes GHG allowance trading. Further the project has neither sought nor received another form of GHG-related environmental credits. Declaration /16/ to this effect is also submitted by the project participant. This is also confirmed during the interviews.

No commercially sensitive information has been excluded from the public version of the project description as verified during the interviews.

Validation team confirms that the description in the project description is accurate, complete, and provides an understanding of the nature of the project.

Sustainable development contributions from the project activity has been mentioned under section 1.17 of the VCS PD /02/ and found OK. It would be further verified during the verification of the project.

3.2 Safeguards

3.2.1 No Net Harm

No negative environmental and socio-economic impacts have been identified for the project activity

¹¹ As per CDM Project 9911 : BQS improved cookstoves for Burundi restaurants, undergoing de-registration

¹² Deregistration is confirmed on CDM website : <https://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1394766881.05/view?cp=1>

considering the proposed VCS project activity aims at **1.** Distributing institutional improved cookstoves (ICS) in restaurants of Burundi to replace currently used traditional open fire three-stone system (and traditional stoves); and **2.** Switching from non-renewable wood fuel to a sustainable energy supply: briquettes made of renewable biomass waste. The same was also checked during the interviews with PP and with the NGO i.e. World Vision. Hence no net harm.

3.2.2 Local Stakeholder Consultation

As described in the VCS PD /02/, a stakeholder conference was held in Bujumbura Mairie Province (capital of Burundi) by PP on 2012-01-13. The attendance list and the news about this meeting reported by a local newspaper /26/ were also checked and confirmed valid. It is confirmed that 163 stakeholder from various organizations as well as local community representatives participated in the consultation meeting. PP summarized the comments including the feedbacks from stakeholders' comments as described in the VCS-PD /02/. The general comments are positive. Major concerns from the stakeholders are described in the VCS-PD, and responses from the PP are also provided in the VCS-PD. Further the same was also confirmed during the interviews from NGO i.e. World Vision.

The comments by local stakeholders are invited in an open and transparent manner. A summary of the comments received has provided to the validation team along with the report indicating how due account was taken to the comments received.

Validation team has checked the supportive documents /26/ to confirm the stakeholder meeting. Review of the Stakeholder meeting minutes shows that people were supportive to the project activity and expressed no negative comments on the project activity. As part of the validation, 4KES confirmed through document review that the stakeholders were invited in a transparent manner.

All the comments have been addressed by the PP and updates have been made with regard to the design of the project activity.

At the end of the meeting, the contact details of BQS have been shared with the participants to ensure on-going communication with the stakeholders which is also the "mechanism" for ongoing communication which is also confirmed during the interviews. Validation team has found that the "mechanism" for ongoing communication is well established.

Following details have been communicated to participants:

- Company Name: Burundi Quality Stoves (BQS)
- Physical address: Quartier Industriel, Avenue Nyabissindu BP 5612, Bujumbura, Burundi
- Contact name: Pascal Rwemera
- Phone number: +257 22259470
- Email address: info@bqs.bi

3.2.3 Environmental Impact

No negative environmental impacts have been identified for the project activity considering the proposed VCS project activity aims at **1.** Distributing institutional improved cookstoves (ICS) in restaurants of Burundi to replace currently used traditional open fire three-stone system (and traditional stoves); and **2.** Switching from non-renewable wood fuel to a sustainable energy supply: briquettes made of renewable biomass waste. An environmental impact assessment (EIA) is not required for the project activity which is also confirmed during the interviews. Further this was also checked from the representative of Burundi DNA (i.e. Ministry of Water, Environment, Land Management and Urban Planning, the governmental authority which is responsible for environmental issues in Burundi) during the CDM registration¹³ of the project activity.

Opinion: In the opinion of the validation team, the project activity does not require an EIA to be conducted.

3.2.4 Public Comments

In accordance with the requirement in clause 3.16.5 of the VCS standard version 4.1 “All VCS projects are subject to a 30-day public comment period. The date on which the project is listed on the project pipeline marks the beginning of the project’s 30-day public comment period”.

The PP listed their project activity in the VCS pipeline for 30 days from 15/12/2021 to 14/01/2022 (<https://registry.verra.org/app/projectDetail/VCS/2540>) for public comments.

No comments received during the commenting period, as evident from the VCS pipeline in the web interface.

3.2.5 AFOLU-Specific Safeguards

Not Applicable.

3.3 Application of Methodology

3.3.1 Title and Reference

The validation team confirm that selected baseline and monitoring methodology is approved methodology and PP has correctly used it. The applied methodology and tools are still valid.

- AMS-I.E. - Switch from non-renewable biomass for thermal applications by the user, Version 12.0. It is latest version and Valid from 27 May 21 onwards.

Other guidelines and tools referenced in this methodology are:

- The CDM tool 30 has also been used for the calculation “Calculation of the fraction of non-renewable biomass” version 3
- CDM Tool 21: “Demonstration of additionality of small-scale project activity” version 13.1

¹³ <https://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1394766881.05/view>

- CDM tool 05: “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation”. Version 3.0
- CDM tool 16: “Project and leakage emissions from biomass” Version 4

3.3.2 Applicability

Applicable criteria for the selected baseline methodology AMS-I.E., Version 12.0 is assessed by the validation team by means of document review & interviews. The project applicability was confirmed against each condition in the approved methodology by the following methods.

AMS-I.E. - Switch from non-renewable biomass for thermal applications by the user, Version 12.0

Methodology AMS I.E version 12.0	Applicability to the project Activity	Validation remarks
This methodology comprises of activities to displace the use of non-renewable biomass by introducing renewable energy technologies to households, communities, and/or institutions such as schools, prisons or hospitals (hereinafter referred as end-users). Examples of these technologies include, but are not limited to: (a) Cookstoves using renewable biomass, such as briquettes, pellets, and woodchips. (b) Biogas stoves. (c) Bioethanol stoves; (d) Electric cookstoves including induction cookstoves (hereafter electric cookstoves) that receive electricity entirely from: (i) An integrated renewable energy	Applicable. The project introduce improved cookstoves and renewable biomass (briquettes) to restaurants in Burundi, to replace use of traditional cookstoves with non-renewable biomass. The briquettes introduced are from renewable sources and therefore complies with para 2 a) of the methodology	The justification provided by PP is found accepted as checked from the technology specification of the project cookstoves /17/, /33/, /34/ project description under VCS PD /02/ and during the interviews. Hence this para of the applied methodology is applicable to the project activity.

generating device, grid or mini-grid that is 100 per cent powered by renewable energy sources; or (ii) A renewable energy system that is also connected to the grid via netmetering, where, on an annual basis, the electricity generated by the renewable energy system is larger than the annual electricity consumed by the electric cookstoves and any other loads (e.g. lighting, fans, TV) connected.		
Project participants can show that non-renewable biomass has been used since 31 December 1989, using survey methods or referring to published literature, official reports or statistics.	Applicable. According to the World Bank¹⁴, 172,000 ha (7% of land area) are forested in Burundi in 2010. In total, between 1990 and 2010, this country lost 40.5% of its forest cover or around 117,000 ha before getting back to 1990 level since 2015. Furthermore, in the current situation, wood products represent over 96.6% of the energy balance of Burundi¹⁵.	The justification has been provided by the PP and found acceptable. Hence this para of the applied methodology is applicable to the project activity.

¹⁴ Available at <https://data.worldbank.org/indicator/AG.LND.FRST.ZS?locations=BI>

¹⁵ Available at <https://revues.cirad.fr/index.php/BFT/article/download/ID-BFT-151127/31022>

	The FAO Forestry production and trade¹⁶ also shows that woodfuel have been used and produced in Burundi since 1989. Therefore it is demonstrated that the country have been using non-renewable biomass since 1989.	
The methodology is applicable for technologies displacing use of non-renewable biomass by renewable energy	The technologies implemented under this project will be energy efficient cook stoves that use renewable biomass and will displace the use of fuel wood, which is a non-renewable biomass used by the baseline stoves	The justification provided by PP is found accepted as checked from the technology specification of the project cookstoves /17/, /33/, /34/project description under VCS PD /02/ and during the interviews. Hence this para of the applied methodology is applicable to the project activity.
In the case that technologies using renewable biomass are used under the project activity, this methodology is applicable where all emissions related to processing of biomass are fully accounted for and biomass is sourced from biomass residues and/or a dedicated plantation of the CDM project activity, meeting the following conditions: (a) For projects that use biomass residues, prior to the implementation of the project activity, the biomass residues have not been collected and used but been left for decay and	Applicable The project distributes renewable biomass, and meets the conditions of the applied methodology: a) The biomass is collected from agro-industrial wastes which are widely available in the country. This waste would have been left to decay without the project or burnt without energy recovery. b) The project only collects biomass residues, from	Justification has been provided by the PP and found OK. The was also confirmed during the interviews.

¹⁶ Available at <https://www.fao.org/faostat/en/#data/FO>

would, in the absence of the project activity, continue to be left for decay; and (b) For projects that use biomass residues from a production process (e.g. production of sugar or wood panel boards), the implementation of the project does not result in an increase of the processing capacity of raw input (e.g. sugar, rice, logs, etc.) or in other substantial changes (e.g. product change) in this process; and (c) The biomass used by the project facility is not stored for more than one year; and (d) In the case biomass from dedicated plantations are used, the applicability conditions of TOOL16 “Project and leakage emissions from biomass” are satisfied.	agro-industrial activities. The project proponent is not involved in these agro-industrial activities. As only waste, are collected, the project does not result neither in increase of processing capacity, nor in changes in the process c) All the waste/residue collected, are processed within the year to produce briquettes, and therefore meet this applicability condition d) The applicability conditions of the tool 16 are satisfied as demonstrated in leakage and project emissions assessment Therefore, all the applicability conditions are met.	
For electric cookstoves with integrated renewable energy device or with grid connected renewable energy system employing net metering, project participants shall demonstrate that, on an annual basis, at least 80% of the electricity generated is consumed by the electric cook stoves (i.e. 20% or less of electricity is consumed by other loads connected).	Not Applicable The project doesn't distribute electric cookstoves	Justification has been provided by the PP and found OK. Hence this para of the applied methodology is not applicable to the project activity.
For electric cook stoves, in all cases under paragraph 2(d) above where back-up diesel	Not Applicable	Justification has been provided by the PP and found OK.

generators are used, this methodology is only applicable when no more than 1% of total electricity supply occurs from back up diesel generators on an annual basis.	The project doesn't distribute electric cookstoves	Hence this para of the applied methodology is not applicable to the project activity.
Under this methodology, emission reductions cannot be claimed only due to fuel-switch aspect and proposed project activities shall introduce new renewable energy-based technologies, i.e. technology switch is also involved	Applicable The project introduce renewable biomass (briquettes) as well as efficient cookstove. The project does not claim emissions reduction due only to fuel switch but also to renewable energy provided (briquettes). Therefore, the project meets the applicability condition.	The justification provided by PP is found accepted as checked from the technology specification of the project cookstoves /17/, /33/, /34/ project description under VCS PD /02/ and during the interviews. Hence this para of the applied methodology is applicable to the project activity.
Project participants shall describe in the PDD/PoA-DD the proposed method for distribution of project devices and how the double counting of emission reductions has been addressed, for example, using methods such as unique identifications of product and end-user locations (e.g. programme logo), to prevent double counting of emission reductions from the project devices (e.g. between end users, distributors and producers of stoves, producers of renewable energy, producers of processed renewable biomass).	Applicable. To avoid double counting, each of the restaurants equipped are uniquely identified and the quantity of briquettes distributed as well as the number of ICS distributed is recorded in the Excel database to avoid double counting name, address and client informations are linked to these identification number. All the restaurants participating in the project signs an agreement that transfer the Emissions reduction generated by them to OBEN EAC. Also, PP has given declaration that project will not claim credits in any other programme	Justification has been provided by the PP and found OK. The same is also checked during the interviews. End user agreement /19/ and declaration for non-participation in any other programme /16/ have been checked to confirm the same.
For project activities introducing bio-ethanol cookstoves, project participants shall demonstrate that the bioethanol cookstoves	Not applicable, the project does not distribute bioethanol cookstoves	Justification has been provided by the PP and found OK.

are designed, constructed and operated to the requirements (e.g. with regard to safety) of a relevant national or local standard or comparable literature. Latest guidelines issued by a relevant national authority or an international organisation may also be used.		Hence this para of the applied methodology is not applicable to the project activity.
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3.3.3 Project Boundary

Para 16 of applied small-scale baseline methodology AMS-I.E. v12.0, delineates the project boundary. As per the applied methodology, the project boundary is defined as.

“The project boundary is the physical, geographical site of the use of biomass or the renewable energy”

Therefore, it encompasses all the restaurants of Burundi urban centres targeted by the project activity, who will consume the renewable biomass, enabled by the implementation of the improved cookstoves. Only the restaurants using the cookstoves introduced by the project and the renewable biomass supplied by the project are included in the project boundary, therefore neither restaurants using project's stove without project's renewable biomass nor restaurants using project's renewable biomass without project's cookstoves will be part of it.

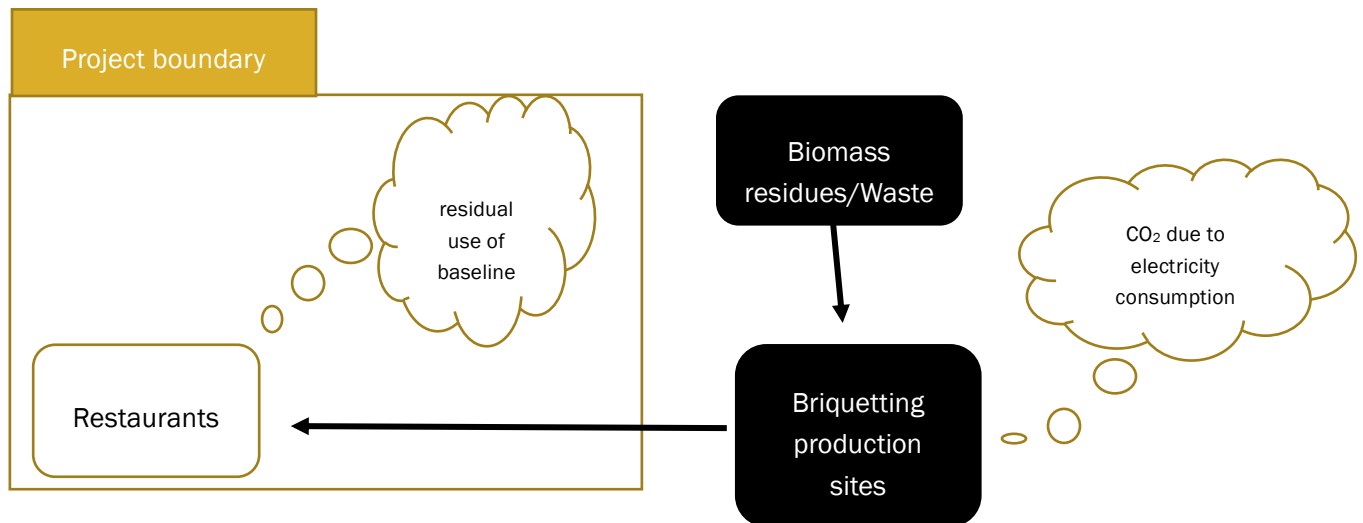
The briquetting machines are not included within the project's boundaries and will rather be accounted as leakage emissions since each production site will supply independently the closest cities where participating restaurants are located but not only because other communities such as schools and police camps and prisons may be supplied as well by the same production sites. Moreover, not any production site will be dedicated specifically to one city's restaurants which was also discussed during the interviews.

The main emission sources and type of GHGs in the project boundary are CO₂ emissions from substitution of fossil fuel consumption by similar consumers, equivalent to the non-renewable woody biomass saved by the project activity, as listed in the table below which is found OK according to the interviews and the supportive documents.

Source		Gas	Included?	Justification/Explanation
Baseline	Emissions from consumption of nonrenewable woody biomass in low efficiency three-stone fires and traditional cook stoves	CO ₂	Yes	Main source of emissions
		CH ₄	No	Minor emissions sources (neglected for simplification)
		N ₂ O	No	Minor emissions sources (neglected for simplification)
		Other	No	Minor emissions sources (neglected for simplification)
Project	Emissions from consumption of baseline woodfuel in improved cook stoves distributed by the project activity	CO ₂	Yes	Main source of emissions
		CH ₄	No	Minor emissions sources (neglected for simplification)
		N ₂ O	No	Minor emissions sources (neglected for simplification)
		Other	No	Minor emissions sources (neglected for simplification)
	emissions from shift of pre-project activity	CO ₂	No	The renewable biomass used is all from residue/waste, this emission source is not applicable to this project.
		CH ₄		
		N ₂ O		
		Other		

Source		Gas	Included?	Justification/Explanation
	emissions from biomass generation/ cultivation	CO ₂	No	The renewable biomass used is all from residue/waste, this emission source is not applicable to this project.
		CH ₄		
		N ₂ O		
		Other		
	emissions from electricity consumption for briquettes production	CO ₂	Yes	Main source of emissions
		CH ₄	No	Minor emissions sources (neglected for simplification)
		N ₂ O	No	Minor emissions sources (neglected for simplification)
		Other	No	Minor emissions sources (neglected for simplification)
	emissions from transportation of biomass	CO ₂	No	Taking into consideration that: the average distance of collection of renewable biomass for the project activity is shorter than the mean distance of origin of previously used biomass in the baseline and; for the proposed project, the residues will never be transported over a distance more than 200 km thus can be neglected. Moreover, the average distance of transportation of renewable briquettes from briquetting plants to restaurants is shorter than the baseline situation where non-renewable woody biomass was transported over a longer distance from isolated rural production site thus can be neglected.
		CH ₄	No	
		Other	No	
		N ₂ O	No	
Leakage	emissions from shift of pre-project activities	CH ₄	No	Not applicable as the renewable biomass is from waste residues
		CO ₂	No	
		Other	No	
		N ₂ O	No	

The diagrams below show the equipment, systems and flows of energy with the GHG emission sources identified in the project boundary.



Opinion:

The validation team considers that GHG emissions as a result of the implementation of the proposed project activity which is not addressed by the applied methodology, i.e. AMS-I.E., Version 12.0 is deemed to contribute less than 1% of the overall expected average annual emissions reductions. Validation team confirm that project boundary and selected sources, sinks and reservoirs are justified for the project.

3.3.4 Baseline Scenario

As per para 24 of the applied methodology AMS-I.E. Version 12.0, It is assumed that in the absence of the project activity, the baseline scenario would be the use of fossil fuels for meeting similar thermal energy needs.

As per the VCS-PD /02/, In the baseline scenario (identical to the scenario existing prior to the implementation of the project activity), the prevailing technology in operation is the basic three stones cookstoves or traditional stoves broadly used in most Central African's restaurants fuelled by non-renewable woodfuel.

The validation team confirms that the proposed project activity meets the above requirement. Therefore, the baseline scenario as prescribed in the AMS-I.E. / version 12.0 is applicable to the proposed project activity.

From the desk review of the VCS PD /02/, CRUEA report /35/ and interviews, validation team was able to confirm baseline scenario. PP has correctly identified the baseline as per the applied methodology and emission reduction has been calculated accordingly.

Opinion:

The assessment team confirms:

- (a) The identified baseline scenario is justified.
- (b) The approved baseline methodology has been correctly applied to identify the most plausible baseline scenario and the identified baseline scenario reasonably represents what would occur in the absence of the proposed project activity.

3.3.5 Additionality

The additionality of the project is demonstrated as per Figure 1 of the tool 21 “Demonstration of additionality of small-scale project activities” Version 13.1 /11/:

The project activity aggregate size is below small-scale threshold (15 MW or 45 MWth). Furthermore, the project activity aggregate size is also below micro scale thresholds (5 MW or 15 MWth). This is demonstrated by the maximal thermal output of the aggregate number of cookstoves to be distributed.

It is estimated ex-ante that 6,000 stoves will be distributed as given below:

Stove type	Thermal output	Ex-ante number of stoves to be distributed	Thermal output per type of stove
Turkish Large	4.82 kWth	200	964
Turkish medium	2.49 kWth	500	1,245
Matawi medium	2.074 kWth	5000	10,370
Total			12,569 kWth

The capacity of the project ICS has been verified from WBT conducted /33/, /34/.

Based on ex-ante estimation, maximal thermal output of the aggregate number of cookstoves will be equal to 12.6 MWth which is below 15 MWth (micro-scale limit).

Further as per figure 1 of the tool 21 “Demonstration of additionality of small-scale project activities” Version 13.1 /11/, project activity also satisfy the following conditions.

The project is implemented in an LDC (Burundi) and involves clean and energy efficient cookstoves (as per para 11 (c) of the tool 19 “Demonstration of additionality of microscale project activities” version 09.0 /15/ and end users are Households/communities/SMEs). Therefore, all the conditions are met for the project to be considered automatically additional.

Also, as allowed by the applied methodology /06/, automatic additionality can be demonstrated as per option 1 para 18: “Demonstrate ex ante that the penetration of the project technology is equal to or less than 5 per cent of the technologies/measures providing similar services in the region in order to be considered as automatically additional”.

As per page 195 table, of the Energy progress report¹⁷, the penetration rate for clean fuels and technologies for cooking in Burundi is equal to 0 which is below 5% (Therefore, the conditions are sufficient for the proposed project to be automatically additional).

3.3.6 Quantification of GHG Emission Reductions and Removals

The emission reduction (ER_y) by the project activity during the crediting period is the difference between baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage (L_y). The calculations and formulae as addressed in the approved baseline and monitoring methodology AMS-I.E. Version 12.0 have been applied. All aspects related to the direct and indirect GHG emissions as relevant to the project activity have been addressed and are presented in a transparent manner, in line with the approved methodology.

Baseline emissions:

As per para 25 of the applied methodology AMS-I.E. Version 12.0, Baseline emissions are calculated as:

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

Where:

BE_y = Baseline emissions in the year y (tCO₂e)

B_y = Quantity of woody biomass that is substituted or displaced in year y (tonnes)

$f_{NRB,y}$ = Fraction of woody biomass used in the absence of the project activity in year y that can be established as non-renewable biomass (fraction or %)

$NCV_{biomass}$ = Net calorific value of the non-renewable woody biomass that is substituted (TJ/tonne)

$EF_{projected_fossil_fuel}$ = Emission factor of fossil fuels projected to substitute non-renewable woody biomass by similar consumers (tCO₂e/TJ).

Determination of B_y

B_y has been calculated from para 29 option C:

Calculated as the product of the number of persons served per institution multiplied by the number of institutions and the estimate of average annual consumption of woody biomass per person that is displaced by the project activity:

$$B_y = \sum N_{IN,y} \times N_{p,IN,y} \times (BC_{BL,PP} - BC_{PJ,PP,y})$$

Where:

¹⁷ https://trackingsdg7.esmap.org/data/files/download-documents/2021_tracking_sdg7_report.pdf

$N_{p,IN,y}$ = Average number of persons served per institution¹⁸ in year y (number)

$N_{IN,y}$ = Number of institutions with functional cookstoves distributed under the project activity in year y (number)

$BC_{BL,PP}$ = Average annual consumption of woody biomass per person before the start of the project activity or at the renewal of each crediting period whichever is later (tonnes/person/year)

$BC_{PJ,PP,y}$ = Average annual consumption of woody biomass per person in the pre project devices during the project activity (tonnes/person/year). This parameter shall be considered if it is found that pre-project devices were not completely displaced but continue to be used to some extent.

The project install energy efficient cookstoves and distribute renewable energy to restaurants in Burundi. The number of persons served by each restaurant is known by the average number of meals cooked and sold by the restaurant. Therefore, it is assumed that one meal is served for one person. The number of meals served by the restaurant is equal to the number of persons served by the institution.

Determination of average number of meals prepared by restaurant in the year, y ($N_{p,IN,y}$):

A baseline survey has been conducted in 2020 /20/ on 15 project restaurants equipped with ICS and briquettes, to estimate briquettes consumption and number of meals prepared by the restaurants equipped with stoves and briquettes, this survey has been made for 3 days and the results are below:

N°	NAME	LOCALITY	Number of meals per day	Meals per year	Quantity of briquette per meal (kg/meal)
1	Bar ARRET BUS	GITEGA	279	101,713	0.13
2	MARIMBU OUEST HOUSE	RUMONGE	340	124,100	0.13
3	KU MUKENKE	KIRUNDO	255	931,97	0.12
4	RESTAURANT BISMILAH	BUYENZI/MUKAZA	267	97,577	0.09
5	HOTEL LA CASA	GIHOSHA/MUKAZA	475	173,497	0.10
6	RESTAURANT CHEZ MAMAN SOLO	BWIZA/MUKAZA	308	112,542	0.09
7	RESTAURANT POPULAIRE	ROHERO/MUKAA	561	204,643	0.08
8	RESTAURANT AKANOVERA	NYAKABIGA/MUKAZ	412	150,380	0.09

¹⁸ Institutions refers to restaurants in this project

		A			
9	RESTAURANT VYISI	KANYOSHA/MUHA	586	213,768	0.07
10	HOTEL ISHIMWE	KININDO/MUHA	614	224,110	0.08
11	SNACK BAR KUMAZIRAMERO	KININDO/MUHA	442	161,208	0.09
12	RESTAURANT HAKORAMUNDA	KINAMA/NTAHANG WA	433	157,923	0.11
13	RESTAURANT KANI	BUTERERE/NTAHAN GWA	308	112,542	0.12
14	BAR BIERE LOCALE	NGAGARA/NTAHAN WA	270	98,550	0.09
15	RESTAURANT BONNE VIE	CIBITOKI/NTAHAN WA	430	156,828	0.09
Average			399	145,505	0.10

Results shows that on an average, restaurants prepare 145,505 meals per year.

For ex-post estimation, the average number of meals distributed per restaurant in the year y will be monitored based on a sampled number of restaurants.

Determination of Total number of participating restaurant in year y ($N_{IN,y}$):

The number of participating restaurants is extracted from formerly registered project “Project 9911: BQS improved cookstoves for Burundi restaurants”¹⁹. Baseline survey²⁰ done in 2012 provides with the number of participating restaurants for the communes of Buterere, Buyenzi, Bwiza, Cibitoke, Gihosha, Kamenge, Kinama, Kinindo, Musaga, Ngagara, Nyakabiga and Rohero.

Therefore, the total number of restaurants ex-ante from both Bujumbura Mairie and communes are 1,811. The number of participating restaurants will be monitored each year.

Determination of average annual consumption of woody biomass per person before the start of the project ($BCBL,PP$):

The Average annual consumption of woody biomass per person. The term “person” here refers to the number of meals. It is assumed that the number of persons is equal to the number of meals distributed by year. The historical average consumption of woody biomass per meal prepared by the restaurant in the absence of the project activity ($BCBL,PP$)

¹⁹ <https://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1394766881.05/view?cp=1>

²⁰ Staff from OBEN E.A.C SA has collected data from registries of each city hall to calculate the number of registered restaurant per urban center. Excel sheet gathering data is available on ER calculation sheet

Baseline survey provides the following historical data:

The historical wood fuel (in stère ²¹ /day) and charcoal (in bags ²² /day) consumption of 99 restaurants present in two communes of Bujumbura ²³ during survey period in the year 2012.

Conversion of data into woodfuel equivalent:

Conversion from stère of woodfuel to mass of woodfuel equivalent:

A conservative factor of 350 kg/stère is used for converting stère into mass of woodfuel (GTZ-HERA, 2012). Validation team has checked the conversion factor and found OK. This value has been used as conservative, compared to FAO value (1 stère = 600kg) <https://www.fao.org/3/x5667e/x5667e04.htm> and hence accepted to the validation team.

Conversion from bags of charcoal to mass of woodfuel equivalent:

A default value of 6 is applied according to recommendation of the IPCC Guidelines (IPCC 1996-Reference Manual, Chapter 1, Energy, p 1.45) because the production of charcoal is not standardized and suitable local data for estimating the amount of carbon released through charcoal production and consumption are not available which is found OK and acceptable.

Conversion from daily basis into yearly basis: Surveys data are provided daily. Data are multiplied by 365 days to convert into yearly basis.

Determination of average historical consumption of woodfuel equivalent per meal distributed by restaurants ($BC_{BL,PP}$)

The average historical consumption of woodfuel equivalent per meal distributed by restaurants in 2012 is determined by dividing the overall historical consumption of woodfuel equivalent of restaurants of communes followed during the baseline survey (Tonnes of woodfuel equivalent per day) divided by the overall number of meals distributed by restaurants of communes followed during baseline survey in 2012 (meals/day).

Historical consumption of woodfuel equivalent

	Restaurant's Number having participated to the Baseline survey	Meals number per day	Annual consumption of wood equivalent
Communes	restaurant	Meals/ day	tonnes of wood equivalent/restaurant/y
BUYENZI	43	2,760	69.3
KAMENGE	56	3,930	119.46

²¹ The values are provided in stère per year. 1 stère of wood fuel is equivalent to 1 cubic meter

²² One bag of charcoal weights 23 kg.

²³ Buyenzi and Kamenge

Total	99	6,690	97.4
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The value of average historical consumption of woodfuel equivalent per meal distributed by restaurants of Burundi is equal to the total historical consumption of all communes surveyed by the total number of meals distributed thus equal to 0.00395 (tonnes of woodfuel equivalent per meal). A discount factor of 0.89²⁴ is applied to account for model uncertainties therefore ($BCBL_{PP}$) is taken at $0.00395 * 0.89 = 0.00351$ tonnes of woodfuel equivalent per meal. It corresponds to estimated uncertainty range greater than 30% and less than or equal to 50%. Validation team has checked the calculation and found OK. Further the same value was also used during the CDM registration of the project activity.

Determination of average annual consumption of woody biomass per person in the preproject devices during the project activity $BC_{PJ,PP,y}$:

The average consumption of woody biomass in preproject devices will be monitored ex-post during monitoring surveys. For ex-ante estimation, it is estimated that 10% of the meals will be cooked with woodfuels in pre-project devices.

Determination of Net calorific value of the substituted non-renewable woody biomass ($NCV_{biomass}$)

This is a ex-ante parameter and already fixed for the 1st crediting period as mentioned under section 5.1 of the VCS-PD /02/.

Determination of $EF_{projected_fossil\ fuel}$:

This is a ex-ante parameter and already fixed for the 1st crediting period as mentioned under section 5.1 of the VCS-PD /02/.

Determination of $f_{NRB,y}$

The value of f_{NRB} shall be calculated using either of the following two options:

- (a) Ex ante: the f_{NRB} value is determined once at the validation stage, thus no monitoring and recalculation of the f_{NRB} value during the crediting period is required.
- (b) Ex post: the $f_{NRB,y}$ value is determined for the year y in the crediting period, requiring the f_{NRB} value to be updated annually, following a consistent calculation procedure throughout the crediting period.

The $f_{NRB,y}$ for Burundi have been calculated ex-ante as per option a following CDM tool 30 and the value is 81.83%. Details of $f_{NRB,y}$ calculation are found in the Emission reduction calculation sheet /04/ which is checked by the validation team and found OK. This is a ex-ante parameter and already

²⁴ The value of 0.89 is used to account for model uncertainties. According to the "Report of the subsidiary body for scientific and technological advice on its eighteenth session, held at Bonn, from 4 to 13 June 2003" Annex III para 6 p25 accessible here: <http://unfccc.int/resource/docs/2003/sbsta/10a02.pdf> . As an example, the value is used in methodology AMS-III.H.

fixed for the 1st crediting period as mentioned under section 5.1 of the VCS-PD /02/.

Project emissions:

According to the methodology para 36:

If the project cookstoves use biomass, the following sources of project emissions shall be considered as applicable, bearing in mind that some sources may be only relevant for specific fuels (e.g. production of bioethanol):

(a) Project emissions from cultivation, use and processing of biomass shall be calculated using the latest version of “TOOL16: Project and leakage emissions from biomass” including

(i) CO₂ emissions from on-site consumption of fossil fuels due to the project activity, (e.g. consumption of fossil fuels for any processing of feedstock);

(ii) CO₂ emissions from electricity consumption by the project activity (e.g. the consumption of electricity for any processing of feedstock);

(iii) Project emissions related to cultivation of feedstock.

(iv) Project emissions from transportation of biomass if the transportation distance is more than 200 km; otherwise, they can be neglected.

(b) Methane emission from solid waste disposal or wastewater calculated as per provisions in AMS-III.G. (landfill); AMS-III.F. (composting) and AMS-III.H. (wastewater treatment) in cases where the wastes resulting from production and processing of biomass is disposed in anaerobic conditions.

Project emissions from cultivation of biomass:

As the renewable biomass used is all from residue/waste, this emission source is not applicable to this project. The justification provided by the PP is found acceptable.

Project emissions from utilization of biomass residues that account for:

Emissions resulting from energy consumption as per para 30 of the tool “Project and leakage emissions from biomass” /14/,

Emissions resulting from energy consumption are estimated, unless otherwise required in the relevant methodology, by following the provisions in the “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion” and the tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation”. These emissions include emissions due to thermal and mechanical processing of the biomass residue. In the project activity, there is no leakage or project emissions linked to consumption of fuel which is found OK. Therefore, the only emissions come from electricity consumption for transformation of renewable biomass into briquettes. These emissions are calculated as follow:

Emissions related to the transformation of renewable biomass into briquettes

Potential project emissions may arise from the electricity consumption from the machines processing the transformation from renewable biomass into briquettes²⁵. This emissions source is calculated as

²⁵ The briquettes production sites are not included within the boundaries of the project because they will supply different separated projects, different communities and because it is not possible to allocate one production site to one specific city's restaurants as this will depend on the capacity production per site and the regional demand.

per the tool 'Tool to calculate baseline, project and/or leakage emissions from electricity consumption' version 3 /13/. A conservative specific electricity consumption per tonnes of briquettes produced is estimated ex-ante.

Project emissions from electricity consumption

Project emissions from consumption of electricity are calculated, as follows:

$$PE = PE_{EC,y} = \sum EC_{PJ,j,y} * EF_{EF,j,y} * (1 + TDL_{j,y})$$

Where:

$PE_{EC,y}$ = Project emissions from electricity consumption in year y (tCO₂/yr)

$EC_{PJ,j,y}$ = Quantity of electricity consumed by the project electricity consumption source j in year y (MWh/yr)

$EF_{EF,j,y}$ = Emission factor for electricity generation for source j in year y (tCO₂/MWh)

$TDL_{j,y}$ = Average technical transmission and distribution losses for providing electricity to source j in year y

j = Sources of electricity consumption in the project

Determination of the quantity of electricity consumed by the project ($EC_{PJ,j,y}$)

The quantity of electricity consumed by the project $EC_{PJ,j,y}$ is calculated based on a default value for the specific quantity of electricity consumed per ton of briquettes produced SEC_{briq} (MWh/ton) estimated ex-ante multiplied by the quantity of briquettes supplied to the project activity $M_{renewable.biomass,y}$.

SEC_{briq} is an ex-ante parameter and already fixed for the 1st crediting period as mentioned under section 5.1 of the VCS-PD /02/.

For ex-ante estimation of project emissions, the assumption made is:

$$M_{renewable.biomass,y} = 0.1 * M_{substituted.biomass,y}$$

Value applied ex ante is based on conservative biomass savings estimate derived from preliminary experience²⁶. Validation team has checked the results of the survey /28/ and found OK.

$M_{substituted.biomass,y}$ is estimated as following:

$$\begin{aligned} M_{substituted.biomass,y} &= \sum N_{IN,y} * N_{p,IN,y} * (BC_{BL,PP} - BC_{PJ,PP,y}) \\ &= 145,505 * 1,630 * (0.00351 - 0.000351) = 749,890 \text{ tonnes/year} \end{aligned}$$

²⁶ Experiments to estimate the approximate renewable briquettes consumption per cookstove have been conducted and recorded by project proponent over the same model of cookstoves expected to be used by restaurants in two schools and police camp, evidencing savings up to 90%. Thus, 90% is kept as value

$M_{renewable.biomass,y}$ is therefore calculated as :

$$= 0.1 * 749,890 = 74,989 \text{ tonnes/year}$$

Validation team has checked the calculation and found OK. Further $M_{renewable_biomass,y}$ is a monitoring parameter and will be monitored ex-post.

Determination of the emission factor for electricity generation ($EF_{EL,j,y}$)

The determination of the emission factor for electricity generation EF depends on scenario applied to the source of electricity consumption. PP has selected the Option A2: Use the conservative default value 1.3 tCO₂/MWh which is a conservative approach and hence accepted to the validation team.

Average technical transmission and distribution losses for providing electricity to source j in year y ($TDL_{j,y}$)

In case of scenario A, choose one of the following options:

1. Use recent, accurate and reliable data available within the host country.
2. Use as default values of 20% for project or leakage electricity consumption sources.

Option 2 is chosen i.e. default values of 20% which is a conservative approach and hence accepted to the validation team.

Emissions resulting from transport

Emissions resulting from transport of biomass residue to the processing/utilization facility are estimated, unless otherwise required in the relevant methodology, by following the provisions in the methodological tool “Project and leakage emissions from transportation of freight”.

Small scale project activities may, unless otherwise required by the methodology, neglect this source of emissions if the transportation distance is less than 200 km.

Transportation of renewable biomass wastes from collection sites to the briquetting plant will be neglected as the briquetting plants will be operated close to the residues provision sites. For the proposed project, the residues/briquettes will never be transported over a distance more than 200 km (one way), then emissions from transportation can be neglected.

Therefore, no additional leakage emissions from transportation need to be accounted for. The Justification provided by the PP is found OK. Further total area of Burundi is 27,834 km² only and hence it is very unlikely that one way transport will be more than 100 km.

Leakage emissions:

According to para. 38 of the applied methodology AMS-I.E. V12.0:

If the cookstoves distributed under the project activity involve the use of biomass, leakage emissions (LE_y) shall be calculated using the latest version of “TOOL16: Project and leakage emissions from

biomass”, including leakage emissions due to production of processed renewable biomass and bioethanol (e.g. CO2 emissions due to consumption of fossil fuels and electricity).

The following leakage emissions are considered according to the tool 16 version 4 /14/.

1) Shifts of pre-project activities

According to tool 16 para 34 “This section is applicable only if the project activity utilizes biomass cultivated in a dedicated plantation. Project proponents are advised to avoid pre-project activities from being shifted outside the project boundary, to avoid indirect land use changes because of the project activity. Rather, project proponents are encouraged to include in the project boundary the land in which the pre-project activities will take place after the project implementation” As the renewable biomass used is all from residue/waste, this emission source is not applicable to this project. The justification provided by the PP is found OK.

2) Leakage due to diversion of biomass residues from other applications

According to tool 16 para 39, “This section is applicable for project activities which utilize biomass residues. It quantifies leakage due to diversion of biomass residues to the project to be used as either fuel or feedstock. These biomass residues could have been used outside the project boundary in competing applications, and due to the implementation of the project activity these competing application might be forced to use inputs which are not carbon neutral.”

The biomass residues, collected in this project would have been burnt in an uncontrolled manner without utilizing it for energy purposes. This situation refers to scenario B3 para 40 of the tool /14/.

As per para 42 of the tool /14/, PP has justified the biomass availability which is found acceptable.

The Project activity’s biomass supply involves agro-industrial wastes such as sugar cane wastes, coffee parchments and sawmills residues. These types of wastes are widely available in the region and currently burnt without energy purpose²⁷. The biomass residue processing is included in the project boundaries and calculated in the project emissions. Therefore, option B3 para 40 of the tool is applicable. The biomass used in the project activity would be burnt in the absence of the project.

The estimation for the quantity of renewable biomass available regarding the types of biomass used for briquettes productions is presented below.

Product	Production in 2019 (tonnes) ²⁸	% of agricultural residus ²⁹	Average estimation of waste available (tonnes)
Coffee	14,059	35.7%	5,019
Rice	241,211	170%	410,058

²⁷ Apart from the cogeneration project of SOSUMO where already residues is declared as too many. Indeed, SOSUMO has too much residues and has to burn a great part of it. That’s why, OBEN E.A.C SA is signing a partnership with SOSUMO at the sugar cane plant location in order to process the surplus into briquettes

²⁸ <https://www.fao.org/faostat/en/#data/QCL>

²⁹ Percentage of agricultural residues is extracted from the report from Burundi ministry of Energy and mines available at [Ministry of Energy and Mine \(Burundi\)](#)

Palm Oil	17,668	72.5%	12,809
Sorghum	8,851	250%	22,127
Sugar	154,139	30%	46,241
Total	435,928		496,254

Moreover, Burundi has a peat reserve of nearly 60,000,000³⁰ tonnes

Based on production capacity of 3 briquetting machines of 500 tonnes per month the quantity of biomass needed is 18,000 tonnes of dry biomass, thus 36,000 tonnes of wet biomass residues assuming 50% moisture of biomass residues. Therefore, the quantity of available biomass residues in the region is at least 25% larger than the quantity of biomass that is utilized including the project activity. This source of leakage can thus be neglected. Validation team has checked the data from the sources and found correct.

Further as per para 39 of applied methodology AMS-I.E. V12.0, PP has selected the alternative approach i.e. By is multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required which is found OK.

Validation team has verified the ex-ante ER calculation /04/ and found OK. The ex-ante Emission reduction is summarized below.

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
03/02/2020 to 31/12/2020	605,775	4,211	-	594,906
01/01/2021 to 31/12/2021	665,686	4,679	-	661,007
01/01/2022 to 31/12/2022	665,686	4,679	-	661,007
01/01/2023 to 31/12/2023	665,686	4,679	-	661,007

³⁰ http://obpe.bi/images/pdf/bulletin_numero_4.pdf

01/01/2024 to 31/12/2024	665,686	4,679	-	661,007
01/01/2025 to 31/12/2025	665,686	4,679	-	661,007
01/01/2026 to 31/12/2026	665,686	4,679	-	661,007
01/01/2027 to 02/02/2027	66,569	468	-	661,007
Total	4,659,805	27,608	-	4,627,048
Total number of crediting years	7			
Annual average over the crediting period	665,686			661,007

Opinion:

As discussed above, the validation team confirms the following:

- All assumptions and data used by the project participants are listed in the PD, including their references and sources;
- All documentation used by project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PD;
- All values used in the PD are considered reasonable in the context of the proposed project activity;
- The baseline methodology has been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions;

All estimates of the baseline/project emissions can be replicated using the data and parameter values provided in the PD and corresponding spreadsheets.

3.3.7 Methodology Deviations

As per applied methodology (i.e. AMS-I.E. version 12.0) para 29, option c, the quantity of biomass

substituted, is calculated using the number of person served per institution. However, for this project the exact number of people could not directly be monitored. Therefore, it is assumed that restaurants distribute 1 meal/persons, and the number of persons is deemed equivalent to the number of meals distributed. VVB has checked the methodology deviation applied to the Project and found OK. Validation team would like to clarify that By “Quantity of woody biomass that is substituted or displaced in year y (tonnes)” is an important parameter for the BEy calculation.

$$By = \sum N_{IN,y} \times N_{p,IN,y} \times (BC_{BL,PP} - BC_{PJ,PP,y})$$

Where:

$N_{p,IN,y}$ = Average number of persons served per institution³¹ in year y (number)

$N_{IN,y}$ = Number of institutions with functional cookstoves distributed under the project activity in year y (number)

$BC_{BL,PP}$ = Average annual consumption of woody biomass per person before the start of the project activity or at the renewal of each crediting period whichever is later (tonnes/person/year)

$BC_{PJ,PP,y}$ = Average annual consumption of woody biomass per person in the pre project devices during the project activity (tonnes/person/year). This parameter shall be considered if it is found that pre-project devices were not completely displaced but continue to be used to some extent.

In this formula, PP has used the terminology of per meal in place of per person for all the three parameters i.e. $N_{p,IN,y}$, $BC_{BL,PP}$ and $BC_{PJ,PP,y}$. Therefore, the deviation does not negatively impact the conservativeness of the quantification of GHG emission reductions or removals.

VVB confirm that applied methodology deviation applied to the project is valid.

3.3.8 Monitoring Plan

The project activity uses the approved baseline and monitoring methodology AMS-I.E. Version 12.0. Validation team considers the monitoring plan to be complying with the requirements of the methodology based on the following assessment. Details of the data collection and frequency of data recording and associated formats are described and observed to be adequate. The monitoring plan will give opportunity for real measurements of emission reductions that will be accrued.

The responsibilities and authorities for project management, procedures for monitoring and reporting and QA/QC procedures have been systematically established and formalized. Data will be archived electronically until 2 years after the end of the crediting period.

Ex-ante parameters:

Following ex-ante parameters are reported under section 5.1 of VCS PD.

³¹ Institutions refers to restaurants in this project

						VWB assessment
Data / Parameter	P _j					Validation team has checked the stove capacities from the WBT conducted /33/, /34/ and found consistent.
Data unit	kW _{th}					
Description	Useful thermal output capacity of the ICS type j					
Source of data	Performance test results					
Value applied:						
	ICS type j	Medium	Large	Matawi		
	Useful thermal output capacity	2.49 kW _{th}	4.82 kW _{th}	2.074 kW _{th}		
Justification of choice of data or description of measurement methods and procedures applied	Useful thermal output of the ICS has been estimated by Water Boiling Test by the Turkish supplier for the Turkish stoves and by the CRUEA laboratory for OBEN Matawi stoves					
Purpose of Data	Small-scale threshold, debundle and automatic additionality compliance					
Comments	-					

		VWB Assessment
Data / Parameter	$f_{NRB,y}$	Validation team has verified the calculation for fNRB /04/ and found correct. The validation team confirms that the calculation of fNRB is in line with the TOOL 30: Calculation of the fraction of non-renewable biomass, Version 03.0 /12/ which is
Data unit	Fraction	
Description	Fraction of biomass used in the absence of the CDM project in year y that can be established as non-renewable biomass	
Source of data	Forest resources assessments 2015 (FAO)	
Value applied:	0.8183	
Justification of choice of	The fraction of non-renewable biomass has been calculated following the CDM tool 30	

data or description of measurement methods and procedures applied	version 3	still valid as verified from the UNFCCC website³². The Calculation is found correct. The sources have been checked and found correct. The steps of calculation for fNRB are in accordance with the tool 30. Hence the value is found correct.
Purpose of Data	Calculation of baseline emissions	
Comments	-	

		VVB Assessment
Data / Parameter	NCVbiomass	The ex-ante parameter is as per the applied methodology AMS-I.E. Version 12.0. The considered value is a default value as per the IPCC and hence accepted to the validation team.
Data unit	TJ/tonne	
Description	Net calorific value of the non-renewable woody biomass that is substituted	
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories	
Value applied:	0.0156	
Justification of choice of data or description of measurement methods and procedures applied	According to methodology AMS-I.E, the Net Calorific Value of the non-renewable woody biomass that is substituted has to be taken as IPCC default for wood fuel.	
Purpose of Data	Calculation of baseline emissions	
Comments	-	

		VVB Assessment
Data / Parameter	EFprojected_fossilfuel	The ex-ante parameter is as per para 26 of the applied

³² https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-30-v3.0.pdf/history_view

Data unit	tCO ₂ /TJ	methodology AMS-I.E. Version 12.0 i.e. value for “Sub-Saharan Africa” and hence accepted to the validation team.
Description	Emission factor for the substitution of non-renewable woody biomass by similar consumers	
Source of data	AMS-I.E version 12.0	
Value applied:	73.2	
Justification of choice of data or description of measurement methods and procedures applied	As indicated by the methodology AMS-I.E, this value represents the emission factor of the substitution fuels likely to be used by similar users in Sub-Saharan Africa	
Purpose of Data	Calculation of baseline emissions	
Comments	-	

		VVB Assessment
Data / Parameter	<i>BC_{BL,PP}</i>	The value has been determined from the baseline survey conducted by PP and was used during the CDM registration ³³ of the project as well. Validation team has checked the calculation of the ex-ante parameter under section 4.1 of the VCS PD /02/ and found correct. Hence the value is accepted to the validation team.
Data unit	Tonnes of wood equivalent / meal	
Description	Average historical consumption of woodfuel equivalent per meal (Tonnes of wood equivalent/meal)	
Source of data	Derived from baseline survey discounted by a factor of 0.89.	
Value applied:	0.00351	
Justification of choice of data or description of measurement	As permitted by the methodology AMS-I.E, this was derived from Baseline survey gathering restaurants woodfuel consumption data of two communes of Bujumbura.	

³³ <https://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1394766881.05/view>

methods and procedures applied	The historical consumption of restaurants has been divided by the historical number of meals distributed in order to get the historical consumption of woodfuel equivalent per meal. The value obtained has been discounted by a factor of 0.89 to account for model uncertainties.	
Purpose of Data	Calculation of baseline emissions	
Comments	-	

		VVB Assessment
Data / Parameter	Leakage_{adj}	The ex-ante parameter is as per para 39 of the applied methodology AMS-I.E. Version 12 and hence accepted to the validation team.
Data unit	fraction	
Description	Net to gross adjustment factor to account for leakages	
Source of data	Methodology AMS-I.E Version 12	
Value applied:	0.95	
Justification of choice of data or description of measurement methods and procedures applied	In case this leakage adjustment factor is applied, it is not required to survey	
Purpose of Data	Calculation of leakage emissions	
Comments	the use/diversion of non-renewable woody biomass saved under the project activity by non-project households/users that previously used renewable energy sources.	

		VVB Assessment
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Data / Parameter	EF _{EL,j,y}	The ex-ante is in accordance with the tool “Tool to calculate baseline, project and/or leakage emissions from electricity consumption” (Version 03). Default value has been chosen by the PP which is also conservative and hence accepted to the validation team.
Data unit	tCO ₂ /MWh	
Description	Emission factor for electricity generation for source j in year y	
Source of data	“Tool to calculate baseline, project and/or leakage emissions from electricity consumption” (Version 03)	
Value applied:	1.3	
Justification of choice of data or description of measurement methods and procedures applied	Option A2: Use a conservative default value of 1.3 tCO ₂ /MWh	
Purpose of Data	Calculation of leakage emissions	
Comments	-	

		WVB Assessment
Data / Parameter	TDL _{j,y}	Default value of 20% as per option 2 (a) i.e. “project or leakage electricity consumption sources” of the applied tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” Version 3.0 /13/ has been selected which is found correct. Hence the value is accepted to the validation team.
Data unit	-	
Description	Average technical transmission and distribution losses for providing electricity to the briquetting machine	
Source of data	“Tool to calculate baseline, project and/or leakage emissions from electricity consumption” (Version 03)	
Value applied:	0.20	
Justification of choice of data or description of	Use as default values of 20% for option: (a) project or leakage electricity consumption sources;	

measurement methods and procedures applied		
Purpose of Data	Calculation of leakage emissions	
Comments	-	

		VVB Assessment
Data / Parameter	SEC _{briq}	Specific consumption provided by the manufacturer /29/ is 35-40 kWh/ Metric tonne of Biomass. To be conservative, a value of 40 kWh/tonne is chosen by PP which is found correct and hence accepted to the validation team.
Data unit	MWh/tonne	
Description	Default value for the specific quantity of electricity consumed per tonne of briquettes produced	
Source of data	Estimated ex-ante based on historic specific electricity consumption per tonne of briquettes produced.	
Value applied:	0.04	
Justification of choice of data or description of measurement methods and procedures applied	The specific electricity consumption is estimated ex-ante based on historic data of electricity consumption per tonne of briquettes produced	
Purpose of Data	Calculation of leakage emissions	
Comments	Specific consumption provided by the constructor is 35-40 kWh/ Metric tonne of Biomass. To be conservative, a value of 40 kWh/tonne is chosen.	

		VVB Assessment
Data / Parameter	m _{biomass} / m _{charcoal}	The ex-ante parameter is as per para 35 of the applied methodology AMS-I.E. Version 12.0.
Data unit	kg biomass/kg charcoal	

Description	Conversion factor wood/charcoal	The considered value is a default value as per the IPCC and hence accepted to the validation team.
Source of data	IPCC 1996- Reference Manual, Chapter 1, Energy, p 1.45 Or national/local values from literature, surveys, or expert judgments if available	
Value applied:	6	
Justification of choice of data or description of measurement methods and procedures applied	The default value should be applied according to recommendations of the IPCC Guidelines if no national/local value is available. However, such default value may be revised ex-post would reliable and country-specific data become available during monitoring.	
Purpose of Data	Calculation of baseline	
Comments	-	

Ex-post parameters:

Following ex-post parameters are reported under section 5.2 of VCS PD /02/.

	Data / Parameter	Data unit	Description
1.	$N_{distributed_ICS,j,y}$	Number	Total number of distributed ICS (medium and large) or replaced by an equivalent appliance in year y
2.	$N_{restaurant,y}$	Number	Total number of participating restaurants in year y
3.	$Pop_{restaurant,y}$	fraction	Proportion of restaurants still operating ICS or having replaced their ICS by an equivalent in service one under similar conditions under the project activity in year y.
4.	$BC_{PJ,PP}$	Tonnes of wood equivalent / meal	Average annual consumption of woody biomass per meal in the preproject devices during the project activity during year y

5.	$M_{renewable_biomass,y}$	tonnes/year	Quantity of renewable biomass consumed by the participating restaurants in year y
6.	$N_{p,IN,y}$	meals/restaurant/year	Average number of meals prepared per restaurant in the year y (meals/y)

The monitoring plan and the QA/QC procedure would ensure the accurate monitoring of the data/parameters mentioned in the VCS PD throughout the implementation of the project activity. The validation team confirms that the monitoring procedures mentioned are best as per Industry norms. The Validation team further confirm that all the parameters required by this project are being monitored.

Opinion: The assessment team confirms that:

- (a) The monitoring plan mentioned in VCS PD is in compliance with the applied methodology AMS-I.E., version 12.0;
- (b) The assessment team has conducted the interviews and based on the interviews and based on the local and sectoral expertise; the assessment team confirms that monitoring arrangements described in the monitoring plan are feasible within the project design;
- (c) Based on the interview with the PP representatives, the assessment team confirms that the project participant deputed the competent personal to execute the monitoring approach and to follow the monitoring plan.

3.4 Non-Permanence Risk Analysis

The project activity does not require a non-permanence risk analysis. Hence this is not applicable.

4 VALIDATION CONCLUSION

AERA Group has commissioned “4K Earth Science Private Limited” to carry out the Validation of the project “Improved cookstoves for Burundi restaurants”, with regard to the relevant requirements of VCS Standard Version 4.1.

OBEN E.A.C (SA) developed an improved cookstoves project for restaurants³⁴ of Burundi. The proposed VCS project activity aims at:

1. Distributing institutional improved cookstoves (ICS) in restaurants of Burundi to replace currently used traditional open fire three-stone system (and traditional stoves); and

³⁴ One restaurant should be understood as any commercial entities preparing meals. Bars and Hostels are covered under the proposed project and assimilated as restaurants.

2. Switching from non-renewable wood fuel to a sustainable energy supply: briquettes made of renewable biomass waste. Compared to the currently used three-stone fires or traditional stoves, the advanced technology of ICS allows quicker heating-up, longer cooking and heat retaining with less wood-fuel as well as lower combustion fumes. It results in saving wood-fuel and associated expenses.

Along with the diffusion of such a stove to replace currently inefficient cooking systems, a renewable biomass supply-chain was set up, by sourcing unutilized biomass residues to produce renewable biomass briquettes and market it to the participating restaurants in replacement of their non-renewable wood fuel. OBEN will ensure a competitive and attractive price for using briquettes together with improved cook stoves to give incentives to the restaurants to switch 100% from the previous costly non-renewable wood fuel to the innovative briquettes made of renewable biomass wastes.³⁵ OBEN will ensure through a sale agreement and robust supply strategy that no shortage of briquettes will appear as discussed during the interviews.

The distribution of up to six thousand ICS to restaurants supplied with renewable biomass briquettes, and the associated awareness and training campaigns will help halving these commercial entities' fuel use³⁶ and turning it 100% renewable. Thus, the project will reduce greenhouse gas emissions by reducing the use of non-renewable biomass within the country, therefore slowing down deforestation.

The expected annual amount of greenhouse gas reductions averages 661,007 tCO₂ eq and the total amount of greenhouse gas emissions reductions for the chosen crediting period is 4,627,048 tCO₂ eq.

Validation is a requirement for all VCS projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of estimated verified emission reductions (VERs).

A risk-based approach has been followed to perform this validation. In the course of the validation 02 Corrective Action Requests (CAR) and 03 Clarification Requests (CL) were raised and successfully closed out. No FAR was raised during this validation.

The validation is based on the VCS PD, additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and supporting documents made available to the validation team by project proponent.

³⁵ Thanks to ICS cook stoves, OBEN expect to replace 1 stère of wood by in average 20 kg of briquettes (based on experiences done in police camp (an average of 22 kg of briquettes per stère) and schools (an average of 18 kg of briquettes per stère) depending on Lower Heating Value of raw material used for the briquettes (indicative information is 3,300 kcal/kg briquettes for briquettes made of sugar mill wastes against 4,800 kcal/kg briquettes for briquettes made of pine needles). The report of test has been provided to DOE. Actually, one stère of wood is ~~val~~at about 15,000 FBU and one bag of charcoal of 23 kg at 30,000 FBU whereas OBEN E.A.C SA plans to sell 1 kg of briquettes at 378 FBU (indicative price); satisfying the same thermal energy need, will thus cost from two to ten times less than in baseline situation according to one-site visit interviews.

³⁶ Experiments to estimate the approximate renewable briquettes consumption per cookstove have been conducted and recorded, evidencing savings up to 90% in quantity and 50% time. Communities will save fuel and time

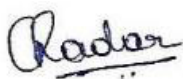
The objective of this validation activity is to have an independent third party for the assessment of the project design, estimated ER sheet and to ensure a thorough assessment of the proposed project activity against the applicable CDM and VCS requirements. As a result of the validation, the validation team confirms that:

- The project fulfils criteria of VCS Standard Version 4.1.
- The project is in line with all relevant VCS requirements.
- The project additionality is sufficiently justified in the PD.
- The monitoring plan is transparent, adequate and in line with applied baseline and monitoring methodology AMS-I.E. Version 12.0.
- The calculation of the Baseline emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of 4,627,048 tCO₂e is most likely to be achieved within the 7 years of first crediting period.
- The projects compliance with the requirements of Article 12 of the Kyoto Protocol, the CDM Modalities and Procedures as agreed in the Marrakech Accords under decision 3/CMP.1, the annexes to this decision, subsequent decisions and guidance made by COP/MOP & CDM Executive Board and other relevant rules, including the Host Country legislation and sustainability criteria.

No restrictions or uncertainties were identified related to the validation.

Therefore, 4KES is able to certify that the project is in full compliance with the VCS Standard Version 4.1 and recommend registration of the project activity.

Approved by



Chandrakala .R

Director

Date: 18/04/2022

4K Earth Science Pvt. Ltd

Place: Bangalore, India

APPENDIX 1: REFERENCES

S. No.	Name of document	date
/1/	Draft VCS PD	Version 1.0, dated 06/12/2021
/2/	Final VCS PD	Version 1.2, dated 18/04/2022
/3/	Draft ER spread-sheet	Corresponding to PD Version 1.0
/4/	Final ER spread-sheet	Corresponding to PD Version 1.2
/5/	CDM-EB: Clean Development Mechanism Validation and Verification Standard for project activity	Version 03.0
/6/	Approved CDM Methodology AMS-I.E. - Switch from non-renewable biomass for thermal applications by the user, Version 12.0	-
/7/	VCS Verified Carbon Standard: VCS Program Guide, VCS Version 4.0	-
/8/	VCS Verified Carbon Standard: VCS Standard, v4.1	-
/9/	VCS Verified Carbon Standard: Registration and Issuance Process Version 4.0	-
/10/	VCS Verified Carbon Standard: Validation and Verification Manual, Version 3.2	-
/11/	Demonstration of additionality of small-scale project activities, V 13.1	-
/12/	"Calculation of the fraction of non-renewable biomass" version 3.0	-
/13/	"Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation". Version 3.0	-
/14/	"Project and leakage emissions from biomass" Version 4	-
/15/	Demonstration of additionality of microscale project activities, Version 09.0	-
/16/	Declaration for double counting, dated 01/03/2021	-

/17/	Summary description and production process for project cookstoves	-
/18/	By decision of its general assembly, BQS transferred the project to OBEN dated 25/06/2021	-
/19/	End user agreement (warranty card and Carbon rights transfer) and sales invoice	-
/20/	Baseline Survey scan records and excel sheet of the survey	Baseline surveys 2008 and 2020
/21/	Training of staff	-
/22/	Organization structure for the project activity	-
/23/	Company registration certificate, dated 03/12/2020	-
/24/	Photographs of project stove and baseline practice	-
/25/	Monitoring survey conducted in 2020	-
/26/	Evidence documents related to local stakeholder meeting	-
/27/	Physio chemical characterization of briquettes	-
/28/	Supportive for Experiments to estimate the approximate renewable briquettes consumption per cookstove have been conducted and recorded by project proponent over the same model of cookstoves expected to be used by restaurants in two schools and police camp, evidencing savings up to 90%, thus a conversion factor of 0.5 is a conservative assumption.	-
/29/	Technical details of briquette manufacturing machine including 1. Manual instructions for briquette manufacturing 2. Supplied Electrical Motor (HP) 3. Power consumption	-
/30/	ERPA signed between Aera group and PP dated 07/12/2020	-
/31/	Elaboration of the Sector Strategy for the Energy Sector in Burundi – Interim Report. Jan 2011	-
/32/	2540, Exemption Letter, dated 14 December 2021	-
/33/	WBT conducted for project ICS MATAWI by Centre for research in energy and energy conservation, July 2019	-
/34/	WBT conducted for Turkish ICS	-

/35/	Nationally accredited laboratory “University Research Centre on Alternative Energies” (CRUEA) report: “SURVEY ON THE ENERGY CONSUMED BY POPULAR RESTAURANTS IN BUJUMBURA (BURUNDI)”	26/03/2019
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APPENDIX 2: CLARIFICATION REQUESTS, CORRECTIVE ACTION REQUESTS, FORWARD ACTION REQUESTS (CAR/CL/FAR)

Table 1. CLs from this validation

CL ID	01	Section no.	3.1	Date: 08/01/2022
Description of CL				
As per the submitted sales agreements, Burundi Quality Stoves S.A. is mentioned as a company distributing the ICS however OBEN EAC (S.A.) is mentioned as project proponent under section 1.5 of the VCS PD.				
Project participant response				Date: 24/01/2022
The cookstove distribution started with BQS as the project proponent. However, as explained in the exemption letter transmitted to VCS, the cookstoves distribution activity have been transferred by BQS, the former proponent to OBEN who is the owner of the emissions reduction generated by the project. As the cookstoves installation as well as the briquettes distribution were handled by BQS, their name is still present in the sales agreement.				
Documentation provided by project participant				
VCS listing letter				
DOE assessment				Date: 31/01/2022
Response has been provided by the PP and found OK. Validation team has checked the Exemption Letter /32/ and the decision for transferring the project from BQS to OBEN /18/. Hence this CL is closed.				

CL ID	02	Section no.	3.1	Date: 08/01/2022
Description of CL				
PP need to demonstrate the eligibility of the biomass briquette as renewable biomass as per the definition of CDM-EB 23, Annex 18.				

Project participant response	Date: 24/01/2022
1. As per CDM-EB 23, Annex 18: Biomass is “renewable” if one of the following five conditions applies: 4. The biomass is a biomass residue and the use of that biomass residue in the project activity does not involve a decrease of carbon pools, in particular dead wood, litter or soil or-ganic carbon, on the land areas where the biomass residues are originating from. Briquettes are produced using biomass residues from agro-industrial waste and does not involve a decrease of carbon pool. The biomass residues collected would have been burnt without energy recovery without the project. The biomass residue is therefore considered as a renewable source.	
Documentation provided by project participant	
N/A	
DOE assessment	Date: 31/01/2022
Clarification has been provided by the PP and found OK. The same is also confirmed from the interviews and characterization of briquettes /27/. Hence this CL is closed.	

CL ID	03	Section no.	3.3.5	Date: 08/01/2022
Description of CL				
Under section 3.5 of the VCS PD, the additionality is demonstrated as per microscale tool 19 “Demonstration of additionality of microscale project activities” Version 09. Since the project is small scale project activity, PP need to clarify how the micro scale tool is applicable.				
Project participant response				Date: 24/01/2022
The demonstration of additionality has been revised to use tool 21 and option 1 of the methodology				
Documentation provided by project participant				
Revised VCS-PD				
DOE assessment				Date: 31/01/2022
Corrections have been done in the revised VCS-PD /02/ and found OK. Hence this CL is closed.				

Table 2. CARs from this validation

CAR ID	01	Section no.	-	Date: 08/01/2022
Description of CAR				

1. Under section 1.2 of the VCS PD, PP need to clearly mention whether the project is a grouped project (as per template requirements).
2. Under section 1.3 of the VCS PD, PP need to describe and justify how the project is eligible under the scope of the VCS Program (as per template requirements).
3. Under section 1.7 of the VCS PD, PP need to provide evidence of project ownership, in accordance with the VCS Program specifications on project ownership.
4. Under section 1.9 of the VCS PD, PP need to indicate the project crediting period, specifying the day, month and year for the start and end dates and the total number of years (as per template requirements).
5. Under section 1.10 of the VCS PD, the end date of the crediting period (i.e. 31/01/2027) is not correct with respect to start date of the crediting period (i.e. 03/02/2020) and the duration of the crediting period i.e. 7 years.
6. Under section 1.11 of the VCS PD, PP need to describe the project activity or activities (including the technologies or measures employed) and how it/they will achieve net GHG emission reductions or removals (as per template requirements).
7. Under section 2.2 of the VCS PD, PP need to describe the mechanism for on-going communication with local stakeholders (as per template requirements).
8. Under section 2.4 of the VCS PD, PP need to “Demonstrate how due account of all and any comments received during the public comment period has been taken. Include details on any updates to the project design or demonstrate the insignificance or irrelevance of comments” (as per template requirements).
9. Under section 3.1 of the VCS PD, PP need to mention all the referred tools (as per template requirements).
10. Under section 3.2 of the VCS PD, PP need to demonstrate and justify how the project activity(s) meets each of the applicability conditions of the methodology(s), and tools (where applicable) applied by the project. Address each applicability condition separately.

Project participant response

Date: 24/01/2022

1. The project is not a grouped project. This has been mentioned in the VCS-PD
2. The demonstration of eligibility has been included in the VCS-PD
3. The evidence of project ownership has been included in section 1.7 of the VCS-PD
4. The project crediting period has been specified in section 1.9
5. The correct end date for the first monitoring period has been revised
6. The technologies or measures employed as well as how they will achieve net GHG emissions reduction is explained in section 1.1. This have also been included in section 1.11
7. The mechanism for ongoing communication has been included in the VCS-PD
8. No comment has been received during the public comment period; therefore, no deviation or change has been applied to the project.
9. All the tools used have been referred in the VCS-PD
10. The applicability condition of the project has been revised according to the methodology.

Documentation provided by project participant

Revised VCS-PD

DOE assessment

Date: 31/01/2022

1. Correction has been done in the revised VCS-PD /02/ and found OK. Hence this part of CAR is closed.
2. Corrections have been done in the revised VCS-PD /02/ and found OK. Hence this part of CAR is closed.
3. Correction has been done in the revised VCS-PD /02/ and found OK. Hence this part of CAR is closed.
4. Corrections have been done in the revised VCS-PD /02 and found OK. Hence this part of CAR is closed.
5. Correction has been done in the revised VCS-PD /02/ and found OK. Hence this part of CAR is closed.
6. Correction has been done in the revised VCS-PD /02/ and found OK. Hence this part of CAR is closed.
7. Correction has been done in the revised VCS-PD /02/ and found OK. Hence this part of CAR is closed.
8. Correction has been done in the revised VCS-PD /02/ and found OK. Hence this part of CAR is closed.
9. Correction has been done in the revised VCS-PD /02/ and found OK. Hence this part of CAR is closed.
10. Correction has been done in the revised VCS-PD /02/ and found OK. Hence this part of CAR is closed.

CAR ID	02	Section no.	3.3.6	Date: 08/01/2022
Description of CAR				

Under section 4.1 of the VCS PD:

1. PP need to demonstrate applicability of para 32-34 of the applied methodology.
2. PP need to clarify how the ex-ante emission reduction calculation is in compliance with para 29 (c) of the applied methodology which is based on “Average annual consumption of woody biomass per person before the start of the project activity” and “Average annual consumption of woody biomass per person in the pre project devices during the project activity (tonnes/person/year)”.
3. PP has referred the baseline survey which was conducted in 2012. PP need to clarify how the baseline survey conducted in 2012 is suitable for the project activity.

Project participant response

Date: 24/01/2022

1. Para 32-34 of the methodology refers to mechanisms allowed for replacing/retrofitting cookstoves distributed. As per sales agreements, restaurants stoves broken during the crediting period will be replaced. At the end of the life span stoves that are not replaced will be withdrawn from the project database and no emissions reductions will be claimed for them. In case cookstoves are repaired or retrofitted before or at the end of the crediting period all the details of the retrofits/repairs will be documented as per para 34, and extended lifetime will be demonstrated through a warranty from the original manufacturer OBEN, or a guarantee from a company with demonstrated experience in cookstove repair that assures the performance of the stove in its entirety comparable to the original device including with regard to efficiency, safety and indoor emissions.
2. As per methodology par 29 (c), By is calculated as the product of the number of persons served per institution multiplied by the number of institutions (here restaurants) and the estimate of average annual consumption of woody biomass per person that is displaced by the project activity. It is assumed, that one meal is served by person and that therefore the number of meals served by restaurants represent the number of persons served by the institution. The average number of meals cooked have been deducted both from baseline surveys from baseline survey conducted in 2020 on 15 restaurants equipped with ICS and briquettes. The second parameter “Average annual consumption of woody biomass per person in the pre project devices during the project activity (tonnes/person/year)” is also accounted for by the monitored parameter $BC_{PJ,PP}$, which is subtracted in the quantity of biomass that is substituted. Therefore, the calculation is in line with the para 29 (c) of the methodology.
3. The survey made in 2012, has been used to estimate the parameter $BC_{BL,PP}$. This parameter refers to the quantity of biomass used to prepare one meal and have been calculated from survey conducted in 2012. The baseline surveys conducted in 2012 have been completed in 2020 to assess ex-ante the average number of meals cooked per restaurants.

The baseline surveys made in 2012, was used to determine the quantity of non-renewable biomass used to prepare a meal. The results from this study are found to be the most reliable as no other data regarding restaurants in Burundi is available. To assess the quantity of meals prepared by a restaurant, under the project, a baseline survey has been done in 2020 on 15 restaurants to assess the average quantity of meals cooked by year by the restaurant. So, the completion refers to the assessment of the number of meals cooked by restaurants by year.

Documentation provided by project participant

Revised VCS-PD

DOE assessment	Date: 31/01/2022
1. Corrections have been done in the revised VCS-PD /02/ and found OK. Hence this part of CAR is closed. 2. Clarification has been provided by the PP and found OK. Methodology deviation is applied and filled under section 3.6 of the VCS-PD /02/. Hence this part of CAR is closed. 3. Clarification has been provided by the PP and found convincing. Hence this part of CAR is closed.	

Table 3. FARs from this validation

No FAR raised during this validation.

FAR ID	**	Section no.		Date: DD/MM/YYYY
Description of FAR				
Project participant response				Date: DD/MM/YYYY
Documentation provided by project participant				
DOE assessment				Date: DD/MM/YYYY

APPENDIX 3: COMPETENCE OF TEAM MEMBERS

<i>Certificate of Competence</i>						
Name	☒ Mr. ☐ Ms.	Chetan Swaroop Sharma				
Qualification Procedure	Fulfils the requirement as per the appointment of personnel procedure of 4KES for Validation and Verification of CDM/VCS/GS/GHG Projects.					
Appointed to work as:						
	CDM Validator/Verifier	Team Leader	Team Member	Technical Expert	Technical Reviewer	Financial Expert

Appointed	Yes	Yes	Yes	Yes	Yes	No
Appointed Date	27-04-2021					
Authorized to work as Technical Expert for:						
Authorized Technical Area	Sectoral Scope	TA Code	Technical Area within the scope			
	Energy industries (renewable - / non-renewable sources)	1.1	Thermal energy generation			
	Energy industries (renewable - / non-renewable sources)	1.2	Renewables			
	Energy distribution	2.1	Energy distribution			
	Energy demand	3.1	Energy demand			
	Waste handling and disposal	13.1	Solid waste and wastewater			
	Waste handling and disposal	13.2	Manure			
Authorized to work as Local Expert for:						
Country/Countries	India					
Compliance check by: Anand S. R.						

<u>Certificate of Competence</u>						
Name	☒ Mr. ☐ Ms.	Ma Paa Puratchikkanal				
Qualification Procedure	Fulfils the requirement as per the appointment of personnel procedure of 4KES for Validation and Verification of CDM/VCS/GS/GHG Projects.					
Appointed to work as:						
	CDM Validator/Verifier	Team Leader	Team Member	Technical Expert	Technical Reviewer	Financial Expert
Appointed	Yes	Yes	Yes	Yes	Yes	No

Appointed Date	27-04-2021		
Authorized to work as Technical Expert for:			
Authorized Technical Area	Sectoral Scope	TA Code	Technical Area within the scope
	Energy industries (renewable - / non-renewable sources)	1.1	Thermal energy generation
	Energy industries (renewable - / non-renewable sources)	1.2	Renewables
	Energy demand	3.1	Energy demand
	Construction	6.1	Construction
	Waste handling and disposal	13.1	Solid waste and wastewater
	Waste handling and disposal	13.2	Manure
	Agriculture	15.1	Agriculture
Authorized to work as Local Expert for:			
Country/Countries	India and Sri Lanka		
Compliance check by: Anand S. R.			

APPENDIX 4: ABBREVIATIONS

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CL	Clarification Request
EB	Executive Board
ER	Emission Reductions
FAR	Forward Action Request
GHG	Greenhouse Gases

IPCC	Intergovernmental Panel for Climate Change
ISO	International Organization for Standardization
MP	Monitoring Period
MR	Monitoring Report
MW	Mega Watt
MWh	MegaWatt hour
PD	Project Description
PP	Project proponent
QA/QC	Quality Assurance/Quality Control
tCO ₂	Tonnes of Carbon Dioxide
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standard
VCSA	Verified Carbon Standard Association
VCU	Verified Carbon Unit